ETH BOARD

2019 Intermediate Evaluation of the ETH Domain

Response of the ETH Board to the Recommendations of the Expert Committee

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Adopted by the ETH Board on 25/26 September 2019

ETH zürich

EPFL

PAUL SCHERRER INSTITUT
PSI

WSL Swiss Federal Institute for Forest,
Snow and Landscape Research WSL

Empa
Materials Science and Technology

eawag
aquatic research

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1. Executive Summary

Every four years, in the middle of its funding period, the ETH Domain is thoroughly evaluated by an international panel of experts mandated by the head of the responsible department of the Swiss Federal Council. The ETH Board was eager to learn from the 2019 Intermediate Evaluation how the experts view the ETH Domain's standing and role in the Swiss higher education and research system, and how they consider it should be further developed to maintain its international competitiveness while also serving Switzerland's needs. The ETH Board greatly appreciates the forward-looking orientation of the recommendations, which will support the ETH Domain's future development in the interests of society and the economy.

Based on strategic considerations in response to the experts' recommendations, the ETH Board has defined the following **top-priority measures:**

- The increasing global competition and major scientific and societal challenges call for a thorough **review of the ETH Domain's organisational structure**. Major criteria of the review concern the ETH Domain's agility and flexibility for setting thematic goals that address pressing societal, humanitarian and economic needs, and its ability to foster multi-disciplinary research programmes that deliver innovative solutions for sustainable development. The review has begun by addressing the structure of, and cooperation within, the ETH Domain and will subsequently involve external partners (incl. universities, universities of applied sciences and Federal Offices).

- The current partial revision of the ETH Act will further improve the internal **governance** of the ETH Domain, taking due account of the specificities associated with leading and supervising higher education and research institutions.

- **International openness** and multilateral cooperation are essential for the global competitiveness and positioning of the ETH Domain institutions. Access to international networks and participation in international research schemes (notably Horizon Europe) are of paramount importance for remaining competitive internationally, for the development of young Swiss academics and for Switzerland's ability to address societal challenges.

- The ETH Domain institutions will strengthen and further develop their **continuing education** offering, specifically addressing former graduates of ETH Zurich and EPFL as well as persons with different educational backgrounds to equip them with the digital skills necessary to face the digital challenge in their respective leadership positions.

- Human resources are the key factor for the ETH Domain's successful future development. The ETH Board emphasises the importance of high standards of **leadership and management** and will ensure that adequate processes are in place in all ETH Domain institutions.

- **Reserves** are crucial: each institution of the ETH Domain will manage its reserves to foster the institution's strategic development and to drive forward new scientific fields and initiatives.

- Communication with the general public and with stakeholders is of utmost importance. The ETH Board recognises the need to broaden the scope of the ETH Domain's **communication** efforts, emphasising the impact of the institutions' research endeavours and services to society and how they can help shape society's transition processes.

The recommendations of the 2019 Intermediate Evaluation identify or confirm important strategic action fields and help to accelerate the processes to implement the respective and appropriate measures. Defining and implementing them at the ETH Domain and the institutional level will require joint efforts by the ETH Board and the institutions as well as a corresponding timeframe. The ETH Board is convinced that implementation of the outlined measures will properly equip the ETH Domain for tackling future challenges.

2. Response to the Recommendations in Six Strategic Action Fields

It is the prime mission of the ETH Domain to serve Swiss society through education, research, technology transfer and scientific services. The ETH Domain alleviates shortages in the skilled workforce, in particular in the STEM[1] area, helps Switzerland to proceed on the pathway to digitalisation, collaborates with industry on new technologies, provides the public sector with information for science-based policy making at the national and local level, and provides scientific services and assumes national tasks for the good of society. Through interdisciplinary research and – with increasing importance – transdisciplinary approaches which involve the social sciences and public stakeholders, the ETH Domain delivers solutions and strategies to meet unprecedented societal, economic, and environmental challenges of the 21st century. At the same time the ETH Domain is committed to excellence in all areas of activity with the goal of remaining internationally competitive and attractive and thus serve Switzerland's economy and society with science-based solutions in the longer term too. The ETH Domain's continued emphasis on engineering and basic sciences, and the design, building and operation of open-access, large-scale research infrastructures serve this long-term goal, paving the way for scientific breakthroughs and pioneering technologies and thus feeding the innovation chain for future generations.

The ETH Board is pleased by the experts' general assessment of the ETH Domain as an excellent education and research system and concedes that such excellence must go hand-in-hand with the highest standards of leadership culture and internal support processes in the ETH Domain.

The ETH Board responds to the recommendations of the experts in six clusters of statements (chapters 2.1 - 2.6). These represent important strategic action fields for the Board. All 22 recommendations are considered, while some recommendations are addressed in more than one cluster. The ETH Board's detailed responses to each of the recommendations are given in chapter 3.

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[1] Science, technology, engineering and mathematics, including computer and communication sciences, in analogy to the German term MINT (Mathematik, Informatik, Naturwissenschaft, Technik)

2.1. ETH Domain Strategy and Structure

Referring to Recommendations
#21: Strategic Focus Areas
 #4: Research and Research Infrastructures
#22: Digitalisation
 #6: Fostering Innovation
#10: Structure of the ETH Domain
#14: Autonomy of the Institutions

The ETH Board welcomes the forward-looking nature of the recommendations concerning the ETH Domain's strategy and structure. They will help to even better fulfil the Domain's mission. In its Strategic Planning 2021–2024 the ETH Board emphasises a number of challenges that lie ahead: "The globalisation of science and the economy, the digital revolution and massively increased investment in science and education by certain large nations present major challenges for the ETH Domain institutions, as do limitations in terms of both human capital and financial resources. These factors challenge the institutions' ability to thrive, attract the world's best talent, perform high-impact research and provide first-class education for future students."[2] In order to respond to these challenges, the institutions must be able to further advance in several areas to ensure future success.

- With the ETH Domain's **strategic focus areas (SFAs)**[3] and by focussing on key **research infrastructures**[4] of national importance which also have to pass a thorough selection process, the ETH Board bundles activities in the ETH Domain and provides the necessary financial means for their implementation. Through such initiatives and many other initiatives at the institutions (in many cases in conjunction with external partner institutions), inter- and **multidisciplinary research** is promoted by exploiting the full potential of the engineering and basic sciences within the ETH Domain. Examples of such initiatives are those in the field of medicine that are implemented in collaboration with hospitals, where the institutions of the ETH Domain provide the natural and engineering sciences inputs. The SFAs incorporate central aspects of **digitalisation** in their respective fields and contribute to diffusion of digitalisation throughout the ETH Domain and beyond. They do so by reaching out to industry, or by providing the health sector and other sectors with secure and sustainable foundations for making use of digitalisation. Efforts to promote digitalisation to other fields, as well as to exploit its potential for teaching and learning, are well underway in the institutions. The ETH Board expects that the adoption of suitable models for cooperation between the ETH Domain institutions and external partner institutions will reinforce Switzerland's leadership position in these areas[5].

- Knowledge and technology transfer is one of the core missions of the ETH Domain, and drives **innovation** in Switzerland and elsewhere. The ETH Domain's impact is manifold: by educating students for a highly skilled labour force, collaborating with large industry as well as with small and medium enterprises, or spinning off new companies, the institutions of the ETH Domain contribute to Switzerland's innovative strength[6]. The ETH Board sees a need to further support the development of Venture Capital (VC) instruments in Switzerland, e.g. by featuring spin-offs and start-ups in suitable partner-/membership programmes for VC funds as part of a coordinated ETH Domain effort. It also encourages the institutions to further strengthen their programmes and share best practices[7]. The ETH Domain's innovation capacity may also be strengthened by including research activities abroad that are in line with the ETH Board's strategic position for international subsidiaries[8].

