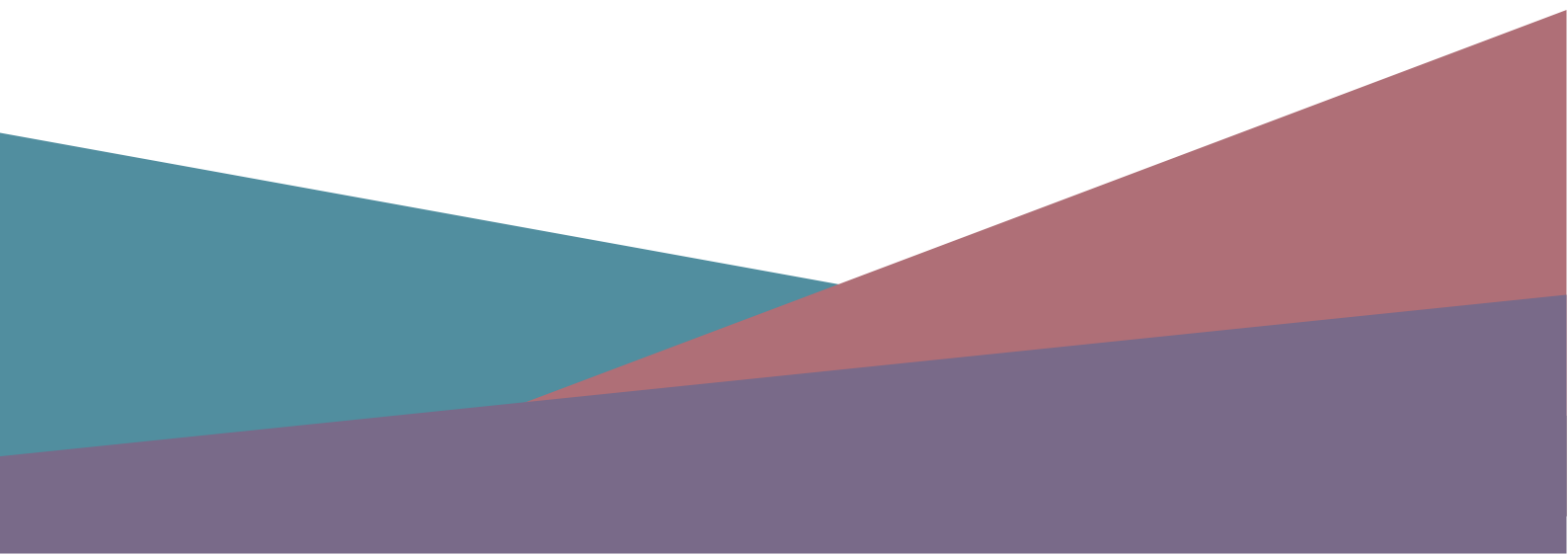




STRATEGIC PLAN 2025–2028

of the ETH Board
for the ETH Domain



Foreword by the President of the ETH Board

Dear Reader

The ETH Domain strives to best serve the Swiss society and economy. Through excellence in teaching, in research and in knowledge and technology transfer, the ETH Domain enhances the prosperity and competitiveness of our country and contributes to its sustainable development.



The ETH Domain's success rests on four unique strengths: its wide range of specialisations in STEM subjects, the synergistic and complementary character of its institutions, its internationally renowned large-scale research infrastructures, and an education of top-quality largely based on fundamental research. Thanks to these strengths, it contributes to the development of solutions to the complex social, environmental and economic challenges of our time.

For the period 2025–2028 the ETH Board has decided to focus on five Strategic Areas where the ETH Domain is well positioned to have a strong impact: “Human Health”, “Energy, Climate and Environmental Sustainability”, “Responsible Digital Transformation”, “Advanced Materials and Key Technologies” and “Engagement and Dialogue with Society”. Collaboration within the ETH Domain as well as with other ERI stakeholders, with public and private organisations (such as hospitals), and with industry and society is crucial in these areas.

In order to fully implement its strategy for 2025–2028, the ETH Board requests the Federal Council and Parliament to approve an expenditure ceiling of CHF 12,222 million for the period 2025–2028. Only with this level of funding will the ETH Domain be able to fully support Switzerland in facing the challenges ahead of us, and to remain internationally competitive at the highest level.

However, stable and reliable funding is only one of the three pillars on which the ETH Domain's excellent international standing and its ability to contribute to the prosperity of Switzerland rest. Equally important are the internationality and openness of Switzerland, as well as good governance and the strong autonomy of the ETH Domain. Several of these enabling factors are currently threatened. For example, as of this writing, Switzerland is still not associated to the EU's Horizon Europe Framework Programme for Research and Innovation. The longer this situation lasts, the greater the damage to our country's competitiveness in research and innovation - the first negative effects are unfortunately already becoming apparent.

In addition, the overall financial situation has become very challenging. The coronavirus pandemic and the war in Ukraine will generate significant financial pressures on the federal budget. It is vital that education, research and innovation – all key factors for the long-term prosperity of Switzerland – do not suffer from this. In this spirit, let me leave you with a quote from Benjamin Franklin, inventor and founding father of the USA: “An investment in knowledge always pays the highest returns.”

Thank you very much for your interest and your support.

A handwritten signature in black ink that reads "Michael O. Hengartner". The signature is written in a cursive, slightly stylized font.

Prof. Michael O. Hengartner, President of the ETH Board

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I. Executive Summary

For the period 2025–2028, the ETH Domain aims to be internationally competitive and to serve Switzerland by addressing important challenges in the context of education, research and innovation. The ETH Board prioritises five Strategic Areas to respond to most pressing global challenges, and in which the ETH Domain is well positioned to have a strong impact. A set of measures are also identified in the context of the core and key transversal tasks of the Domain, in order to continue achieving excellence in education, research and knowledge and technology transfer. Moreover, the present Strategy addresses the long-term organisational development of the ETH Domain as a whole, aiming at remaining as agile as possible, as well as at strengthening collaboration and exploiting synergies among the institutions of the ETH Domain.

Challenges and Opportunities

The ETH Domain identifies six global challenges that are of particular importance for society in the context of education, research and innovation between now and 2028:

- Encouraging and ensuring scientific excellence in an increasingly complex world
- Strengthening the dialogue between science and society for more inclusive and ethical decision-making
- Generating comprehensive environmental and societal knowledge and working towards a positive environmental impact
- Enabling access to a global and inclusive education
- Accelerating technology for the benefit of people and the planet
- Promoting, enabling and practising new forms of employment

As a key actor in education, research and innovation in Switzerland, the ETH Domain is well positioned to contribute to solving these pressing global challenges.

Challenges that are specific to the ETH Domain and the ERI (education, research and innovation) sector are also identified and addressed transversally within the Strategic Plan 2025–2028:

- Ensuring sustainable institutional development
- Maintaining a favourable international context

Strategy 2025–2028

The strategic approach for 2025–2028 is based on the following pillars: the specific Strategic Areas identified by the ETH Board for the period 2025–2028, the tasks for which the institutions are responsible according to their mandate, and the long-term organisational development of the ETH Domain.

Strategic Areas and Joint Initiatives of the ETH Domain

The ETH Board identifies five Strategic Areas that aim to respond to the global challenges identified for the period up to 2028:

- Human Health
- Energy, Climate and Environmental Sustainability
- Responsible Digital Transformation
- Advanced Materials and Key Technologies
- Engagement and Dialogue with Society

In all five Strategic Areas, the institutions of the ETH Domain are well positioned to have a particularly strong impact – on their own as well as through cooperation within the Domain and beyond. Beside these defined Strategic Areas, the ETH Board and the ETH Domain

institutions emphasise the general importance of fundamental discovery science as the cornerstone of all the ETH Domain institutions' activities.

The ETH Domain implements the five Strategic Areas for 2025–2028 through existing or new activities at the level of the individual institutions, and with Joint Initiatives at the level of the ETH Domain. Joint Initiatives are proposed bottom-up on a competitive basis and may be co-funded by the ETH Board.

Core Tasks and Key Transversal Tasks

The ETH Domain institutions perform their manifold tasks according to the mandate conferred on them by the ETH Act and the strategic objectives of the Federal Council. For the period 2025–2028, the ETH Board sets the following objectives for each of these tasks:

Top-Quality Research-Based Education. The ETH Domain institutions play a leading role in Switzerland's educational system by providing research-based education and continuing education of a very high quality. Students and doctoral students are enabled to succeed in their studies and are well-equipped to help actively shape the future of Switzerland and society in general. Institutions continue to ensure top-quality education even in the context of a growing student population – a consequence of the attractiveness of the ETH Domain and the high demand for engineering and information and communications technology professionals in Switzerland.

World-Class Research. The ETH Domain continues to perform research at the highest, internationally competitive level. It contributes to anticipating and resolving the most pressing local, national and global challenges and to strengthening Switzerland's innovative potential and international reputation. Fundamental discovery science remains a core element of all the ETH Domain's activities and is supported by adequate funding. In addition, the ETH Domain institutions promote Open Science, ensure research integrity, and nurture national and international collaboration and cooperation.

State-of-the-Art Large-Scale Research Infrastructures and Platforms. The ETH Domain conceptualises, develops and operates a portfolio of large-scale research infrastructures and platforms that offer unique resources and services for research communities within the higher education sector in Switzerland and abroad, and for industry users. The ETH Domain's large-scale research infrastructures play a major role in the country's international reputation. The ETH Domain contributes to the coordination of large-scale research infrastructures at the national level by participating to the Swiss Roadmap 2023 process.

Knowledge and Technology Transfer (KTT). The ETH Domain institutions actively contribute to Switzerland's innovative capacity by accelerating the uptake of research results into technologies, practice and policy-making, and collaborate with industry and public authorities to that end. They foster entrepreneurship among their members, and provide graduates with the skills required to become the main actors of knowledge and know-how transfer between academia and society. Engagement and dialogue with society is emphasised as a central KTT activity.

Attractive Careers and Positive Work Culture. The ETH Domain institutions foster an inspiring, inclusive and respectful environment for all their employees and students. They develop and exploit new forms of work. Diversity is recognised as key to excellence and creativity, whether in research, in education or in all other activities. The ETH Domain institutions are stepping up their efforts to increase the proportion of women among their members, especially in professorial and management positions.

Sustainable Real Estate Management. The ETH Domain maintains and develops its real estate portfolio in order to offer the best conditions for education, research and KTT. The institutions' efforts focus on functionality (incl. accessibility), cost-effectiveness and sustainability of existing and new buildings, and maintaining their value and function. The ETH Domain aims to act as a role model in terms of sustainability.

Strategic and Proactive Financial Management. The institutions have a sound financial base and pursue sustainable, accountable financial management and planning to ensure long-term financial stability. As part of this corporate responsibility, they actively manage financial reserves and, together with the ETH Board, aim to make further use of them strategically in the period from 2025 to 2028. When allocating the federal funds, the ETH Board takes account of the institutions' tasks, strategic requirements and performance.

Organisational Development of the ETH Domain

The ETH Domain is committed to serving Switzerland with an organisation that is highly agile and responsive, and is able to adapt quickly to dynamically changing environments, new challenges and opportunities as well as ever-increasing complexities. The ETH Domain continues to make organisational adjustments as necessary, in order to facilitate and further improve its ability to deliver on its stated mission and in order to align with the defined Strategic Areas.

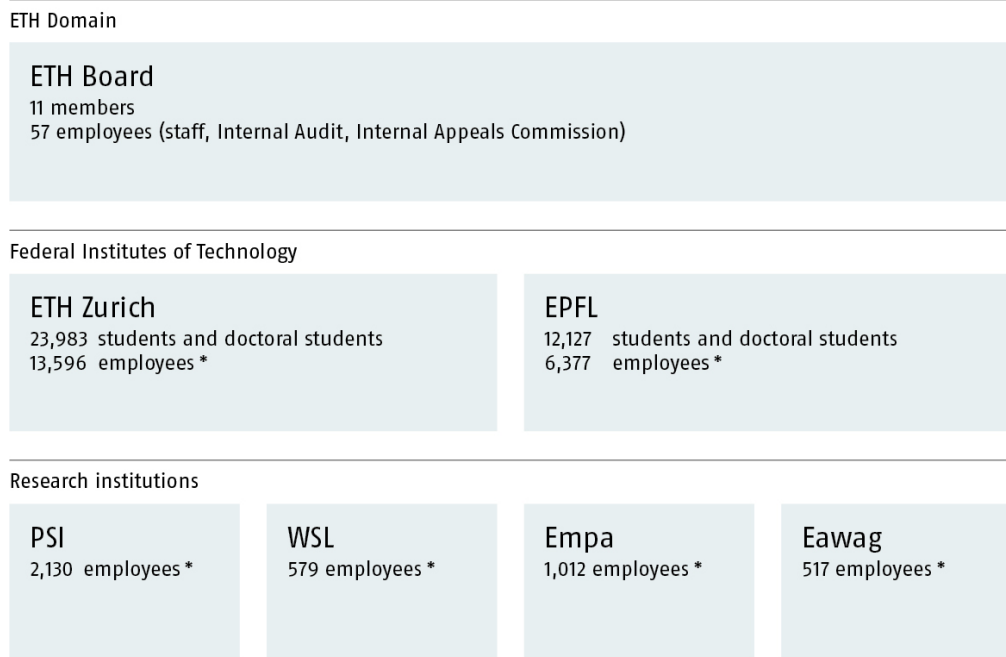
Financial Requirements

In order to be able to implement its strategy with appropriate measures and to enable the ETH Domain to fulfil its mission, the ETH Board is asking the Federal Council and Parliament to approve an expenditure ceiling of CHF 12,222 million for the ETH Domain for the period 2025–2028. Based on the financial plan for 2024, this amount would represent a compound annual growth rate (CAGR) of 2.5% in real terms. The ETH Board is earmarking 3-5% of the Swiss Confederation's financial contribution for the years 2025–2028 to co-finance Joint Initiatives in the Strategic Areas of the ETH Domain, and for large-scale research infrastructures (substantial upgrades and new projects) prioritised by the ETH Board. The lion's share (approximately 95%) of the annual federal funding is allocated to the six institutions as a base budget to enable them to fulfil their mission.

II. The ETH Domain in Brief

The ETH Domain comprises the two Federal Institutes of Technology, ETH Zurich and EPFL, and the four research institutes PSI, WSL, Empa and Eawag. The ETH Board is the strategic governing and supervisory body of the ETH Domain (see Fig. 1). The ETH Domain is firmly anchored in all regions of Switzerland (see Fig. 2), and its institutions are internationally renowned. The ETH Domain fulfils the mandate conferred on it by the ETH Act, based on its vision, mission and guiding principles, and through continuous investments into its unique strengths (see also p. 11-13).

Figure 1: The ETH Domain in numbers



* Employment contracts including doctoral students, as of 31 December 2021

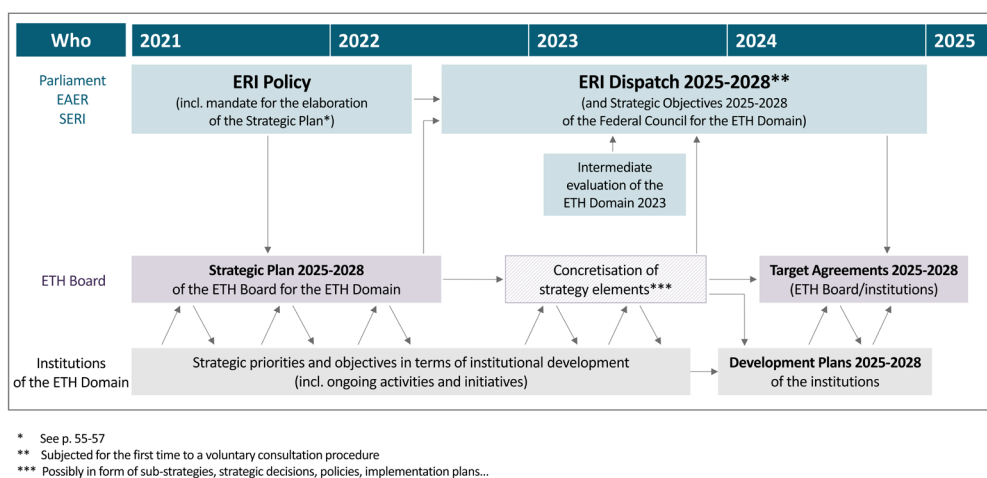
Figure 2: The ETH Domain's locations in Switzerland



The Strategic Plan is a central tool for defining key aspects and objectives for the further strategic and organisational development of the whole ETH Domain. The document also provides information on the ETH Domain's resource planning and financial requirements, and is used by the ETH Domain institutions as a framework for their activities, own institutional strategies and development plans.

The State Secretariat for Education, Research and Innovation (SERI) orients itself, among other sources, on the Strategic Plan of the ETH Board for the ETH Domain to elaborate the dispatch for the promotion of Education, Research and Innovation (ERI Dispatch) for the years 2025–2028 and to inform the strategic objectives of the Federal Council for the ETH Domain for the same period. The ETH Board has been mandated by the SERI in this context to take into account selected themes and financial scenarios for elaborating its Strategic Plan 2025–2028 (see details on p. 55-57).

Figure 3: The Strategic Plan of the ETH Domain in the context of federal and institutional planning



Due to framework constraints, the Strategic Plan 2025–2028 of the ETH Board for the ETH Domain is already being published in 2022, so it is not possible to detail all the future actions and measures planned for the period 2025–2028. Elements that are not described in detail here will be concretised in dedicated subsequent processes, such as sub-strategies, strategic decisions, policies, implementation plans (or similar), etc., as well as in the development plans of the institutions (see Fig. 3 above).

The Federal Act on the Federal Institutes of Technology (ETH Act)

The ETH Act of 4 October 1991 defines the status, structure and mission of the ETH Domain. The ETH Act regulates the division of competencies between Parliament, the Federal Council, the ETH Board and the six institutions. According to the legislative provisions, the ETH Domain is autonomous and is affiliated to the Federal Department of Economic Affairs, Education and Research (EAER). The ETH Act also defines the autonomy of the ETH Domain institutions.

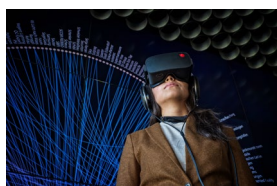
The Higher Education Act (HEdA)

The HEdA establishes the basic principles for coordinating, maintaining the quality of and ensuring the competitiveness of the entire higher education sector in Switzerland. The HEdA applies to all recognised higher education institutions in Switzerland, including ETH Zurich and EPFL. It ensures the coordination of the entire Swiss higher education sector and it obliges the higher education institutions to periodically review their instruments and processes to ensure the quality of teaching, research and services.

III. Challenges and Opportunities

A. Global Challenges and Opportunities in the context of Education, Research and Innovation

The ETH Domain identifies several global challenges that are of particular importance in the context of education, research and innovation in the period leading up to 2028. With its unique strengths (see p. 11/12), the ETH Domain is well positioned to contribute to Switzerland's solutions aimed at addressing these most pressing global challenges.



