

**Intermediate Evaluation 2015
of the ETH Domain**

**Response of the ETH Board
to the Report of
the Expert Committee**

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Adopted by the ETH Board on September 24, 2015

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Foreword by the President of the ETH Board



Dear Reader,

The present document is the third and final element of the 2015 intermediate evaluation of the ETH Domain: In what follows, the ETH Board comments on the Report of April 8, 2015 by the international Expert Committee, which was mandated by Federal Councilor Johann Schneider-Ammann to carry out the intermediate evaluation.

It is my privilege first and foremost to express, in the name of the entire ETH Board, my sincere gratitude to the Expert Committee – which was composed of Swiss and international experts – for the excellent report, as we are now able to benefit from their evaluation work. The report provides a thorough general analysis of the strengths, weaknesses and challenges that characterize the ETH Domain within the Swiss higher education system and of the framework conditions this system offers. As its central element, the report puts forward 13 recommendations highlighting issues of great relevance to the development of the ETH Domain. For the ETH Board and the ETH Domain institutions, it has thus been very valuable and fruitful to analyze the recommendations and hence to take stock of the current situation and establish a position on the various aspects addressed by the individual recommendations.

As the Expert Committee points out, the Self-Assessment Report of the ETH Board, together with the presentations given during the experts' visit in March 2015, provided the Committee with comprehensive information, allowing the experts to thoroughly assess the issues laid down in the Federal Council's mandate for the intermediate evaluation. The ETH Board is pleased with the overall result of the expert review, which confirms the importance of the ETH Domain institutions for the Swiss economy and society at large. The Expert Report also acknowledges the ETH Domain institutions' competitiveness on a global scale, their major scientific impact and their important contributions to education, as well as their preeminent role in knowledge and technology transfer. The Expert Report contains highly relevant comments and recommendations, all of which are characterized by very helpful constructive criticism regarding the ETH Domain's prospects for the near future. This approach has been greatly appreciated by the ETH Board. As set out in detail in the present response, the ETH Board's key positions on the experts' recommendations concern three areas, namely: governance, excellence, and contributions by the ETH Domain to the Swiss research and higher education system.

Governance

The ETH Board welcomes the Expert Committee's confirmation of autonomy as a major asset contributing to the ETH Domain's excellent performance (see recommendation 1). Autonomy is indeed one of the core prerequisites for the successful positioning of the ETH Domain and its institutions for future challenges. A robust and well-balanced governance of the ETH Domain must therefore serve the objective of maintaining or extending the high degree of autonomy currently granted to the ETH Domain and its institutions. Such autonomy is fundamental to the definition and implementation of new strategic developments which will be relevant tomorrow for the ETH Domain and for Switzerland as an academic and economic focal point in Europe.

The ETH Board maintains that the fundamental value of autonomy emerges from the "dual autonomy" conferred by the ETH Act upon the ETH Domain institutions and the ETH Domain as a whole. Beside the individual institutions' autonomy, the entire ETH Domain enjoys the freedom to act within the framework of the ETH Act and the performance mandate conferred upon the ETH Domain by the Federal Council. Strategic decisions that are of relevance for the entire Domain as well as the ensuing allocation of the ETH Domain's global budget to the individual institutions, to strategic projects and to other system-relevant positions are thus the responsibility of the ETH Board. This strategic role of the ETH Board ensures effective use of the budget allocated to the ETH Domain system. This dual autonomy clearly corresponds to the intentions of Federal law-makers and is a key success factor for the ETH Domain.

The ETH Board also acknowledges the Expert Committee's perception that autonomy must not only be paired with the capacity at the level of the ETH Board to take on strategic responsibility, but also with high requirements in terms of accountability at the respective levels. The ETH Board maintains that these requirements are already well served and shares the Experts' view highlighting the importance of properly balancing autonomy with accountability.

Strengthening the ETH Domain in this regard means reinforcing the leadership role of the ETH Board and the ETH Domain institutions in the context of the Swiss higher education landscape. In this respect,

the ETH Board will continue to further intensify its focus on the strategic key issues of the future. With this objective in mind, the ETH Board also concurs with the Experts' position that the ETH Board should take on a stronger role in Swiss higher education policy-making and strengthen its presence in Bern.

Excellence

The Expert Committee's Report attaches great importance to the ETH Domain institutions' collaborations within the Swiss higher education system, and therefore looks carefully into their relations with the cantons (including ETH Domain locations), into the collaboration with the Universities of Applied Sciences, and into the institutions' role with regard to the current process of creating a Swiss Innovation Park.

The ETH Board is convinced that following an excellence strategy is the only way to fulfill the mission of the ETH Domain in the long term. Current developments, such as expansion in the number of regional locations, enhanced collaborations with universities, Universities of Applied Sciences and cantons and international commitments, as well as the involvement of ETH Domain institutions in the Swiss Innovation Park and other activities to promote knowledge and technology transfer, will all serve this purpose. All such endeavors must be evaluated in terms of their compatibility with highest standards of excellence in research, teaching and technology transfer, and considering the future funding perspectives of the ETH Domain and the availability of proper financing instruments.

The ETH Board is in favor of further strengthening collaboration between the ETH Domain institutions and universities or Universities of Applied Sciences – as suggested by the Expert Committee. Such collaboration, however, must continue to be driven by mutual interest and complementarity of competencies. This is best guaranteed in environments that allow and foster bottom-up initiatives in research and teaching. Top-down financial incentives, as advocated by the Expert Committee, are considered neither necessary nor suitable as a means of intensifying collaboration. Therefore, the ETH Board is opposed to introducing such incentives. Nevertheless, the Board acknowledges the need for a suitable funding instrument for common longer-term research projects between universities and Universities of Applied Sciences. Such an instrument would ideally be positioned to promote the precompetitive stage of research with industry partners.

With the aim of fostering excellence, the ETH Board will also continue to promote workforce diversity, in particular with regard to gender balance and cultural diversity. This effort must be complemented and supported by unrestricted access to the international workforce, which remains a key success factor for the ETH Domain and must not be sacrificed under any circumstances.

Contributions to Swiss Research and the Swiss Higher Education System

The Expert Committee encourages the ETH Domain to uphold its leadership position in the provision of large-scale research infrastructures and to take on a more prominent role in research and teaching in the field of medicine (recommendations no. 6 and 11). The ETH Board is pleased with these recommendations as they acknowledge the ETH Domain's manifold contributions to the Swiss research and higher education system and to the interests of society at large.

Based on their unique role as the major natural sciences and technology institutions in Switzerland, the ETH Domain institutions are in an excellent position to take on responsibility to continue serving Swiss research by planning and developing large research infrastructures. The ETH Board believes that this role also entails involving the ETH Domain more closely in focusing the Swiss Roadmap for Research Infrastructures. The ETH Board is convinced that consideration of the ETH Domain's experience with and proven leadership in large research infrastructures would greatly facilitate the Roadmap's update process and its relevance for all partners involved.

Concerning the ETH Domain's role in the field of medicine, the ETH Board confirms that the ETH Domain is interested in contributing to the training of medical staff with a strong background in natural sciences, engineering, or information technology. It is also interested in taking its research closer to the patients, i.e. becoming much more involved in translational research, in particular in the fields of medical technology, medical informatics, genetics, biotechnology, and imaging technologies for diagnostic and therapeutic applications. The ETH Board is convinced that, by pursuing the strategies in this area as described in the report, the ETH Domain will achieve these goals. At the same time the ETH Domain will also contribute to training larger numbers of medical doctors in Switzerland, with a focus on future medical specialists with a strong background in science and technology.

Conclusion

The ETH Board looks forward to implementing its conclusions drawn from the Expert Committee's recommendations. It also awaits with great interest discussing the results and recommendations of this intermediate evaluation with the political partners at all levels.

I would like to thank the Expert Committee and its chairman, Jean-Daniel Gerber, once again for their highly valuable work and to express my gratitude to the head of the Federal Department of Economic Affairs, Education and Research, Federal Councilor Johann Schneider-Ammann, and to the State Secretary for Education, Research and Innovation, Mauro Dell'Ambrogio, for having chosen to focus the 2015 intermediate evaluation of the ETH Domain on the role played by the ETH Domain institutions in higher education policy and economic and innovation policy in Switzerland. The choice of this focus has allowed the ETH Domain to account for its contributions in this regard. The ETH Board and the ETH Domain institutions are pleased that the relevance of these contributions was confirmed both by the Expert Committee and by the stakeholders that it interviewed. It shows that the ETH Domain is able to fulfill its purpose and meet the high expectations prevalent in business and political circles as well as among the general public in Switzerland. I see the particular focus set for this intermediate evaluation as a strong sign of trust and continuing support for the ETH Domain.

Such strong support will be needed for the ETH Domain's future development. For the ETH Board, this development must follow the vision laid down in its Strategic Planning 2017-2020: "As a driving force for innovation, the ETH Domain wishes to strengthen Switzerland's long-term competitiveness through excellence in research, teaching and knowledge and technology transfer, and to contribute to the development of society. Acting as a beacon, it will seek to assume its share of global responsibility for tackling urgent social challenges, for improving quality of life and for the long-term preservation of the resources our lives depend on."

Zurich/Bern, September 2015



Dr. Fritz Schiesser
President of the ETH Board

I. Introduction

As stated in their report, the 13 recommendations gathered by the international experts in charge of the intermediate evaluation 2015 do not address every item raised in the Terms of Reference set forth by Federal Councilor Johann Schneider-Ammann. Rather, in its Report (Appendix 1) the Expert Committee (EC) has concentrated its work "on those sections in the self-evaluation report of the ETH-Board where it deemed it necessary"¹. In its present Response to the Expert Report, the ETH Board follows the structure determined by the Expert Committee: every recommendation is addressed individually, with differentiated answers provided for the various topics that may be assembled in one recommendation. For each topic, the ETH Board first presents an appraisal and accounts for the status of fulfillment of the particular aspects of the recommendation. This part (entitled "Appraisal & Status") is followed by the position of the ETH Board to the recommendation (entitled "Position of the ETH Board"). To facilitate the use of the present document, each recommendation is quoted from the Expert Report at the beginning of the respective chapter.

In its introduction, the Expert Committee states that it agrees to the Self-Assessment Report of the ETH Board "[w]here no specific recommendation has been made"². As this is the case for many topics, and as the ETH Board itself refers to the Self-Assessment Report on various occasions throughout the present Response, this report will be treated integrally as an appendix to the present Response (see Appendix 2). In its Self-Assessment Report, the ETH Board addresses each of the Terms of Reference individually and presents numerous examples on initiatives, achievements, instruments and involvement of the ETH Domain, its institutions, and the ETH Board on the various levels of action addressed by the present intermediate evaluation.

Additionally, the ETH Board presents in the introduction to its Self-Assessment Report a general analysis of strengths, weaknesses, opportunities, as well as challenges and threats "which aims at systematizing, on a comprehensive level, important aspects regarding the mid- to longer-term development perspectives for the ETH Domain and the individual institutions"³. Similarly, in its report, the Expert Committee provides a general assess-

ment that discusses the strengths, weaknesses and challenges the ETH Domain is facing, thus helping the reader to understand the potential of the ETH Domain within the changing higher education environment.⁴

In general, the ETH Board agrees with this analysis put forward by the Expert Committee and stresses that many aspects contained in the Committee's analysis are also presented – from the specific angle of the ETH Domain – in the corresponding sections of the Self-Assessment Report. The ETH Board therefore considers that the general analysis of the Expert Committee is most helpful in confirming the importance of many issues raised by the ETH Board and in highlighting the extent to which some of them are genuine issues of concern. This pertains in particular to the relationship between Switzerland and the European Union and the persisting uncertainties regarding Switzerland's future status of association with "Horizon 2020". In a similar vein, it pertains to the general mindset at stake in Switzerland, i.e. its spirit of openness and its fundamental understanding for the value of internationality, in particular in the field of research and innovation.