- One of the most important success factors of the ETH Domain is its legal basis: it was founded by the ETH Act of October 4, 1991[9], which gives the Domain its own legal status in the Swiss Higher Education

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[2] Strategic Planning of the ETH Board for the ETH Domain 2021–2024, p. 6
[3] Strategic Planning of the ETH Board for the ETH Domain 2021–2024, p. 24-26
[4] Strategic Planning of the ETH Board for the ETH Domain 2021–2024, p. 28-30
[5] Strategic Planning of the ETH Board for the ETH Domain 2021–2024, p. 22
[6] Annual Report of the ETH Board for the ETH Domain 2018, p. 89-90
[7] Strategic Planning of the ETH Board for the ETH Domain 2021–2024, p. 33
[8] Position Paper on International Initiatives of ETH Domain Institutions (ETH Board, 4/5 March 2015)
[9] put into force February 1, 1993

landscape and allows its institutions the freedom of action they require to strengthen their international competitiveness and position. The current partial revision of the ETH Act serves the needs of the ETH Board and is conducive to the functioning of the ETH Domain.

- The increasing global competition and major scientific and societal challenges call for a thorough review of **the ETH Domain's organisation**. The ETH Board has embarked on an assessment of the **structures and cooperation within the ETH Domain**[10], as well as the interactions pursued with external institutions. The ETH Board is evaluating the organisation of mandate-driven, mission-oriented research with the ultimate intention of sharpening institutional profiles, refocusing activity portfolios, and optimising resource allocation. Major criteria of evaluation concern the ETH Domain's agility for setting thematic goals that address pressing societal, humanitarian and economic needs, and its ability to foster multi-disciplinary research programs that deliver innovative solutions for sustainable development.

It is the ETH Board's primary task to ensure suitable framework conditions for such evolution in the ETH Domain's strategy and development.

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[10] ETH Board decision of 25/26 September 2019

2.2. Cooperation and Collaboration within the ETH Domain and with Outside Partners

Referring to Recommendations
#11: Cooperation within the ETH Domain
 #8: Collaborations with other Higher-
    Education Institutions
#13: Cooperation with Cantons
#12: Institutional Coordination under the HEdA
 #9: Collaborations in the Healthcare Field
#18: International Openness
 #4: Research and Research Infrastructures

Cooperation and collaboration among the six institutions **within the ETH Domain** is driven by academic added value in research and teaching and by the benefits that accrue from synergies in research infrastructure use and in administration. Among many others, the strategic initiatives of the ETH Domain are examples of such cooperation: The SFAs accelerate research in their specific fields through bundling of competencies and (seed) funding by the ETH Board. The research infrastructures from PSI, as well as those from other institutions of the ETH Domain, such as the Swiss High Performance Computing Center (CSCS) of ETH Zurich or the Swiss Plasma Center (SPC) of EPFL among many others, are accessible to researchers from the entire ETH Domain and to further partners from Switzerland and abroad. The schools and the Research Institutes of the ETH Domain exploit their complementarities through over 70 joint professors[11], through thousands of teaching hours provided by the Research Institutes at ETH Zurich, EPFL, and at other universities[12], in numerous interdisciplinary projects as well as through common research platforms, and through collaboration at the administrative level. Collaboration within the ETH Domain is well established and sought after wherever it makes sense.

The cooperation in research often goes well **beyond the ETH Domain** and includes other institutions of the higher education and research sector, many hospitals nationwide, strategic alliances with research institutes of national importance[13], and the private sector. The large-scale research infrastructures of the ETH Domain[14] of national and international importance are excellent examples of cooperation. They are openly accessible and available to researchers within and outside the ETH Domain and bring multidisciplinary teams together[15].

- The ETH Board financially supports the institutions' bottom-up joint research initiatives as part of its four-year strategic planning process in order to promote strategy-driven cooperation within the ETH Domain. Starting with the period 2021–2024, the strategic dimension of the budget allocation within the ETH Doman will also be consistently strengthened. In a specially adapted process, the institutions provide additional strategic information in the context of preparing their budget proposals.

Cooperation between the ETH Domain institutions and the **cantons** and their **higher education and research institutions** strengthens the ETH Domain and the entire Swiss higher education system, as it ensures that the best possible use is made of the system's complementarities and synergies. The approaches of the ETH Domain institutions differ with regard to their cooperation and interactions with the cantons; these reflect their diversity in terms of opportunities as well as Switzerland's political, economic and cultural diversity[16]. The assessment of benefits and costs of the ETH Domain institutions' external sites in various cantons conducted in 2018 came to a positive conclusion in terms of scientific results, publications, collaboration and transfer of technology[17]. Furthermore, the cooperation with the cantons assists local SMEs, fosters the establishment of start-ups and spin-offs, and strengthens the institutions' regional embedding and networking with industry, authorities and the population to boost innovation in the region.

- The ETH Board fully supports the current cooperation approaches with the cantons and their higher education and research institutions. The ETH Board stresses that the models for cantonal cooperation

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[11] SAR Chapter A.4.2, p. 83, joint professors at ETH Zurich or EPFL and the Research Institutes as of October 2018
[12] Annual Report 2018 of the ETH Board for the ETH Domain, p. 88
[13] According to article 15 of the Federal Act on the Promotion of Research and Innovation
[14] SAR Chapter A.1.3, p. 26-28, 41-42
[15] The large-scale research infrastructures at PSI attract over 2,500 users and 1,500 at CSCS per year; Annual Report of the ETH Board on the ETH Domain 2018, p. 52-53
[16] SAR Chapter A.5.1, p. 90-92, 96-97
[17] The ETH Board took note of the individual reports (ETH Zurich, EPFL, WSL, Empa, Eawag) on 4/5 July 2018

will differ due to the historical circumstances of their creation as well as specific regional needs and opportunities. The ETH Board acknowledges the potential in formulating an overarching strategy that will allow the institutions to implement their individual approaches, while exploiting opportunities with external locations for the benefit of the entire Domain and in compliance with the criteria defined[18].

The Higher Education Council (Hochschulrat / Conseil des hautes écoles) plays the key role on the political level in the coordination and cooperation of the Swiss higher education sector in the context of the **Higher Education Act** (HEdA). The ETH Board President participates in this body as a non-voting member. On the academic level, ETH Zurich and EPFL as members of swissuniversities (chamber of universities and specific delegations) are involved in strategic and coordinating actions within the higher education sector[19]. In those areas of the **healthcare** and medical field classified as "high cost" (*besonders kostenintensive Bereiche / des domaines particulièrement onéreux*), there is a particular need for coordination among the actors to maximise the benefits for society and economy.

- The ETH Board expects ETH Zurich, EPFL, and the Research Institutes to take every opportunity to pursue the interests of all ETH Domain institutions in the Swiss higher education sector. The ETH Board strongly encourages ETH Zurich and EPFL to support the mandate of the Higher Education Council granted to swissuniversities to analyse and propose measures for strengthening the universities' profiles and reorganising portfolios – specifically in the "high-cost" areas – by 2020.

- The ETH Board encourages the institutions to participate in shaping the governance of the high-cost areas in order to ensure optimal conditions for research and large-scale research infrastructures. The Board applauds the close cooperation of ETH Zurich and EPFL, PSI and Empa with medical faculties, hospitals and industry based on their specific strengths in the health and medical sciences as well as in related technologies and translational research.