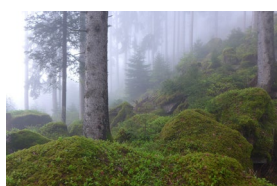
Encouraging and ensuring scientific excellence in an increasingly complex world – The interplay of globalisation, demographics, geopolitical influence, climate change, digitalisation of society and technical change is creating highly dynamic environments. The ETH Domain is well prepared to respond to these increasing complexities. It understands and

anticipates major developments related to education, research and innovation as well as to political priorities. In this context, safeguarding excellence requires agility and openness to the creation and adoption of new forms and sources of knowledge. It also calls for the strengthening of collaborations and for committing to international openness.



Strengthening the dialogue between science and society for more inclusive and ethical decision-making – In order to provide solutions to the most pressing challenges, the scientific community must continue to earn the trust of civil society by making science more accessible and participative. It must also reinforce its engagement to better support the government in

making inclusive, evidence-informed and ethical decisions. As a key actor in education, research and innovation in Switzerland, the ETH Domain can play an important role in fostering a proactive, open-minded and transparent dialogue with all members of society.



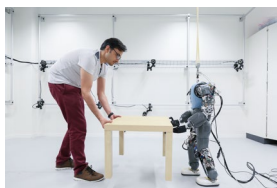
Generating comprehensive environmental and societal knowledge and working towards a positive environmental impact – Our planet is facing unprecedented ecological crises, in particular climate change and biodiversity loss. Generating comprehensive environmental and societal knowledge is key to addressing this challenge. To do so, collective efforts in

education, research and innovation as well as global-scale communication and collaboration are necessary. The ETH Domain has the potential to contribute to this effort and to positively impact the environment.



Enabling access to a global and inclusive education – Providing broad access to top-quality education is key to inclusive and stable societies. It positively contributes to countries' innovative and creative capabilities and generally results in superior economic outcomes. The ETH Domain is well positioned to advocate broad and equitable access to top-quality education

and to promote life-long learning. This includes establishing infrastructures and programmes that facilitate access to education for all, including unrepresented and historically excluded groups in Switzerland and around the world.



Accelerating technology for the benefit of people and the planet – Accelerating the pace of technological innovation and democratising its use provide solutions to global and local challenges. However, technologies must be developed with due consideration to their potential impact on people and the environment, and, if necessary, regulated to only serve a greater good. The ETH Domain can lead by example by promoting an integrated understanding and use of technology for human and ecological advancement.



Promoting, enabling and practising new forms of employment – With rapidly advancing digitalisation and automation, working environments are changing and becoming highly complex. The workforce must be able to adapt to new work conditions and gain a wider range of skills. In this context, the ETH Domain must ensure that its graduates remain in high demand in the workforce, and that academic careers continue to be attractive. As an employer, it must also ensure that all employees have access to development opportunities. By supporting new forms of employment and ensuring meaningful work for all its employees, the ETH Domain may become a role model in terms of employment practices and personnel development.

B. Specific Challenges Faced by the ETH Domain and the Swiss ERI Sector

Some challenges are specific to the Swiss ERI sector and the ETH Domain. The ETH Board strives to address them transversally within the Strategic Plan 2025–2028 across all its activities. Complementary to the challenges identified by the SERI for the ERI Dispatch 2025–2028 (see p. 56-57), the ETH Board identifies the following current challenges that are specific to the ETH Domain and the ERI sector.

Ensuring sustainable institutional development – The ETH Domain will continue to support Switzerland in its efforts to combat the shortage of experts by training more students in the coming years. In addition, it will develop the research competencies and infrastructures that are necessary to meet the challenges likely to be faced by Switzerland and the world at large. This will require, among other things, more employees and the expansion and reorganisation of research, education and working spaces. To be successful, this overall growth has to be financially, socially and ecologically sustainable. As long as the framework conditions allow it, the ETH Domain has the opportunity to set an example with regard to the sustainability of its development, while continuing to train part of Switzerland's workforce, to participate actively in the country's innovative capacity and to remain an attractive employer.

Maintaining a favourable international context – To be successful and competitive, the institutions of the ETH Domain need to be part of international networks and collaborations, attract talented international students and researchers, and have access to competitive funding and research infrastructures worldwide. Thus, the unfavourable developments in Switzerland's relationship with neighbouring Europe, which led to its exclusion from the European Framework Programme for Research and Innovation, directly affect the ETH Domain and the ERI sector as a whole. The current geopolitical tensions add to the uncertainty of future international cooperation. Although the ETH Domain has only limited influence on these framework conditions, it can promote science diplomacy for the benefit of Switzerland's relations with other countries.

IV. Long-term Positioning of the ETH Domain

A. Vision

The ETH Domain strengthens Switzerland's prosperity and competitiveness and contributes to the sustainable development of society through excellence in research and education as well as in scientific knowledge and technology transfer.

B. Mission

The ETH Domain serves society through the pursuit and dissemination of knowledge and the beneficial application of science. The ETH Domain institutions share responsibility for education and research, and for knowledge and technology transfer. They anticipate and contribute to solving the most pressing national and global challenges through pioneering fundamental and applied research and by maintaining a continuous dialogue with society. Their research activities are supported by a portfolio of large-scale research infrastructures and platforms that offer unique resources for research communities in Switzerland and abroad. They also provide science-based services for the benefit of Swiss society. As degree-granting universities of science and technology, ETH Zurich and EPFL play a leading role with a distinctive profile in Switzerland's educational system. In line with their thematic mandates, the research institutes PSI, WSL, Empa and Eawag provide specialised world-class research and education as well as continuity of expertise for the benefit of Switzerland in particular. Together with ETH Zurich and EPFL, they promote and curate the implementation of their insights and discoveries by the public and private sectors.

C. Unique Strengths

The ETH Domain accomplishes its mission based on a combination of unique strengths. This allows for an excellent positioning of the ETH Domain as a whole, and of the individual institutions with their distinct profiles.

The combination of exact, natural and engineering sciences as well as their links to social sciences, health sciences and humanities

The ETH Domain is the main actor in Switzerland that offers a broad range of specialisations in exact, natural and engineering sciences, both with respect to research and to education. This specificity also allows the ETH Domain to deliver science-based services in the context of tasks assigned to it by the Swiss Confederation. An interdisciplinary network of competencies is key for the ETH Domain's capacity to provide solutions to the complex societal, political and economic challenges of our time. The ETH Domain institutions continue to meet their responsibility for research performed with integrity that pushes the frontier of human understanding. They engage and retain the best-qualified scientists they can attract, and offer them and their students adequate resources.

The synergies among ETH Zurich, EPFL and the four research institutes

The complementary character of the ETH Domain institutions, combined with their academic, industrial and governmental partners, generates powerful synergies. This opens the door for comprehensive and interdisciplinary approaches in research and education. ETH Zurich and EPFL are engaged in world-class and mostly fundamental research and research-based education, as well as in knowledge and technology transfer activities. The four research institutes – PSI, WSL, Empa and Eawag – focus on top-level thematic research

and technology development. The six institutions cover the entire spectrum of activities from fundamental research and education to the application of new knowledge and technologies to meet societal and economic needs.

The internationally renowned large-scale research infrastructures and platforms

The portfolio of major research facilities conceptualised, developed and operated by the ETH Domain is of crucial importance to the advancement of cutting-edge and innovative research. These state-of-the-art large-scale research infrastructures and platforms are of national interest and are mainly operated as user labs, allowing researchers from academia and industry to benefit from them.

The unique education provided by the ETH Domain

ETH Zurich and EPFL, with targeted contributions by the four research institutes, provide an education based largely on fundamental research. Teaching at ETH Zurich and EPFL is informed by the latest breakthroughs in science and technology. The ETH Domain institutions offer students a high standard of education and continuing education, and empower them to become independent, critical thinkers who are well-equipped to shape the future as responsible members of society. The ETH Domain's unique contributions to the Swiss higher education sector lie in STEM fields (Science, Technology, Engineering and Mathematics), incl. computer and communication sciences. At the university level in Switzerland, some STEM fields of high relevance for Swiss industries are covered exclusively or predominantly by ETH Zurich and EPFL. Moreover, the ETH Domain offers a unique international academic environment that is essential for excellence and for effectively preparing students for a global labour market.

D. Guiding Principles

The ETH Domain accomplishes its mission and develops its strategy sustainably and based on common values and a respectful institutional culture while recognising its responsibility towards society. These are the three main guiding principles on which the ETH Domain institutions seek to base all their activities and attain excellence.

Common values and respectful culture

The ETH Domain institutions develop and share common values and maintain a dialogue on best practices, specifically in terms of working conditions and research integrity. The ETH Domain fosters an inspiring, creative and safe work environment in which all members can contribute and in which respect, equity, diversity, dialogue and trust are supported and put into practice. The ETH Domain recognises that research integrity is essential to progress in science and thus offers an environment designed to promote and ensure research integrity.

Sustainability

The ETH Domain is committed to environmental, social and economic sustainable development in and through all its activities, from education to research, knowledge and technology transfer and in the construction and maintenance of its real estate portfolio and large-scale research infrastructures. With their endeavours, the ETH Domain institutions actively support the achievement of the United Nations' sustainable development goals (SDG; Agenda 2030). In particular, the ETH Domain institutions seek to achieve a leading global position with regard to environmental sustainability by developing, providing and applying innovative solutions. They intensify their activities in that area through a dedicated Strategic Area, "Energy, Climate and Environmental Sustainability" (see p. 19-21). The ETH Domain institutions provide services in an environmentally responsible and resource-saving manner, and they act as role models with regard to the construction and operation of their facilities.

Responsibility towards society

The ETH Domain recognises its obligation to work for the benefit and well-being of all members of society and to serve the public good. It acknowledges the freedom given to science and research and advocates a responsible and meaningful use of public resources. As part of its knowledge and technology transfer activities, the ETH Domain fosters the uptake of research results into technologies, practice and policy-making, provides services to the community and educates students, with the ultimate aim of providing the best possible support for Switzerland. The ETH Domain strives to make science more understandable, accessible and participatory, and dedicates the Strategic Area “Engagement and Dialogue with Society” to this purpose (p. 24-25).

E. Enabling Factors

The ETH Domain relies on a set of key factors which are considered to be prerequisites for success and which enable its institutions to remain highly competitive internationally and to contribute to the prosperity of Switzerland.

Internationality and openness

Switzerland’s internationality and openness are vital to the ETH Domain’s ability to create benefit for the country’s society and economy. In return, through its international standing the ETH Domain contributes to the recognition of Switzerland as a centre of excellence in research and innovation. Excellence is only possible if student and researcher recruitment is based on merit and performance, regardless of the candidate’s country of origin. Thus, the ETH Domain must be able to recruit talent worldwide. International graduates and scientists bring knowledge and skills to Swiss society, and help combat the shortage of skilled employees. Those who leave Switzerland after graduation act as ambassadors abroad. Swiss students at the ETH Domain institutions benefit from an international environment which prepares them for a competitive and global labour market. International openness gives Swiss scientists access to global networking opportunities and collaborations, as well as to international large-scale infrastructures and platforms. This ensures cultural exchange and an efficient distribution of tasks with regard to infrastructures while leveraging new means of cost sharing – including the possibility of tapping into alternative sources of funding.

Participation in international programmes and networks (such as the European Framework Programmes for Research and Innovation) is vital for the international recognition and competitiveness of Switzerland and its scientists. Indeed, the benefits of international collaborations in science go beyond academia, extending into industrial agreements and the maintenance of good relations between countries in general.

Good governance and responsible autonomy

The ETH Domain’s dual autonomy (autonomy of the institutions on one hand and of the ETH Domain as a whole on the other hand) is central to the successful positioning of the ETH Domain and its institutions with regard to future challenges. The ETH Board is responsible for strategic decisions, as well as for allocating the Domain’s global budget to the six institutions and to projects of strategic importance. Within the overall strategy of the ETH Domain, the organisational and operational autonomy granted to the institutions of the ETH Domain ensures freedom to explore novel and innovative fields and to allocate resources according to scientific and strategic needs. This is essential for the identification and timely implementation of new strategic initiatives. The financial autonomy of the institutions allows them to invest in disruptive and long-term research, as well as in thematic and applied research. Within the scope of the legal requirements, their autonomy in terms of personnel allows them to recruit, retain and promote the most talented researchers and employees. The autonomy of the ETH Domain goes hand in hand with accountability and responsibility. The ETH Domain reports transparently on its activities and the use of its resources, acts within the framework of the ETH Act and aims to fulfil the

strategic objectives conferred upon it by the Federal Council. The ETH Domain is a responsible employer and is accountable for its activities.

Critical mass and reliable funding

A critical mass of excellent students, researchers and supporting staff increases the opportunities for internal collaborations and interaction, and makes it possible to participate in national and international networks of excellence. It also allows the ETH Domain to respond swiftly to emerging challenges and to attract different sources of funding. An equally important precondition for its success is having stable and reliable support from the Swiss Confederation. This is indispensable as it provides the framework that enables the institutions to play a key role in education, research and innovation. It allows for long-term planning and the anticipation and implementation of strategic developments over multiple years. Stable and sufficient funding by the Confederation also enables the ETH Domain to fulfil the ambitious objectives set by the Confederation every four years. Third-party income can only represent a complementary funding mechanism, as it is unpredictable (and hence unstable) and is often restricted to specific endeavours.

V. Strategy 2025–2028

For the period 2025–2028 the ETH Domain aims to provide Switzerland with the best possible support and remain internationally competitive. The ETH Board defines five Strategic Areas to respond to the most pressing global challenges and in which the ETH Domain is well positioned to have a strong impact. It also identifies a set of measures in order to achieve excellence in all the ETH Domain’s activities, from education, research and knowledge and technology transfer (KTT) to the working conditions offered to its employees and the services provided for Switzerland. Moreover, the present Strategy addresses the long-term organisational development of the ETH Domain as a whole, aiming to remain as agile as possible, to strengthen collaboration and to exploit synergies among the institutions of the ETH Domain. The activities of the ETH Domain are performed according to the guiding principles depicted on pages 12 and 13.

The Strategy 2025–2028 includes several transversal concepts, some of which have been defined as transversal themes by the SERI for the ERI Dispatch 2025–2028 (“Digitalisation”, “Sustainable (environmental, social and economic) Development”, “Equity” and “National and International cooperation”; see also p. 55-56). In addition, and in view of recent geopolitical events, current and future global crises, as well as fast-paced technological advances, the ETH Board identifies the broad concept of “Security” as a transversal topic as well (including but not limited to the idea of energy, food, funding, employment and cybersecurity).



A. Strategic Areas and Joint Initiatives of the ETH Domain

Strategic Areas

Rooted in the previous and current strategies and in ongoing activities of the ETH Domain, the ETH Board identifies five Strategic Areas for the period 2025–2028 that are or will be of particular societal importance. In all five Strategic Areas, the institutions of the ETH Domain are positioned to have a particularly strong impact on their own as well as through cooperation within the ETH Domain and beyond.

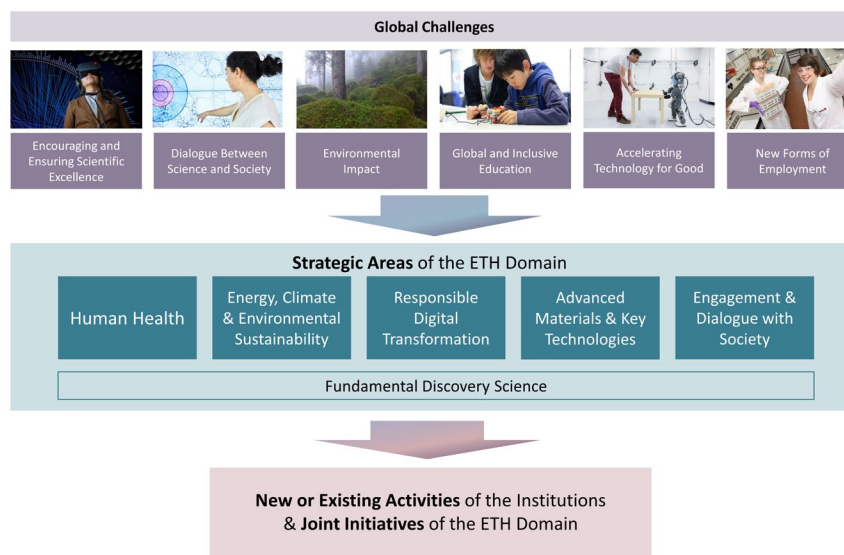
The five Strategic Areas of the ETH Domain 2025–2028 are:

- **Human Health**
- **Energy, Climate and Environmental Sustainability**
- **Responsible Digital Transformation**
- **Advanced Materials and Key Technologies**
- **Engagement and Dialogue with Society**

The five Strategic Areas of the ETH Domain 2025–2028 aim to respond to the global challenges identified by the ETH Board in the context of education, research and innovation (see p. 9-10 and Fig. 4 below). They relate to, yet go well beyond, the three Strategic Focus Areas that the ETH Board specified in its previous Strategic Plan 2021–2024 for the ETH Domain¹. The Strategic Areas are synergetic, support each other and are implemented through coordinated efforts by the ETH Domain institutions.

Beside these defined Strategic Areas, the ETH Board and the ETH Domain institutions emphasise the general importance of fundamental discovery science as the cornerstone of all the ETH Domain institutions’ activities and as an essential element spanning all Strategic Areas (see also box, p. 32). Scientific advances and applied solutions can respond to global challenges thanks to knowledge previously acquired with fundamental research.

Figure 4: Relationship between Strategic Areas and global challenges identified



The ETH Domain implements the five Strategic Areas for 2025–2028 through existing or new activities at the level of the individual institutions, and with Joint Initiatives at the level of the ETH Domain (see Fig. 4 above). The activities and initiatives in the context of Strategic

¹ Personalized Health and Related Technologies, Data Science and Advanced Manufacturing.

Areas cover the whole spectrum of the ETH Domain’s tasks – from education, to research and KTT – and often span several Strategic Areas.

Joint Initiatives

Joint Initiatives are defined as large, time-limited collaborative projects addressing key challenges in one of the Strategic Areas, involving at least two institutions of the ETH Domain. In addition, a Joint Initiative can be organised between ETH Domain institutions and (an) external partner(s). Joint Initiatives are proposed bottom-up on a competitive basis and may be co-funded by the ETH Board. The ETH-Board decided to start the Joint Initiatives for the two Strategic Areas “Energy, Climate and Environmental Sustainability” and “Engagement and Dialogue with Society” in 2022 already, in order to respond promptly to urgent challenges.