While many weaknesses and challenges raised by the Expert Committee involve not only the ETH Board or the ETH Domain, but are addressed to various actors as well as authorities at different levels of government, many are also dealt with through the answers provided by the ETH Board with regard to the individual recommendations. Therefore, reference is made to the position explained by the ETH Board on the 13 recommendations⁵ or to the ETH Board's Self-Assessment Report⁶ for most topics addressed in the "general assessment" section of the Expert Report.

With reference in particular to the overall focus of the present intermediate evaluation, the Expert Report mentions the specific challenge "global issues requiring systematic innovations". The ETH Board agrees with the Expert Committee's

¹ See "Report of the Expert Committee", April 8, 2015, p. 4. In the Expert Report, a table on p. 15 summarizes in which ways the individual recommendations tackle the Terms of Reference.
² See "Report of the Expert Committee", April 8, 2015, p. 4 and footnote 1 on p. 9.
³ See "Self-Assessment Report", December 11, 2014, p. 12.

⁴ See "Report of the Expert Committee", April 8, 2015, p. 5-8.

⁵ Cf. in particular: "Balance between accountability towards taxpayers and autonomy (and administrative burden)", "Not to permit internal rivalries to harm joint actions in pursuing excellence in research and education", "Enhancing gender diversity at all levels", "Optimal adaption to regulations by the law (e.g. entrance criteria for students, tuition fees)".

⁶ Cf. in particular: "Inclusion in the international and in particular in the European higher education and research area", "Capacity to provide enough highly trained professionals in certain key fields", "Increasing expectations of short term return on investment can weaken basic research", "Equilibrium between the regions and the cantons in reaping the benefits".

conclusion that in this regard the ETH Domain can serve as a catalyst for the entire country. Both in the Self-Assessment Report and in the present Response (see e.g. recommendation 12 below), it discusses initiatives and instruments deployed by the institutions for fostering entrepreneurship. The ETH Board also agrees that the prevalence of a culture of entrepreneurship and risk-taking represents a highly relevant success factor for Switzerland and its innovation capacity. Therefore, the institutions of the ETH Domain attach great importance to introducing and delivering an appropriate culture and role models to young scientists and engineers. Having acquired such experience during their studies, the graduates of the ETH Domain may initiate and accelerate innovative activities in the business environment.

The ETH Board also shares the Expert Committee's concern about the "risk of deindustrialization in Switzerland". This concern confirms the importance of the specific focus chosen for the present intermediate evaluation, i.e. the contribution of the ETH Domain to Switzerland's innovation capacity and its role in this respect. If they are to succeed, countries like Switzerland with high labor costs and prices must be able to innovate. These locations and economies are in a fiercely competitive race for quality and innovation. They must be able to gain at least a temporary competitive advantage with product and process innovations and to exploit these innovations for their economic success. The ETH Domain institutions are therefore constantly striving to strengthen the unique linkages that the ETH Domain provides between (fundamental) research, teaching, industry, and public administration. One way of doing so is by taking on a leading role in the implementation of the Swiss Innovation Park (SIP).

II. Response to the Recommendations of the Expert Committee

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Recommendation 1 – Strengthening the Autonomy of the ETH Domain

Recommendation: “All stakeholders consider autonomy of the ETH Domain as a major asset for the high performance of the system⁷ and for the fulfilment of the mandate. In this respect the present governance works well and there is no need to change it substantially. In the past years, there has been a tendency to limit autonomy, as exemplified by the separation of the regular budget from the budget for buildings, and by the limitations in the public-private partnerships projects.

This evolution could also hamper curiosity-driven research as one of the cornerstones for innovation. The EC recommends that this tendency be reversed and the autonomy strengthened including for the four Research Institutes. Within the framework of the mission and strategy of the ETH Domain, the autonomy of the Domain comes with accountability. Therefore, the EC recommends to better define the content of accountability and recommends that the ETH Domain develops a coherent policy of risk assessment and risk management.”

Appraisal & Status

The ETH Board underlines on every occasion that autonomy is one of the main preconditions for the success of the ETH Domain and the institutions. This has been stressed in particular by the ETH Board in its Self-Assessment Report (see Appendix 2). Therefore, the ETH Board has also expressed concern about the tendency towards limiting the autonomy of the institutions, exemplified for instance by the separation of the financial contribution for operating expenses (*Finanzierungsbeitrag/Contribution financière*) from the investment credit for federally owned real estate (*Investitionskredit/Crédit d'investissement pour constructions*).

Rooted in the Federal Act on the Federal Institutes of Technology (ETH Act), the autonomy granted to the institutions of the ETH Domain – which entails their freedom to explore novel and innovative scientific fields and to allocate their resources independently – is fundamental to the definition and implementation of new strategic projects which will be relevant tomorrow for the ETH Domain and for Switzerland as an academic and economic focal point in Europe. Their capacity to act autonomously in a strategic and entrepreneurial spirit is clearly a strength of the ETH Domain's institutions and must be preserved for the future. The ETH Board thus highly appreciates the expert group's view that all stakeholders “consider autonomy of the ETH Domain as a major asset for the high performance of the system and for the fulfillment of the mandate.”

The recommendation does not distinguish in detail between the autonomy of the entire ETH Domain and the autonomy of the individual institutions. This “dual autonomy” is a cornerstone

of the ETH Act and was a major achievement of the last total revision of the Act in 2003. Beside the individual institution's autonomy, the entire ETH Domain enjoys the freedom to act within the framework of the ETH Act and the performance mandate conferred upon the ETH Domain by the Federal Council. Strategic decisions that are of relevance for the entire Domain as well as the ensuing allocation of the ETH Domain's global budget to the individual institutions, to strategic projects and to other system-relevant positions are thus the responsibility of the ETH Board. This strategic role of the ETH Board ensures effective use of the budget allocated to the ETH Domain system. This dual autonomy clearly corresponds to the will of the Federal Legislator and represents a key success factor for the ETH Domain.

Consequently, the ETH Board also agrees with the Expert Committee's view that autonomy requires sufficient instruments with regard to accountability. These instruments, the ETH Board holds, are already in place. Moreover, they recently have been extended with the introduction of the new accounting standard based on IPSAS. Similarly, with regard to real estate management, the new Ordinance on Federal Real Estate Management and Logistics⁸ will entail increased requirements on accountability.

In the same vein, risk assessment and risk management have become more and more important issues in the past years. They have been closely linked to the autonomy granted to the ETH Domain and form a part of the required accountability. Therefore, risk assessment and management processes have recently been formalized and further improved both on the level of the institutions and on the level of the ETH Board: Under the leadership

of its audit committee and its internal audit unit, the ETH Board has developed a framework process for strategic decision-taking and continuous ex ante risk assessment. On the level of the institutions,

risk management processes have been implemented and are considered to represent an important element of strategic management.

Position of the ETH Board

a) Dual autonomy

The ETH Board entirely agrees with the endorsing position of the Expert Committee regarding the fundamental importance of the dual autonomy granted by the ETH Act to the ETH Domain (with the ETH Board assuming a strategic leadership role) and to the ETH Domain institutions⁹. One particular challenge, which concerns the autonomy of the ETH Domain as a whole, regards the implementation of the new Higher Education Funding and Coordination Act (HEdA). In this regard, the ETH Board must make sure that the autonomy of the ETH Domain is not restricted, even though the Domain remains within the auspices of the ETH Act (in relation to aspects such as governance, financial commitments, and decision-making processes).

With regard to the autonomy of the individual institutions, the ETH Board aims to maintain as much autonomy as possible vis-à-vis the federal authorities. It acknowledges that this also entails constantly reviewing the delimitation between the autonomy of the institutions and the autonomy of the ETH Domain. It also entails defining and steering the associated processes and communicating them to the institutions on the one hand and the Federal Government and Parliament on the other hand. In this sense, it shares the position of the Expert Committee highlighting the importance of well balancing out autonomy and accountability.

b) Accountability

The ETH Board acknowledges that instruments governing accountability within the ETH Domain (i.e. reporting, strategic controlling etc.) do exist and are in operation, guaranteeing an adequate

level of accountability in response to the autonomy granted to the ETH Domain and to the individual institutions. The ETH Domain has implemented an integrated system of corresponding instruments and processes both between the institutions and the ETH Board (respectively the Confederation) and within the individual institutions. In some cases information flow and process implementation may have to be reviewed. Therefore, the ETH Board is convinced that it has an important task in continuously strengthening a fruitful balance between autonomy and accountability. It furthermore acknowledges that this requires a joint effort by the institutions, the ETH Board, and the Confederation (including Parliament).

c) Risk assessment and management

Where risk management is concerned, the ETH Board agrees with the Expert Committee's position that a coherent risk assessment policy is of great importance. The ETH Board considers that the existing instruments have proven their worth. Nevertheless, a review of governance and risk assessment procedures in the ETH Domain was initiated at the retreat held by the ETH Board in July 2015. New developments in recent years led to new areas of activities that require proper application of existing governance and risk assessment procedures or the development of suitable new instruments. The current instruments will represent the basis on which further steps may be taken, always keeping in mind that they must not place an excessive administrative burden on the institutions and the ETH Board.

⁷ See also the survey conducted by the European University Association regarding university autonomy in 29 European higher education systems. It focuses on four autonomy areas and ranks countries according to the level of autonomy they have in each of these. <http://www.university-autonomy.eu/>

⁸ Ordinance on Federal Real Estate Management and Logistics (Verordnung über das Immobilienmanagement und die Logistik des Bundes, VILB / Ordonnance concernant la gestion de l'immobilier et la logistique de la Confédération, OILC), SR 172.010.21.

⁹ See also Self-Assessment Report, e.g. chapter B.1 for details

Recommendation 2 – Securing Stable Funding

Recommendation: “The substantive increase of funding for the ETH Domain over the last years was key to its outstanding success, particularly in fostering curiosity-driven research. In order to guarantee the success and the international competitiveness of the institutions of the ETH Domain in the future, the EC recommends that the budget be secured over the coming planning periods as much as possible.

In addition, the EC recommends that the ETH Board assesses the possibility and, if relevant, define a framework supporting the development of complementary funding such as endowments, increased overhead, development of fund raising, monetization of continuous education, strengthening of licensing income (equity, royalties, etc.), promotion of innovative financial instruments (PPP, etc.), and a review of tuition fees. In addition, the EC would welcome a discussion on the current and potential cantonal co-financing schemes to which not all cantons currently participate.”

Appraisal & Status

The ETH Board fully agrees with the Expert Committee's position on the importance of stable basic funding from which the ETH Domain and the institutions benefit. Indeed, its secure stable funding ranks – together with autonomy as well as with internationality and openness – among the key success factors of the ETH Domain. Yet despite the support received from Parliament in the past debates with the four-year budget framework, considerable insecurity remains with regard to the stability of the ETH Domain's yearly budgets, as these are not exempt from budget cuts that may be decided as part of the Confederation's cost-saving packages. As the fundamental tasks of the ETH Domain institutions, in particular teaching, bind most of the resources allocated to the institutions, such budget risk forcing the institutions to cancel or postpone investments in research infrastructure or selected research topics. Also, they may particularly affect those that are needed to explore novel areas of potentially high strategic importance. Hence the ETH Domain institutions and the ETH Board see an increased need to adapt legal dispositions in such a way that the ETH Domain's budget could be exempt from budget cuts in the future, as these budgets may be considered as “tied expenses” (*gebundene Ausgaben*). This option, however, could not be granted by the Confederation. Unforeseen budget cuts, therefore, will continue to represent a threat to the stable planning and timely implementation of certain innovative activities or large-scale projects of the institutions and the ETH Domain.