International openness and multilateral cooperation are essential for the global competitiveness and positioning of the ETH Domain institutions. To ensure the sustainability of institutional cooperation and to minimise strategic risks, the mandatory criteria for cooperation at **national** and **international** level – i.e. academic coherence and responsibility, critical mass (of main and external sites) and international competitiveness – will continue to apply. Additional supporting elements include financial agreements and coherence with regional competencies and industrial and economic characteristics[20].

- The ETH Board will continue to apply the criteria defined for national and international cooperation and positioning with regard to international initiatives[21].

The ETH Board expects considerable added value for society and economy to emanate from the institutions' cooperation and collaboration within and beyond the ETH Domain, nationally and internationally.

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[18] ETH Board Position Paper on International Initiatives of ETH Domain Institutions (ETH Board, 4/5 March 2015)

[19] Swissuniversities, Strategische Planung 2021–2024 von swissuniversities zuhanden der Schweizerischen Hochschulkonferenz.

[20] SAR Chapter A.5.1, p. 90-92, 96-97

[21] ETH Board Position Paper on International Initiatives of ETH Domain Institutions (ETH Board, 4/5 March 2015)

2.3. Developing Education for the Next Generation

Referring to Recommendations
#3: Teaching New Skills
#7: Attracting Women to STEM Disciplines
#1: Quality of Teaching
#2: Continuing Education

The ETH Domain's main mission and principal core task is to provide research-based teaching of the highest quality[22]. The study programmes offered by ETH Zurich and EPFL and complemented by the Research Institutes are rooted in a profound knowledge of key disciplines such as exact, natural and engineering sciences, and in a solid technical training. They foster an innovative and entrepreneurial spirit in order – through their graduates – to best serve the needs of economy and society. The strong focus on the STEM fields is crucial, given the high demand in Swiss industry for graduates in these disciplines. Well-established processes are in place to continuously develop and improve teaching and learning outcomes. These processes help to keep curricula up to date, encourage new teaching forms and assure quality.

Continuous efforts are necessary to establish high-quality education programmes in areas that are relevant to the digital society. The expertise of the ETH Domain institutions will be expanded and new study programmes will be set up. Computational thinking[23] as one of the **future skills for the digital transformation** is increasingly perceived by educators, policymakers and researchers as a core element of modern education. The essence of computational thinking is to address problems from any discipline with a coherent process of problem formulation, data representation and the creation of algorithms to produce generic solutions. In parallel, teaching and learning will themselves take advantage of digitalisation. The ability to **evaluate teaching quality and learning outcome using digital technologies** will create added value for teachers, students and the education system at large. Computational thinking is applicable across disciplines beyond STEM and encompasses the social sciences. In this way the ETH Domain is making a major contribution to the transformation of Swiss higher education.

- Computational thinking as one of the **future skills for the digital transformation** shall be introduced in all study programmes.

- An important aim of the transformation of teaching and learning is to make **STEM curricula more attractive to women**. This includes embedding study content of specific interest to women in the programmes, offering mission-oriented projects that link science and engineering to societal needs as well as introducing new teaching methods, and re-shaping curricula and learning settings.

- The ETH Board aims to include initial data from the assessment of **teaching quality** in the next evaluation.

Continuing education is an effective instrument for the transfer of knowledge and technology between academia and society at large (including citizen science[24]). A wide range of practice-oriented continuing education courses are offered on topics that reflect the respective institutional core areas and that combine technology with management and social sciences. Continuing education courses take account of the participants' individual needs and background and give them the opportunity to build up their skills and competencies. The ETH Board sees a particular need for and explores new opportunities to extend continuing education. Its aim here is to retrain the workforce for the digital transformation, to aid industrial rehabilitation and to support education in computer science, programming and computational thinking by educating teachers of all school levels, from primary up to baccalaureate[25]. The schools' alumni and persons with different educational backgrounds will be addressed with new offerings that will equip them with the **digital skills** necessary to face the digital challenge in their respective leadership positions.

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[22] Strategic Planning 2021–2024 of the ETH Board for the ETH Domain, p. 16
[23] Strategic Planning 2021–2024 of the ETH Board for the ETH Domain, p. 18
[24] Swiss Science Council 2018, Citizen Science: Expertise, Democracy, and Public Participation.
[25] Strategic Planning 2021–2024 of the ETH Board for the ETH Domain, p. 23

- The ETH Board expects the ETH Domain institutions to strengthen and further develop this **extension of the current continuing education offering**.

Curiosity-driven basic research remains an indispensable prerequisite for teaching at the highest quality level making the latest scientific developments available for the next generation of students. At the same time basic research feeds the innovation pipeline in the long run. Consequently, upholding long-term investments in basic research keeps Switzerland attractive, as a place for higher education and for research, and competitive. This attracts companies of all size that position themselves at the forefront of developing novel technologies for marketable products and of delivering smart services for society.

2.4. Leadership and Culture

Referring to Recommendations
#15: Leadership and Human Resources
Management
#19: Diversity
#7: Attracting Women to STEM Disciplines

The ETH Domain seeks to maintain and support an inspirational working environment based on the principles of respect, appreciation, equal opportunities and trust. Transparent, reliable structures and attractive employment and working conditions are essential for motivating employees to maximise their performance and for supporting their professional development. The academic environment requires specific and adequate leadership, culture and management based on a participatory style. Employees must exercise a great deal of personal responsibility, initiative and time management to accomplish tasks that often cannot be fully defined in advance.

- The ETH Board emphasises the prime importance of **top-quality leadership and management** in the ETH Domain, as human resources are the key factor for the Domain's successful future development. The ETH Board fully supports the various efforts and approaches by the institutions to strengthen leadership skills and ensure adequate human resources management and will check that respective processes are in place.

  o Management training will be targeted on all categories of employees (faculty and staff) as well as on the individual institution's situation. The exchange of good practices and experience among the institutions will be promoted by the ETH Board to accelerate progress and to exploit joint approaches by the institutions for added value.

  o The importance of career development support open to all staff – including doctoral students and postdoctoral researchers – is recognised and will be fostered by the ETH Board. The institutions choose the most appropriate approaches at the institutional level or jointly with other institutions / partners within or outside the ETH Domain.

  o Procedures to identify internal conflicts at an early stage (weak signals) and to react promptly and appropriately are of great importance and will be developed further. The ETH Board ensures that adequate early warning systems are in place so that conflicts are given due attention and resolved swiftly.

The ETH Domain aims to improve the gender balance among its members by increasing the share of women in education and research, and specifically in management positions and decision-making bodies. The Gender Strategy 2017–2020, adopted by the ETH Board in 2017, outlines an overarching strategy to foster gender balance and equal opportunities for women and men within the ETH Domain[26]. While the broader concept of **diversity** is important to the ETH Domain, the Strategy focuses on the gender dimension in order to adopt an efficient and targeted approach. The Domain's institutions implement the strategy through appropriate measures that are defined in their action plans[27]. The institutions carefully monitor the development of the gender balance and regularly report to the ETH Board. The Gender Strategy will be updated for the years 2021–2024.

- The ETH Board is redoubling its efforts to improve gender balance at all levels and **attract more women to STEM fields**. The Board assents to the recommendation of setting quantitative targets but not quotas. Such targets will be proposed individually by each institution, as they must match the institution's particular situation and include the specific measures needed to achieve them.

- Gender stereotypes and unconscious bias are an impediment to gender balance and equal opportunities. The ETH Board calls on the institutions to take action to raise awareness and sensitivity to stereotypes and bias among all their employees (faculty and staff) through mandatory training.

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[26] ETH Domain Strategy for Equal Opportunities and Gender Balance 2017–2020
[27] Equal opportunity action plans 2017–2020 of the institutions (at one of the Research Institutes the action plan is still under development).