Human Health

Description and scope

The concept of human health can be divided into two main areas: prevention and treatment. Both of these areas are undergoing constant transformation due to rapid advances in diverse fields, including (but not limited to) medical technology and engineering, pharmaceutical sciences, molecular biology, epidemiology, neuroscience, and digitalisation. Advances in human health require an understanding of the mechanisms underlying health and/or disease, and thus rely heavily on fundamental discovery science. Environmental, agricultural and social sciences as well as architecture also play an important role in the area of prevention. Indeed, the environment –both natural and man-made– has an impact on human health. Due to the rapid transformation in society, accelerating the implementation of research results and technology into practice and policy is necessary. It requires transdisciplinary approaches and harmonised digital solutions within the Swiss healthcare system, to fill the knowledge gaps existing between researchers and stakeholders (such as patients, health care providers and regulators) to promote individual- and population-level acceptance.

In the context of this Strategic Area, the ETH Domain institutions shall build on their expertise in the fields of epidemiology, personalised health, molecular biology, neurosciences, environmental and agricultural sciences, information sciences, etc. to address aspects and develop knowledge linked to prevention and treatment.

Opportunities for Switzerland

Switzerland is in a unique position, based on its excellent track record in academic and industrial research, to foster and expand networks between researchers and stakeholders with respect to innovations in health management. This includes knowledge and data transfer, and the rapid uptake of new technologies, algorithms, (pharmaceutical) products, innovative therapies and policies to improve human health (both in term of prevention and treatment). Interactions on the national level should be promoted to overcome the cantonal and content-wise fragmentation of health policies and regulations. Harmonised digital tools would enable the use of health data in research, and accelerate the introduction of novel solutions into prevention and clinical practice. The main players for evoking a change in patient care are in the university hospitals across Switzerland, and thus the ETH Domain institutions shall engage in collaborative interactions that support and extend the impact of technology on the clinical practice of medicine. The Strategic Area Human Health shall allow the ETH Domain – and hence also Switzerland – to further develop and sustain worldwide leadership in translating innovation into human benefit. It shall enable the ETH Domain to become an international beacon for optimising both man-made and natural environments in terms of health, which is especially relevant in the context of climate change and global urbanisation. It shall also aim to help prevent and/or respond effectively to possible future health crises while actively contributing to the

sustainability goals of the Agenda 2030 (“Ensuring healthy lives and promoting well-being for all at all ages”).

Contribution of the ETH Domain

ETH Domain institutions are already very active in areas linked to human health at the education, research and KTT levels. ETH Zurich introduced a Bachelor in Human Medicine in 2017 and offers MAS in clinical research, both with the aim of educating future physicians in the utilisation and implementation of newly developed technologies. Several Master’s programmes are offered and developed both at ETH Zurich and EPFL in human health, neuroscience and engineering, nutrition, and the interface of environmental science, healthcare and public health. PSI also offers educational, clinical and research programmes on proton therapy as well as in the development of novel radiotherapy treatments, and actively participates in the development of advanced methods for precision treatment and diagnostics. For the period from 2017 to 2024, the ETH Board has defined Personalized Health and Related Technology (PHRT) as a Strategic Focus Area in its Strategic Plan. One of the fruits of this effort has been the development of a diverse community of ETH researchers at the interface to clinical issues and institutions across Switzerland. From a research perspective, PHRT has made it possible to digitise clinical biospecimens, enabling clinical decision-making for the benefit of patients. Further elaboration of this effort, and the establishment of a harmonised and interoperable human health database, would be key to improving patient care in Switzerland. Structured FAIR Health data support cutting-edge research, as well as providing the basis for the development of digital tools that improve the selection of treatments, e.g. for cancer patients. The promotion of medical digitalisation and the development of medical databases and biobanks are essential for establishing links between health threats, e.g. their genetic, social and environmental determinants, especially for prevention purposes. Ideally, the ETH Domain institutions would collaborate to develop future technology platforms, research and competence centres and other specific structures that serve human health. Preserving patients’ data security and privacy is central to medical digitalisation success (see also Strategic Area “Responsible Digital Transformation”, p. 21-22).

For the period 2025–2028, and in the context of the Strategic Area “Human Health”, the ETH Domain institutions shall build on their expertise and existing competencies and infrastructures to continue developing knowledge and technology linked to disease prevention and treatment. They aim also to expand human health-related research and education on emerging health threats and global public health. One important step is to promote and sustain networks of researchers who study health threats and their social and environmental determinants in order to optimise health policy. New models for interaction between science, policy, clinicians and health literacy have to be co-designed and tested with all stakeholders.

As part of this Strategic Area, contributions of the ETH Domain are likely to include the coordination of ongoing medical-related research both within the ETH Domain and with hospitals and clinics. Existing partnerships with health actors and national organisations would be expanded and new partnerships would be created to ensure the delivery of precision medicine across Switzerland. A medical research network across ETH Domain institutions would improve coordination of individual efforts, and achieve better health data harmonisation across Switzerland. The interoperability of data and technologies developed within the ETH Domain would lead to the development of new algorithms that benefit patients. The ETH Domain shall continue to be a key player in fundamental discovery science, neurosciences and prosthetics as well as in radionuclide-based diagnostics and therapy. This would go hand in hand with the state-of-the-art large-scale research infrastructures proposed by the ETH Domain institutions for 2025–2028 (such as *Neuro-Health Technology Hub*, *IMPACT* or *EM-Frontiers* – see p. 34-36). Efforts to promote healthy ageing, be it through public health policies (environment, nutrition) or through interventions (cognitive support, assistive technologies) interface with neurosciences, molecular biology and improved digital patient data processing.

In addition to the activities linked to research and KTT, the ETH Domain institutions shall continue to develop their curricula (both in terms of education and continuing education) in fields related to human health, including in medical sciences. Overall, this Strategic Area seeks to promote a rapid and uncomplicated translation of ETH Domain research results and technologies into policy and practice.

Energy, Climate and Environmental Sustainability

Description and scope

As scientifically demonstrated, climate change and environmental degradation are resulting from the unsustainable use of fossil resources, inefficient energy systems and industry processes, inappropriate land use, intensive agriculture and non-circular use of materials. This in turn impacts on the environment, the biosphere and humankind. Solutions encompass the reduction of CO₂ and other greenhouse gas (GHG) emissions, the transition from a linear to a circular economy, sustainable consumption and production, halting and reversing the loss of biodiversity and reducing global inequalities. To ensure environmental sustainability and maintain the health and proper functioning of ecosystems, it is vital that the rate of depletion of renewable resources should not exceed their regeneration. Considering the interdependencies of the challenges related to climate, energy and environment, these issues must be tackled in an integrated manner. The strategies guiding the energy transition and future economic, industrial, urban and landscape development must incorporate sustainability principles by identifying measures that can simultaneously counterbalance climate changes while preserving natural resources and biodiversity. Society is facing severe time constraints, which makes immediate actions necessary to mitigate and avoid devastating changes to the environment.

With this Strategic Area, the ETH Domain aims to address the challenges associated with energy transition, climate change and the impact of anthropogenic resource and energy consumption on the environment. The ETH Domain institutions intend to focus their efforts along three axes: (i) energy transition, (ii) net zero emissions, and (iii) biodiversity, climate change, and sustainable construction, mobility and land use. Activities in this Strategic Area cover the entire spectrum of ETH Domain competencies – from education and basic research to technology-specific development work, including pilot and demonstration projects.

The challenges linked to energy, climate change and environmental degradation call for fast-acting solutions, but also continuous investigation in fundamental research. Applicable solutions rely heavily on knowledge collected in fundamental discovery science, which therefore need to remain central to efforts aimed at energy savings and transition, halting of climate change and preservation of the environment.

Opportunities for Switzerland

In its long-term climate strategy to 2050¹, the Federal Council targets a 50% reduction of GHG emissions as compared with 1990 and a reduction to net zero by 2050. With its broad spectrum of activities in fields linked to energy, climate change, biodiversity, environment, mobility and construction, the ETH Domain can play a major role for achieving these federal goals. It can provide a holistic approach in education, research and innovation to develop, propose and support the implementation of novel strategies and solutions. In the context of this Strategic Area, the ETH Domain shall continue educating new talents, generating novel science, developing timely solutions and transferring innovation to entrepreneurial initiatives in the areas of energy, climate and environmental sustainability for the benefit of Switzerland, Europe and the world. It would thus actively inform and support the Federal

¹ [Switzerland's Long-term Climate Strategy](#)

Council's long-term climate strategy to 2050¹, its energy strategy for the period to 2050², its biodiversity strategy and action plan³ as well as its decision to reduce the Federal Administration's greenhouse gas emissions⁴. It would also enable Switzerland to find a solution to safeguarding its energy supply and ensuring energy security in the long term.

Contribution of the ETH Domain

Energy and energy transition have been a focus of the ETH Domain for many years, and projects and initiatives in these areas are numerous, whether initiated bottom up or top-down through competitive funding. The Swiss Competence Centers for Energy Research (SCCERs) –now concluded– were established in 2014 by the Swiss government to focus on solutions to the technical, social and political challenges posed by the energy revolution. All SCCERs have explored and developed solutions that are marketable and socially acceptable, and that may be seamlessly transferred to and further developed by industry. The ETH Domain aims to continue this tradition in addressing the energy transition in a holistic view by supporting research and technological development in the areas of renewable energy sources, energy conversion systems and processes, energy networks, energy storage systems, end-uses and applications, sustainable mobility, industrial processes, and energy system and impact analysis. The ETH Domain institutions are also involved – e.g. through NCCR Catalysis – in the environmentally friendly production of materials and chemicals, thus directly linking the Strategic Areas “Energy, Climate and Environmental Sustainability” and “Advanced Materials and Key Technologies” (see p. 21-22). They also play a major role in the newly launched SWEET (SWiss Energy research for the Energy Transition) funding programme of the Swiss Federal Office of Energy. The ETH Domain's nuclear energy research and service infrastructures shall continue to deliver important contributions to guaranteeing the highest safety standards for the long-term operation of Switzerland's nuclear power plants and their safe decommissioning and disposal, as well as to monitoring newly emerging technologies and maintaining domestic nuclear competencies for the decades to come. The ETH Domain institutions are also active in nuclear fusion research and have submitted a large-scale research infrastructure project in that area to the Swiss Roadmap 2023 process (“Swiss Fusion Hub”, see p. 35).

For the “net zero” component of this Strategic Area, the activities of the ETH Domain would be structured along four axes involving education, research and development, as well as pilot and demonstration activities: (i) reduction of CO₂ emissions; (ii) removal of CO₂ from the atmosphere, reuse and long-term carbon storage; (iii) monitoring and assessment of impacts; and (iv) the implementation of NetZero campuses. The ETH Domain aims to become a role model for society in this area. According to the Federal Administration's Climate Package⁴ and to support the Federal Council's long-term climate strategy to 2050¹, the objective for the ETH Domain is to reduce its greenhouse gas emissions to 50% of 2006 levels by 2030 while fully offsetting the remaining emissions. Thanks to measures already planned in advance and to the strong commitment and support of the ETH Board, the institutions of the ETH Domain are well on track to meet these goals, provided that adequate funding can be guaranteed for the period 2025–2028.

In terms of loss of biodiversity, environmental pollution, climate change and sustainable land use, there is a requirement for integrative solutions linking ecosystems, land use interests and various stakeholders. ETH Domain scientists should be able to develop and incorporate modern and more efficient monitoring methods, modelling large volumes of environmental data to generate local and global models. This would facilitate the prediction of biodiversity dynamics and environmental pollution in response to climate and land use change, the estimation of GHG emissions, as well the assessment of global warming mitigation and restoration of damaged ecosystems.

¹ [Switzerland's Long-term Climate Strategy](#)

² [Energy Strategy 2050](#)

³ [Action Plan for the Swiss Biodiversity Strategy and Action Plan](#)

⁴ [Federal Administration Climate Package \(in German and French only\)](#)

Activities of the ETH Domain may address threats and synergies between the following areas: (i) ecosystem services/biodiversity, environment and climate/energy change; (ii) sustainable land use and restoration to preserve ecosystem services and healthy environments; (iii) pest management; (iv) development of nature-based concepts for adaptation to climate change; and (v) fostering biodiversity and human well-being.

Responsible Digital Transformation

Description and scope

Digital technologies have an enormous potential for – but also a great impact on – society. The use of and access to digital technologies are necessary for many activities, such as those relating to the labour market, for education (incl. continuing education), for efficient production, for health care and for leisure activities. Also, innovations in the field of data science, artificial intelligence (AI), the Internet of Things and cloud computing are making a major contribution to tackling some of the world’s most challenging problems.

Key challenges related to digitalisation are the excessive use of resources and energy, and lack of alignment with societal expectations in terms of transparency, accessibility, integration into political structures, reliability and availability, safety and security, as well as widening global digital inequality. Equitable access to and trust in developed and deployed technologies are prerequisites for societal acceptance and application. The Strategic Area “Responsible Digital Transformation” aims to respond to those challenges. Using digital information is part of our daily lives, and “responsible digital transformation” refers to the fair, secure, and ethical use of such information. This covers many aspects of data management, including trust, security, resource preservation, user needs and acceptance by both the public and professional practitioners. It also encompasses the hardware and protocols used for digital transformation.

It includes research, technology transfer and educational activities, and seeks to put technological advances linked to digitalisation into a broader context. Specific examples are energy and transportation, the building and infrastructure sector, manufacturing, agriculture, environmental monitoring and health. The widespread availability of information and energy-efficient and rapid data transmission are essential for satisfying demand in these areas. Responsible Digital Transformation thus closely links its technological activities to societal expectations on the one hand and to sustainability on the other. This Strategic Area aims to strengthen the collaboration between the ETH Domain institutions themselves, and with Swiss universities, industry, society and governmental institutions in the relevant areas of digital transformation.

Opportunities for Switzerland

Switzerland, like other countries, is in the midst of a new wave of digitalisation. With its diverse activities and large-scale research infrastructures, the ETH Domain supports the Swiss economy and public authorities, and society at large, in meeting the challenges associated with responsible digitalisation. The activities in this Strategic Area are a further step in this direction. They should also make it possible to efficiently connect the various areas of expertise available at the ETH institutions for a more efficient and responsible digital transformation in Switzerland, hence ensuring maximum benefit for science and society.

Incorporating computational thinking and know-how in educational programmes would enable Switzerland to position itself as a leader in digitalisation and data-driven research by providing access to cutting-edge data science expertise. The Strategic Area “Responsible Digital Transformation” is therefore an opportunity to position the ETH Domain as a provider for all Swiss universities and for industry in terms of research and educational activities. It shall also play a key role in establishing the degree of trust necessary for the public acceptance of digital transformation.

Contribution of the ETH Domain

The ETH Domain collectively has a long tradition in world-class long-term basic research and education in the foundational areas of digital transformation, such as machine learning, data science, information theory, programming languages, statistics, software engineering, image processing, computer architecture, computer networking, data transmission, data processors, computer graphics, and cryptography and security. Prime examples are the Zurich Information Security and Privacy Center (ZISC) at ETH Zurich, the Center for Digital Trust (C4DT) at EPFL, the Artificial Intelligence Center at ETH Zurich, the Center for Intelligent Systems at EPFL, the newly founded research division Scientific Computing, Theory and Data at PSI, as well as the Swiss Data Science Center (SDSC). The ETH Domain also plays a key role in assisting the Swiss government in performing its own responsible digital transformation, notably in collaborating with the Federal Office of Justice on the new E-ID proposals, and through collaboration between the SDSC and the Federal Statistical Office. The Strategic Area “Responsible Digital Transformation” shall build on this expertise and these facilities, services and collaborations to accelerate digital transformation, and to strengthen cooperation between well-established areas in the ETH Domain. It seeks to specifically leverage the infrastructure, know-how and services set up in the ETH Domain, as well as existing and proven collaboration models. The aspects linked to the security of digital devices and data exchange, the broad access to digital solutions, the responsible use of resources and the reliability and transparency of digital solutions are of particular interest when developing technology and education offers. The institutions of the ETH Domain shall expand their leading role in cybersecurity in Switzerland (in terms of research, education and continuing education, but also in terms of the services provided) and aim to be exemplary in the use and exchange of data.

One component of this Strategic Area is to facilitate the development and deployment of state-of-the-art machine learning and AI algorithms. The responsible use of these technologies requires properties like technical robustness and safety, statistical replicability, providing formal guarantees and interpretability of decisions and fairness, just to name a few.

In the context of this Strategic Area, the ETH Domain institutions also want to federate data science and research data management tools in order to accelerate the implementation of Open Science in Switzerland. They shall continue to support the digital transformation of Swiss administration and society and aim to provide solutions for the implementation of Open Research Data (ORD) solutions in the ETH Domain as well as throughout Switzerland.

The Strategic Area “Responsible Digital Transformation” is closely linked to the other Strategic Areas as they all rely on the production and management of digital data. It would thus ensure that scientific outcomes from the other Strategic Areas can be fully exploited.

This Strategic Area could also support the development of the SDSC into a national decentralised service platform, a project submitted to the Swiss Roadmap 2023 (see p. 34 and “Organisational Development of the ETH Domain” on p. 47). Such a service platform would be open to the entire Swiss community by developing and providing new expertise in different disciplines, such as the processing of health-related and environmental monitoring data.

Advanced Materials and Key Technologies

Description and scope

The development of advanced materials or technologies based on sustainable production and technological breakthroughs are necessary for providing solutions for today’s global challenges, such as climate change, global poverty and inequality, dwindling resources, demographic development, renewable energy and digitalisation. The development of advanced manufacturing technologies is also a prerequisite for the eventual success of

modern-day materials science. New materials, material combinations or materials with novel, previously unknown properties are in high demand for various applications.

Materials science and key technologies development address the entire life cycle of materials: from extraction or production, through all phases of conversion and usage, to the manufacture of goods and products and, finally, to recycling or disposal. It spans and integrates very broad and highly interdisciplinary fields, including natural sciences (such as physics, chemistry and biology) as well as the highly diverse engineering sciences, from mechanics and civil engineering all the way to computer and data science. It can thus be considered fundamental to other research activities, too.

Opportunities for Switzerland

New sustainable materials are essential to the circular economy and to mastering the processing of advanced materials, and thus help to ensure Swiss economic prosperity while advancing society's knowledge. The ETH Domain is set to lead this development and is currently at the global forefront. This strength builds on excellence in education and research at ETH Zurich and at EPFL, complemented by the competencies and facilities of the research institutes and unique technology transfer expertise. The ETH Domain institutions can therefore contribute to the development of advanced materials and technologies in Switzerland, with an impact on Swiss industry in particular.

With the Strategic Area Advanced “Materials and Key Technologies”, the ETH Domain wants to go further and bring the different scientific communities on board, combine their competencies and boost synergies. To develop and deploy the materials of future technologies, the competencies of natural and material sciences, architecture, engineering sciences as well as other disciplines, such as medicine and economics, are needed. In all these areas, data science and data-driven developments – including AI and machine learning – are crucial. With its excellence and its well-developed network structure, the ETH Domain is the ideal place to ignite this development. Overall, this Strategic Area aims to bring the different education and research communities in Switzerland together to advance materials science and technology.