Diversification of the income sources is indeed relevant for the ETH Domain, but needs to be optimized with regard to a number of competing aspects. This has been recognized in the past, and several instruments mentioned in the Expert

Committee's recommendation have been developed or are more intensively used in this respect (e.g. increase of third-party funds from SNSF and EU, donations, cantonal contributions). Together with the institutions, however, the ETH Board likes to point out that diversified income sources – as they are also associated with challenges such as an incomplete coverage of overhead costs, high volatility, or limits for their use – should only represent complementary funding, whereas a stable basic funding from the Confederation still provides a crucial and indispensable foundation.

The ETH Board considers that careful evaluation is needed to establish whether the ETH Board could and should have a proper role in defining framework conditions that further support development of complementary funding as suggested. Such a framework would be added to the already manifold activities and regulations of the institutions in this regard. The institutions have deployed strong initiatives in view of the diversification of their income sources and are evaluating potentials and possibilities with regard to licensing, equity, etc. These efforts are strongly supported by the ETH Board. However, the ETH Board itself will have to further develop the roles and competencies for its strategic controlling and supervisory function regarding complementary funding in order to secure proper governance and risk assessment of new structures that may be needed for exploiting additional income sources.

With regard to cantonal co-financing, the ETH Board agrees that the associated opportunities and risks must be carefully evaluated, for instance in the context of the current processes of geographic development within the ETH Domain. To gain an overview of the financial contributions by the cantons to the ETH Domain, the cantonal Directors of Education (EDK) and the SERI – in view of the next issue of the Report ERI Financing by the Cantons and

the Confederation – recently solicited the cantons for information on the amount of such contributions¹⁰. Provisional results from this survey indicate that for the period 2013–2016, income of the ETH Domain institutions from cantons will amount to about 80m CHF, and to about 115m CHF for the period 2017–2019.

¹⁰ Rapport 'Financement FRI par les cantons et la Confédération' / 'BFI-Finanzierung durch Kantone und Bund'. The financial numbers correspond to the totals as provided by the SERI and EDK survey. They are still under validation by the institutions of the ETH Domain.

Position of the ETH Board

The ETH Board shares the Expert Committee's view regarding the importance of stable basic funding and refers to the Self-Assessment Report for further elaboration of this position (cf. part B). Stable basic financing is not only an indispensable precondition for success but is also a core requirement for enabling the institutions to play their key role in innovation. In this sense, the ETH Board considers it part of its mission to continue striving for political support to ensure maximum security in terms of basic funding.

With regard to the Expert Committee's position on the diversification of income sources, the ETH Board encourages the institutions to further exploit current income sources, identify new sources, and seek to benefit from new collaboration and financing models for research projects and teaching. Given the bleak prospects for an increase in the federal budget for the ETH Domain in upcoming years and the threat of being excluded from the European research program, the income sources below must be reviewed (among others). It must be borne in mind, however, that all forms of third-party funding are highly volatile with regard to both predictability and the amounts actually provided.

a) Increases in tuition fees

Education is not envisaged to become a significant source of additional income. In principle, however, the ETH Board is in favor of increasing the tuition fees for students at ETH Zurich and EPFL. As the possibility of diversifying tuition fees is still a matter of political debate, the ETH Board currently refrains from taking any further decisions.

b) Monetization of continuing education

In the past neither the institutions nor the ETH Board regarded continuing education as a field in which monetization should represent a primary aim. While it is uncontested that such offerings must be cost-covering, the ETH Domain institutions and the ETH Board agree on the general principle that the trend towards increased monetization of continuing education must be carefully analyzed, as revenues may become

more important in the future, at least in certain areas for which profitable business models may emerge.

c) Overhead rates

The ETH Board has repeatedly demanded that a higher overhead rate be granted on research projects from SNSF, CTI, and federal agencies, which would cover a more substantial fraction of indirect costs. This request is being upheld and indeed is gaining in importance as current Swiss funding schemes provide for lower overhead rates than European ones. With the potential loss of the partial association with the European funding sources of Horizon 2020, the problem of insufficient overhead contributions from Swiss funding sources will become even acuter. The ETH Board therefore reiterates that rising and reliable direct financial support from the Swiss Confederation is crucial to acquiring additional sources of income. Practically all third-party funds are associated with indirect costs. No funding scheme in Switzerland or Europe covers overhead costs. The burden of indirect costs, which is more accentuated for institutions that are able to mobilize a larger fraction of their budgets from competitive funds, can currently only be absorbed with a solid financial basis.

d) Monetization of intellectual property

Tight limits should be placed on generating financial returns on patents and licenses etc., as monetization of intellectual property is not a core business of the ETH Domain and may compete with knowledge and technology transfer in the best interest of society. Within these limits, the ETH Board agrees that it can be useful to further examine – within the ETH Domain – the potential of making more intensive use of diversified income sources for the continued development of the ETH Domain institutions, in particular where there are growing uncertainties with regard to the allocation of basic funding.

e) Financial contributions by cantons

Financial contributions by cantons have recently been receiving some attention. In its Self-Assessment Report (part C.1), the ETH Board has described criteria to be considered in the context of geographic expansion. These criteria remain relevant whenever cantonal co-financing is offered to ETH Domain institutions for promoting research or teaching efforts in addition to the institutions' existing main campuses. The ETH

Board wishes to note that financial contributions from cantons may compete with the financing of the canton's own academic institutions and therefore holds that contributions must not unduly burden the budget of the partner institution(s). The ETH Board also insists on the need to distinguish between project-based co-financing (e.g. of research infrastructures) and mid- to long-term basic co-funding (e.g. real estate development).

Recommendation 3 – Reinforcing the Strategic Capacity of the ETH Board

Recommendation: “As indicated in the general remarks, the world of science, economic competitiveness, and societal needs continue to change rapidly. In order to meet these challenges, the strategic capacity of the ETH Board should be strengthened. Furthermore, the ETH Board has to find the appropriate balance between internal competition and creating synergies in cooperation among its member institutions. In addition, the ETH Board must foster cooperation between the ETH Domain and the universities as well as the universities of applied sciences.

To fulfil all these goals, the EC recommends that the ETH Board consider the merits of establishing a strategic fund. This fund would enable the Domain to set up new strategic initiatives, encourage collaborative programs as well as provide incentives when needed (examples could include promoting gender diversity, strengthening entrepreneurial spirit, etc.). This fund should act as a catalyst; hence, the resources it provides for a particular activity should be for a limited period of time.

From an efficiency point of view, the six institutions of the ETH Domain pursue common objectives and share many interests. Each has developed competencies that could be pooled and shared whenever appropriate, also to reduce administrative costs. For example, a centre of competence on business policies (e.g. licenses and patent regulations, procurement rules) would improve the use of available knowledge by concentrating topics of general relevance to a single institution or to the ETH Board staff. Furthermore, at the level of the ETH Domain the cooperation on dual career hiring should be fostered.”

Appraisal & Status

The present recommendation encompasses several distinct issues that seem to be linked by the concern that the ETH Board, at present, may be too absorbed by non-strategic issues on the one hand and, on the other, may lack adequate instruments and internal working methods (see also recommendation 4) to focus on strategic orientations for the ETH Domain and its institutions rather than mere controlling or reporting.

a) Cooperation and Competition

As the ETH Board argues (see point “Position”), the current instruments with regard to fostering cooperation – both among the ETH Domain institutions and with institutions outside of the ETH Domain – work well. Such cooperation is considered important both by the institutions of the ETH Domain and the ETH Board. Numerous examples of existing cooperation projects have been described and assessed by the ETH Board in its Self-Assessment Report (see, for instance, chapter C.5.3). Meanwhile, it has also been confirmed by the external stakeholders invited for hearings during the intermediate evaluation that such cooperation is not only valuable, but also generally works very well. It provides added value not only for the

ETH Domain institutions, but also for the institutions’ partners.

Equally, it is acknowledged by the ETH Domain institutions that a fruitful balance between cooperation and competition is an important precondition for the success of the ETH Domain. However, as can be seen from the projects presented in the Self-Assessment Report, this balance is currently reckoned to work well and to be fruitful. Given this assessment of the current situation, it may be concluded that the ETH Board is already in a good position to focus on strategic guidance in terms of creating the right framework for cooperation and joint projects among the institutions and their partners.

b) Pooling of Competencies

With regard to the pooling of competencies and resources among the ETH Domain institutions, the ETH Board acknowledges that this can contribute to reducing administrative costs. Several steps in this regard have been undertaken in the recent past by all ETH Domain institutions, such as KoBe ETH+ (joint procurement in the ETH Domain), sharing of best practices in the field of legal services and patenting through swiTT, IPSAS, energy and environment, libraries (KOBAR and the Research Institutes’ joint library, Lib4RI). The four Research Institutes

also share resources through their joint SAP system. Similarly, the institutions engage in intense coordination and an exchange of best practices throughout the ETH Domain and/or between ETH Zurich and EPFL, such as through regular meetings in the field of HR, finances, tech transfer, IT, academic affairs, diversity, etc. Importantly, the Domain meeting (president and vice-president ETH Board, presidents of ETH Zurich and EPFL, directors of Research Institutes, representative of the school assemblies) and the meeting of the directors of the four Research Institutes also serve to coordinate and optimize the use of existing competencies.

A pooling of competencies is also recommended by the Expert Committee with regard to dual career hiring. Dual career hiring presents a challenge for the institutions of the ETH Domain. An increasing number of hiring processes for skilled staff depends on being able to offer career opportunities for their partners or to support them in finding attractive solutions in reasonable time. Proper handling of dual career cases has thus become a competitive advantage in global recruitments. Cooperation within the ETH Domain is an important element in the effective handling of such cases. But cooperation with institutions or networks outside the ETH Domain is also needed as the ETH Domain covers only the science and engineering fields. In dual career cases with partners working in business or public administration, such networks are particularly important and have proven highly useful in the past.

The institutions recognized the significance of this issue many years ago and have constantly expanded their networks for advice and placements. ETH Zurich and EPFL are members of dual career networks such as the International Dual Career Network, IDCN¹¹. Interactions between the respective human affairs offices take place but in some cases are limited by geographical constraints for dual career placements. Under the lead of Eawag, the Research Institutes of the ETH Domain have launched the Swiss Dual Career Platform¹² as a further measure to improve the situation.

c) Strategic Capacity and Strategic Fund

As the cornerstone of the present recommendation, the Expert Committee suggests that the strategic capacity of the ETH Board should be generally strengthened. To this end, the Expert Committee encourages the Board in particular to consider the merits of establishing a strategic fund. Currently, a part of the ETH Domain's annual budget is allocated to the institutions through the so-called LEIOMIZU process, i.e. by applying performance-oriented allocation criteria. At the same time, the ETH Domain defines strategic focus areas through the Strategic Planning of the ETH Board. Thus a considerable part of the resources is earmarked for strategic initiatives and large research or infrastructure projects over the corresponding four-year funding period. These resources are indeed reserved for strategically relevant research topics, identified jointly by the ETH Domain institutions and defended with regard to their strategic relevance by the ETH Board. Additional strategically oriented funding would therefore need to be supported with evidence of significant added value, as earmarked resources always compete to a certain extent with regular and autonomously allocated resources at the disposal of the ETH Domain institutions.

Determining the major strategic guidelines for the ETH Domain is clearly a task to which the ETH Board is devoted. Strengthening its capacity to focus on strategically relevant issues means reducing its workload generated by non-strategic issues. Currently, at least 16 meeting days a year are scheduled for regular external ETH Board members (including 6 days of Dialog meetings). For internal ETH Board members, this number goes up to 20. With a view to strengthening its strategic role, the ETH Board must therefore consider measures which allow a reduction in the number of meeting days by better focusing on the strategically relevant topics.

¹¹ IDCN: <http://www.idcn.info> (last accessed: August 31, 2015).

¹² <https://plus.google.com/+SwissdualcareerplatformCh1/about> (last accessed: August 31, 2015).