As human resources are recognised as a key factor for successful future development, the ETH Board will emphasise the further improvement of leadership, management and gender balance in the ETH Domain institutions.

2.5. Stable Financial Framework

Referring to Recommendations
#16: Funding
#17: Strategic Funds

The institutions of the ETH Domain enjoy an excellent reputation. In recent years, ETH Zurich and EPFL have moved to top positions in international university rankings. Stable financial support from the Swiss Confederation was one of the key success factors to achieve this goal. It allowed the embrace of new and challenging scientific fields, the recruitment of outstanding faculty, and the modernisation of teaching and learning for the 21st century. The ETH Domain is poised to build on its past success and to face the challenges that lie ahead. In order to implement the measures outlined in its Strategic Planning 2021–2024 for the ETH Domain, the ETH Board is asking the Federal Council and Parliament to approve CHF 11'053 million as the budget appropriation for the ETH Domain for the period 2021–2024. Based on currently planned federal government funding of the ETH Domain for 2020, the overall requirement for 2021–2024 assumes an annual increase in funding of 3.1% (including compensation for assumed annual inflation of 1%)[28]. As a system of internationally oriented institutions which face a growing competition worldwide, the ETH Board considers a special treatment of the ETH Domain in the ERI message as justified.

- The ETH Board welcomes the experts' recommendation for **adequate federal funding** of the ETH Domain in times of growing scientific challenges and societal needs. It reiterates its arguments put forward in the consultative process relating to the motion (17.3977) of the National Council's finance commission to reverse the fund restrictions ('Ausgabenbindung') contained in Art. 50 HEdA[29]: The ETH Board voiced its concern about implementing Art. 50 HEdA – namely, that this must not put the ETH Domain at a disadvantage vis-à-vis Switzerland's other higher education institutions, especially as the operation of the ETH Domain is a Confederation task anchored in Art. 63a of the Swiss Constitution.

- With the introduction of IPSAS[30] in the ETH Domain, the accumulated reserves have become highly visible and might be interpreted as freely available funds instead of funds with varying degrees of dedication. The ETH Board is concerned that the success in acquiring third-party funds and donations might conflict with the ETH Domain's federal funding, although Art. 34b ETH Act guarantees that the federal financial contribution is independent of the institutions' third-party resources. The ETH Board has prepared documentation explaining the nature and purpose of the reserves. Sufficient **strategic reserves** are important for the institutions and provide the necessary flexibility to drive new scientific fields, e.g. by creating new professorships or research groups. The ETH Board supports the institutions in generating additional income and attracting donations, which will build up further reserves in the future. The ETH Domain is preparing a reserve policy that defines a target range for the reserves deemed necessary so that the ETH Board and the institutions have both, the strategic freedom to launch initiatives and the security to cope with the risk of fluctuating revenues[31]. Additionally, the reserve policy will foster an active management of reserves and ensure appropriate reporting at the institutional level as well as strategic controlling by the ETH Board.

Having the flexibility to invest within the ETH Domain is essential to maintain its ability to compete at the global level. Reserves at the level of the ETH Domain and the institutions complement the budgetary framework of the Swiss Confederation granted to the ETH Domain. They allow exploratory research projects or educational initiatives of strategic importance to be "kick-started".

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[28] Strategic Planning of the ETH Board for the ETH Domain 2021–2024, p. 42-44
[29] Letter of the President ETH Board to the State Secretary of January 18, 2018
[30] International Public Sector Accounting Standards, IPSAS, were introduced in the ETH Domain [2015]
[31] Reserven ETH-Bereich: Reservepolitik, Richtgrössen und Bewirtschaftung (ETH Board, 25/26 September 2019)

2.6. Communication and Impact Measurement

Referring to Recommendations
  #5: Communication
#20: Measuring Impact

Trust in science and its processes is of paramount importance for the understanding of society's global challenges. It is also ever more important to ensure that people understand the way science is conducted, especially given that science is increasingly vulnerable to divergent interests which could lead to an over-emphasis on science-based applications with short-term goals. This tendency jeopardises the long-term basic research which feeds the pipeline for future technologies and applications that will guarantee the competitiveness of Swiss industry in the future. The ETH Board concedes that communication with the general public is of utmost importance. In addition, the Board sees a need to engage more proactively with the stakeholders supporting the ETH Domain, i.e. central government (the federal departments that "own" the Domain) as well as the parliamentary chambers and commissions. To that end, the ETH Board considers that the recommendations concerning communication and those regarding the assessment of the ETH Domain's impact to be closely related. It proposes an **integrated communication approach** that makes use, where possible, of **meaningful impact indicators** that go beyond the mere measurement of output.

- The ETH Board recognises the need to broaden the scope of the ETH Domain's **communication** efforts, emphasising the impact of the institutions' research endeavours and services to society and the way they can help shape its transition processes (e.g. in view of digitalisation or the sustainable use of resources). The institutions must also showcase their research infrastructures for the advancement of science on the one hand and for the economy – through the development of novel technologies and the generation of related spin-offs – on the other.

- In its communication activities, the Board must include its viewpoints and positions on the importance of the ETH Domain for Switzerland's education and research framework, and for Switzerland as an innovation location. The ETH Board will support the institutions through its recently established ETH Domain news portal "Sciena.ch". Finally, the Board is eager to point out the pioneering role of the ETH Domain as a leading higher education and research actor for Switzerland.

- Effective communication on impact depends on verifiable accounts of short- and longer-term impact as well as **qualitative and quantitative indicators of such impact** to support them. The ETH Board will explore different approaches and learn from other organisations in order to define, where possible, suitable indicators of impact. Impact indicators as opposed to output indicators may provide much more useful information for the federal departments responsible for the ETH Domain, for the ETH Board and for science communication to the general public[32].

The ETH Board is committed to acting as an "ambassador" for the ETH Domain with the goal of building trust and ensuring public support for long-term investment in science, nationally and internationally. Its communication activities emphasise the importance of favourable framework conditions for the Swiss higher education system, including access to international instruments for the promotion of collaborative research and talent.

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[32] Empfehlungen des Schweizerischen Wissenschaftsrates SWR für die BFI-Botschaft 2021–2024 (p. 56); Swiss Academy of Sciences, Conference 21 November 2018: Beyond impact factor, h-index and university rankings: Evaluate science in more meaningful ways; Swiss Academy of Sciences: swiss academies communications, Vol 13, no 5, 2018: Zur Diskussion: Qualität vor Quantität.

3. Measures in Response to Each of the Recommendations

The ETH Board responds to each of the 22 recommendations listed below.

Please note that the recommendations as presented in the first column of pages 18-32 are an excerpt from the "Report of the Expert Committee" of 19 April 2019. For the full text of the recommendations, please consult the report.