Contribution of the ETH Domain

The excellence of individual ETH Domain scientists combined with collaboration between researchers and research groups from the different institutions of the Domain permit the development of advanced materials and technologies in various application fields. The highly inter- and transdisciplinarity of this Strategic Area can only be covered holistically and comprehensively by larger universities and national research institutions like the ETH Domain.

The Strategic Area Advanced Materials and Key Technologies is closely interlinked with the other Strategic Areas. For example, it can provide technology and solutions for “Human Health” (see p. 17-18) or for “Energy, Climate and Environmental Sustainability” (see p. 19-20). Similarly, “Advanced Materials and Key Technology” is a major element of the “Responsible Digital Transformation” (see p. 21-22). Zero-CO₂ material processing, quantum technologies, and assessing and minimising ecological impact are among the key topics addressed by this Strategic Area.

The field of zero-CO₂ materials processing is emerging worldwide. With their research and technology development work, the ETH Domain institutions are helping actively to tackle the problems related to making key materials available with zero CO₂ emissions and to replace production processes that emit large amounts of CO₂. The ETH Domain institutions shall continue their efforts in this area and aim to provide research and development at the interface of applied computational sciences, in the discovery of new materials and processing methods, in assisting the tracking and retrieval of critical materials, and in finding solutions for prolonging the lifetime of products.

Quantum technology promises to revolutionise computing technology and to bring sensors to an unprecedented level of sensitivity. The institutions of the ETH Domain are at the forefront of quantum technology development and aim to step up their activities in that

area (see also “ETH QuRI” as one of the large-scale research infrastructure submitted to the Swiss Roadmap 2023 process, p. 35). Progress in this field is closely connected to the development of materials for quantum computing and supporting technologies.

Developing and implementing sustainable materials, chemistry and technologies requires methods, tools and facilities for assessing and improving them from an environmental sustainability perspective. The ETH Domain institutions would help to provide all the instruments needed to address the materials and technology life cycle. These would be applicable at an early stage of the materials and technology development and design process to allow for ongoing feedback and improvements.

Engagement and Dialogue with Society

Description and scope

The ETH Domain aims to foster a proactive and open dialogue with society. This ensures transparency, provides context for scientific insights, and supports the formation of cooperative partnerships with societal actors. Such dialogue helps to translate research into concrete solutions and policies, promote science and research, and attract the younger generation into STEM fields.

Today’s global challenges are more complex, interconnected and rapidly evolving than ever. Advances in science and technology are essential, but not sufficient, to meet these challenges. The implementation of scientific and technological advances requires societal and cultural acceptance, legal and regulatory frameworks, financing, and government support. The scientific community bears responsibility for making scientific findings accessible to the public, countering misinformation on local, national and global scales, and addressing mistrust in science and research, even though this may only affect a minority of the population. In particular, the way in which scientific knowledge evolves with time must be better communicated to avoid the misapprehension that scientists are contradicting themselves when new research results and data become available.

Scientists share their fascination for science and research with the public, especially to attract the younger generation into STEM fields. They also convey the importance of fundamental discovery science as a source of knowledge for societal benefit to the general public. For this, students should be enabled to develop the skills required to be understood by all when sharing scientific and research discoveries and facts. Members of the ETH Domain cultivate dialogue with their fellow members of Swiss society and appreciate the importance of the national languages as a key route to broader understanding. Scientists recognise their moral and social responsibility when they engage with the public. They take into account the societal and political context, as well as the different roles of the scientific community, political bodies and media in the processes that lead to decision making.

Through supported and educational activities, the experts of the ETH Domain shall develop transdisciplinary skills and train a new generation of professionals to be leaders in a world of complex challenges and rapid change. This task requires cooperation both within and beyond the ETH Domain, especially with universities active in humanities and social science. Furthermore, addressing global challenges requires strong partnerships and collaborations with universities around the world. In these activities, the participants from the ETH Domain would expand their conventional roles, moving from unidirectional knowledge transfer to a cooperative framing of issues and co-production of knowledge.

Opportunities for Switzerland

Worldwide, the coronavirus pandemic has opened the eyes of many to the crucial importance of scientific knowledge and its translation into effective solutions. On this basis, the Federal Council is considering how to strengthen the exchange between science, politics and society. With its strong expertise in education, research and knowledge transfer, the ETH Domain is ideally positioned to set new standards for outreach and policy advice and to

promote the implementation of scientific findings in Switzerland and beyond, thus enhancing the standing of science in society.

Increased and improved knowledge exchange between ETH Domain experts, specialists from cantonal universities and universities of applied sciences, and actors from society (politics, administration, the economy and the public) supports the uptake of innovation and evidence-based policy-making in Switzerland.

Contribution of the ETH Domain

Many current activities of the ETH Domain institutions in research, education and KTT already contribute to engagement and dialogue with society. A highly visible example of such cooperation, the National COVID-19 Science Task Force created during the pandemic, brought together experts from across the Swiss academic landscape who shared their expertise with hospitals, medical professionals, the public, industry and political decision-makers.

Ongoing programmes foster public dialogue and exchange, for example on topics related to climate, energy, public health and urban development. Similarly, educational outreach programmes (Cybathlon, Girls on Ice, Scientastic, SLF-Tours, etc.) contribute significantly to engaging public interest and attracting young people into STEM fields, incl. computer and communication sciences. The ETH Domain institutions collaborate with schools to eliminate the existing gender gap in STEM subjects. They also host and/or participate in a variety of platforms designed to share open data, models, and technical guidance on topics including air quality, climate, cyber risks, forests, groundwater and life cycle assessment. These serve as an excellent basis for open dialogue with society.

Research platforms conceived, developed and hosted by the ETH Domain institutions provide access to technical infrastructure and support synergies with industry in areas such as advanced manufacturing, building technologies, energy systems, mobility and transportation, quantum technologies, building technologies, and protein and new drug characterisation.

Engagement and inclusion of implementation partners in developing and conducting research projects help to ensure the ultimate uptake of project outcomes in policy and practice. To that end, the ETH Domain institutions cooperate with numerous partners, including the Swiss government, non-governmental organisations such as the International Committee of the Red Cross, public health authorities, businesses, cantons, and professional and public interest groups, and engage with international organisations and in science for diplomacy.

Education activities are key for making science understandable, accessible and participatory. On the one hand, public awareness requires specific skills that should be acquired during the course of studies already. On the other hand, promoting open education (incl. by offering online courses, see also p. 28-29) enables a broad and equitable access to science and to high-quality education. Thus, ETH Zurich and EPFL take these aspects into account when developing their curricula.

All these activities are to be continued, improved and stepped up in the context of the Strategic Area “Engagement and Dialogue with Society”. This Strategic Area aims to increase the visibility and impact of existing and future research activities of high societal relevance. A portfolio of activities would holistically support input from society that extends from the initial identification of needs to the ultimate utilisation of scientific results. This shall enhance mutual trust and understanding between experts from science and politics, develop skills for the co-design of sustainable solutions to complex problems, and expand the benefits that the ETH Domain provides to society.

The Strategic Area “Engagement and Dialogue with Society” is transversal to all the other Strategic Areas. Indeed, challenges addressed by the other Strategic Areas can only be fully answered if scientific communities and the public, industry and public authorities work together to find and apply appropriate solutions.

B. Core Tasks

The ETH Domain institutions perform their manifold tasks according to the mandate conferred on them by the ETH Act and the strategic objectives of the Federal Council. The core tasks of the ETH Domain include education, research, large-scale research infrastructures, and KTT.

Top-Quality Research-Based Education

The ETH Domain institutions play a leading role in Switzerland's educational system by providing research-based education and continuing education of a very high quality. Students and doctoral students are enabled to succeed in their studies and are well-equipped to help actively shape the future of Switzerland and of society in general. Institutions continue to ensure top-quality education even in the context of a growing student population – a consequence of the attractiveness of the ETH Domain and the high demand for engineering and information and communication technology (ICT) professionals in Switzerland.

Maintaining education quality as priority

Context

The ETH Domain institutions provide research-based education in the exact and natural sciences, engineering sciences (including digital sciences), architecture and management sciences, with links to social sciences and the humanities. One of the main priorities of the ETH Domain is to maintain excellence through demanding, top-quality education. Central to this aspect are the quality of teaching, the performance of students, as well as their well-being and satisfaction, together with attractive future professional perspectives. Students should have access to a challenging, inspiring, diverse and inclusive environment. The latter refers to ensuring the fair, respectful and equal treatment of all students by the institution, by faculty members and also by their peers (see Guiding Principles, p. 12). An open culture of discussion and dialogue is also encouraged and the diversity of opinions is respected, as both are key to academic freedom. A particular challenge that remains is the serious underrepresentation of women in natural and engineering sciences in Switzerland, a phenomenon that also affects the ETH Domain.

Prerequisites

Openness and an international environment are central to diversity, creativity and international competitiveness and are thus vital for institutions that strive for excellence. In that regard, the ETH Domain must be able to retain the ability to attract the most talented students, staff and faculty from Switzerland and globally (see Enabling Factors, p. 13).

Access to Swiss universities for all holders of the Swiss Matura is a basic principle for accessible higher education in Switzerland. The high-quality Swiss Matura should give prospective students the tools to start their studies under the best possible conditions.

Innovation in education includes the use of digital tools, but also more interdisciplinary, hands-on and interactive approaches to teaching, project-based learning, peer teaching and flipped classrooms. Innovation in education requires more time investment from supervisors, and possibly more funding, as well as flexibility in the use of real estate and workspace.

Measures 2025–2028

- While developing their curricula, the ETH Domain institutions take into account the aspects of inter- and transdisciplinarity, critical thinking, sustainability, ethical principles, Open Science, digitalisation (incl. cybersecurity), computational competencies and self-

organisational skills. They also nurture academic cooperation with other Swiss higher education institutions and build on this to offer and benefit from complementary expertise and curricula.

- Measures for maintaining or improving education quality are put in place to take into account the projected growth in student numbers, societal and economic developments and the funding levels expected for the next decade. Innovative teaching approaches – including an accelerated use of digital technologies – are fostered and draw on previous experience and learnings (especially from the coronavirus pandemic – see box p. 29). In order to ensure top-quality education, the institutions of the ETH Domain regularly evaluate courses and examinations and assess the satisfaction of their students and faculty members. Feedback is used for continuous improvements.
- ETH Zurich and EPFL take appropriate measures to improve gender ratios and diversity among students by helping to ensure that underrepresented groups enrol and are retained in Bachelor's and Master's programmes. To this end, they actively work together with actors involved in teacher training for primary and secondary schools, and continue to encourage young pupils to take up STEM fields.
- Together with other ERI actors, the ETH Board upholds and sharpens the distinct profiles of Switzerland's higher education institutions. It contributes to the continued and complementary division of tasks between the federal technical and cantonal universities on the one hand and the universities of applied sciences on the other.
- The ETH Domain institutions promote the national and international mobility of their students so that they are exposed to global perspectives. ETH Zurich and EPFL further develop their cooperation with other Swiss higher education institutions. The mobility of students and education-related cooperation between ETH Zurich, EPFL and the four research institutes is promoted.

Ensuring favourable conditions for a growing population of students

Context

The ETH Domain is committed to fulfilling the mandate granted by the ETH Act to educate students in scientific and technical fields, and for them to become the experts needed by the economy, research and the public administration. In this context, it is very gratifying that in the past decade the ETH Domain has been able to attract an increasing number of students and doctoral students in Engineering Sciences and in Information and Communication Technologies (ICT), since both disciplines are in very high demand on the Swiss labour market. The growth of the ETH Domain student population thus echoes Switzerland's high demand for professionals and experts in these fields but also reflects the national and international attractiveness of the ETH Domain and the excellent professional perspectives for graduates. Together with the expected increase in the numbers of Matura holders in the next decade, this will lead to a steady rise in the numbers of Bachelor and Master students until 2028 (estimated by ETH Zurich and EPFL at around +3.5% per year altogether for the period 2025–2028). The ETH Board has thus developed a strategy together with the ETH Domain institutions to provide guidance and measures to mitigate the risks that such an increase may pose to the quality of education in the long term (strategy regarding the development in student and doctoral student numbers, as mandated by the Federal Council in its strategic objectives for the ETH Domain 2021–2024). As ETH Domain graduates are in high demand in the Swiss labour market, limits on student admissions should only be considered if the quality of education cannot be maintained, and only once all other options have been exhausted.

Prerequisites

The growth of the ETH Domain student population is to a certain extent the result and a precondition for meeting Switzerland's high demand for professionals and experts in STEM fields. However, it will also require favourable framework conditions, including sufficient financial and human resources and infrastructure, as well as scalable innovative teaching and learning concepts supported by digital technologies.

Only by continuing to attract talented students from here and abroad will Switzerland be able to effectively counteract the shortage of skilled employees. Thus, access to international students is necessary to satisfy the expected demand for the specialists needed in technical and engineering fields. Their prospective professional integration in Switzerland should be made easier so that this goal can be attained.

Measures 2025–2028

- Action is taken to implement the strategy of the ETH Board for the ETH Domain regarding the development in students and doctoral student numbers formulated in the ERI period 2021–2024. (*N.B.: specific measures are described in that strategy and not in the context of the present Strategic Plan 2025–2028.*)
- The ETH Domain institutions ensure favourable conditions for maintaining a high standard of education, even against the backdrop of a significant increase in student numbers. This includes the creation of new teaching and learning forms and of workspaces that are adapted to them and to increasing student numbers. The institutions use rental solutions if necessary to increase the availability of space.
- ETH Zurich and EPFL further develop their own strategies to manage the student population growth and to integrate the growing student population into higher education planning while still upholding quality in education. These include supporting prospective students, managing student admissions, scaling learning and teaching formats, and securing resources. Also, ETH Zurich and EPFL further collaborate with PSI, WSL, Empa and Eawag, as well as with other institutions, to expand and diversify teaching and supervision possibilities. Adjunct professors nominated at ETH Zurich or EPFL and working at the research institutes are recognised as key contributors to teaching in the ETH Domain and to ensuring adequate student supervision.
- The ETH Domain institutions maintain a dialogue with the private and public sectors in order to anticipate and meet their needs for specialists on the Swiss labour market.

Continuing education

Context

The ETH Domain institutions promote long-life learning through their continuing education programmes and in this way contribute to the sustainable development of society and the economy and to the strengthening of Switzerland's competitiveness.

In the light of rapidly advancing digitalisation and automation processes, working environments are becoming increasingly complex and demanding. With their continuing education programs, ETH Zurich, EPFL and the research institutes provide solutions to this challenge by helping individuals (including alumni) and industrial partners to respond to fundamental labour market transformations.

Prerequisites

Fostering the dialogue and cooperation between universities, research institutes, business and society helps to efficiently shape offerings according to their needs and make use of existing complementarities and synergies.

Measures 2025–2028

- The ETH Domain institutions further develop their offerings in continuing education according to their respective thematic areas of activity and with a view to society's needs. A wide range of unique research-based courses and degrees, as well as practice-oriented and applied courses, are offered on topics relevant for business and the public

sector. This includes programmes relevant for the responsible digital transformation of society (see also Strategic Area “Responsible Digital Transformation”, p. 21-22).

- The ETH Domain institutions continue to contribute to the broad and equitable access to top-quality education by promoting open education. This includes further expanding offers to include a wide range of short and flexible online courses that could potentially reach a larger audience.

Learnings from the coronavirus pandemic in education

The coronavirus pandemic had obliged the ETH Domain institutions to close the doors of their lecture halls and training facilities to students almost overnight. The successful transition from on-site to virtual teaching was only possible because they had been working for years on exploring and introducing new and innovative forms of teaching, with a focus on digitalisation. The flexibility and creativity of the teaching staff and students have played a major role in this success as well – not to mention their willingness and readiness to try out new and innovative solutions. ETH Zurich and EPFL have carried out surveys to ascertain student satisfaction and the quality of the programmes offered during this period. One of the findings was that online courses have their limitations in terms of student satisfaction and well-being. Thus, while digitalisation and online courses can offer some potential for optimising supervision and infrastructure capacity – and perhaps partially compensate for the increasing number of students – hybrid solutions are better suited.

The coronavirus pandemic has provided important insights into how lectures could be optimised as well as into the potential of distance and virtual education. ETH Zurich and EPFL are already using and will continue to use these insights as learnings for developing their offers. For example, ETH Zurich teaching staff have created physics experiments that Bachelor students could perform safely at home during the pandemic. The students used water bottles, cardboard, CDs or polarised sunglasses to determine the speed of sound, constructed a visible-light spectrometer or verified Malus’ law, which describes the intensity of light behind a polarisation filter. Instead of lab equipment, students used sensors present in every smartphone, along with basic household devices such as scales, thermometers or rulers. The “physics lab @home”, redesigned out of necessity, brought a qualitative improvement over the pre-pandemic concept with respect to self-organised and explorative learning, as well as teamwork and scientific reporting. Since the autumn semester 2021–2022, students have been back on campus – and in the laboratories. It is again possible to carry out traditional experiments with the equipment in the labs. However, the new “@home” experiments are still in the portfolio. This approach also helps students to develop creativity and inventiveness, which are central skills for scientists and entrepreneurs.

Teaching staff at EPFL have also been able to quickly adapt teaching to the fully online or hybrid (one third of students on campus) settings. A configuration that worked well consisted of using lecture recordings to organise flipped classrooms. Following the flipped model, students watch videos about the basic concepts of the lecture before attending a live interactive session either online or on campus. Nearly 25% of teaching staff used this approach during the autumn semester 2020–2022. To offer additional feedback opportunities between live sessions, teachers increasingly used discussion forums. An example is “Piazza”, which allows students to post questions, to collaboratively build answers to each other’s questions or to search for previously asked and answered questions. The aim is to obtain high-quality and rapid answers to difficult questions. Because of the success of this intuitive platform, Piazza has remained popular even after students came back to campus.

World-Class Research

The ETH Domain continues to perform research at the highest, internationally competitive level. It contributes to anticipating and resolving the most pressing local, national and global challenges and to strengthening Switzerland's innovative potential and international reputation. Fundamental discovery science remains a core element of all the ETH Domain's activities and is supported by adequate funding. In addition, the ETH Domain institutions promote Open Science, ensure research integrity and nurture national and international collaboration and cooperation.

Leading international position in research

Context

The impact of the ETH Domain's researchers is recognised worldwide. It is thanks to them that the ETH Domain institutions are recognised as top research institutions world-wide, and thus actively contribute to Switzerland's innovative potential and long-term economic competitiveness.