Position of the ETH Board

a) Cooperation and Competition

With regard to cooperation and competition, the ETH Board agrees to the principle expressed by the Expert Committee. Cooperation within the ETH Domain functions very well, as has been described in the Self-Assessment Report. Similarly, very good use has been made of initiatives for creating synergies in the recent past – e.g. energy research, and recently the Initiative for Data Science in Switzerland (IDSS). Therefore, the ETH Board is convinced that the balance between cooperation and competition is not currently an area for concern.

The ETH Board also shares the Expert Committee's view regarding the added value generated by cooperation with universities and universities of applied sciences. It acknowledges that the ETH Domain institutions are engaged in such a large number of cooperation projects that a further increase would be difficult to absorb (both with regard to the existing quantity and the quality of cooperation). Hence the ETH Board is not aware of any particular difficulties identified by ETH Domain institutions which would hinder their ability to engage in cooperation with partners both inside and outside the ETH Domain. The ETH Board therefore feels that it should not try to set incentives or define strategic priorities on the level of particular cooperation schemes in order to avoid unwelcome steering effects. As mentioned in the Self-Assessment Report (cf. chapter C.5), the bottom-up character of cooperation is an important success factor. However, the ETH Board also recalls that cooperation always entails considerable coordination costs, which must also be taken into account in the assessment of the added value generated by cooperation.

b) Pooling of Competencies

Regarding the pooling of competencies, the ETH Board is clearly in favor of the recommendation. Therefore, future opportunities (at the moment, for example, with regard to increased cooperation among libraries at ETH Zurich and EPFL) should be seized as in the past (for instance Lib4RI, SAP, IPSAS, KoBe ETH+). At the same time, the ETH Board attaches great importance to observing the institutions' autonomy in terms of organiza-

tion and therefore stresses that they have always seized opportunities to engage in such a pooling of competencies on their own initiative, insofar as this pooling proves to be truly in their own interest.

With regard to dual career hiring, the ETH Board encourages the institutions of the ETH Domain to maintain their efforts to cooperate across the ETH Domain. The ETH Board also commends the institutions' efforts to exploit opportunities involving institutions and networks outside the ETH Domain, because the ETH Domain alone cannot cover the diversity of the demand. However, the ETH Board does not see a need to financially incentivize such efforts to promote dual career hiring, as they are in the best interest of the institutions and directly benefit them.

c) Strategic Capacity and Strategic Fund

The ETH Board is opposed to the recommendation of establishing a strategic fund on its own behalf. It considers that it has neither the capacity nor the role of a funding agency. Most importantly, it does not have (nor should it have) the competencies to assess projects in accordance with established standards pertaining to scientific review processes. Again, bottom-up cooperation proves to be more successful than top-down strategic cooperation initiatives.

Concerning the strengthening of its general strategic capacities, the ETH Board agrees to this objective set forth by the Expert Committee, although it emphasizes the fact that this does not concern the general competency of the Board and its members but the possibility of focusing its work on the issues that are strategically relevant. In order to strengthen this focus, the ETH Board has already started a process aimed at increasing the efficiency of ETH Board meetings and thus reducing the workload they generate as well as the number of meeting days. With the same aim, the ETH Board is developing models for moving towards a more substantial delegation of non-strategic tasks to its Executive Committee, the Domain meeting, and the ETH Board's staff (see also position to recommendation 4, point d).

Recommendation 4 – Reviewing the Organization of the ETH Board

Recommendation: “In all its aspects, the work of the ETH Board should focus on strategic issues and leave the operational activities to member institutions to the maximum extent possible.

No substantive change on governance of the ETH Board is proposed. However, to emphasize the national significance of the ETH Domain, the EC recommends that the ETH Board should take steps to have its seat and central activity moved to Bern.

In the interest of a lean organization, the working method of the ETH Board needs to be reviewed in order to ease the administrative burden.

In general, there is a shared feeling by the ETH Board and the institutions of the ETH Domain that administrative work has increased significantly over the past years. The EC recommends that the State Secretariat and the ETH Board review the situation and propose appropriate measures.

Finally, the EC noted the recommendation of the previous expert committee and shares its concern about the lack of international representation in the ETH Board. It invites the Swiss government to follow up these recommendations and re-assess the situation.”

Appraisal & Status

a) Location of the ETH Board

The ETH Board considers that it must be able to act as a strong voice in the higher education and research policy debates in Switzerland. To this end, a strong presence in Bern is of great importance to the ETH Domain. At present, the ETH Board already operates a site at Bern, beside its location at Zurich. A former President of the ETH Board also operated offices at Lausanne (Château En Bassenges, Ecublens).

In general, the ETH Board's presence at Bern is to be considered as high: Almost all ETH Board meetings (excluding Dialog meetings and occasional external meetings) are held at Bern. This also includes meetings of other ETH Board or ETH Domain bodies, such as the Executive Committee or the Domain meeting. In addition, the president of the ETH Board has a presence of 1–2 full days per week in Bern. Regarding the ETH Board's staff, currently about 20% of all employees are permanently located at Bern. Each of the remaining staff members has the right to determine whether they prefer to be located at Zurich or at Bern.

b) Administrative burden

The ETH Board seeks to minimize the administrative burden for the institutions insofar as this is compatible with the applicable law. Nevertheless, rising demands for transparency and public accountability increase the administrative workload. At the same time, the complexity of the work has

been growing and the institutions increasingly collaborate with third parties (incl. PPP) as requested in the Performance Mandate. These developments coupled with increasing short-term demands from authorities and politics on various levels (Confederation, cantons, municipal level), the media and the public have spawned a growing number of requests and regulations from the owner and from Parliament. New legal provisions have been a major contributor to this increased workload. The ETH Board mentioned this problematic development in the Self-Assessment Report (chapter B.1.1), as well as in its Budget Report 2015. Legal provisions recently introduced include the revision of the procurement regulations, the Freedom of Information Act¹³, the spatial and financial master plans (SFMP)¹⁴, the role model function of the Confederation in the energy sector¹⁵, and many others. The regulatory costs due to new or changed regulatory provisions have risen sharply in the past years. As an example, the recent change of the financial consolidation system to IPSAS meant that one person had to be hired at the ETH Board level and twelve FTE at the institutions for the short term, which will be reduced to about eight FTE for the longer term.

¹³ 'Öffentlichkeitsgesetz', (BGÖ) / 'Loi sur la transparence', (LTrans), SR 152.3.

¹⁴ 'Räumliche und finanzielle Gesamtkonzepte' (RFGK) / 'Schémas généraux des espaces et du financement' (SGEF).

¹⁵ 'Vorbildfunktion des Bundes' / 'Rôle exemplaire de la Confédération'.

c) International representation

Access to international expertise at ETH Board level is important if the Board is to exert its strategic leadership function. As the ETH Board has considerable international experience collectively, it can readily deal with urgent strategic issues that may come up during the year. In longer-term strategic decision making, the ETH Board may benefit from tapping the additional know-how and experience of international experts. That would apply, for example, to the ETH Board's strategic planning for the ETH Domain, to strategic decision processes for research infrastructures, or to other long-term developments.

In the past, identifying an international member who would be able to attend meetings of the ETH Board regularly proved difficult. A similar recommendation of the Intermediate Evaluation 2010 could not be implemented as the search for available international members failed. An international member of the ETH Board who was elected to the ETH Board in March 2000 attended one single meeting. On the other hand, the ETH Board made an effort to learn from international perspectives: in July 2013 the ETH Board held its retreat in Cambridge, UK, with a specific focus on models for knowledge and technology transfer and on collaboration with the private sector. It should also be noted that international expertise is firmly anchored at the institutions. Several academic quality and performance control processes currently in place incorporate an international perspective as well: evaluations at the level of the institutions or their units as well as the intermediate evaluation of the ETH Domain are conducted by internationally composed expert panels. Some institutions also maintain international advisory boards.

d) Working method of the ETH Board

The ETH Board assumes two fundamentally different functions that are prescribed by law: i) a strategic leadership function, and ii) a supervisory function for the ETH Domain that includes strategic risk monitoring and assessment. These functions must be seen in the context of the dual autonomy of the ETH Domain, i.e. the autonomy of the institutions, and the autonomy of the ETH Domain as a whole – both of which come with their respective accountability. The ETH Board may appear all too often to be occupied with operational tasks or to be dealing with issues that should be dealt with by the institutions as part of their responsibilities. The ETH Board acknowledges that this impression may arise, but underlines that it is required by law to perform certain key operational tasks. An analysis of the items dealt with by the ETH Board at its meetings over the past year shows that purely operational issues are rare. In addition, the ETH Board exercises the role of the *Bau- und Liegenschaftsorgan des Bundes* (real estate authority for the Confederation) and is thus legally required to perform specific operational tasks. Yet in many cases these tasks are of strategic importance, too – such as the sale or acquisition of land, the construction of buildings in public-private partnerships, etc.

Currently, the Executive Committee comprises one external member, i.e. the President of the ETH Board, who chairs the Committee, and four internal members, i.e. the Presidents of ETH Zurich and EPFL, the Director of PSI, and a member representing the School assemblies of ETH Zurich and EPFL. Today, the Executive Committee has no defined decision-making power. If this were to be changed, the composition of the Executive Committee would have to include more external members to better balance the viewpoints of the institutions *versus* the ETH Domain as a whole. Given the already high frequency of meetings for board members and the additional duties of some external ETH Board members in the audit committee, such a model is deemed unworkable with the current number of external members.

Position of the ETH Board

a) Extension of the ETH Board's location in Bern

The ETH Board acknowledges the great political significance and the advantages of a strong presence in Bern. The ETH Domain institutions as well as the ETH Board must be able to act and to be heard as the leading voices among the Swiss higher education and research actors – an ambition the ETH Domain institutions already take very seriously, given their strong involvement, for instance, in bodies of swissuniversities. The ETH Board considers that it has the permanent task of guaranteeing a strong presence and a solid standing of the ETH Domain on the national scene. The ETH Board, and in particular its President, will further intensify the presence in Bern.

The ETH Board's staff is present at two locations, Zurich and Bern. Both locations shall be maintained. At the same time the ETH Board will expand its staff at Bern, including central activities as recommended by the experts. The expansion of the Bern location shall also serve – in the national interest, in which the institutions of the ETH Domain and the ETH Board act – to nurture a good cultural mix, representing the various regions of Switzerland within the ETH Board's staff.

In the ETH Board's view, cultural diversity as a prerequisite for cultural sensitivity is as important as the question of the effective locations of the ETH Board and its staff. Strengthening the Bern location shall – beside strengthening the ETH Board's voice in Bern – also serve this goal.

b) Administrative burden

The ETH Board welcomes the recommendation to conduct a review of the increasing administrative burden on the ETH Domain. Three levels need to be analyzed: i) ETH Board/ETH Domain (type and intensity of involvement of institutions in processes of the ETH Board), ii) institutions of the ETH Domain (review of situation at the institutions, e.g. further coordination, delegation or outsourcing), iii) Federal Government (reporting needs, numbers of meetings, hearings, audits, etc.). The review at the ETH Domain (i) and the institutions (ii) will be handled internally and should be complemented by a review at the federal level (iii) that should be conducted by the State Secretariat and the ETH Board.

c) International representation

The ETH Board is open to the notion of appointing international members to the ETH Board and would welcome a renewed effort by the Federal Council to work towards this goal. The ETH Board also suggests seizing the opportunity presented by the next election round of new Board members in 2016 to proactively realize the potential for integrating international expertise when determining the future ETH Board members' profiles. As an immediate measure, which shall be complementary to benefitting from the international expertise by the executive members of the ETH Board (Presidents of ETH Zurich and EPFL, as well as the Director of PSI), the ETH Board is considering various ways of including additional international expertise in its discussions, such as by inviting international experts as guests to attend ETH Board meetings or retreats when major strategic issues require reflection from an international perspective. The creation of an international advisory board to the ETH Board will also be considered.

d) Working method

The ETH Board fully agrees that more time should be allocated to discussing and taking decisions on strategic items. Delegation of some tasks to the Executive Committee or to the "Domain meeting" should be given closer consideration. However, many of the apparent operational tasks of the ETH Board do have strategic components, which limits the scope for final decisions by the Executive Committee or the Domain meeting. Improved structuring of the documentation for the ETH Board and proper management of time allocated to mainly operational items at the ETH Board meeting have improved the situation over the past years by allowing more time for strategic discussions. In addition, the ETH Board has recently introduced a window for the institutions that invites them to submit strategic issues to the ETH Board at an early stage. Such measures have gradually strengthened its strategic function. The ETH Board intends to pursue this pragmatic approach in view of the scope of the tasks conferred on it by law.