Recommendation	Position of the ETH Board
#1: Quality of Teaching Beyond the efforts made so far, and in consideration of the achievements that it acknowledges, the Expert Committee strongly encourages that further steps be taken to measure and improve the quality of teaching at ETHZ and EPFL.	**The ETH Board agrees with the recommendation.** Well-established processes are in place to continuously develop and improve the quality of teaching and learning outcomes (i.e. the knowledge and skills acquired by the students) and encourage new teaching forms. These processes include evaluations by external experts, strong stakeholder involvement in curricula development, graduate surveys and institutional accreditation procedures (SAR[33] Appendix A.3). The ETH Board welcomes the recommendation and supports exploiting digital technologies to evaluate teaching quality and learning outcomes in order to create added value for teachers, students and the education system at large. **Measures** • The quality management of teaching will be further developed, making full use of digital technologies. Information from the assessment of teaching quality and learning outcomes will be made available for the next intermediate evaluation.
#2: Continuing Education The Expert Committee anticipates a substantial increase in the demand for continuing education; ETHZ and EPFL should further their efforts in providing continuing education of high quality.	**The ETH Board agrees with the recommendation.** A wide range of practice-oriented continuing education courses are offered by ETH Zurich, EPFL and the Research Institutes on topics that reflect the respective institutional core areas and that combine technology with management and social sciences. Continuing education courses take account of the participants' individual needs and backgrounds and give them the opportunity to build up their skills and competencies. The ETH Board welcomes the recommendation and sees a particular need for, and is exploring new opportunities in, the expansion of continuing education offerings, especially digital skills courses, with the aim of contributing to retraining the workforce for the digital transformation. The courses are developed in cooperation with stakeholders from the private and public sectors (SAR Appendix A.3). Offerings for teacher education in computer science, programming and computational thinking are developed in close collaboration with the Universities of Teacher Education. **Measures** • ETH Zurich and EPFL address their former graduates and people from a variety of educational backgrounds with new continuing education courses (online and face-to-face) that will equip them with the necessary skills to face the digital challenge in their respective leadership positions. • ETH Zurich's School for Continuing Education bundles existing

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[33] Self-Assessment Report of the ETH Board for the 2019 Intermediate Evaluation of the ETH Domain

Recommendation	Position of the ETH Board
	offerings and offerings for new target groups in thematic clusters. The focus is on short courses (Certificate of Advanced Studies, CAS), reflecting demand. • EPFL's Extension School offers digital skills courses for people from a variety of educational backgrounds, and the School continuously expands its portfolio.
#3: Teaching New Skills Innovation in course offerings should be continued, in order to combine basic science and engineering courses with computational skills.	**The ETH Board agrees with the recommendation.** The essence of computational thinking is to address problems from any discipline with a coherent process of problem formulation, data representation and the creation of algorithms to produce generic solutions. The ETH Board fully agrees with the recommendation and supports the efforts to apply computational thinking across disciplines beyond STEM fields and encompassing the social sciences (SAR Appendix C.2). **Measures** • ETH Zurich and EPFL vigorously pursue their efforts to promote the digital skills of their graduates and the future STEM labour force. • ETH Zurich and EPFL include computational thinking as one of the future skills for the digital transformation in all study programmes. They reinforce their efforts to get sufficient scientific personnel engaged in teaching to ensure high quality education and student supervision.
#4: Research and Research Infrastructures The Expert Committee expects substantial translational impact from multidisciplinary research; it therefore encourages the ETH Domain to maintain and further develop its effort in this type of research, including internationally competitive research infrastructures and technology platforms.	**The ETH Board agrees with the recommendation.** The research infrastructures and the strategic focus areas (SFAs) of the ETH Domain, together with many other initiatives at the institutions (in many cases in conjunction with external partner institutions), bundle activities, take advantage of the various competencies, and thus promote inter- and multidisciplinary research. Openly accessible research infrastructures, platforms and centres provide the basis for multidisciplinary research. The ETH Board welcomes the recommendation and upholds the leading role of the ETH Domain institutions in developing new – and operating and upgrading existing – research infrastructures of national importance for the benefit of users from academia and industry. In addition, experts from the ETH Domain contribute significantly to international research infrastructures. **Measures** • Through its four-year strategic planning process the ETH Board will continue to bundle research activities, to prioritise research infrastructures and to ensure access to these excellent infrastructures in order to promote inter- and multidisciplinary

Recommendation	Position of the ETH Board
	research.

- In the period 2021–2024 the strategic focus areas Personalized Health and Related Technologies (PHRT), Data Science with the Swiss Data Science Center (SDSC), and Advanced Manufacturing initiated in the period 2017–2020 will be continued in order to realise their full potential. Energy research will continue to be pursued as part of the regular research activities of the ETH Domain institutions. Strategic priority will be given to the following research infrastructures: The Blue Brain Project (BBP), the upgrade of the computing infrastructure (HPCN-24) at the CSCS, the upgrade of the Swiss Light Source (SLS 2.0), and the realisation of the Catalysis Hub as a contribution to catalysis-driven, sustainable chemical processes (incl. provision of fuels and feedstock for a green economy).

#5: Communication

The ETH Board agrees with the recommendation.

Communication remains of utmost importance, in particular with the general public; efforts should be continued to convince the general public of the societal value of investments in science.

The ETH Board welcomes the recommendation and acknowledges that communication with the general public is of utmost importance. It is also ever more important to ensure that people understand the way research is conducted and the societal value of investments in science.

In addition, the ETH Board sees a need to engage more proactively with the stakeholders that support the ETH Domain, i.e. central government (the federal departments that "own" the Domain) as well as the parliamentary chambers and commissions.

The ETH Board also recognises the need to broaden the scope of the ETH Domain's communication efforts, emphasising the impact of the institutions' research endeavours and services to society and the way they can help shape its transition processes (cf. Recommendation #20).

Measures
- The ETH Board, together with the institutions, exploits the news portal "Sciena.ch", which is pooling the information of the ETH Domain centrally to promote communication. This portal will be used to communicate science to the broader public and to emphasise the impact of the ETH Domain on society and the economy (cf. Recommendation #20).
- Dialogue with society is an important pillar of all ETH Domain institutions and will be further strengthened.
- The ETH Domain institutions pursue Open Science initiatives (including open access publications, open research and open science funds). Ease of access to public scientific content will also benefit the communication of research results and the impact on the public.

Recommendation	Position of the ETH Board
#6: Fostering Innovation The ETH Domain should continue to drive world-class innovation. The policies and practices to foster the creation and growth of start-ups[34] require further consideration.	**The ETH Board agrees with the recommendation.** Knowledge and technology transfer is one of the core missions of the ETH Domain, and drives innovation in Switzerland and elsewhere. The ETH Domain institutions very actively promote innovation through various instruments, as well as by means of their intense collaboration with SMEs and industry, their strong involvement with Switzerland Innovation Parks and as members of "Switzerland Innovation", their commitment to Technoparks and business incubators, and in the creation of spin-offs (SAR Chapter A.1.4 and Appendix A.2). Participation as stakeholders in promising spin-offs at an early stage is already a well-established practice. The ETH Board welcomes the recommendation and fully supports the institutions in expanding their innovation capacities. As progress also depends on favourable conditions outside the ETH Domain, the ETH Board sees a need to further support the development of Venture Capital (VC) instruments in the private sector. Research activities abroad, in line with the ETH Board's strategic position, contribute to the ETH Domain's innovation capacity. Access to international innovation funding schemes, namely Horizon Europe – including the new European Innovation Council (supporting innovators from the invention stage through to investment and the scale-up of companies) – is of the highest importance for staying competitive internationally (cf. Recommendation #18). **Measures** • The institutions of the ETH Domain will further explore opportunities to support Venture Capital circles in Switzerland and abroad, and exploit partnership / membership programmes for VC funds as part of a coordinated ETH Domain effort – e.g. by featuring spin-offs and start-ups. • The institutions further strengthen the exchange of best practices within and outside the ETH Domain (e.g. through the swiTT network) to foster innovation.
#7: Attracting Women to STEM Disciplines The ETH Domain should develop a teaching and research program to inspire more women to choose careers in STEM disciplines.	**The ETH Board agrees with the recommendation.** The study programmes offered by ETH Zurich and EPFL and complemented by the Research Institutes are rooted in a profound knowledge of key disciplines such as the exact, natural and engineering sciences, and in solid technical training. The strong focus on the STEM disciplines is crucial, given the high demand in Swiss industry for graduates in these disciplines. The ETH Board welcomes the recommendation and sees the need to make STEM curricula more attractive to women to increase the

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[34] The term "start-ups" is used in the sense of "spin-offs" of the ETH Domain.