Fundamental discovery science is recognised by the ETH Domain as the central pillar of all its activities, as essential for generating new knowledge and as a starting point for innovation. The overriding importance of fundamental discovery science in the long term must be continuously communicated to the public and political authorities, since it may be perceived as less attractive than the pursuit of research activities that have an immediate societal or financial impact. Fundamental and applied research performed at the institutions of the ETH Domain are complementary and stimulate each other. Both are often carried out together with academic partners or with partners from industry and the public sector. The defining characteristics of research in the ETH Domain are interdisciplinary work and collaboration on both the national and international levels (see also Unique Strengths, p. 11-12).

Prerequisites

Access to international networks and international competitive funding such as the European Framework Programmes for Research and Innovation (Horizon Europe) is essential to ensure the competitiveness of the ETH Domain's research.

Measures 2025–2028

- The ETH Domain institutions provide their researchers with sufficient scope and resources to conduct fundamental research over the long term. They seek a good balance between preserving continuity in research while ensuring flexibility.
- The ETH Domain institutions intensify interdisciplinary approaches and cooperation nationally and internationally. They strive to optimise and maximise synergies within the ETH Domain and Switzerland in order to best exploit the complementary profiles of the various institutions. They enable ETH Domain employees and students to build strong scientific networks by – for example – encouraging the mobility of researchers.
- The institutions, together with the ETH Board, are committed to helping Switzerland become fully associated with the European Framework Programmes for Research and Innovation in the near future. They develop further initiatives and measures in order to remain attractive to international talents, regardless of the political context.
- In order to engage in new fields of research and education, ETH Zurich, EPFL and the research institutes renew or redirect fields of research and adapt the number of professorships according to the institution's strategic development and available budget.
- Specific strategically relevant areas of research are defined using a bottom-up approach with top-down incentives. This includes the Strategic Areas of the ETH Domain decided by the ETH Board (see p. 16-25), as well as various national initiatives such as the

National Centres of Competence in Research (NCCR) and National Research Programmes (NRP).

Research integrity

Context

Academic freedom goes hand-in-hand with individual and institutional responsibilities. The freedom given to science and research by society and legislation calls for researchers to accept and observe the fundamental principles of scientific integrity (i.e. reliability, honesty, respect and accountability). These principles guide scientists in their research and teaching activities, and help them to deal with the practical, ethical and intellectual challenges they are likely to encounter. The ETH Domain institutions pay particular attention to maintaining academic freedom and ensuring research integrity in the context of collaborations with international and industrial partners, where they may be confronted with positions that do not reflect values enshrined in the Swiss legislation. The ETH Domain's institutions all have internal guidelines in place to ensure research integrity.

Prerequisites

Research integrity must be supported and practised by the entire academic community and is seen as a prerequisite for excellence in research. The environment in which science is carried out plays an important role in ensuring research integrity.

Measures 2025–2028

- The ETH Domain institutions comply with Swiss and international standards for research integrity and perpetuate their efforts to sustain a research environment designed to promote respect for, and compliance with, research integrity.
- The ETH Domain institutions assess the possibility and need for harmonising guidelines and procedural regulations within the ETH Domain. They update these if necessary, taking into account the Code of Conduct for Scientific Integrity drawn up by the Swiss Academies of Arts and Sciences, together with swissuniversities, the Swiss National Science Foundation and Innosuisse.

Open Science and Open Research Data

Context

Open Science is concerned with making scientific research and results easily and widely accessible. It renders research more transparent, visible and reproducible, stimulates new research and discoveries, facilitates collaborations and rightfully returns publicly funded discoveries to society. The ETH Domain is complying with the National Open Access Strategy, which requires all published results from research projects financed in Switzerland using public funds to be accessible to everyone free of charge by 2024. Open Research Data (ORD) is a core aspect of Open Science: it refers to research data that are accessible publicly and that can be used, reused and distributed. ORD should be widely adopted for publicly funded research, but norms vary considerably from one research discipline to another. Also, due to legal, ethical, privacy or security reasons, not all data may be suitable for sharing. Another important challenge arising from ORD is that making data publicly available and curating them requires substantial human resources, infrastructure and reliable funding. The institutions of the ETH Domain set out their vision for ORD in a position paper in 2020.

Prerequisites

Research communities must work together and provide incentives for a successful culture change regarding the accessibility and dissemination of research data. The National ORD Strategy and Action Plan of swissuniversities involving the different actors of the ERI sector guide this coordinated effort.

Measures 2025–2028

- The ETH Domain continues to promote Open Science. It aims to remove existing hurdles and disincentives for the adoption of ORD and to develop mechanisms to support and incentivise the widespread adoption of Open Science within the ETH Domain, thereby assuming a leading role in implementing responsible ORD practices in the Swiss and international research landscape.
- The ETH Domain institutions support the objectives described in the national ORD Strategy. Appropriate funding is provided by the ETH Domain for continuing the implementation of measures related to ORD in the period 2025–2028.

The immense potential of fundamental discovery science

Fundamental discovery science is necessary for generating new knowledge and as a starting point for innovation. It is curiosity-driven, aims to expand knowledge at large and does not usually generate findings that have immediate applications in society or the economy. However, it has immense potential in the long-term. Some of the fundamental discovery science performed decades ago is now having a large impact on society. Similarly, fundamental discovery science performed now will help in providing solutions for future challenges.

For example, plant-based meat analogues with a similar appearance and taste to animal products are a good solution for people who are concerned about animal welfare or environmental issues or have dietary restrictions. The “Planted Foods” spin-off founded by former ETH Zurich doctoral and master students in Food Process Engineering produces and distributes such products, which mimic conventional products – not only in texture, but also in taste, appearance and nutritional value – almost perfectly. The successful elaboration and commercialisation of these products was only possible thanks to knowledge acquired much earlier by researchers at ETH Zurich and others working in the basic research fields of extrusion viscoelastic fluid systems and the structuring mechanism of proteins.

Another good example is our improved understanding – thanks to recent advances in theoretical mathematics – of how spheres of the same diameter can be stacked in the most compact way possible in high dimensional spaces. These results emanate from fundamental discovery science but have important practical applications in everyday technology – for example, in the analysis of crystal structures or in troubleshooting signal transmission of mobile phones, space probes or internet connections. These scientific advances, for which an EPFL professor earned the 2020 Latsis Prize, have broad potential for telecommunication systems.

Similarly, the effective optimisation of water and wastewater treatment processes is based on rigorous fundamental discovery science. One example is the use of ozonation in the treatment of drinking water or wastewater in order to break down a wide range of micropollutants. This method was developed thanks to previous fundamental studies on ozone decomposition in water, such as those conducted at Eawag in the early 1980s. Scientists at Eawag continue to focus on the chemistry of water ozonation and especially on the potential formation of undesirable by-products. These findings have considerable potential for the upgrading of hundreds of wastewater treatment plants across Switzerland in the next 25 years.

State-of-the-Art Large-Scale Research Infrastructures and Platforms

The ETH Domain conceptualises, develops and operates a portfolio of large-scale research infrastructures and platforms that offer unique resources and services for research communities within the higher education sector in Switzerland and abroad as well as for industry users. The ETH Domain's large-scale research infrastructures contribute play a major role in the country's international reputation. The ETH Domain contributes to the coordination of large-scale research infrastructures at the national level by participating in the Swiss Roadmap 2023 process.

Conceptualisation, development and operation of large-scale research infrastructures and platforms

Context

The ETH Domain owns and operates a unique portfolio of large-scale research infrastructures and technology transfer platforms. These offer notable opportunities for academia and industry, boost innovation and provide solutions for the advancement of cutting-edge research. The ETH Domain's large-scale research infrastructures give scientists from Switzerland and abroad access to unique research opportunities and training and promote technology transfer through numerous collaborations with industry. The institutions of the ETH Domain play a leading role internationally with regard to the conceptualisation, development and operation of world-class large-scale research infrastructures and platforms, and also ensure their open access for research communities, based on scientific excellence and transparent selection processes.

Prerequisites

Stable and reliable funding of the ETH Domain by the Swiss Confederation allows the ETH Domain to invest in large-scale research infrastructures for the benefit of the entire Swiss higher education and research landscape, and of industrial partners.

Internationality and academic openness are core prerequisites for the development and operation of the ETH Domain's large-scale research infrastructures (see Enabling Factors, p. 13). Open access for researchers from around the world should continue to be granted, as it is a reciprocal process and the access to and development of facilities abroad are of great benefit to Swiss researchers.

The coordination of large-scale research infrastructures is necessary at the national and international level. On the national level, this coordination takes place through the Swiss Roadmap process led by SERI, and on the European level through the ESFRI (European Strategy Forum on Research Infrastructures) Roadmap.

Measures 2025–2028

- The ETH Domain continues to devote adequate resources to conceptualising, developing and operating large-scale research infrastructures and platforms of national and international importance. The ETH Domain institutions guarantee their availability to the scientific community and – subject to the charging-on of costs – to industry as well, and ensure their appropriate governance based on good practice.
- The ETH Board accords strategic priority to selected large-scale research infrastructures that were submitted to the Swiss Roadmap 2023 process (see p. 34-36). Decisions regarding the implementation of these projects are to be taken in 2023, after completion of the scientific review conducted by the Swiss National Science Foundation (SNSF) and the evaluation by the ETH Board of the feasibility and financing scheme. Thus, the infrastructures described below serve as an indication only. The ETH Board also considers

supporting the continuation of Catalysis Hub (Cat+), a large-scale research infrastructure of strategic priority launched in the period 2021–2024.

Large-scale research infrastructures of strategic relevance submitted to the Swiss Roadmap 2023 process.

Five substantial upgrades of existing large-scale research infrastructures and three new projects were prioritised by the ETH Board for submission to the Roadmap 2023 process.).

Substantial upgrades of existing large-scale research infrastructures

1. **Swiss Data Science Center+ (SDSC+).** The importance of data science, machine learning and AI, as well as their potential impact on countries' economies and societies, are widely recognised. The Swiss Data Science Center (SDSC) was established in 2017 as a joint venture between EPFL and ETH Zurich, with hubs at both campuses. A third hub at PSI was added in 2021. The aim of SDSC is to accelerate the use of data science and machine learning technologies by researchers in the ETH Domain and the Swiss academic community at large, as well as by the industrial sector. The increasing demand across all research areas for these technologies has positioned the SDSC as a leading and unique centre of expertise for these fields in Switzerland. The expansion of the SDSC into a decentralised national digital infrastructure (SDSC+) would help to increase the scope of its activities nationwide. It would also play a central role in shaping the ORD landscape of Switzerland by accelerating ORD best practices. This Swiss-wide scientific service platform would be open to the entire Swiss community, including academia, industry and the public sector.
2. **Sustained Scientific User Laboratory for Simulation and Data-based Science at CSCS (HPCN-28).** High-performance computing is undeniably a key technology for both science and businesses, as it is able to process large data sets and perform complex calculations at very high speeds. In 2009, the Swiss Federal Parliament approved the High-Performance Computing and Networking (HPCN) initiative and mandated the ETH Domain and ETH Zurich in particular with its implementation at the Swiss National Supercomputing Centre (CSCS) in Lugano. The resulting CSCS User Lab has now become one of the leading research infrastructures of its kind internationally. It is an essential service facility for Swiss researchers, helping them to address diverse issues and requirements – from the pure calculation of complex problems to the analysis of large data volumes. HPCN-28 would be a substantial upgrade of its predecessor infrastructure at the CSCS and would represent the continuation of the HPCN initiative for the ERI period 2025–2028. It would include an upgrade of the computing and data infrastructure at CSCS, as well as the development of further services in collaboration with PSI and EPFL. Besides the institutions of the ETH Domain, MeteoSwiss and a number of Swiss higher education institutions are directly involved in the development of the CSCS through various collaboration projects.
3. **Neuro-Health Technology Hub.** Neurological disorders are a major cause of mortality and disability worldwide, yet little is understood about how the brain works and how these disorders arise. A better understanding would lead to improved diagnostic techniques and treatments. This calls for interdisciplinary research and innovation, as well as sophisticated equipment and research infrastructures. The Neuro-Health Technology Hub aims to bring together infrastructures and expertise in the areas of neuroscience, neurocomputation, neuroengineering and clinical neuroscience located in the Lake Geneva region. The Hub would be developed jointly by EPFL, the University of Geneva and the Geneva University Hospitals, thus building on initiatives that have already been launched by these entities. It would enable existing infrastructures to be linked and equipment to be acquired or upgraded, thereby helping to advance imaging, computational and simulation technologies. The Neuro-Health Technology Hub would also leverage supercomputing resources through collaboration with the CSCS.

4. **Swiss Fusion Hub.** Controlled nuclear fusion has the potential to provide humanity with an abundant and environmentally friendly source of energy. Nuclear fusion does not give rise to any CO₂ or other harmful emissions into the atmosphere or to long-lived radioactive nuclear waste. Scientists and engineers from all over the world are investigating ways to control fusion energy. The Swiss Plasma Center located at EPFL is part of this international effort. It is working towards a better understanding of fusion and plasma physics. It is also performing a series of tasks relating to the activities of the EUROfusion Consortium with a view to the development of ITER, the world's largest fusion experiment and the first fusion plant able to produce net energy. (NB: Due to Switzerland's exclusion from the European Framework Programmes for Research and Innovation, its participation in ITER is currently suspended). The aim of the Swiss Fusion Hub at the Swiss Plasma Center is to substantially upgrade two of its existing infrastructures (one located at EPFL and one at PSI). These upgrades would make it possible to address some of the key challenges facing physics and technology on the way to fusion energy and allow Switzerland to remain at the forefront of plasma and fusion research.
5. **IMPACT – Isotope and Muon Production with Advanced Cyclotron and Target Technology.** The High Intensity Proton Accelerator (HIPA) facility at PSI, which features the world's most intense continuous beam muon source, has numerous applications – notably in material science, particle and life sciences. It is one of the main large-scale research infrastructures of the ETH Domain and is intensively used by scientists from all over Switzerland and abroad. IMPACT would be a substantial upgrade of the HIPA facility, with two new installations. One of these would enable novel and much improved experiments in particle physics and material science, with increases in muon rates by a factor of up to 100. The other would aim to produce innovative (and otherwise unavailable) radionuclides for the diagnosis and therapy of cancer. IMPACT is thus highly relevant for the advancement of particle physics, material science, life sciences and medical research. It would be realised in collaboration with the University of Zurich and the University Hospital Zurich in order to fully exploit their respective and complementary expertise.

New large-scale research infrastructures

1. **ETH Quantum Research Infrastructure (ETH QuRI).** Quantum technology is recognised as having enormous potential for secure communication, advanced computation and simulation capabilities, and for overcoming current limits in sensing and metrology. While fundamental research continues to be a key pillar of quantum science, translation of quantum technology into concrete applications is becoming increasingly important. ETH Domain researchers have played a leading role in advancing this field for more than a decade. They aim to stay at the forefront with ETH QuRI, which would build on and bring together expertise, infrastructure and initiatives already in place at ETH Zurich, EPFL and PSI and combine physics, material science and engineering for advancing quantum technology and its application. ETH QuRI aims to give Swiss researchers, start-ups and both large enterprises and SMEs access to the expertise, sophisticated equipment, facilities and infrastructure required for quantum technology research, development and application. With the Quantum Center, the Center for Quantum Science and Engineering, the recently opened ETH Zurich – PSI quantum Computing Hub and the possibilities offered by SLS 2.0 and SwissFEL, ETH Zurich, EPFL and PSI contribute complementary activities and infrastructures, and are thus ideally positioned to coordinate ETH QuRI.
2. **EM-Frontiers.** Electron microscopy (EM) has revolutionised our understanding of materials and biology. In biology, EM has provided significant insights into a number of biological questions of medical relevance, including in the fields of cancer, neurodegenerative diseases and infectious diseases by enabling the visualisation of protein structures. In material sciences and chemistry, EM can simultaneously provide information on the structure and chemical composition of complex materials at the

atomic scale. Scientists around the world now aim to push out the limits of EM detection and resolution even further in order to open up the field to new discoveries. EM-Frontiers seeks to provide researchers in the ETH Domain and throughout Switzerland with the tools to remain at the forefront of this technology and continue leading the development and application of EM. To do so, EM-Frontiers would bring together existing expertise, infrastructures and activities of Empa, EPFL, ETH Zurich and PSI, as well as of several cantonal universities, thus enabling the acquisition of complementary equipment and the development of collaborative research. EM-Frontier would rely on advanced data analyses using machine learning and AI and would therefore collaborate with SDSC.

- 3. Swiss Biosites for Sustainable Agriculture and Agroecology (SISAL).** Sustainable agriculture is at the core of many global societal challenges, from climate change to biodiversity loss to food security. In Switzerland, the high population density as well as the proximity of cultivated areas, forests and freshwater bodies call for more holistic and sustainable approaches to agroecosystems management and food production. Properly addressing these challenges requires coordinated efforts across numerous disciplines and across ecosystem boundaries within agricultural landscapes. Under the leadership of ETH Zurich and in collaboration with EPFL, WSL, Eawag, and Empa, SISAL would coordinate and extend the activities of agroecological research sites, facilities and services across Switzerland. It would complement the activities at Agroscope, and collaborations with universities and institutions outside the ETH Domain are planned. SISAL would develop innovative technologies, establish or upgrade state-of-the-art research facilities and devise new data acquisition and treatment methods, the aim being to identify and implement the most promising solutions in the interests of sustainable agriculture and food production/processing.

Investing in large-scale research infrastructures for the benefit of the entire Swiss higher education and research landscape

The ETH Domain institutions allocate considerable financial resources to research infrastructures for the benefit of national and international scientific communities, and of industry users.

The large-scale research infrastructures on the PSI campus demonstrate the uniqueness of the ETH Domain's infrastructure portfolio and the diversity of its users. PSI is the only institution in the world where four complementary and complex large-scale research infrastructures are jointly operated at one site and under one organisation: synchrotron, neutron and muon sources as well as an X-ray free-electron laser. Every year, more than 2,500 scientists from Switzerland and around the world use these facilities for their scientific experiments.

Some of the methods applied at these large-scale research infrastructures have now developed into powerful methods applied routinely by scientists across a broad range of disciplines. An example of such technology development is the success story of X-ray spectroscopy and tomography using synchrotron light at the Swiss Light Source (SLS). This methodology initially served a limited group of experts in physics and materials sciences but has been significantly developed, automated and simplified in recent years and thus has become available to a much larger scientific community. This is reflected in the increasingly broad spectrum of users from chemistry, biology, medicine and industry who now routinely use these methods at the SLS.

To ensure that the scientific community and industry continue to have access to research facilities at the forefront of technology, the Swiss Confederation, the ETH Domain and PSI are investing in a major upgrade of the SLS in the ERI period 2021–2024. This project shall ensure a beam quality of the X-ray beam arriving at the SLS experimental stations that is on average 40 times better than the current one. All existing applications and methods shall immediately benefit from this upgrade, which will also enable entirely new applications and provide solutions for multidisciplinary users.