Recommendation 5 – Intensifying the Relations Between the ETH Domain and the Cantons

Recommendation: “The national mission of the ETH Domain is presently fulfilled at different locations in Switzerland. So far, the ETH Domain is present in 13 cantons out of 26.

There is an increased interest of cantonal institutions (cantonal universities and universities of applied sciences) in leveraging the strength and mission of the ETH Domain.

There are differences in approaches within the ETH Domain regarding partnerships, territorial implantations and co-financing by the cantons, reflecting diversity in opportunities, and political, economical, and cultural differences in Switzerland.

The EC recommends that the ETH Board carry out a strategic monitoring of the outcomes of these approaches in the light of the missions of the ETH Domain. The monitoring should weigh the positive impact of these initiatives, their sustainability, as well as the risks associated with them, including the potential dilution of the institution’s resources. The results of this monitoring should be made transparent.”

Appraisal & Status

The ETH Board has generally given the institutions considerable room for maneuver for their strategic development. This also applies to the recent expansion of EPFL in the context of its antenna strategy. Today, the institutions of the ETH Domain are present in half of the Swiss cantons. The ETH Board concurs with the recommendation to perform a review of the outcome of the different approaches taken in recent and more distant times. This review should mainly be seen in the context of the strategic and supervisory functions of the ETH Board. Its conclusions should assist future strategic decision-making at the ETH Domain level. Such a review should therefore go well beyond mere monitoring.

The ETH Board possesses a number of instruments for monitoring the interactions of the institutions with cantons and other third parties: ETH Board meetings (tabulation of requests for information and updates, or the “windows for the institutions” at each meeting), the yearly Dialog meetings, internal audits, etc¹⁶. The ETH Board has laid down a number of criteria that guide regional cooperation as well as international initiatives¹⁷. Both documents mention a number of desired outcomes and provide a good basis for following the current developments.

¹⁶ The strategic goals and desired outcomes of past and current geographic expansion of ETH Domain institutions have been laid down in the SAR (chapter C.1: Geographic Developments, p. 79–85).

¹⁷ See the documents of the ETH Board “Domaine des EPF: création d’antennes régionales – Principes et critères de collaboration avec les Cantons”, ETH Board, December 4/5, 2013, and “Position Paper on International Initiatives of ETH Domain Institutions”, ETH Board, March 4/5, 2015.

Position of the ETH Board

The ETH Board appreciates the relations of the ETH Domain with the cantons and their higher education institutions, and encourages the institutions of the ETH Domain to nurture these relations. Strengthening the ETH Domain and its institutions as well as promoting the Swiss higher education system as a whole must be the prime goal of such relations, e.g. through making best use of the complementarities and synergies in the system.

With this goal in mind, the ETH Board will evaluate the outcome of the various models of interactions of ETH Domain institutions with the cantons once the first phase of the current expansion projects is completed, namely the EPFL-led strategic initiatives in the Arc Lémanique and the ETH Zurich-led creation of D-BSSE in Basel, as well as the further cooperation models involving ETH Domain institutions. In implementing the expert’s recommendation for a strategic monitoring of the outcome, the ETH Board will thoroughly assess it based on the information obtained regarding the benefits, costs and risks of these models of interaction, the structuring role of the interactions for the further development of the higher education system as a whole, and the specific supervisory challenges associated with the development.

Recommendation 6 – Fostering Research Infrastructures

Recommendation: “The ETH Domain, with the two schools and the four research institutes, plans, constructs, and runs outstanding technology platforms and unique large-scale research facilities for their own research and for the scientific community at national and international level, including users from the private sector. Such large-scale infrastructures need particular skills to be conceived, built and operated.

The EC was impressed by the fact that especially the Swiss FEL (Free Electron Laser) and NEST (Next Evolution in Sustainable Buildings Technologies) infrastructure projects seem to be on schedule and within budget. The EC points out that these infrastructures require long term planning with stable budgets, and recommends assuring this by appropriate means. In its area of competence, the ETH Domain plays a key role in further developing the national roadmap for future large-scale infrastructures and in the participation of Switzerland in international initiatives.”

Appraisal & Status

Planning and implementation of large-scale research infrastructures require long-term strategies and reliable financial planning. The institutions of the ETH Domain, and PSI in particular, have a proven track record and profound experience in developing such infrastructures and in thoroughly defining their underlying science case. Reliable funding and swift decision-making by political authorities at the federal, cantonal, and municipal level are of paramount importance. In the past, this combination has allowed the responsible institutions to implement large-scale research infrastructures in a significantly shorter time than their competitors, giving Swiss-based researchers a distinctive advantage. Examples are the implementation of the HPCN strategy, including the construction of the new CSCS high performance computational center of ETH Zurich, and the construction of the free electron laser SwissFEL at PSI, which will become operational in 2017.

Several future large-scale infrastructures have been included in the recent update of the Swiss roadmap for research infrastructures. These infrastructures include the Initiative for Data Science in Switzerland (IDSS), and the Swiss Plasma Center (SPC). The ETH Domain may collaborate with partners for establishing these infrastructures, but plays a leading role in these cases and spearheaded the successful realization of many others in the past.

Position of the ETH Board

The ETH Board is pleased with the favorable outcome of the review with regard to the ETH Domain's competencies in the area of large-scale research infrastructures. It agrees with the expert's notion that planning and building large-scale research infrastructures require stable budgets that must be secured by appropriate means. If proper budgets can be secured, the ETH Board – together with the institutions – will be ready to take on future challenges, such as the implementation of the Swiss Data Science Center project.

To optimize future planning processes in the context of the Swiss Roadmap for Research Infrastructures, the ETH Board proposes that the ETH Board, together with the SERI, co-lead the next update of the Roadmap in the ETH Domain's areas of competence. Coordination of the process with the ETH Domain, swissuniversities and the SNSF should be managed jointly at the level of the ETH Board senior staff and the respective contacts at the SERI. The SERI will remain responsible and provide input for the international roadmaps.

Recommendation 7 – Striving for Gender Diversity

Recommendation: “Progress has been made in all institutions to raise awareness of the importance of gender diversity and equality of opportunities, including increasing the number of female faculty. Nevertheless, practices, improvements and level of commitment and implementation vary across the institutions and their programs.

The EC recommends that the ETH Board insist on the formulation and implementation of a clear gender diversity and equality of opportunity policy.

The implementation of this policy should start immediately and not wait for the re-accreditation procedure mandated by the Federal Act on Funding and Coordination of the Swiss Higher Education Sector (Article 75, paragraph 1).

The EC also recommends that the ETH-Board enhance its continued monitoring of the implementation of the policy. Monitoring could include benchmarking against best practices at comparable institutions worldwide. The possibility of providing incentives and quantitative targets to accelerate implementation is encouraged.”

Appraisal & Status

The ETH Board regards gender diversity and equal opportunity as key success factors in maintaining academic excellence in the ETH Domain. It notes that the institutions make considerable and growing efforts toward this end. Focusing on effectiveness, such efforts are aimed at introducing tailor-made measures with respect to the different sciences areas as well as the institution's specific challenges and structures. In 2010 the ETH Board laid down a number of key principles that created a framework for such efforts. Each institution is mandated to take appropriate measures to promote equal opportunity and gender diversity in response to the performance mandate conferred upon the ETH Domain by the federal government and the agreement on goals between the ETH Board and the individual institution. The institutions' annual reporting to the ETH Board on the type and cost of such measures, as well as the biannual gender monitoring of ETH Zurich and EPFL plus other surveys testify to the efforts made. From a financial point of view, the goal set by the ETH Board¹⁸ to spend at least 0.4% of the institutions' overall funding was significantly surpassed in 2014 (0.53%).

Some quantitative targets were set by past performance mandates of the ETH Domain, but these had only limited success. The ETH Board is pleased that the current mandate (period 2013–2016) does not contain quantitative targets; neither does the draft of the ERI message 2017–2020 currently under consultation. The ETH Board rather believes

that continuous efforts are required that will lead to steady improvement over time. Lessons learned from the US National Science Foundation's ADVANCE program¹⁹ are that promotion of gender equity must be cultivated over decades at all levels of academic institutions and be guided by best practice approaches. Individual, interactional and institutional barriers²⁰ must be addressed if a sustainable and measureable impact is to result.

The institutions of the ETH Domain monitor gender-related aspects. ETH Zurich and EPFL each present their gender monitoring reports to the ETH Board. The Research Institutes provide similar reports, although on a smaller scale and in a different format. Gender aspects are also frequent topics at the annual meetings with the institutions (“Dialogs”). The ratio of women in leadership positions, or the ratio of female staff, varies considerably from institution to institution, depending on their major scientific fields of activity. Benchmarking concerning gender diversity and equal opportunity may be useful in areas that need particular attention. The upcoming presentation of the gender monitoring of ETH Zurich to the ETH Board for the years 2013/2014 will include benchmarking

¹⁸ Strategic Planning 2012–2016 of the ETH Board for the ETH Domain.

¹⁹ <http://www.portal.advance.vt.edu/index.php/about> (last accessed: August 31, 2015).

²⁰ Holmes, M.A. (2014): Advancing women in oceanography: How NSF's ADVANCE program promotes gender equity in academia. *Oceanography* 27(4) supplement: 30–38, <http://dx.doi.org/10.5670/oceanog.2014.112>.

Recommendation 7 – Striving for Gender Diversity

with international institutions as a special feature and may serve as an example for further such analyses. Incentives for financial support may be envisioned for specific situations. Support or incentives are not confined to financial support, but must rather

enable an institution to pursue the best possible solution, e.g. to proceed with dual career hiring or retain female staff or faculty members if there is a risk of losing them.

Position of the ETH Board

The ETH Board agrees with the Expert Committee that “enhancing gender diversity at all levels” can have “a very positive potential impact for the institutions”. The ETH Board underlines that the institutions have made considerable progress and applied diverse measures to promote gender diversity; it encourages them to continue and step up their efforts. The ETH Board concurs that “benchmarking against practices at comparable institutions” would be valuable and would further encourage the sharing of effective practices among the institutions of the ETH Domain. The ETH Board identifies the opportunity to benefit from the expertise of female academic leaders within the ETH Domain as well as those from comparable institutions.

The ETH Board recognizes that an ETH Domain-wide policy on gender diversity and equal opportunity, agreed upon by all institutions, would be useful as a complement to the policies and guidelines already in effect at the institutions. The ETH Board articulated its strategic

principles on diversity in 2010 and will review and adapt this document to provide a coherent framework policy at the Domain level. This will provide greater visibility for the measures implemented in the institutions, including the on-going, detailed monitoring on the representation and advancement of women at all levels. It will also stimulate the uptake and implementation of new measures.

The ETH Board is reluctant to set quantitative targets for diversity or to provide specific incentives to achieve them. It does, however, recognize that investments (both by the institutions and, where appropriate, by the ETH Board) are warranted to support initiatives that would implement measures with proven success in promoting diversity.

The Board also recognizes the importance of acknowledging success in promoting and achieving diversity and in supporting and replicating the measures through which such success has been achieved.