Recommendation	Position of the ETH Board
	proportion of female students and doctoral students, thus improving the gender balance.

Measures
- ETH Zurich and EPFL review and – where necessary – revise their curricula and learning settings to make them more attractive to women. Linking science and engineering to societal needs in a meaningful way in course content and study projects has been shown to increase the interest and engagement of women students. New teaching approaches will also be introduced.
- Linking science and engineering to societal needs in study projects applies likewise to the Research Institutes, which continue to offer opportunities for applied bachelor, master, and doctoral thesis projects.

#8: Collaborations with other Higher-Education Institutions

Institutions in the ETH Domain should focus on creating value for Switzerland. This should be achieved by identifying competencies in other Swiss higher-education institutions, and by developing a strategy that takes advantage of the combined strengths.

The ETH Board agrees with the recommendation.

Collaboration is driven by academic added value in research and teaching and by the benefits that accrue from synergies in research infrastructure use and in the administration.

Collaboration has intensified in recent years as demonstrated by the following examples: the joint Master in Cyber Security (ETH Zurich / EPFL) starting in 2019; the Bachelor in Human Medicine of ETH Zurich with the partner Universities of Zurich, Basel and Università della Svizzera Italiana (USI) which started in 2017; the joint ETH Zurich / EPFL Swiss Data Science Center (SDSC) (SAR Chapters A.1.1, A.3.2, C.1.2).

The Research Institutes are open to and benefit from cooperation with Swiss higher education institutions including the Universities of Applied Sciences. They focus on leveraging synergies and avoiding duplication of efforts.

Measures
- ETH Zurich and EPFL support the mandate of the Higher Education Council granted to swissuniversities to analyse and propose measures for strengthening the universities' profiles and reorganising portfolios – specifically in the "high-cost" areas – by 2020 (cf. Recommendation #12).

#9: Collaborations in the Healthcare Field

The ETH Domain, in collaboration with the medical faculties of the universities and with industry, should focus on research and education that will infuse multidisciplinary, digital and technological

The ETH Board agrees with the recommendation.

The ETH Domain institutions have developed close cooperations with medical faculties, hospitals and industry on the basis of their specific strengths in the health and medical sciences as well as in related technologies and translational research (SAR Chapter A.5.4).

The ETH Board agrees with the recommendation to continue the

Recommendation	Position of the ETH Board
competencies, necessary to sustain and improve health outcomes for Switzerland and the world.	successful involvement of the ETH Domain institutions in research and education in the healthcare and medical field and related technologies. In the medical field, the need for coordination between the many actors is acknowledged. The institutions of the ETH Domain set up their research and teaching programmes according to academic needs and the expected value for the economy and society. They represent reliable equal strategic partners for universities, hospitals and research institutes outside the ETH Domain. Examples are the successful launch of the Bachelor in Human Medicine set up by ETH Zurich in close collaboration with the partner universities (SAR Chapter A.1.1); and Agora, a joint initiative between EPFL, ISREC, the Ludwig Institute for Cancer Research, and the Universities and University Hospitals of Lausanne and Geneva (SAR Chapter A.5.4). **Measures** • The ETH Domain institutions, specifically ETH Zurich and EPFL, PSI and Empa, pursue close cooperation with medical faculties, hospitals and industry based on their specific strengths in the health and medical sciences as well as in related technologies in order to advance translational research.
#10: Structure of the ETH Domain The effort initiated by the ETH Board to rethink the structure of the ETH Domain, currently with two large technical universities and four research institutes of varying size, is fully supported. The aim of this effort should be to enable flexibility and agility and to allow the evolution of the Domain in order to address the needs of the future.	**The ETH Board agrees with the recommendation.** Increasing global competition and major scientific and societal challenges make a thorough review of the ETH Domain's organisational structure necessary. The ETH Board strongly agrees with the recommendation and has embarked on an assessment of structures and cooperation within the ETH Domain, as well as the interactions pursued with external institutions. The ETH Board is evaluating the organisation of mandate-driven, mission-oriented research with the ultimate intention of sharpening institutional profiles, refocusing activity portfolios, and optimising resource allocation. Major evaluation criteria concern the ETH Domain's agility in setting thematic goals that address pressing societal, humanitarian and economic needs, and its ability to foster multi-disciplinary research programmes that deliver innovative solutions for sustainable development. **Measures** • The ETH Board prioritises a thorough review of the ETH Domain's organisational structure and plans to establish a world-class transdisciplinary centre of excellence, the "Swiss Federal Institute of Technology for Environment and Sustainability (SITES)" [working title] into which the Research Institutes WSL and Eawag will be integrated. Questions concerned with the possible bundling of energy research activities at PSI and

Recommendation	Position of the ETH Board
	Empa in relation to the centre will have to be clarified in a future-oriented way that is closely coordinated with ETH Zurich and EPFL. • The centre will address urgent challenges and topics for sustainable development in a mission-oriented manner and will intensify coordination and cooperation between all ETH Domain institutions in relation to research activities in this area. • In collaboration with the institutions, the ETH Board vigorously pursues the process that has been initiated.
#11: Cooperation within the ETH Domain Cooperation between the ETHZ and EPFL should be emphasized. Budget mechanisms should be considered that encourage multidisciplinary institutional cooperation within the Domain.	**The ETH Board agrees with the recommendation.** The strategic initiatives of the ETH Domain are, among many others, examples of internal cooperation: the strategic focus areas (SFAs) accelerate research in their specific fields through bundling of competencies and (seed) funding by the ETH Board (SAR Chapter C.1). The research infrastructures of PSI, as well as those of other institutions of the ETH Domain, such as the Swiss National Supercomputing Centre (CSCS) of ETH Zurich, the Swiss Plasma Center (SPC) of EPFL and NEST of Empa and Eawag, among many others, are accessible to researchers from the entire ETH Domain and to other partners from Switzerland and abroad (SAR Appendix A.1). ETH Zurich, EPFL and the Research Institutes of the ETH Domain exploit their complementarities through over 70 joint professors, through thousands of teaching hours provided by the Research Institutes at ETH Zurich, EPFL and other universities, through numerous interdisciplinary projects as well as through common research platforms, and through collaboration at the administrative level (SAR Chapter A.4.2). In addition, funding schemes such as National Centres of Competence in Research (NCCRs) and Swiss Competence Centers for Energy Research (SCCERs) foster collaboration and cooperation at the national level (SAR Chapter C.1.4). The ETH Board welcomes the recommendation to strengthen the strategic dimension of the budget allocation within the ETH Domain. **Measures** • The six institutions will reinforce cooperation and collaboration within the ETH Domain, driven by academic added value in research and teaching and by the benefits that accrue from synergies in research infrastructure use and in the administration. • Starting with the period 2021–2024, the ETH Board will strengthen the strategic dimension of the budget allocation