Founded in 1991, CSCS – the Swiss National Supercomputing Centre in Lugano – is another example of a unique facility that has been continuously developed and upgraded for the benefit of a large range of users spanning various disciplines. CSCS, which is a part of – and is operated by – ETH Zurich, develops and operates a cutting-edge high-performance computing infrastructure as an essential service facility for researchers. It is used by scientists for a diverse range of purposes – from high-resolution simulations to the analysis of complex data, both key elements of cutting-edge science and research. Since 2011 it has run a scientific user lab that is available to domestic and international researchers through a transparent, peer-reviewed and open access process. CSCS's resources are open to academia, and are also available to users from industry and the business sector. MeteoSwiss is one of the external partners of CSCS and uses units of the CSCS supercomputer for the production of its daily weather forecasts, an essential service provided to Switzerland and its population.

The Swiss Data Science Center (SDSC), founded in 2017 by EPFL and ETH Zurich, is also one of the major research infrastructures of the ETH Domain's portfolio. It was established to support ETH Domain researchers with AI, machine learning and data management expertise. A third hub focusing on large-scale infrastructures was opened at PSI in 2021. SDSC collaborates with SWITCH and CSCS for the data infrastructure (e.g. servers, network, authentication), as well as with several industrial partners and the Federal Statistics Office. SDSC has also the potential to contribute to the digital solutions in the field of human health (see also p. 17-19). Thanks to its activities and services, the SDSC can effectively support universities, Swiss industry and public authorities in the use of AI and machine learning techniques, thereby promoting innovation in data science, multidisciplinary research and open science.

Knowledge and Technology Transfer

The ETH Domain institutions actively contribute to Switzerland's innovative capacity by accelerating the uptake of research results into technologies, practice and policy-making, and collaborate with industry and public authorities to that end. They foster entrepreneurship among their members and provide graduates with the skills required to become the main actors of knowledge and know-how transfer between academia and society. Engagement and dialogue with society are emphasised as a central knowledge and technology transfer (KTT) activity.

Contribution to Switzerland's innovative capacity

Context

The ETH Domain institutions produce a wealth of scientific results, know-how, software and technologies in fields such as engineering, natural sciences and life sciences, as well as in the domain of medical technology. Discoveries and technological development are truly made available to society and the economy at large when they find their way into industrial applications and public goods. Although commercial and financial aspects are part of their KTT strategy, the ETH Domain institutions – as publicly funded entities – aim primarily at maximising the societal impact of their research.

The ETH Domain institutions engage with society to raise awareness of the value of research findings and technological innovations. By doing so they encourage the uptake of new technologies by start-ups, established enterprises and the public sector, as well as improving acceptance by the public. They promote fact-based communication as a guiding principle and aim to make science more understandable, accessible and participative (see p. 13). ETH Domain institutions bring the STEM subjects closer to the public and try to get pupils interested in them through a wide range of outreach activities.

Prerequisites

Enabling environments, notably the innovation parks of Switzerland Innovation, are essential for KTT activities.

The ETH Domain depends on favourable framework conditions that allow for straightforward interactions with third parties from the private and public sectors. While partnering with industry or public authorities, the ETH Domain institutions need to maintain their autonomy, for example in terms of decisions regarding personnel, areas of research or publications.

Measures 2025–2028

- The ETH Domain institutions intensify and diversify their KTT activities, as well as their collaborations with industry and the public sector. They increase their visibility as valuable academic partners and actively support cooperation between industry and academia. They engage in a dialogue with associations and representatives of industry (such as Economiesuisse or Swissmem) to properly understand and cater for the needs of Swiss industries.
- The ETH Domain institutions remain important partners for national and international non-governmental institutions, including those that are active in the humanitarian sector or in sustainable development.
- The ETH Domain institutions continue to play a key role in the innovation parks of Switzerland Innovation, as well as in the AM-TTC (Advanced Manufacturing Technology Transfer Centers) by actively contributing to their development. They establish and consolidate collaboration projects with companies present at the innovation parks and support the two established AM-TTC “ANAXAM+” and “Swiss m4m Center” in their efforts to increase their exposure and marketing activities.

- The activities linked to engagement and dialogue with society are continued, enhanced and stepped up, and are prioritised by the ETH Board in its Strategy 2025–2028 through a dedicated Strategic Area “Engagement and Dialogue with Society” (see p. 24-25). The institutions of the ETH Domain take account of the learnings from the coronavirus pandemic when developing their activities (such as the fact that different stakeholders in science and politics have different roles, approaches, tasks and responsibilities).
- The ETH Domain institutions continue to meet their responsibility for delivering high-quality services in the context of the so-called “tasks assigned to the ETH Domain by the Swiss Confederation” (previously known as “national tasks”).
- The Ecotox Centre intends to expand its competencies in the period 2025–2028 to strengthen soil ecotoxicology and risk assessment as recommended by the recent evaluation, assuming that additional funding can be provided. The federal Office for the Environment (FOEN), the Federal Office for Agriculture (FOAG) and the “Konferenz der Vorsteher der Umweltschutzämter der Schweiz/Conférence des chefs des services de la protection de l’environnement” (KVU/CCE) endorse this expansion as well.
- In the context of the Memorandum of Cooperation signed by the Swiss Confederation with the ESA Space Agency, the ETH Domain intends to establish a Swiss ESA Centre of Excellence – provided the necessary financial means are granted. The Memorandum of Cooperation aims at establishing a framework to accelerate the adoption and availability of deep technology innovation for the benefit of ESA and its Members States, ESA’s activities and programmes and the Swiss and European space sector at large (“Deep-Tech Innovation”).

Promoting innovation in the ETH Domain and KTT through people

Context

The ETH Domain institutions offer various instruments and programmes to identify, promote and develop the entrepreneurial aptitudes of their students and employees, and to encourage the creation and successful development of spin-offs. For example, they assist spin-offs in searching for seed or venture funds as well as helping students and employees to participate in national networks, and they operate business incubators.

The ETH Domain’s highly qualified graduates make one of the biggest contributions to the transfer of knowledge and know-how to Swiss society when they take on professional activities in the private or public sector. In addition, members of the ETH Domain institutions share their expertise and knowledge by consulting and participating in advisory and scientific boards, as well as serving on national task forces.

Prerequisites

Scaling up these various instruments and programmes to support students and researchers in KTT activities requires substantial resources and thus adequate basic and competitive public funding. This is also true for bridging fundamental to applied research and innovation, and for funding the first steps from innovation to application.

Measures 2025–2028

- KTT through people is further encouraged. The ETH Domain institutions are actively encouraging their graduates and departing employees to establish early contacts with industry, public administration and non-governmental organisations, for example by supporting them with career centres. They also develop and nurture a network of alumni who are professionally active in the private and public sectors.
- KTT across the institutions is supported through collaborations and overarching projects between ETH Domain institutions and with external partners, using appropriate instruments.
- The ETH Domain institutions step up their efforts to raise awareness among their students and employees of the socio-economic value of research results and intellectual

property. KTT activities are regarded as important elements of excellence; they are both encouraged and expected of researchers.

- The institutions scale-up and diversify their instruments, programmes and incentives to stimulate inventions and business ideas and to bring intellectual property to market. The institutions especially target women and underrepresented groups when developing these activities and support tools.

The diversity of KTT activities

KTT activities in the ETH Domain are very diverse and go well beyond the usual concepts of licencing, patenting or creating spin-offs. Pathways to knowledge and technology dissemination take various forms, including cooperation with industry and public services, scientific and subject-specific consulting activities, education (incl. continuing education), engagement with the public, promoting Open Science, providing services and platforms to society, research communities and industry, etc. The ETH Domain institutions continuously explore new pathways to be able to effectively transmit knowledge, scientific results and technologies to society and the economy.

NEST, the modular research and innovation building that opened in 2016 on the Empa and Eawag campus, is a well-known example of alternative efforts for KTT between research and industry. NEST provides a unique test environment with real-world conditions for projects in the areas of construction and the living environment, making it possible to validate and accelerate the market entry of new products, systems or technologies. It bridges the gap between technologies that work on a lab scale on the one hand, and their development and testing for marketable applications on the other. In the various NEST units, more than 100 partners from industry and academia are now actively involved. With up to 1,000 visitors per month, NEST contributes to an important dialogue with society by acting as a central knowledge transfer and demonstration platform.

The National COVID-19 Science Task Force is another highly visible example of the engagement of ETH Domain researchers – together with other specialists – in the transfer of knowledge between science and society. Created at the beginning of the pandemic, the task force has brought together experts from across the Swiss academic landscape on a voluntary basis to share their expertise with political decision-makers, the public, hospitals, medical professionals and industry. Such cooperation between science and politics allows public authorities to rely on scientific facts when taking decisions and should be seen as essential for addressing other major challenges facing Switzerland today and in the future. The National COVID-19 Science Task Force was one of the ETH Domain’s many contributions to combatting the coronavirus pandemic. Other notable contributions include the surveillance of the propagation and evolution of the coronavirus by measuring its presence in wastewater treatment plants and the creation of the SwissCovid mobile phone app for contact tracing.

The ETH Domain institutions are also very involved in scientific outreach, whether to the general public, professionals or public authorities. Digitalisation can be seized as an opportunity to enable and diversify outreach activities. The online tools “FORTE” and “FORTE future” developed by WSL as part of the Swiss National Centre for Climate Services is a good example of how digital tools can be used for targeting various audiences. Data collected or modelled through several research projects have been aggregated into the user-friendly tools “FORTE” (which provides information on the current conditions of Swiss forests) and “FORTE future” (which projects their probable state in the future). These tools can serve as an important and science-based source of information for forest managers, owners and decision-makers, but also for teachers, journalists and other interested parties. Now that a simplified application, “FORTE edu”, has been developed, younger individuals (pupils) can access this information as well.

C. Key Transversal Tasks

In addition to its core tasks the ETH Domain is responsible for further key tasks that are transversal to all the other activities, such as providing attractive and respectful working conditions, sustainable real estate management, and strategic and proactive financial management.

Attractive Careers and Positive Work Culture

The ETH Domain institutions foster an inspiring, inclusive and respectful environment for all their employees and students. They develop and exploit new forms of work. Diversity is recognised as key to excellence and creativity, whether in research, in education or in all other activities. The ETH Domain institutions are stepping up their efforts to increase the proportion of women among their members, especially in professorial and management positions.

Context

The ETH Domain is committed to excellence in all areas. This commitment must also extend to its ability to assess and continuously improve working conditions so as to remain attractive to outstanding talents from around the world and to encourage academic careers. The ETH Domain institutions provide attractive working conditions for all their employees and training opportunities for apprentices. They recognise that a culture based on dialogue, transparency, mutual respect and confidence are core elements of attractive working conditions. A particular focus is placed on the personal integrity of all members. Targeted prevention campaigns, training programmes and institutional processes are used to raise awareness of psychosocial risks and to combat bullying, victimisation, harassment, racism, discrimination, threats, violence and the abuse of power. Measures to strengthen civil courage are gaining in importance. The institutions of the ETH Domain also offer conditions conducive to a good “life-Domain balance”. The ETH Domain institutions have taken numerous measures in recent years to improve the situation and professional perspectives of their scientific staff and aim to continue their efforts in this direction. Leadership development for professors and supervisors at all levels is in place to meet the challenges relating to working and learning conditions.

Prerequisites

An inspiring and international working environment is a key enabling factor (see p. 13) and plays a major role for recruiting talents from Switzerland and abroad and for training the students for the global workplace. Also, talented doctoral students and postdocs must be given the opportunity to work and stay in Switzerland after completion of their education so that they can make an active contribution to Swiss society and the economy in the long term.

Measures 2025–2028

- The institutions of the ETH Domain continue to foster a diverse and inclusive working, learning and research environment while actively involving different target groups in the process. They are continuously working on developing and diversifying measures to increase the proportion of women in education and research, as well as in management positions, including professors and senior scientists. They aim to improve gender ratios in administrative and technical occupations as well. They uphold equity in recruitment processes, encourage academic careers of women and their promotion, and offer a working culture free of gender stereotypes and biases. Equal Opportunities/Gender Action Plans of the institutions are continuously updated. An ETH Domain strategy on diversity is elaborated for the years 2025–2028 on the basis of the current Gender Strategy but integrating a broader concept of diversity.

- The ETH Domain institutions expand their respective policies to further dimensions of diversity (such as ethnic and generation diversity, gender identity and sexual orientation) and promote the recruitment of people with physical and mental disabilities, combating stigmas and enabling barrier-free work. They further promote a culture of respect and stereotype-free interactions. Targeted measures are developed to combat and penalise all discrimination.
- As part of the prevention of psychosocial risks, the institutions of the ETH Domain regularly assess their institutional culture at work.
- ETH Domain institutions and their employees are encouraged to embrace new forms of work, technological advances and digitalisation to harness their benefits and to continuously develop their respective skills. To support this, adequate learning formats or opportunities are provided at all levels, with continuing education further developed to that end. Awareness of the risks and responsibilities associated with personal data collection and exchange is part of the training possibilities and processes put in place by the institutions.
- The ETH Domain institutions assess the situation and professional perspectives of their scientific staff at the intermediate level. They develop measures to support them (in particular doctoral students and postdoctoral fellows) in taking on attractive leadership positions in academia, but also in industry, public administration and non-governmental organisations.

Key elements for exemplary working conditions in the ETH Domain

Equal opportunities and gender balance. Strategies and action plans are continuously developed and are aimed in particular at the aspects of gender, diversity, inclusion, family-friendliness and life-Domain balance. The ETH Domain focuses on increasing diversity and creating an atmosphere of respect, offering flexible working conditions, and providing support in stressful situations.

Respect. The working environment is characterised by appreciation, security and respect, which guarantees the dignity and integrity of each person. The ETH Domain empowers its members to stand up against inappropriate behaviour. The institutions raise awareness for a respectful culture and provide support with contact points, counselling centres and professional conflict management. Grievance procedures are reinforced so as to ensure fairness.

New forms of work. In a dialogue with their employees, the ETH Domain institutions are actively shaping the working conditions of the future, which are characterised by the desire for more flexibility in terms of the place of work, working hours and new forms of collaboration. There is a need for more flexible approaches to work opportunities and career development for co-workers above 50 years of age, as well as flexible and sustainable retirement arrangements for those between 60 and 70, without prejudicing the career possibilities of younger employees and researchers. Flexible working forms must be compatible with family-friendliness.

Mental health. Students and employees receive the necessary support to maintain their mental health through counselling services and the development of networks to help them cope with potential stress experiences in the context of study and work.

Leadership. The continuous support and development of employees at all levels (including professors) from hiring through to retirement is highly important. Superiors empower employees and students towards self-responsibility and to strive towards more interdisciplinary and flexible forms of work. The importance of a leadership independent of hierarchies is underlined. Organisational structures and procedures at all levels to foster a culture of trust, empowerment and inclusiveness are continuously evaluated and improved.

Development and career opportunities. The ETH Domain supports its members with targeted measures and programmes for their personal development, for honing their talents and shaping their working environment. Maintaining the employability of its members for both internal and external careers is a central objective.

Sustainable Real Estate Management

The ETH Domain maintains and develops its real estate portfolio in order to offer the best conditions for education, research and KTT. The institutions' efforts focus on the functionality (incl. accessibility), cost-effectiveness and sustainability of existing and new buildings, and on maintaining their value and function. The ETH Domain aims to act as a role model in terms of sustainability.

Context

The ETH Domain uses an extensive real estate portfolio owned by the Swiss Confederation. The quality of the ETH Domain's built infrastructure makes a key contribution to the international competitiveness of Swiss education and research and thus represents a strategic asset. Campuses, with multiple buildings at a single location, provide the best conditions for ensuring an appropriate architectural setting and encouraging sustainable practices that take society, the environment and the economy into account while fulfilling the mandated tasks. Given the specific energy-intensive nature of research and of research infrastructures the ETH Domain as a whole is a major consumer of energy. The targets set by the Federal Council in its Energy Strategy 2050¹ and the Federal Administration Climate Package² present major challenges for the ETH Domain.

The constant growth in student numbers, together with new approaches to innovative teaching and learning, as well as the development of research areas – and consequently the increase in the number of professorships – is generating demand for space and infrastructure. Meeting this demand in the medium to long term will be challenging, yet it is important that the financial requirements for real estate do not disproportionately affect the resources available for the ETH Domain's core tasks.

Prerequisites

The sustainable management of the real estate portfolio must be geared to the specific needs and tasks of the ETH Domain. Chosen sites must be both available and easily accessible, and permit the development of clusters in conjunction with education, research and KTT partners.

Some construction projects are long-term schemes. Maintaining and developing the real estate portfolio must be properly safeguarded with long-term viable financial measures and stable federal funding.

Measures 2025–2028

- The ETH Board and the ETH Domain institutions ensure that the development of the ETH Domain's real estate portfolio is affordable within the framework of their basic funding. They conduct prudent resource planning, coordinated with education, research and KTT, while also adopting innovative approaches (including developing and rolling out new workplace and learning-place concepts to reduce space demand). Management of the real estate portfolio is geared more closely to these aims, supported by transparent real estate accounts.

¹ [Energy Strategy 2050](#)

² [Federal Administration Climate Package \(available in German and French only\)](#)

- The ETH Domain continues to implement organisational and infrastructural measures in order to act as a role model in all areas of sustainability. To this end, it systematically reduces and offsets its CO₂ emissions induced by building operations and invests in further improving energy efficiency while increasing the production and utilisation of alternative energies. Carbon-free operation of the institutions is regarded as an overall vision, and – while not directly linked to real estate management – also includes business travel and other areas of operation.
- The ETH Domain expects that additional funding needed for special measures and government programmes relating to energy and the environment, as well as other requirements, will be made available by the Swiss Confederation as the contracting party and owner.
- With the increasing internationalisation of the ETH Domain, the availability of affordable student housing is of strategic importance. Hence, the ETH Domain supports the creation of affordable student housing by non-profit organisations.

Strategic and Proactive Financial Management

The institutions have a sound financial base and pursue sustainable, accountable financial management and planning to ensure long-term financial stability. As part of this corporate responsibility, they actively manage financial reserves and, together with the ETH Board, aim to further use them strategically from 2025 to 2028. When allocating the federal funds, the ETH Board takes account of the institutions' tasks, strategic requirements and performance.

Context

Academic systems require a solid financial base to implement their objectives, which are mostly long-term in nature. Sufficient financial resources are an important prerequisite for strengthening the national research landscape and positioning the ETH Domain institutions at the forefront of international competition with technology-intensive research (see Enabling Factors, p. 14). The federal government provides the lion's share of funding. Its stable development forms a reliable basis for maintaining strategic room for manoeuvre and freedom of education and research. Third-party funds as well as reserves also contribute to entrepreneurial flexibility. Third-party funds are raised from public and private organisations or individuals.