Recommendation 8 – Improving Graduation Rates

Recommendation: “The universities within the ETH Domain, ETH Zürich and EPFL, provide a superb education to their students. The educational experience is of the calibre of that of a very select group of elite science and technology universities in the world. Nevertheless, it is unfortunate and surprising that a large percentage of the students entering the Bachelor’s program are not able to continue after the first year. Hence, the graduation rates are lower than would be expected for such leading institutions in the world. In addition, this comes at a significant cost to the ETH Domain and the country.

The EC notes with concern an inefficiency in the system of admission, i.e. an existing gap between the learning outcome of the Matura and the success rate of students in the first year of their bachelor studies at ETH Zurich and EPFL. Efforts are under way to close this gap.

The EC recommends that these efforts be strengthened in order to improve the quality of the Matura and to close the gap more rapidly. On the other hand, ETH Zurich and EPFL should consider the possibility of a selective admission for students holding foreign qualifications, respecting the existing national and international regulations. Furthermore, for students with a Swiss certificate, the option of a non-compulsory, informative entrance assessment, as practiced in some areas by some universities and UAS, should also be taken into consideration. The EC appreciates that this question is only one aspect of the many facets of the entire educational system, and thus a complex issue to even consider. However, from the perspective of good stewardship of the country’s resources, it ought to be re-assessed.”

Appraisal & Status

The ETH Board agrees with the Expert Committee that the issue of graduation rates needs to be addressed within the context of overall admissions policy in Switzerland. Its uncontested core element is to grant access to all areas of study and to all universities in the country for anyone who has obtained the Swiss Matura (baccalaureate) certificate, irrespective of the profile or orientation they have chosen. The ETH Board is well aware of the relatively low success rates at the examinations after the first year of study at ETH Zurich and EPFL. Depending on the year and the area of studies, the failure rates at ETH Zurich and EPFL have been between 50% and 60%, though many students successfully pass the exams at the second attempt. The ETH Board thus acknowledges the necessity to remain attentive to this matter.

It is therefore necessary, as the Expert Committee states in its recommendation, not only to focus on measures that may allow for an even better coaching of students in the first year, but also on the level of knowledge and skills reflected in the Matura. Therefore, the ETH Board remains ready to support the efforts deployed by the various bodies so strengthen the quality of the Matura, in particular the level attained by the students in the MINT

disciplines. This problem does not therefore fall within the competencies of the ETH Board but needs to be tackled at the level of the cantons and together with the Confederation.

The ETH Board draws attention to the manifold and very substantial efforts already undertaken by ETH Zurich and EPFL with regard to strengthening the Matura, especially in mathematics and sciences – efforts that have been stepped up over the past years. In particular, these include training courses for teachers in biology, chemistry, geography, physics, mathematics, informatics and sports as well as the production of teaching materials (e.g. through EducETH at ETH Zurich and through direct exchange with high schools and political authorities at EPFL). In the Canton of Zurich, furthermore, the HSGYM initiative brings together high school teachers and teaching staff (professors and others) from ETH Zurich and the University of Zurich. Their concern is to optimize the interface between high school and the university – an interface that is also one of EPFL’s major areas of activity in its direct interaction with the competent actors. In 2014, the cantonal ministers for education have chosen HSGYM as a model for nationwide attempts to improve the interface between high school and university.

In addition, the potential of online learning tools (including MOOCs) for self-evaluation and

Recommendation 8 – Improving Graduation Rates

rectifying deficits must be highlighted. For instance, EPFL will start to offer a MOOC to students with too many deficits in mathematics and physics during the first half year, allowing them to catch up during the second part of the first study year. Similarly, ETH Zurich intends to start offering a specific support course for students needing to rectify shortfalls in mathematics.

With regard to admission policy – in particular for foreign students at the entry level (Bachelor program) – the ETH Board acknowledges that their increasing number represents a considerable challenge, especially for EPFL. Recently, EPFL in particular has been confronted with a rapidly increasing demand for study places, notably among French

students wanting to study at a world-leading and (at least partially) French-speaking university. Measures have therefore already been taken and will continue to be sought within the next years. For instance, EPFL has increased the qualification requirements for European students at entry, (up from 70% to 80% of the respective maximum grade). Whether this measure alone will produce the desired effect remains to be seen. It should be noted that in the context of the next ERI message, the ETH Board has requested an amendment to the ETH Act (revision of Art. 16a). However, this will only make it possible to restrict access at entry to the Bachelor level for capacity reasons but will not provide a basis for selective admissions.

Position of the ETH Board

The ETH Board shares the opinion that the issues tackled by the present recommendation are of great importance. The ETH Board is therefore grateful for the efforts undertaken by all ETH Domain institutions to strengthen students' competencies in MINT disciplines and permit assessment of their level of competence before and during the first year of Bachelor studies. Nevertheless, the ETH Board considers that specific measures for strengthening the Matura qualification must primarily be defined, decided and implemented by the cantons (with the support of the Confederation), as Matura schools are in in their area of responsibility.

As capacity is the only reason why the ETH Domain institutions may limit access to students holding a foreign qualification to their Bachelor and Master programs, and given the challenges that have arisen in this regard in the past, the ETH Board has proposed a revision of Art. 16a of the ETH Act. This article would allow the ETH Board – always for reasons of capacity and if

requested by the Presidents of ETH Zurich or EPFL – to limit admission to any Bachelor or Master program, including first year Bachelor programs (subject of the proposed revision), for students holding foreign qualifications.

In general terms, the ETH Board together with the ETH Domain institutions clearly maintains that the Swiss Matura must remain the entry ticket to commence Bachelor studies at ETH Zurich or EPFL, even if this means that first-attempt success rates at examinations at the end of the first year may be lower than at foreign universities with selective admission policies. It is therefore firmly opposed to introducing formal entry exams that would restrict access. Yet the existing, already very considerable efforts to help future students assess and improve their skills are wholeheartedly supported by the ETH Board. ETH Zurich and EPFL will continue their manifold efforts in this regard to further encourage and inform prospective students interested in studying at one of the two universities.

Recommendation 9 – Improving Communication and Dialogue Capacities

Recommendation: “Practically all stakeholders expressed concerns about the considerable risks for research and innovation in Switzerland in case the country does not maintain its particular status with the EU and has full access to the Horizon 2020 program and other instruments. This has to be communicated with urgency to the public and its political representatives. There is a strong responsibility incumbent on all actors, including the ETH Board, the management of the institutions and the scientific community at large, to be actively engaged in the debates about societal issues affected by science and technology.

Therefore, the dialogue with the population and its representatives towards a better mutual understanding should be improved and intensified. The need for building up and maintaining strong international networks and exchanges, the sensitivity of the higher education system to many policy regulations and the acceptance of new technologies in society, are some examples of the importance of public engagement faced by the ETH Domain, and the higher education area in general.

The EC recommends that the ETH Board develops a strong communication strategy in coordination with the other major actors of the higher education system to increase information of and interaction with the public in general and political representatives on one side, and to foster ways to better listen and understand societal concerns on the other side.

Furthermore, the ETH Domain should enhance communication on how science is able to contribute to political decision-making and how it impacts regulation, societal issues and policies (e.g. climate change, ageing, health care) in view of “evidence based policy.”

Appraisal & Status

The ETH Board perceives its communication objective not only as being to explain its decisions and reinforce the reputation of the ETH Domain, but also to reinforce and promote Switzerland as a center of education, research and innovation (ERI) among a broad circle of stakeholders. The ETH Board explicitly recognizes its share of the responsibility “to be actively engaged in the debates about societal issues affected by science and technology”, as recommended by the Expert Group.

Consequently, the Board and the Domain’s institutions have further developed their interaction with stakeholders outside the teaching and science arena and have increasingly reached out to specific communities, the general public and their political and non-governmental representatives. In the

recent past in particular, leading representatives of the Domain – first and foremost the heads of the institutions, and also the President as representative of the ETH Board – have increasingly stepped up communication activities and sought dialogue with key stakeholders. They have in particular intensified their participation in the political debate: the Board and the institutions are increasingly taking a determined public stand on political issues that are important for the Domain, for the ERI community, and for ERI development in Switzerland. They will continue to do so even more intensively in the future wherever possible.

The ETH Board regards such proactive engagement and position-taking to be an important aspect both of the ETH Domain’s autonomy – as granted to it by law – and of the ETH Board’s strategic core function.

Position of the ETH Board

The ETH Board shares the experts' appraisal and recognizes the significance of a consistent and intensive dialogue with the population and its representatives in achieving a better mutual understanding. Dialogue and exchange, including with stakeholders from outside the immediate fields of education and research, are already a core component of communication strategy within the ETH Domain and are firmly established at all institutions. The Board will continue to strongly support activities both at the individual institutions as well as within the Board itself and Domain-wide, e.g. by promoting intra-institutional exchange and exploiting synergies, or procuring access to additional networks and platforms to enable the institutions to enter into dialogue with the population and its representatives.

The ETH Board and the institutions already aim for a coordinated communication strategy to address concerns across the entire gamut of education and research in Switzerland.

In keeping with the recommendation of the Expert Committee, the ETH Board plans to increasingly promote coordination of the Board's and the institutions' communication strategies with other key actors (e.g. by using synergies and common platforms more actively). In addition, the Board sees potential here for progressively engaging other actors outside the ETH Domain (e.g. alumni).

The ETH Board unreservedly shares the communication goals enumerated in the recommendations with regard to the key impact of science on societal challenges and the related policies. These goals are already being pursued in all communication activities within the Domain. In line with the Expert Committee's appraisal, the ETH Board sees the need to further raise public awareness outside the circle of experts of the significant contribution that the Domain is making in the public interest in this field.

Recommendation 10 – Enhancing the Collaboration with the Universities of Applied Sciences

Recommendation: “The institutions of the ETH Domain and the UAS each have unique strengths that should be better leveraged for the benefit of society at large. As an example, the ETH Domain alone will not be able to solve the problem of shortage of engineers. UAS are in position to play an important role to alleviate this shortage.

The EC recommends that the ETH Domain and UAS jointly define ways to better interact in matter of education and research. Among the many possibilities for improvement are the following:

- Strengthen the *passerelles* between curricula (e.g. by exploiting experiences with mobility of UAS–Bachelor students entering ETH Zürich/EPFL Master study programs and by defining the *passerelles* for UAS Master students looking for an ETH Zürich/EPFL PhD);
- Support transfer from fundamental research created within the ETH Domain to market through better utilization of applied research and development created within UAS;
- Define and propose together with interested partners financial incentives targeted towards collaboration between ETH Domain institutions and universities on one side, and universities of applied sciences on the other side.”

Appraisal & Status

Passerelles in the sense of vertical mobility between the universities and the universities of applied sciences (UAS) represent an essential element for the proper functioning of the dual education system in Switzerland. Its broad public support depends also on the perception of reasonable access to mobility between the two higher education tracks and transparency about the procedures governing this mobility. Under these conditions, individual career paths that are best suited to the personal development of students are possible, thus enabling maximum efficiency and an optimal outcome of tertiary education.

ETH Zurich and EPFL both apply well-established procedures that govern the *passerelles* between Bachelor and Master studies. The conditions are described in the respective ordinances and are published on ETH Zurich's and EPFL's websites. At the level of entry into a PhD program, the complete profile of a student is reviewed. Admission is granted on the basis of academic performance and scientific potential. In these cases, the outcome is naturally less predictable for the applying student because completion of a substantial number of additional courses may be required, and the student is competing for a limited number of PhD positions.

Forms and time-scales of KTT vary from field to field, and so do the types of partners involved and the financial instruments needed for making

the process effective. The ETH Domain offers an “ecosystem” that meets a broad range of KTT-related needs. It is estimated that 10–15% of KTT projects in the ETH Domain involve an academic partner from the UAS.