Recommendation	Position of the ETH Board
	within the ETH Domain. To this end, the institutions will provide additional strategic information in the context of their budget proposals.
	• ETH Zurich and EPFL will further strengthen their close collaboration (e.g. Swiss Data Science Center, SDSC) with new joint courses (e.g. the joint ETH Zurich / EPFL Master in Cyber Security) and research infrastructure (e.g. the joint ETH Zurich / EPFL Catalysis Hub, cf. Recommendation #4).
#12: Institutional Coordination under the HEdA The ETH Domain should seek an active participation in the context of the Higher Education Act (HEdA / HFKG / LEHE) and contribute to the coordination and development of the entire Swiss system of higher education.	**The ETH Board agrees with the recommendation.** Cooperation between the ETH Domain institutions and the cantons and their higher education and research institutions strengthens the entire Swiss higher education system, as it ensures that the best possible use is made of the system's complementarities and synergies (SAR Chapter A.5.4). ETH Zurich and EPFL as members of swissuniversities (chamber of universities and specific delegations) are involved in strategic and coordinating actions within the higher education sector. The ETH Board welcomes the recommendation and expects ETH Zurich, EPFL and the Research Institutes to take every opportunity to pursue the interests of all ETH Domain institutions in the Swiss higher education sector. Furthermore, mechanisms to involve the Research Institutes in specific strategic questions in the context of the Higher Education Act are needed (e.g. Roadmap for Research Infrastructures). The ETH Board encourages the institutions to participate in shaping the governance of the high-cost areas (*besonders kostenintensive Bereiche / des domaines particulièrement onéreux*) in order to maximise the benefits for society and the economy. **Measures** • ETH Zurich and EPFL will take the next opportunity to become a member of the Board of swissuniversities with the aim of actively contributing to shaping the higher education landscape. • The ETH Board will explore opportunities to involve the Research Institutes in strategic activities in the context of the Higher Education Act. • The ETH Domain institutions will continue to participate in shaping the governance of the high-cost areas of the Swiss higher education system in order to ensure optimal conditions for research and large-scale research infrastructures (cf. Recommendation #8).
#13: Cooperation with Cantons a. The ETH Domain should develop a strategic framework for regional cooperation and not	**The ETH Board partially agrees with the recommendation.** Cooperation between the ETH Domain institutions and the cantons and their higher education and research institutions strengthens the ETH Domain and the entire Swiss higher education system, as it

Recommendation	Position of the ETH Board
mainly act opportunistically. This strategy must imply a strong coordination. b. While some cantons see value in diffusion of the ETH Domain through decentralised sites, other models of cooperation should be considered in order to retain critical mass in the main sites of the Domain.	ensures that the best possible use is made of the system's complementarities and synergies. The ETH Board partially agrees with the recommendation. The ETH Board acknowledges the need for an overarching strategy for cooperation guided by scientific and academic rationales and coherence and in compliance with defined criteria (SAR Chapter A.5.2). However, the ETH Board stresses that an overarching strategy of this kind has to allow for different cooperation models due to the historical circumstances of their creation as well as specific regional needs and opportunities. The ETH Board agrees that the critical mass of the main and external sites of the institutions is of crucial importance for long-term success and confirms its inclusion in the set of criteria. In addition, the ETH Board emphasises that there are various models of cooperation with cantons and their higher education and research institutions which do not lead to or require additional sites: e.g. the Center for Proton Therapy at PSI (SAR Chapter A.1.5). **Measures** • The ETH Board, together with the institutions, will review the criteria for cooperation and define an overarching strategy for cooperation, allowing for different cooperation models adapted to the needs and opportunities.
#14: Autonomy of the Institutions To take full advantage of autonomy, review governance to ensure that the principle of subsidiarity is followed wherever possible, in order to empower the responsible functions to fulfil their role.	**The ETH Board partially agrees with the recommendation.** The legal basis of the ETH Domain, the ETH Act, gives the Domain its own legal status in the Swiss higher Education landscape and allows the institutions the freedom of action they require in order to strengthen their international competitiveness and position. The current partial revision of the ETH Act serves the needs of the ETH Board and is conducive to the functioning of the ETH Domain. It will further improve the internal governance of the ETH Domain, taking due account of the specificities associated with leading and supervising higher-education and research institutions. The ETH Board supports the principle of subsidiarity as laid down in the ETH Act and highlights the importance of properly balanced autonomy und accountability. However, the ETH Board does not agree with the recommendation to transfer responsibility for the appointment of professors from the ETH Board to the Presidents of ETH Zurich and EPFL. The appointment of professors with their respective fields of research is of high strategic importance as it shapes ETH Zurich and EPFL in the long term and thus counts as one of the most important tasks of the ETH Board (SAR Chapter A.3.3; the renewal of professorships and of unit / group / laboratory heads at the Research Institutes is one of the main strategic processes for defining research areas and shifts into new areas).

Recommendation	Position of the ETH Board
	Each appointment is embedded in the professorial planning process, which is reviewed and approved on an annual basis by the ETH Board.

Measures
- The ETH Board supports the current partial revision of the ETH Act in order to (among other things) improve governance.

#15: Leadership and Human Resources Management

The current efforts to develop leadership skills at all levels and to ensure adequate human resources management within the ETH Domain should be encouraged. The measures proposed for this transition by the management of the institutions should have the full support of the ETH Board.

The ETH Board agrees with the recommendation.

Top-quality leadership and management in the ETH Domain are of prime importance, as human resources are the key factor for the Domain's successful future development (SAR Chapter B.2.1).

The ETH Board entirely agrees with the recommendation and fully supports the various efforts and approaches of the institutions to strengthen leadership skills and ensure adequate human resources management, and will ensure that adequate processes are in place.

Measures
- The institutions strengthen the management training targeted at all categories of employees (faculty and staff). This includes sensitising persons in leadership positions to unconscious bias.
- The institutions foster career development support approaches which are open to all staff – including doctoral students and postdoctoral researchers.
- The institutions further develop procedures to identify and monitor internal conflicts at an early stage (weak signals) and to react promptly and appropriately.
- ETH Zurich will strengthen leadership with measures that include an additional vice-presidency dedicated to leadership and personnel development at the ETH Zurich Executive Board level.
- The ETH Board encourages the exchange of good practices and experience among the institutions to accelerate progress and to exploit joint approaches (within and outside the ETH Domain) for added value.

#16: Funding

a. Stable and reliable funding is essential and should be protected from yearly budget cuts. In view of the growing challenges and the transition to a knowledge society, the funding of the ETH Domain should steadily increase.

b. Like some other parts of the

The ETH Board agrees with the recommendation (implementation being under the responsibility of the Federal authorities).

Stable financial support from the Swiss Confederation is key for the successful execution of the basic mandate and to fulfil the mission of the ETH Domain. It allows the embracing of new and challenging scientific fields, the recruitment of outstanding academic staff, and the modernisation of teaching and learning for the 21st century.

The ETH Board welcomes the recommendation for adequate federal funding. The ETH Board supports the notion that the funding

Recommendation	Position of the ETH Board
federal budget, the ETH expense should be handled as fixed contributions ("gebundene Ausgaben").	should be steadily increased to address the growing scientific challenges and societal needs and to implement the measures outlined in its Strategic Planning 2021–2024 for the ETH Domain. When the ERI budget is first allocated, the ETH Domain should be treated as a priority, since its operation is a task anchored in the Federal Constitution of the Swiss Confederation. The ETH Domain should not be disadvantaged vis-à-vis the universities and the universities of applied sciences that are supported by the legal provisions of the HEdA, which guarantees federal subsidies. ETH Board does not advocate "*gebundene Ausgaben* (fixed contributions) for the ETH Domain" but rather "*gleich lange Spiesse*" (a level playing field) in the event of budget cuts during the four-year ERI period: the ETH Board advocates that the ETH Domain must not be disadvantaged (i.e. suffer disproportionate cuts) as this would hinder its contribution to the future welfare of Swiss economy and society. **Measures** • The ETH Board vigorously pursues negotiations with the Department of Economic Affairs, Education and Research (EAER) and the Federal Department of Finance (FDF) for an increase in federal funding and to avoid putting the ETH Domain at a disadvantage vis-à-vis Switzerland's other higher education institutions.
#17: Strategic Funds The reserve funds of the ETH Domain should be used for strategic growth initiatives, and not diverted to the running budget as compensation.	**The ETH Board agrees with the recommendation.** Sufficient strategic reserves are important for the institutions and provide the necessary flexibility to drive new scientific fields, e.g. by creating new professorships or research groups. The ETH Board supports the institutions in generating additional income and attracting donations, which will build up further reserves in the future. The ETH Domain is preparing a reserve policy that defines a range for the free reserves deemed necessary in order for the ETH Board and the institutions to have both the strategic freedom to launch initiatives and the security to cope with the risk of fluctuating revenues. Additionally, the respective guidelines will foster active management of reserves and ensure appropriate reporting at institutional level as well as strategic controlling by the ETH Board. **Measures** • The ETH Board, together with the institutions, determines guiding values which define a range for the free reserves, both individually per institution and aggregated for the ETH Domain. The lower limit serves to cover the risks and should not be