Diversifying funding sources is both a strategic necessity and a challenge. On the one hand, targeted diversification permits sustainable securing of funding and thus long-term investment decisions in strategically important resources, such as professorships and research infrastructures. Both the establishment of new professorships and the construction of large-scale research infrastructures and platforms tie up substantial financial resources over the long term. On the other hand, there are limits to the growth in third-party funding as the funds from competitive research grants do not fully cover indirect project costs, which must therefore be co-financed from the available – and in this respect limited – federal funds. Where donations and third-party financing are concerned, it is important to safeguard the strategic conformity of research projects as well as their academic independence and, in general, to manage follow-up costs.

By building up adequate financial reserves, the institutions are able to quickly seize opportunities, (pre-) finance innovative project ideas or infrastructures and flexibly compensate for financial bottlenecks that can arise from unpredictable fluctuations in third-party funding income.

The ETH Domain and its institutions therefore have well-defined rules for the efficient and effective management of financial resources, such as financial directives and

implementation measures that follow best practice. This applies equally to the active management of financial reserves, which are used for teaching and research in a timely manner and in line with strategy.

Accounting in the ETH Domain is based on the International Public Sector Accounting Standards (IPSAS). The IPSAS Competence Center ensures that new standards are adopted promptly and that employees are properly trained in their application. This ensures high-quality reporting and the granting of IPSAS certification.

The internal control system (ICS) minimises financial risks in the institutions and ensures compliance with the relevant legal provisions. In addition, all institutions have a risk management system.

Prerequisites

In order to adequately support developments in education and research, the ETH Board and the institutions of the ETH Domain need financial flexibility and planning security. Only long-term secure funding can achieve this. In this context, targeted diversification and responsible, economical handling of the entrusted financial resources are of central importance.

The federal government expects the ETH Domain to expand its financial base so that its financial resources are used efficiently and in accordance with the defined strategy, and that its financial reserves (as defined in the strategic objectives of the Federal Council for the ETH Domain 2021–2024) are further reduced by 2028.

The ability to create and manage financial reserves is a prerequisite for autonomy. It must not be jeopardised either by overregulation or by conflicting objectives. Being able to create reserves is central for research with its long-term orientation.

Measures 2025–2028

- The ETH Board and the institutions of the ETH Domain exercise sustainable financial management to secure sufficient funds for financing the necessary expansion and development of capacities in education and research as well as targeted investments in the maintenance and further development of infrastructure.
- The ETH Board and the institutions of the ETH Domain ensure that funds are used appropriately and that reserves are actively managed at all levels of the organisation and in accordance with the established directives and regulations. The availability of reserves gives the decision-makers financial flexibility. This promotes entrepreneurial action and economical use of financial resources.
- The institutions of the ETH Domain continue to ensure the necessary framework conditions so that the financial reserves can be used for new strategic priorities in education and research.
- Within the framework of their autonomy, the ETH Domain institutions exploit synergies further to share expertise – and, where possible, to save resources – by cooperating in administration, education and research and by sharing facilities.

D. Organisational Development of the ETH Domain

The ETH Domain strives to best serve Switzerland with an organisation that is highly agile and responsive, and is able to adapt quickly to dynamically changing environments and new challenges and opportunities as well as to ever-increasing complexities. The ETH Domain can build on its unique features to contribute significantly to the competitiveness and performance of the Swiss ERI system as a whole while also helping to increase its resilience.

Over the last decades, the ETH Domain has made organisational adjustments whenever they promised to facilitate and improve its ability to deliver on its stated mission (see p. 11). It shall continue to do so as necessary and in order to align with the defined Strategic Areas (see p. 16-25). In their reflections for an optimal organisation in the future, the ETH Board and the institutions take into account (i) the challenges and opportunities presented to the ETH Domain, (ii) the development and needs of society and (iii) the potential synergies existing within the ETH Domain and the entire Swiss higher education and research landscape.

Optimal organisation of the ETH Domain

All the ongoing reflections and discussions are aimed at optimising the ETH Domain's organisational structure in order to best serve Switzerland. Current considerations and future structural decisions build on the following key principles:

- Increasing flexibility in order to set thematic goals and promote multidisciplinary research programmes
- Sustainably improving the mobilisation as well as the systematic and continuous bundling of the competencies available in the ETH Domain
- Achieving critical mass through the organisational pooling of specific expertise and infrastructures of the ETH Domain institutions
- Strengthening interdisciplinary research at a world-class level, thereby increasing national and international visibility
- Preserving the mission-oriented focus of the research institutes
- Creating a framework that allows external elements to be integrated into the ETH Domain without creating additional institutions
- The integration or inclusion of external elements must be compatible with the overall ETH Domain strategy

The ETH Domain evaluates the future of the strategic initiatives and research infrastructures that were supported in the past ERI periods. Whether consolidation of such activities should take place within the existing Domain structure or whether adjustments to the current organisation are needed must be determined on a case-by-case basis. Finally, the ETH Domain needs to remain responsive to possible initiatives and developments emanating from other parts of the Swiss ERI system, to requests and needs raised by the Swiss Confederation, and to strategic developments that emerge “bottom-up” from within the ETH Domain and its institutions themselves (such as Joint Initiatives, see p. 17, or the initiative “ENRICH – Engagement 4RI for Switzerland”, see p. 48).

For the ERI period 2025–2028, the ETH Domain defines five Strategic Areas (see p. 16-25) and prioritises a set of large-scale research infrastructures (see p. 34-36). It also addresses (i) the future of the centres and platforms that have been created in the context of the Strategic Focus Areas (SFAs) 2021–2024, (ii) the possibility of integrating further research institutes or facilities into the ETH Domain and (iii) ongoing or planned projects in relation to a future optimal organisation of the ETH Domain. Particular emphasis is placed on the future of SDSC, and the potential expansion or integration of PHRT (Personalized Health and Related Technologies) with other efforts, beyond the current ERI period 2021–2024. A possible integration of the Swiss Institute of Bioinformatics (SIB) into the ETH Domain is under consideration, as mandated by the SERI. Finally, the further development of an initiative that was initiated bottom-up by the four research institutes (project “ENRICH – Engagement 4 RI for *Switzerland*”) shall result in closer collaboration within the ETH Domain.

Future of the centres and platforms created in the context of the SFAs 2021–2024

In the context of its Strategic Plan 2021–2024, the ETH Board decided to prolong three SFAs that already started during 2017-2020: Data Science – implemented through the Swiss Data Science Centre (SDSC) –, Advanced Manufacturing (AM), and Personalized Health and Related Technologies (PHRT). The ETH Board decided to finance these SFAs for one more ERI period (2021–2024) but not beyond. Whether these SFAs should be completely phased out after 2024, or whether some key elements (for example technology platforms and centres) should be maintained or even made permanent, are important elements in the elaboration of the Strategic Plan 2025–2028 of the ETH Board for the ETH Domain.

Future of SDSC. SDSC was created in 2017 as a joint venture between EPFL and ETH Zurich (and expanded in 2021 with PSI as the third partner) in order to accelerate the use of data science and machine learning technologies by researchers of the ETH Domain. Its value for the ETH Domain institutions past 2024 is undoubted. Thus, the SDSC should continue to exist – no longer as a joint project, but rather in a more stable form that will allow it to support research in years to come. This development is also an opportunity to expand the scope of the SDSC in order to provide support not only to the ETH Domain institutions, but to the Swiss academic community at large, as well as to public authorities and the industrial sector. Indeed, the increasing demand across all research areas for machine learning and AI has positioned the SDSC as a leading and unique centre in Switzerland. The vision of a national expansion of SDSC – also evaluated in the context of the Swiss Roadmap 2023 process– can only be realised through sustained financial support from all stakeholders (see also p. 22 and 34).

Future of centres and platforms created in the context of PHRT. The PHRT initiative was designed for integrating the ETH Domain’s expertise in bio-technologies and molecular and cellular data into medically applicable algorithms and platforms. The implementation of the tools developed depends on close collaboration with universities and university hospitals. The ETH Domain is evaluating which technology platforms, centres, hubs and other specific structures should remain in place beyond 2024, and plans to continue its cooperation with the Swiss Personalized Health Network (SPHN) to enable the implementation of digitalised patient data in optimised diagnostics and treatments. This may involve establishment of a national repository for health data, which will facilitate both the clinical application of such information and ensure that it is available for research. This vision will require a high level of coordination between the involved Swiss higher education institutions, hospitals and other actors from the ERI and healthcare sectors.

Beyond the SFA AM. The SFA AM was designed to enable Switzerland’s scientific and technical community to contribute to the development of new advanced manufacturing technologies, as well as their transfer and introduction into industrial

applications. Beyond the period 2021–2024, research projects in the area of advanced manufacturing are expected to find other funding sources and schemes. Technology platforms or professorships that have emanated from the SFA AM are aligned with the medium- to long-term strategies of the ETH Domain institutions and shall be partially funded by these institutions.

Possible integration of SIB within the ETH Domain:

The SIB is an internationally recognised non-profit organisation dedicated to biological and biomedical data science. It provides the national and international life-science community with a state-of-the-art bioinformatics infrastructure, including resources, collaborative support and services. The SERI has mandated an expert group to reflect on the general framework conditions to reorganise the SIB and on the possibility to integrate it or parts of it into the ETH Domain. Regarding the parts of SIB that could be transferred to the ETH Domain, the idea of association with or integration into the SDSC shall be explored. The integration of SIB –or parts of it– would require appropriate adaptation of the ETH Domain’s budget.

ENRICH – Engagement 4RI for Switzerland

The four ETH Domain research institutes (4RI) complement the two Federal Institutes of Technology and seek to further strengthen this complementarity through the bottom-up initiative “ENRICH – Engagement 4RI for Switzerland”. ENRICH is jointly run by the four research institutes PSI, WSL, Empa and Eawag with the aim of using existing resources in a structured and targeted manner, and to better exploit existing synergies. ENRICH works towards this goal through a series of concrete projects. The organisation and business model for these projects build on learnings from other existing successful collaborative projects and on best practices.

Strategy for cooperation and locations

The ETH Board has defined a Strategy for the ETH Domain institutions’ associated locations, working with cantonal or international partners. The ETH Board is thus responding to a request from the Federal Council (objective 5.6 of the strategic objectives for 2021–2024). More specifically, the strategy provides a definition of locations, the formal procedures at the ETH-Board level for opening a location, as well as the adoption of periodic evaluation processes of the locations (with an adjustable frequency according to needs) and the reinforcement of external communication about the locations.

N.B. The present chapter focuses on the structure of the ETH Domain. In a broader sense, organisational development includes the development of the work culture as well. This aspect – central to the Strategy 2025–2028 of the ETH Board for the ETH Domain – is discussed in greater detail in the section Attractive Careers and Positive Work Culture, p. 41- 42.

VI. Financial Requirements

Sufficient and secure funding from the Swiss Confederation enables the institutions of the ETH Domain to tackle challenges and new opportunities proactively while fulfilling their mission. Only then can they be internationally competitive and serve Switzerland in the best possible way. Therefore, the ETH Board is asking the Federal Council and Parliament to approve an expenditure ceiling of CHF 12,222 million for the ETH Domain for the period 2025–2028 for implementing its overall strategy with appropriate measures. Based on the financial plan for the year 2024, this amount would represent a compound annual growth rate (CAGR) of 2.5% (in real terms) or 3.2% nominal, incl. 0.7% for inflation¹. This plan does not include contributions for organisational development of the ETH Domain that are still under discussion or yet to come, or any additional decisions by the Swiss Confederation (such as a possible integration of SIB, see p. 48).

The ETH Board is earmarking 3-5% of the financial contribution from the Swiss Confederation for the years 2025–2028 as seed and incentive funding to co-finance:

- Joint Initiatives in the ETH Domain's Strategic Areas (see p. 16-25), and for
- Large-scale research infrastructures prioritised by the ETH Board (see p. 34-36).

The lion's share (approximately 95%) of the annual federal funding is allocated to the six institutions as a base budget to enable them to fulfil their mission. The base budget of each institution also covers all shared service functions, such as human resources, communication, information technology, real estate management and financial services. The use of synergies by offering joint services reduces costs and promotes the exchange of know-how within the ETH Domain.

Strategic Areas are transversal thematic priorities that are implemented through existing and new activities of the institutions, and by Joint Initiatives. Contributions of the institutions to the five Strategic Areas fall to a large extent into their core tasks. Thus, activities within Strategic Areas are largely financed through the institutions' base budget. Strategic Areas are also implemented through **Joint Initiatives**, which are defined as large, time-limited collaborative initiatives in one or more Strategic Areas that include at least two institutions of the ETH Domain. A collaborative initiative of an institution with (an) external partner(s) only is not excluded. Co-financing by the ETH Board and the involved institutions of the ETH Domain may be envisaged on the basis of a matching fund scheme.

For the period 2025–2028, the ETH Board gives strategic priority to a selection of **large scale research infrastructure projects** submitted to the Swiss Roadmap 2023 (*SDSC+*, *HPCN-28*, *Neuro-Health Technology Hub*, *Swiss Fusion Hub* and *IMPACT* as substantial upgrades of existing large-scale research infrastructures and *ETH QuRI*, *EM-Frontiers* and *SISAL* as new projects). Decisions regarding the implementation and co-funding by the ETH Board of these projects are to be taken in 2023, after completion of the scientific review conducted by the Swiss National Science Foundation (SNSF) and evaluation by the ETH Board of the feasibility and financing scheme. The ETH Board also considers supporting the continuation of *Catalysis Hub (Cat+)*, a large-scale research infrastructure of strategic priority launched in the period 2021–2024.

¹ As given by the SERI and based on economic projections in early-to-mid 2021 (see p. 52)

Core Tasks

Top-quality research-based education

The development of curricula and enhanced offerings in education and continuing education, as well as innovative teaching approaches, require more investment. Also, the estimated increase in student numbers both from Switzerland and abroad (estimated at around +3.5% per year in total for both ETH Zurich and EPFL in the period 2025–2028) calls for major efforts to ensure high-quality education. It implies favourable conditions in terms of human resources and infrastructure, including digital technologies and learning space, which are to be financed primarily through the institutions' base budget. Adequate investments in education and continuing education are necessary to counteract the skills shortage in Switzerland. In this context, it is also worth noting that education in engineering, exact and natural sciences, life sciences and medicine is expensive by comparison with other fields.

World-class research

Performing research at the highest international level requires considerable financial investment in human resources as well as in equipment, technical facilities and real estate. With a financial scenario representing a compound annual growth rate (CAGR) of 2.5% (in real terms), about 45 additional professors could be hired between 2025 and 2028 (+1.1% per year). This would guarantee strong links between education and top-level research, create new opportunities in research and education, strengthen already established areas of research and enable advances into new ones, especially in the identified Strategic Areas for the ETH Domain. Most importantly, it would provide sufficient scope and resources to conduct fundamental research in the long term. The implementation of measures related to ORD also requires appropriate funding.

State-of-the-art large-scale research infrastructures and platforms

The ETH Domain devotes substantial financial resources to maintaining and operating existing large-scale research infrastructures and platforms, and to developing new ones. These investments are needed to keep large-scale research infrastructures and platforms highly competitive at the international level, and to benefit national and international scientific communities in both the public and private sectors. The costs associated with the operation and maintenance of existing research infrastructures and platforms are largely covered by the institutions themselves and fees for users from the private sector. The investment costs in new large-scale research infrastructures or substantial upgrades may be co-funded by the ETH Board through centrally planned funds and/or by third-party contributions.

Knowledge and technology transfer (KTT)

Scaling up the various instruments and programmes to support students and researchers in KTT activities requires significant resources. This also holds true for bridging the gap between fundamental and applied research and for funding the steps from innovation to application. Among other things, the ETH Domain institutions invest in collaboration projects with companies in the different innovation parks and to support start-ups. The science-based services provided by the ETH Domain institutions for the benefit of Swiss society as part of the tasks assigned to the ETH Domain by the Swiss Confederation (previously known as “national tasks”) also absorb a considerable volume of financial resources and are covered by the base budget of the institutions.

Key Transversal Tasks

Attractive careers and respectful working conditions

The ETH Domain institutions provide attractive and respectful working conditions for their employees and invest in opportunities for their professional development. They offer competitive compensation packages to attract the best talents. Also, the ETH Domain spends a given proportion of the Swiss Confederation's overall financial contribution to implement measures supporting the promotion of equal opportunities between women and men (at least 0.5% for the ERI period 2021–2024). This proportion is to be reviewed for the period 2025–2028 in order to include other dimensions of diversity.

Sustainable real estate management

The ETH Domain coordinates property and real estate management and is responsible for maintaining their value and function. Maintaining and developing the real estate portfolio must be properly safeguarded with long-term viable financial measures and stable federal funding. The ETH Domain plans and develops its real estate portfolio in the medium and long term to meet the needs of research and education, as well as the requirements of the federal government.

Additional requirements

The projects and initiatives relevant to the organisational development of the ETH Domain all have different rationales and financial needs. Some are initiated bottom-up and some are of limited scope, while others are large, long-term projects. Others are the result of decisions or mandates by the owner. Also, operating costs are influenced by external factors.

Extension of existing strategic centres and/or integration of new research facilities in the ETH Domain

A potential expansion of centres and platforms created under the SFAs 2021–2024 and/or a possible integration of selected research institutions of national importance, pursuant to Article 15 of the Federal Act on the Promotion of Research and Innovation (RIPA), would require additional organisational and financial resources.

The vision of a national expansion of SDSC can only be realised through sustained financial support from all stakeholders and thus may require additional financial means from the Swiss Confederation. This would apply in particular if the SIB were integrated into the ETH Domain. The integration of SIB – or parts of it – into the ETH Domain would require an appropriate adaptation of the ETH Domain's financial plan.

Reduction of CO₂ emissions and measures for environmental sustainability

The reduction of CO₂ emissions to net zero forms part of the national and international objectives to be reached by 2050. In order to fully support these goals and be exemplary in this area, the ETH Domain seeks to reduce its own CO₂ emissions at the source. However, continuing to implement the necessary organisational and infrastructural measures requires sufficient financial resources.

The ETH Domain expects that additional funding needed for special measures and government programmes relating to energy and the environment, as well as other requirements, will be made available by the Swiss Confederation as the contracting party and owner.

Expansion of the tasks assigned to the ETH Domain by the Swiss Confederation

- The ETH Domain intends to establish a Swiss ESA Centre of Excellence – provided the necessary financial means can be granted. This would fulfil the requirements of the Memorandum of Cooperation signed between the Swiss Confederation and the European Space Agency. The budget for the Swiss ESA Centre for Excellence is put at CHF 2 million per year for the period 2025–2028.

- The ETH Domain intends to expand the competencies of the Ecotox Centre in the period 2025–2028 to strengthen soil ecotoxicology and risk assessment, provided the necessary financial means can be granted. An additional CHF 1 million per year would be required to successfully implement this recommendation of the recent evaluation of the Ecotox Centre.

Decommissioning and disposal of the accelerator facilities at PSI

Special funding for the provisions for the decommissioning and disposal of the accelerator facilities at PSI amount to CHF 44 million for the period 2025–2028.