As the competency spectra of the UAS as well as their research capacities are growing, so is the intensity of their collaboration with the ETH Domain. In 2014 ETH Zurich alone counted 120 active cooperation projects with UAS. New forms of collaborations are being explored, too: Based on mutual interest in new research areas, ETH Zurich is negotiating a pilot project for a joint doctoral program with the University of Zurich and the Zurich University of the Arts (ZHdK). Since 2002 ETH Zurich has been operating the Zürcher Hochschulinstitut für Schulpädagogik und Fachdidaktik (ZHSF) together with University of Zurich and the Zurich University of Teacher Education on instructional methodology. EPFL reinforces its institutionalized collaborations with the UAS as part of its antenna strategy, i.e. with UAS Sion for EPFL Valais–Wallis and UAS Fribourg for the Smart Living Lab Fribourg. Since 2007, EPFL+ECAL Lab, a common lab between EPFL and the Ecole cantonale d'art de Lausanne, has been active in research and teaching at the crossroads between technology, design and architecture. Furthermore, EPFL has undertaken 67 research projects with the HES–SO (University of Applied Sciences and Arts Western Switzerland) in the last few years. Eawag also plans to engage in more formal cooperation with UAS.

PSI has established two common institutes with UAS Northwestern Switzerland²¹. In the context of the SCCERs, several ETH Domain institutions are exploiting new opportunities for research collaboration on common platforms. Common research projects and professorships between UAS and the Research Institutes, increasing numbers of teaching hours delivered at UAS as well as memberships in advisory boards and search committees indicate a growing commitment to interaction with UAS. In some cases portfolio rearrangement has been sought and successfully implemented. Thus, the ETH Domain interacts in manifold ways with the UAS and thus contributes to the Swiss higher education system well beyond its core mandate.

²¹ Institut für Nanotechnische Kunststoffanwendungen (INKA, <http://www.fhnw.ch/technik/inka>) and Institut für Biomasse und Ressourceneffizienz (<http://www.fhnw.ch/technik/librel>)

Collaboration is driven by mutual interest and by the objective to create synergies. Therefore, the distribution of research types – fundamental research in the ETH Domain and applied research in UAS as implied as a model underlying the expert's recommendation – cannot be a structuring principle per se in collaborations between ETH Domain institutions and UAS. In the ETH Domain, fundamental and applied research coexist in many fields; collaborations with UAS are sought for complementarity in competencies, research methods and infrastructures rather than in research type. The review of interactions between the ETH Domain and the UAS demonstrates that new opportunities and mutual interest remain the major drivers for collaborations with the UAS. The ETH Board acknowledges the already intense cooperation with UAS and frequently reviews its development as part of its strategic controlling (e.g. in the context of the Dialogs).

Position of the ETH Board

Collaborations of ETH Domain institutions with UAS are manifold and also include teaching by staff of ETH Domain institutions at UAS. The ETH Board welcomes the notion that collaboration between the ETH Domain institutions and UAS should be promoted. Collaboration shall be further strengthened but must continue to be driven by mutual interest and complementarity of competencies. This is best guaranteed in environments that allow and foster bottom-up initiatives in research and teaching. Financial incentives are considered neither necessary nor suitable as a means of intensifying collaboration. Therefore, the ETH Board is opposed to introducing such incentives.

The ETH Board sees two areas for improvement:

a) Passerelles for entry to PhD programs at ETH Zurich or EPFL

The *passerelles* for Master students at an UAS who wish to enter a PhD program at ETH Zurich or EPFL may need to be reviewed in terms of transparency of procedures and communication. The ETH Board will ask ETH Zurich and EPFL to present the procedures they already have in place and the respective communication concepts. ETH Board considers that this is primarily an issue of academic importance and concerns proper communication by ETH Zurich and EPFL which should be handled at the institutional level. As the public perception of mobility in the tertiary educational system is important, the number of students who make use of these *passerelles* should also be monitored and communicated in future yearly reports of the ETH Domain.

b) Financial instruments for collaborative research

There is an urgent need for instruments for collaborative research or other common activities between ETH Domain institutions and UAS that would permit financing of such activities, preferably on a competitive basis. Financial support for collaborations cannot come from the ETH Board, nor should it be limited to certain models of partnerships or innovation models (linear, open innovation, etc.) of KTT. Rather, a new funding instrument for common longer-term research projects between universities and UAS is needed that would be positioned to bridge the "death valley" of the precompetitive stage of research with industry partners. Such an instrument would greatly facilitate collaboration of the ETH Domain with UAS. In that respect, the BRIDGE program – a collaborative funding instrument of SNSF and CTI as outlined in the Swiss National Science Foundation's Multi-Year Programme 2017–2020 – may be a good start. But the planned program seems not to cover the most needed common research platforms for longer-term collaborative research between universities, and between universities and industry. Therefore, the ETH Board requests that the ERI message include an extended BRIDGE program or a similar funding instrument which would permit the creation of such platforms and which could accommodate various forms of collaboration between university types, and with industry. In conclusion, the ETH Board considers measures facilitating common research endeavors much more effective and less prone to false outcomes than incentivizing collaborations at the level of ETH Domain institutions.

Recommendation 11 – Defining a Strategy Relative to the Medical and Health Field

Recommendation: “The ETH Domain is active in many areas of the life sciences and medical technology, and interacts with many actors in the health field. However, the EC noted that an overarching approach to health research and to fully utilizing the resources available outside the life sciences (e.g. in architecture, urban planning) is lacking. The EC recommends that the State Secretariat, the ETH Domain and the cantons acting in accordance with their respective responsibilities:

- Support the evolution of medical curricula towards greater Bologna compatibility, to facilitate *passerelles* and define a strategy regarding involvement in medical curricula, e.g. through pre-med programs;
- Define a strategy on how the institutions of the ETH Domain can contribute to increasing productivity in the health care sector, in order to compensate for the shortage of health care professionals;
- Sharpen the vision and the role of the institutions of the ETH Domain regarding precision medicine and translational medical research;
- Define a strategy with the main actors regarding public health, including the potential contribution of the institutions of the ETH Domain in prevention and health promotion;
- Define where the institutions of the ETH Domain could and should take leadership.

The EC takes note that the ETH Board has no strategic aims to strive towards the creation of a medical school within the ETH Domain. The EC concurs with this view.”

Appraisal & Status

As individualized treatments, medical technology, and novel data science methods become increasingly important for medical research, diagnosis and patient treatment, the qualifications of medical staff in many areas of medicine are changing. Clinical research settings in particular require future medical doctors to have a strong science and engineering background. The ETH Domain could make significant contributions to their education. To that end, the disparity between the growing need to train more general practitioners and to train medical doctors capable of conducting clinical research needs to be analyzed from a systemic angle. In its Strategic Planning for 2017–2020 the ETH Board outlined its goal of closer collaboration of ETH Domain institutions with the medical faculties and university hospitals and with other hospitals and clinics. Consistent with the experts' recommendation, ETH Zurich and EPFL are planning to devise and implement new models that contribute to education and research in the medical field.

The recommendation extends the current mandate stated in the ERI message and the Federal Council's performance mandate to the ETH Board for the years 2013–2016. There are high expectations concerning the contributions of the ETH Domain to

progress in (personalized) medical treatment, novel diagnostic and therapeutic methods, etc. The ETH Domain can certainly contribute to productivity in these areas, although increasing productivity to compensate for the shortage of medical professionals is not a primary focus of research.

On the translational research side, the SwissTransMed²² project of the Swiss University Conference, as well as other initiatives for translational research, will also help to alleviate the shortage of capacity for training medical staff. Several translational platforms for medical research have been created. The first call was concluded at the end of May 2013 and resulted in the creation of six interuniversity platforms that are already operational.

The ETH Domain is interested in further developing activities in collaboration with medical schools and hospitals. The large number of existing and planned initiatives as given in the SAR (see Appendix) provides a basis for intensifying institutionalized cooperation in medical research. However, cooperation models exploiting the ETH Domain's competencies for training future medical doctors are still sparse. Recent initiatives of ETH Zurich and EPFL,

²² <http://www.swisstransmed.ch> (last accessed: August 31, 2015).

Recommendation 11 – Defining a Strategy Relative to the Medical and Health Field

such as *passerelles* for students of ETH Zurich or EPFL to medical studies at a University or common study programs with universities in health sciences, are only just beginning to materialize (see Appendix 2, part D). In view of the growing demand for medical doctors with a strong science background who will be working in the increasingly technology-driven environment of clinical medicine and translational research, the ETH Domain's role in training medical doctors needs to be strengthened and expanded in order to fully exploit its competencies in this area. ETH Zurich and EPFL are developing training programs that will help alleviate the shortage of medical doctors in Switzerland. The focus is on training medical doctors with a strong background in natural sciences and engineering.

The ETH Domain's strategy will therefore meet a limited but significant fraction of the needs. Many other aspects need to be addressed which are outside of ETH Domain's area of influence: e.g. process innovation in the health sector, research into healthcare provision²³, part-time employment, high drop-out rates of medical staff, etc.

Possible ways in which the ETH Domain will position itself for contributing to medical education are only just being developed. The ETH Board does not favor one model over the other as the framework conditions differ in terms of both regions and stakeholders. However, an important precondition for an effective contribution by the ETH Domain to the training of medical staff is that students educated at ETH Zurich or EPFL must be able to transfer to Master studies in medicine without losing one or more study years, as is the case with the existing *passerelles*. In that respect, the ETH Board concurs with the recommendation that Bologna compatibility of medical studies is of prime importance and should be reviewed by *swissuniversities*.

The ETH Board has defined personalized medicine as a Strategic Focus Area in its Strategic Planning 2017-2020 for the ETH Domain. Its scope and pace of implementation will depend on the extent to which the Federal Council's ERI Message is funded and how hospitals and universities (medical faculties) integrate their forces as part of a common effort. Together with medical faculties and hospitals, the ETH Domain is involved in developing a concept for a national initiative in Personalized Health, which is coordinated by the SERI.

Prevention and health promotion as such are not part of the core mission of the ETH Domain and it does not see itself taking a leading role in developing – with other actors – a public health strategy as proposed by the experts. Nevertheless, the contributions of individual ETH Domain institutions to public health are significant, e.g. in the areas of nutrition, environmental monitoring, materials sciences, life cycle analysis, or provision of safe drinking water and sanitation. The ETH Domain remains committed to offering not just end-of-pipe-solutions but also to providing safe technologies and contributing to a green economy, both of which are indeed determinants for public health.

In the context of its initiative for data science in Switzerland (IDSS), the ETH Domain is developing a framework to enable research on large numbers of anonymous patient data sets. The ETH Board has taken the lead in implementing this initiative which, among other things, will also benefit medical research and research in the field of personalized medicine.

²³ 'Versorgungsforschung'; see also the NRP proposal "Smarter Health Care".

Position of the ETH Board

a) Contribution to medical education

The ETH Board and the two Federal Institutes of Technology have no plans to create a medical school within the ETH Domain. But the ETH Domain is interested in i) contributing to the training of medical staff with a strong science, engineering, or information technology background, and ii) taking its research closer to the patients, i.e. becoming much more involved in translational research, in particular in the fields of medical technology, medical informatics, genetics, biotechnology, and imaging technologies for diagnostic and therapeutic applications. ETH Zurich and EPFL have been encouraged by the ETH Board to develop models that go beyond the current *passerelle* concept to contribute to the training of medical doctors.