Recommendation	Position of the ETH Board
	fallen below. Above this value a strategic fund has been defined, which provides the necessary strategic flexibility for the institutions of the ETH Domain. Together they form the upper limit of the range.
	• The institutions will strengthen their efforts in actively promoting and managing the use of the reserves. Relevant rules and procedures are in place and, if necessary, will be further developed.
	• The ETH Board, together with the institutions, will draw up guidelines governing the reserve management and monitoring activities.
	• Furthermore, a reporting process will be established to ensure strategic controlling by the ETH Board.
#18: International Openness International openness is essential for global competitiveness. International multilateral cooperation can be complemented, but not replaced, by bilateral research collaborations.	**The ETH Board agrees with the recommendation** (implementation being under the responsibility of the Federal authorities). International openness and multi-lateral cooperation are essential to the global competitiveness and positioning of the ETH Domain institutions (SAR Chapter B.1.1). The ETH Board welcomes the recommendation and fully supports the notion that participation in international research funding schemes, namely Horizon Europe, is of paramount importance for the Swiss higher education sector to stay competitive internationally and for young Swiss academics, and benefits Switzerland in its endeavours to address societal challenges. **Measures** • The ETH Board and the institutions will continue to emphasise the importance of full association with European funding schemes in their communications with federal authorities, stakeholders and the public. • The ETH Board will support the Federal Council in its negotiations for full association.
#19: Diversity The ETH Domain should commit to goals for representation of women and develop evidence-based strategies for recruitment and career development to support achieving these goals.	**The ETH Board agrees with the recommendation.** The ETH Domain aims to improve the gender balance among its members by increasing the proportion of women in education and research, and specifically in management positions and decision-making bodies. The Gender Strategy 2017–2020, adopted by the ETH Board in 2017, outlines an overarching strategy to foster gender balance and equal opportunities for women and men within the ETH Domain (SAR Appendix A.2). The Gender Strategy includes the commitment that at least 0.4% of the annual federal financial contribution needs to be spent on measures to support the promotion of equal opportunities. The institutions implement the strategy through appropriate measures that are defined in their action plans, carefully monitor the development of the gender balance and regularly report to the ETH Board.

Recommendation	Position of the ETH Board
	The ETH Board agrees with the recommendation and assents to setting quantitative targets but not quotas. Such targets will be proposed individually by each institution, as they must match the institution's particular situation and include the specific measures needed to achieve them.

Gender stereotypes and unconscious bias are an impediment to gender balance and equal opportunities. The ETH Board calls on the institutions to take action to raise awareness and sensitivity to stereotypes and bias among all their employees (faculty and staff) through mandatory training.

Measures
- The ETH Board and the institutions will update the Gender Strategy for the years 2021–2024. As in the current strategy, a financial commitment to measures supporting equal opportunities will be an integral part of the strategy, together with a defined set of measures to be taken into account for this commitment.
- Each institution will set quantitative targets for the proportion of women, in line with the institution's particular situation. The institutions will define the specific measures needed to achieve them and report to the ETH Board.
- The institutions will raise awareness and sensitivity to stereotypes and unconscious bias among all their employees (faculty and staff) (cf. Recommendation #15). |
| **#20: Measuring Impact**

The recommendations of the Expert Committee related to Term of Reference B.1 mention the most important success factors; for better assessment of impact in the future, the Domain should consider the further development of indicators of success. | **The ETH Board agrees with the recommendation.**

There is a need for meaningful impact indicators that go beyond the mere measurement of output, in order to better represent the impact of the ETH Domain on the economy and society.

Statements on expected impact, based on qualitative and quantitative indicators, will be used to communicate the ETH Domain's excellence in science and its contributions to the Swiss economy and society.

Measures
- The ETH Board will explore different approaches and learn from other organisations in order to define, where possible, suitable indicators of impact. Such indicators should be devised with great care in order not to create false incentives.
- The ETH Board – with the support of the institutions – will describe the expected impact on the quest for excellence at international level, and on the Swiss economy and society. These statements will be complemented by relevant indicators, where possible, or by other means of providing evidence of success and societal value (cf. Recommendation #5). |

Recommendation	Position of the ETH Board
#21: Strategic Focus Areas The Expert Committee strongly supports the choice of these strategic focus areas. Beyond that, the institutions of the ETH Domain should develop the mechanisms to anticipate research needs and to respond quickly to major challenges.	**The ETH Board agrees with the recommendation.** The ETH Board welcomes the Expert Committee's support for the choice of the strategic focus areas 2017–2020 (SAR Chapter C.1) and agrees with the need for procedures to anticipate research needs and to respond quickly to new challenges. The current bottom-up process used in the Strategic Planning of the ETH Board for the ETH Domain fulfils an important foresight role (SAR Chapter A.3.3). The implementation of foresight processes is gaining in importance in conjunction with the new budget allocation within the ETH Domain, starting with the period 2021–2024 (cf. Recommendation #11). **Measures** • The thorough review of the ETH Domain's organisational structure (cf. Recommendation #10) aims at enabling the ETH Domain to respond faster to new challenges. • The ETH Domain institutions will review and further develop their strategic processes.
#22: Digitalisation The ETH Domain should develop a digitalisation strategy that maximizes translational impact, and organize research and teaching to support diffusion of computational thinking into science and engineering.	**The ETH Board partially agrees with the recommendation.** The diffusion of digitalisation in the ETH Domain is a priority of the Strategic Planning of the ETH Board for the ETH Domain 2021–2024, and the institutions play a leading and driving role in the digital transformation of Switzerland (SAR Chapter C.2). The ETH Board agrees with the recommendation to maximise the translational impact of digitalisation and to leverage the power of digital technologies in all fields of science and engineering. As digitalisation is a cross-cutting theme which falls under the responsibility of the institutions, the ETH Board sees no need for an overall strategy. The SFAs incorporate central aspects of digitalisation in their respective fields and contribute to the diffusion of digitalisation throughout the ETH Domain and beyond. Efforts to promote digitalisation in all fields, as well as to exploit its potential for teaching and learning, are well underway in the institutions. **Measures** • The institutions strengthen their efforts to promote digitalisation in all fields of research and to exploit its potential for teaching and learning. • The SFAs continue to promote the diffusion of digitalisation throughout the ETH Domain and beyond in the period 2021–2024.

Recommendation	Position of the ETH Board
	• ETH Zurich and EPFL include computational thinking as one of the future skills for the digital transformation in all study programmes (cf. Recommendation #3).

ETH Board
Zurich and Bern
www.ethboard.ch

22 November 2019