Annual wage measures

Annual wage measures usually include, if applicable, an inflation adjustment and/or a real wage increase plus the effects from the steering of the wage system (individual salary increase), which are all financed through the expenditure ceiling of the respective ERI period. As was seen in the past years, these measures are usually aligned with the annual wage measures taken by the Swiss Confederation.

Inflation

The indicated financial requirements of CHF 12,222 million include an assumed annual inflation rate of 0.7% – as given by the SERI and based on economic projections in early-to-mid 2021 (see also Financial scenarios for 2025–2028, p. 53-54). Since then, projections have changed to accommodate the recent increase in energy and material prices. The current situation is the result of a supply shock, so it is currently uncertain whether inflation rates will increase continuously or whether prices are settling at a higher level. Thus, the trend must be carefully observed in order to address inflation impacts adequately in the planning figures for the expenditure ceiling. Additionally, if the effective inflation rate differs from the projected inflation rate, it has to be compensated through an adjustment of the annual budgets (rolling forward in the annual financial plans based on the Swiss Confederation’s inflation forecast).

Financial requirements 2025–2028 for the ETH Domain		CHF m	12,222
Base budget for the Institutions			
<p>Core Tasks (incl. activities within Strategic Areas)</p> <ul style="list-style-type: none"> - Top-quality research-based education - World-class research - State-of-the-art large-scale infrastructure and platforms (co-funding) - Knowledge and technology transfer - Joint Initiatives in the Strategic Areas (co-funding) 	<p>Key Transversal Tasks (incl. shared services functions and operating costs)</p> <ul style="list-style-type: none"> - Attractive careers and working conditions - Sustainable real estate management - Proactive financial management 		
Tasks assigned by the Swiss Confederation ("National tasks")			
Centrally planned funds/co-funded activities			
<p>Co-funding of Joint Initiatives in the Strategic Areas</p> <p>State-of-the-art large-scale infrastructures and platforms</p>	<p>Further strategic projects and special funding</p>		
<p><i>Note: These financial requirements do not include financial needs for the organisational development of the ETH Domain that are still under discussion, nor the expansion of Tasks assigned by the Swiss Confederation or any future additional requirements of the Swiss Confederation.</i></p>			

Financial scenarios for 2025–2028

In view of the ERI Dispatch for the period 2025–2028, the SERI has mandated the ETH Board to prepare its Strategic Plan 2025–2028 for the ETH Domain according to three financial scenarios. They are represented as the target, medium and low financial scenarios below (see also p. 58).

- **Target financial scenario:** scenario with a CAGR of +2.5% (real). This favourite scenario is used by the ETH Board to elaborate its present Strategic Plan for the ETH Domain.
- **Medium financial scenario:** scenario with a CAGR of +1.5% (real).
- **Low financial scenario:** scenario with a CAGR of +0.5% (real).

Based on the financial plan for the year 2024 (CHF 2,822 million, as shown in the 2021–2024 financial plan as of 27 August 2020), and in accordance with the low, medium and target financial scenarios given by the SERI, the scenarios result in funding requirements for the ETH Domain of CHF 11,633 million, CHF 11,925 million and CHF 12,222 million, respectively, for the period 2025–2028. These sums include compensation for inflation according to projections dating of early-to-mid 2021 (see also p. 52).

The ambitions and measures described in the present Strategic Plan 2025–2028 of the ETH Board for the ETH Domain are based on the expectation of at least the target financial scenario (CAGR of +2.5% real). This favourable scenario would support a progressive development of the ETH Domain.

The impact of the lower two funding scenarios proposed by the SERI (medium and low) are mentioned below. *(N.B. Due to the timing of the Strategic Plan's publication, it is not possible to prioritise initiatives and projects at this stage).*

Consequences of the medium financial scenario (CAGR of +1.5% real)

Under this restrained scenario, the development of the ETH Domain would be hesitant. Recruitment of new employees, especially professors and group leaders, would be limited. ETH Zurich and EPFL would be able to increase the number of professors by 16 (+0.4% per year) in the planning period. Since the number of students is expected to increase by around +3.5% per year in the same time frame, the ratio of students to professors would deteriorate significantly.

The establishment of new, innovative research and teaching areas would be restricted. Planned initiatives in the Strategic Areas of the ETH Domain may only be pursued with a delay and funding for Joint Initiatives may only be partially secured. Digitalisation activities shall be prioritised, but specific measures, including the ones planned for ORD, may progress with some delay. This may impact the development of data management tools and Open Science as well.

Under this scenario, a reduction of CO₂ emissions at the source would be challenging. The exemplary function expected of the ETH Domain in this area by the Federal Council is not cost-neutral and needs adequate federal funding.

This scenario may at least delay investments in new large-scale research infrastructures of national importance (according to the Swiss Roadmap 2023), as their conceptualisation, long-term maintenance and operation are cost-intensive. This has implications not only for the ETH Domain but also for all potential users in Switzerland and abroad.

Renovations and new investments for the necessary extensions of spaces may be delayed. Sustainable real estate management and investments required for developing innovative and modern education approaches would be hindered. Also, maintaining the value of real estate – as expected by the Federal Council – would be challenging.

The ETH Domain institutions plan to scale up the various instruments and programmes to support students and researchers in KTT activities. Under this scenario, this scaling-up would be limited.

Consequences of the low financial scenario (CAGR of +0.5% real)

Under this critical scenario, the ETH Domain would hardly be able to develop further, and in the worst case would even fall behind. This could subsequently have an adverse effect on the international recognition and competitiveness of the institutions, and alter their positions in international rankings. Major reprioritisations would be necessary. The optimal conditions for fundamental discovery science would be at risk, as it would be difficult to provide researchers with sufficient scope and financial resources to boldly explore scientific areas.

Due to limited federal funds, recruitment of new employees, especially professors and group leaders, would be greatly limited or even put on hold. Third-party funding may be used to recruit professors – but only to a small extent, as such funding is usually granted only temporarily. Thus, under this scenario there would be virtually no increase in the number of professorships between 2025 and 2028, and possibly even a decrease. Since student numbers are expected to increase by 3.5% per year in the same period, the ratio of students to professors would deteriorate dramatically, with a negative impact on the quality of teaching and learning.

The establishment of new, innovative research and education areas would be severely limited. Initiatives in Strategic Areas would not be pursued as planned. Hardly any new Joint Initiatives would be launched, unless there is major reprioritisation. Digitalisation activities, and especially measures planned for ORD, data management and data science, would be slowed down.

The Federal Council's targets a reduction of CO₂ emissions by 2030, a necessary path to net zero by 2050. Under this scenario, the exemplary function expected of the ETH Domain would be jeopardized, as a significant reduction of CO₂ emissions at the source would be extremely challenging to achieve.

This scenario would also greatly impair the maintenance and thus the long-term viability of existing large-scale research infrastructures of national importance. Also, it would cause the ETH Domain to delay or even cancel investments in new high-cost infrastructures, as their long-term maintenance and operation would not be secured. This would not only impact the ETH Domain but also all the potential users in Switzerland and abroad. It may also affect services provided to research communities and industry.

Maintenance of real estate assets would be jeopardised. Sustainable renovations and new investments for necessary extensions to facilities would be delayed or postponed to the next ERI period either partly or entirely. Innovative and modern educational approaches require investment for the redesign of space and infrastructure. Development in this area would be greatly hindered, which in turn would put the quality of education at risk.

The ETH Domain institutions would not be able to scale up the various instruments and programmes to support students and researchers in KTT activities. Nor would they be able to expand their offers to bridge fundamental to applied research and innovation or for funding the steps from innovation to application.

The Strategic Plan in the Context of the ERI Dispatch

For its Strategic Plan 2025–2028 for the ETH Domain, the ETH Board has been mandated by the SERI to take into account the transversal themes that are foreseen for the ERI Dispatch 2025–2028 and core challenges identified for the entire ERI sector. The ETH Board was also requested to prepare its Strategic Plan 2025–2028 for the ETH Domain according to three financial scenarios.

Transversal Themes

The four transversal themes below that are foreseen for the ERI Dispatch 2025–2028 are addressed throughout the Strategic Plan 2025–2028 of the ETH Board for the ETH Domain.

Digitalisation. With the Strategic Area Responsible Digital Transformation (see p. 21- 22), the ETH Domain emphasises the importance of digitalisation and addresses the “transversal” topic in its technological and societal context. The ETH Domain institutions collectively have a long tradition of world-class long-term research and education in the various areas of digitalisation. They also support the Swiss economy and public authorities in meeting the challenges of digitalisation. Several large-scale research infrastructures of the ETH Domain submitted to the Swiss Roadmap 2023 process also aim to develop fields associated with digitalisation (see p. 34-35). Education programmes and continuing education offers are developed in light of society’s high demand for digitalisation skills (see p. 26, 29 and p. 42). Cybersecurity is also central for the successful digital transformation promoted by the ETH Domain (see p. 22, 26 and 42). The ETH Domain drives forward the implementation of Open Science and Open Research Data with appropriate measures (see p. 31-32).

Sustainable Development. The ETH Domain is committed to sustainable development – in environmental, social and economic terms – in and through all its activities, from education to research, KTT and in the construction and maintenance of its real estate portfolio and large-scale research infrastructures (see also Guiding principles, p. 12). The ETH Domain dedicates a Strategic Area for the period 2025–2028 to Energy, Climate and Environmental Sustainability (see p. 19-21). The institutions of the ETH Domain seek to achieve a leading global position in this area in their education and research activities. They also strive to provide their services in the most environmentally friendly and resource-conserving way possible, but without compromising their primary mission. They act as role models in the innovative and responsible construction and operation of their facilities (p. 43-44).

Equity. The fundamental principles of diversity, equal opportunities and inclusion are recognised as a premise for a creative and qualitative learning and working environment, and thus a prerequisite for academic excellence (see p. 12). They also ensure that full use is made of the talent potential existing in Switzerland, and they strengthen social cohesion. Equity is thus a prerequisite for the successful fulfilment of the mission of the ETH Domain (see also p. 11). Equity is central to the positive work culture that the ETH Domain wants to promote (see p. 41-42).

National and International Cooperation. National and international cooperation are of crucial importance. They are key to high standards of quality in education and research, and to the development of large-scale research infrastructures (see also p. 13, 26, 30 and 33). Collaboration within the ETH Domain is encouraged with Joint Initiatives (see p. 17) or projects such as *ENRICH – Engagement 4 RI for Switzerland* (see p. 48). Also, collaboration and cooperation with Swiss industry and public authorities are essential to KTT (see p. 38). The ETH Board continues to develop its strategic approach to fruitful cooperation both with the various Swiss regions and with other nations (see p. 48). The ETH Domain underlines the importance of participating in international collaborations and networks. Thus the

institutions, together with the ETH Board, are doing their utmost to help ensure that Switzerland becomes fully associated with the European Framework Programmes for Research and Innovation in the near future (see p. 30). They also pursue other forms of international cooperation and partnerships, both within and beyond the European Union.

Core Challenges for the ERI Sector

Long-term consequences and lessons of the COVID-19 crisis

The coronavirus pandemic has impacted the activities and functioning of higher education and research institutions in many ways. Long-term consequences and lessons learned from this period are manifold.

Agility and responsiveness. The institutions of the ETH Domain were able to adapt effectively and quickly to the organisational changes in teaching, research and working conditions imposed by the coronavirus pandemic. This response was only possible due to the agility of the institutions, their capacity to respond rapidly to challenges, and the resources available (especially human, technological, digital and financial resources). Thus, the pandemic has clearly demonstrated that sufficient and stable resources are a prerequisite for anticipating and responding swiftly and efficiently to emerging challenges (see also Enabling Factors, p. 14).

Education. The switch to completely digital teaching was successfully implemented at ETH Zurich and EPFL following a smooth and very short transitional period. Many lessons can be learned from this period, especially in view of the projected increase in student numbers (p. 27-28 and box p. 29). Digitalisation and online courses can offer some solutions for optimising space capacity and compensating the increasing ratio of students per faculty. However, these solutions have their limits as they may impact on education quality as well as students' satisfaction and well-being in the long term. Also, these solutions are not equally applicable to all programmes, especially for those that rely to a great extent on practical work.

Research. Many researchers in Switzerland and abroad have reoriented their research to combat the pandemic. Their innovative capacity and readiness to tackle new challenges have been exceptional, and have led to the rapid development of knowledge and technology for the benefit of society and patients. While such approaches have been shown to be very efficient in the context of the coronavirus pandemic, research communities, funding agencies and decision bodies must continue to safeguard the value and support given to fundamental and exploratory research (see also p. 30 and box p. 32). Also, the coronavirus pandemic has demonstrated the importance of European and further international collaborations and cooperation in terms of research (see above in the section Transversal Themes on p. 55-56). These have been developed by higher education and research institutions through long-standing relationships and networks and have proven essential to tackling global challenges.

Knowledge and technology transfer. During this extraordinary period, where applicable solutions were needed fast, technology transfer was accelerated to its full potential. It became particularly clear how valuable close partnerships between the institutions of the ETH Domain and industry are. Also, the pandemic has opened many people's eyes to the importance of scientific knowledge and its translation into effective solutions. The ERI sector should build on this impulse to strengthen the exchange between science, industry, politics and society so as to face future global challenges together. The coronavirus pandemic has also reminded the scientific communities that mistrust in science and research must be taken seriously and tackled (see also p. 24).

Improving effectiveness and efficiency

The ETH Domain institutions strive for greater effectiveness in their various activities. Cooperation and collaboration between the ETH Domain institutions and with other higher education and research institutions in Switzerland play a major role in that regard (see also Transversal Themes above, p. 55-56). In education, for example, collaborations are used to

expand and diversify teaching and supervision possibilities (see p. 28). Regarding large-scale research infrastructures, the coordination of cost-intensive projects in the ETH Domain is ensured at the national level through the Swiss Roadmap process, in which the ETH Domain participates (see p. 33). The HEdA ensures the coordination of the entire Swiss higher education sector and thus its effectiveness and efficiency (see p. 8). Together with other ERI actors, the ETH Board continues to preserve and sharpen the distinct profiles of higher education institutions in Switzerland (see p. 27). Within the framework of their autonomy, the ETH Domain institutions exploit mutual synergies to share expertise and possibly save resources by cooperating in administration, education and research and by sharing facilities (see p. 45). Finally, discussions and decisions regarding the organisational development of the ETH Domain are also aimed at increasing effectiveness (p. 46-48). The initiative “ENRICH – Engagement 4RI for Switzerland”, launched by the four research institutes, aims to use existing resources in an even more structured and targeted manner, and to better exploit existing synergies (see p. 48).

Taking account of the findings of the intermediate evaluations of the ETH Domain

The ETH Domain is evaluated by an international panel of experts every four years half-way into the ERI period. The findings and recommendations of this Intermediate Evaluation are incorporated into the elaboration of the ERI Dispatch for the following ERI period and especially into the Federal Council’s strategic objectives for the ETH Domain.

For its Strategic Plan 2025–2028 for the ETH Domain, the ETH Board has taken into account findings from the 2019 Intermediate Evaluation that have implications for the ETH Domain up to the 2028 horizon. The implementation of the recommendations is thoroughly addressed and reported in other documents.

Other themes affecting higher education policy in Switzerland

In addition to the transversal topics and core challenges, a number of other topics are relevant to the entire Swiss higher education system.

Promotion of young scientists and future experts to alleviate the shortage of skilled staff in Switzerland. Educating Switzerland’s future engineers and scientists is a core task of the ETH Domain, described on pages 26–29 in the present Strategic Plan 2025–2028 for the ETH Domain. Also, the promotion of scientific careers is addressed on pages 41-42. The ETH Domain institutions bring the STEM subjects closer to the public and try to stimulate pupils’ interest in them through a wide range of outreach activities (see also p. 24-25).

Reduction of university drop-out rates. ETH Zurich and EPFL seek to provide optimal conditions for their students to be successful in their studies (see p. 26–27). This concept includes tackling avoidable student drop-outs. ETH Zurich and EPFL already have targeted measures in place to address this challenge and support prospective and enrolled students, such as providing preparatory courses (“Brückenkurs” at ETH Zurich and the “Cours de mathématiques spéciales–CMS” at EPFL) or splitting examination sessions.

Promoting the mobility of higher education institutions’ members. The promotion of student mobility is addressed on page 27 of the Strategic Plan 2025–2028. The mobility of employees and especially researchers is encouraged through collaborations and cooperation with other academic and research institutions and through KTT activities with industry and the public sector (see p. 30 and 39-40, and Transversal Themes, p. 55-56).

Financial Scenarios

In view of the ERI Dispatch for the period 2025–2028, the SERI has mandated the ETH Board to prepare its Strategic Plan 2025–2028 for the ETH Domain based on the three defined financial scenarios. These scenarios and associated consequences are thoroughly discussed in Chapter VI, “Financial Requirements”, on p. 53-54. A summary table can be found on p. 58. Due to the early publication of the Strategic Plan 2025–2028 of the ETH Board for the ETH Domain, the prioritisation of initiatives and projects under the different scenarios cannot be described in more concrete form here. Additional information may be given at a later date to inform the ERI Dispatch during its elaboration.

Financial Scenario	Target	Medium	Low
Financial annual growth rate (real)	+2.5%	+1.5%	+0.5%
ETH Domain and institutional development	progressing	hesitant / restricted	halted/regressing (major reprioritisations required)
Education			
- Annual increase in Bachelor and Master student numbers ¹	+3.5%	+3.5%	+ 3.5%
- Student per professor ratios	slight deterioration	significant deterioration	dramatic deterioration
- Education quality	ensured	ensured (in the short term)	at risk
Research			
- Annual increase in professorships ¹	+1.1%	+0.4%	-0.5% ²
- Research projects and activities in Strategic Areas	full potential	delays	severely restricted
- Digitalisation and Open Science	strategic prioritisation	strategic prioritisation (possible delays)	slowdown
Large-scale research infrastructures			
- Maintenance and operation of existing infrastructures	secured	secured	secured (in the short term)
- Development of new infrastructures (or substantial upgrades) ³	feasible	feasible but with delays	difficult/very restricted
Knowledge and Technology Transfer (KTT)			
- Existing KTT activities	continuing	continuing	reprioritisation required
- Scaling up instruments and programs	possible	difficult	not possible
Careers and working conditions	secured	secured	secured (potential hiring freeze)
Real estate			
- Renovations and extensions	possible	hindered (possible but with delays)	delayed or postponed to the next ERI period
- Preservation of value	feasible	challenging	jeopardized
Reduction of CO₂ emissions⁴	feasible (to some extent)	challenging	jeopardized

¹ Approximations, numbers provided by ETH Zurich and EPFL

² The decrease in professorships can be minimally compensated by third party funding, to avoid loss in numbers

³ According to the Swiss Roadmap 2023 and subsequent decision by the ETH Board

⁴ Effective reduction at the source in order to be exemplary in this area

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