At the ETH Board meeting of July 8/9, 2015 ETH Zurich presented a model for a Bachelor program in medical sciences (working title) that would serve the goals of contributing to the training of medical staff with a strong science and engineering background. The ETH Board supports the initiative of ETH Zurich and encourages it to further pursue the plan to offer a Bachelor in medical sciences (working title). The Bachelor curriculum will be implemented in collaboration with partner universities (Università della Svizzera Italiana, University of Basel, University of Zurich), which will make available the necessary places for Bachelor students to enter Master studies in medicine. The initiative is open for other Swiss universities to join. ETH Zurich plans to launch its Bachelor of medical sciences with about one hundred students. To be able to guarantee a study place at the Master program of medicine at a cantonal university for every Bachelor graduate of medical sciences, a new legal basis must be introduced to the ETH Act, allowing the ETH Board to limit access to the Bachelor program in medical sciences. Therefore, introduction of a *numerus clausus* will be required for students wishing to be admitted to the Bachelor program in medical sciences. A corresponding request has been submitted by the ETH Board in the context of the ongoing partial revision of the ETH Act. The launch of the new Bachelor program thus depends on the political process for introducing appropriate legislation.

EPFL is pursuing similar plans to contribute to the training of medical staff. EPFL favors

a model that would orient itself closer at the Bologna philosophy: Master studies in medicine would be open to students holding a BSc in various areas, and not necessarily only to students with a BSc in medicine or medical sciences. The goal remains the same: helping to train more medical doctors with a strong background in natural sciences and engineering.

The ETH Domain will make a major contribution to training larger numbers of medical doctors in Switzerland, although this alone will not be sufficient for alleviating the shortage of medical professionals in general. The ETH Domain's role will primarily be to train medical specialists with a strong background in the sciences, engineering or information technologies. Nevertheless, future general practitioners may also benefit from a BSc in medical sciences because state-of-the-art treatment options must be known at the point of entry in order to counsel patients appropriately and direct them toward appropriate treatment options.

b) Personalized Medicine

The ETH Board recognizes and supports the institutions' strategic developments with regard to personalized (and precision) medicine, which are to be integrated into a national initiative. The ETH Domain will define the scope of the engagement once the financial framework conditions for the ETH Domain have been decided by Parliament. Partial strategies are being developed at ETH Zurich and EPFL. PSI (proton therapy) and Empa (surface coatings) are also contributing to translational medical research in the ETH Domain. The ETH Board will consolidate these strategies into a framework strategy of the ETH Domain and develop a common vision, taking into account the specific roles of the different stakeholders in medical training and research as part of this national initiative.

c) Leadership in medical sciences

Mindful of its core competencies, the ETH Domain will assume leadership in the abovementioned areas, including the realization of suitable programs that would ideally allow medically-oriented students to transfer to Master studies in medicine at a Swiss university without a loss of study years.

Recommendation 12 – Developing Better Entrepreneurship and Innovation Capacity

Recommendation: “In view of the analysis of the situation, the EC recommends that the institutions within the ETH Domain reinforce their commitment to innovation and entrepreneurship. The EC believes that this can take different forms and vary among institutions.

For instance, efforts could be undertaken or expanded, in cooperation with universities and UAS as well as business actors, to develop a stronger culture of entrepreneurship among the student body, faculty and research staff. Whenever applicable, resources and incentives could be applied to these efforts. The institutions of the ETH Domain could also consider the creation of formal (possibly externally funded) seed or venture funds. It may also be useful to share practices and expertise among the institutions, especially between the universities and research institutes.

These efforts should include selecting broader measures of success and appropriate benchmarking criteria. For instance, survival rate of spin-off companies is not sufficient as criteria, and could be complemented by measures of growth, jobs, impact on SMEs, etc.”

Appraisal & Status

Entrepreneurship is part of the DNA of the ETH Domain institutions. Accordingly, they have developed and continue to develop various instruments and programs aimed at fostering the capacities of all their members in this regard. Therefore, the commitment to innovation and entrepreneurship among the ETH Domain institutions is already very high. This is reflected in numerous examples throughout the Self-Assessment Report of the ETH Board (see Appendix 2), in particular in part A and in Appendix 2 therein (p. 167, table 2). The Report also contains a detailed description of the instruments that have been established by the individual ETH Domain institutions in accordance with their mandate and, in the case of the Research Institutes, their areas of specialization.

In the context of the ETH Domain's institutions' role in the field of innovation and entrepreneurship, seed or venture funds are of great importance with regard to supporting spin-offs and start-ups in all fields of activities of these institutions. Therefore, both ETH Zurich and EPFL have already created programs, funds and initiatives aimed at giving such companies access to venture funds (e.g. ETH Zurich: Pioneer Fellowships, Venture Incubator, Venture Businessplan Competition; EPFL: Innogrants, Fondation pour l'innovation technologique, FIT). Strengthening such instruments and encouraging their use are thus important facets of entrepreneurship support within the ETH Domain.

Moreover, knowledge-sharing among the institutions of the ETH Domain is already intensively practiced and is an important element in fostering

capacities and instruments in the field of technology transfer. As specified in the Self-Assessment Report (Appendix 2, part A), the ETH Domain institutions have played pioneering roles in establishing technology transfer in Switzerland. Both ETH Zurich and EPFL, for instance, have been co-founders and main drivers behind the swiTT network, whose primary purpose is the exchange of best practices. The institutions of the ETH Domain are set to continue playing an important role in this regard. For the ETH Domain institutions as such, an important channel for sharing practices and expertise is the informal exchange associated with joint appointments of staff and joint supervision of students at all levels. For instance, this is considered to be an effective channel between individual Research Institutes of the ETH Domain and specific Departments/Schools at ETH Zurich or EPFL. Furthermore, collaborative research projects provide a channel for informal exchange between the four Research Institutes.

Exchange of best practices is also an important element in terms of benchmarking activities in the field of KTT and fostering entrepreneurship. The need to further develop measures of success and benchmarking criteria was already recognized by the ETH Domain institutions and the ETH Board prior to the 2015 intermediate evaluation. It was one of the main topics addressed during the 2015 Dialog meetings which were held at the end of June 2015 with ETH Zurich and EPFL.

Position of the ETH Board

The ETH Board fully agrees with the Expert Committee's recommendation regarding the importance and the weight of fostering innovation and entrepreneurship through the contributions of the ETH Domain institutions. Yet the ETH Board wishes to highlight the impressive amount of work already done by all ETH Domain institutions and the instruments developed by them, as described in detail in the Self-Assessment Report (p. 167, table 2).

a) Maintaining diverse forms of technology transfer and entrepreneurship

Correspondingly, the ETH Board also acknowledges the importance of practicing a culture of entrepreneurship within the ETH Domain institutions. It therefore supports the many existing initiatives within the institutions. However, it also underlines that not all findings generated by the ETH Domain institutions (according to their tasks and specialization) can be brought to a market. For instance, WSL and Eawag typically deal with public goods. Fostering entrepreneurship in these fields is naturally of limited direct impact. Strengthening technology transfer and entrepreneurship within the ETH Domain must take into account that every institution also deals with matters whose market potential is low (see also Self-Assessment Report, chapter A.1).

b) Benchmarking KTT activities and outcomes

Given the importance of knowledge-sharing for fostering innovation capacity and entrepreneur-

ship within the ETH Domain institutions, the ETH Board also fully agrees with the recommendation and encourages the ETH Domain institutions to continue their efforts in sharing knowledge and best practices in the field of KTT and fostering of entrepreneurship. The ETH Board will also continue to develop the issue of benchmarking KTT activities based on the discussions held during the 2015 Dialog meetings. Implementation of benchmarking could be reported, for instance, in the Annual Report for 2015 or subsequent years.

c) Creation of a venture fund

With regard to the recommendation to create a formal (possibly externally funded) seed or venture fund, the ETH Board acknowledges the positive role such instruments play in encouraging entrepreneurship and highlights and hence also their importance. It considers that it can play a role in raising awareness about the importance of these instruments, which may help in encouraging private investors to create this type of fund. Similarly, the ETH Board, together with the institutions of the ETH Domain, can share experiences and contribute to setting up fruitful framework conditions, allowing start-ups and spin-offs to make effective use of such funding instruments. However, the ETH Board strongly feels it is not its role to establish or control a venture fund itself, as this is not – nor should it be – part of its mission as a strategic authority.

Recommendation 13 – Defining the Role of the ETH Domain Components Regarding the Innovation Park

Recommendation: “The ETH Board states in its self-assessment report that it has so far refrained from taking an independent role in the process of creating a Swiss Innovation Park.

On their part, EPFL and ETH Zürich have played leading roles in the development of the two hubs. But a clear vision, especially regarding the development of the Dübendorf hub, is expected from many stakeholders and should be shared.

While the EC notes that the question of the innovation park was considered by the ETH Board as a matter to be dealt with at the institutional level, the EC is of the opinion that the Board needs to take a more proactive role in view of the national importance of the innovation issue. It should do so by taking into consideration the views expressed by the ETH Zürich, EPFL and the research institutes, as well as by the Swiss and cantonal governments. The EC appreciates the different approaches with regards to the Innovation Park. It does not favour a particular model, but recommends that the ETH Board analyses the many already existing success and failure stories of innovation parks abroad and draws the appropriate conclusions.”

Appraisal & Status

At the meeting of 4/5 December 2013 the ETH Board was informed about the Swiss Innovation Park (SIP) initiative. Based on these deliberations, the Board took the following decision:

- Initiative and responsibility for the participation of the ETH Domain in the two hubs of Zurich and Lausanne and in network locations of the SIP shall remain with the institutions. The ETH Board acts in a subsidiary role with respect to the institutions.
- Planning and commitments by the institutions must be financed with the resources available to their own ordinary budgets, possibly topped up with third-party funding. The ETH Board does not intend to provide any additional funding for the SIP or for the participation of ETH Domain institutions.

It is at the institution's sole discretion to decide which projects at which particular SIP locations to support. However, no financial commitment in addition to the multi-year financial planning of the ETH Board will be allowed.

In addition, the ETH Board wishes to secure transparency about the participation of ETH Domain institutions in individual SIP projects. Among other things, this is backed up by a survey presented to the ETH Board on 21/22 May 2014 on the involvement of the institutions in all the projects previously submitted by the different locations to the Conference of the Cantonal Ministers of Economic Affairs.

The concept of the Zurich and Lausanne hubs was presented to the ETH Board and discussed extensively. The Board approves of the fact that different concepts have been presented for the two hubs.

The institutions have acted proactively in the planning process for SIP hubs and network locations and have shown a constructive collaboration with the cantons which are taking the lead. EPFL seized the opportunity together with the cantons of Geneva, Vaud, Valais, Neuchâtel and Fribourg to strengthen the innovation capacity of the Suisse Romande via the innovation hub. ETH Zurich is strongly involved in the acquisition of firms suitable as high-potential members of the Zurich/ Dübendorf hub. PSI plays a leading role in the PARK InnovAARE of the Canton Aargau. Empa is also active in the planning process for the Zurich hub as well as for several network locations.

The ETH Board followed and discussed this development and the progress of SIP during the 2014 and 2015 Dialogs and particularly during its retreat on 9/10 July 2014. The retreat debate was focused on the issues of governance, finances and real estate with respect to the participation of ETH Domain institutions. In February 2015 the ETH Board released a position paper and made public its basic ideas and principles for the contribution of the ETH Domain to SIP.

Position of the ETH Board

Initiative and responsibility for the ETH Domain's participation in the two hubs and the network locations of SIP lie with the institutions. Planning and commitments by the institutions must be financed with the resources available to their own ordinary budgets, possibly topped up with third-party funding, i.e. the Zurich and Lausanne hubs are a matter for ETH Zurich/Empa and EPFL, respectively, whereby the project lead is in the hands of the cantons. The ETH Board is pleased to note that the institutions have acted in a proactive and constructive manner. The ETH Board intends to remain in a subsidiary role and does not consider it necessary or suitable to assume a more active role.

According to the SIP dispatch of the Federal Council of March 5, 2015, the Federal Department

of Economic Affairs, Education and Research EAER is charged to assure that with the involvement of ETH Domain institutions in SIP projects, no uncontrolled real estate risks should arise. The ETH Board is ready to support the federal administration in this respect.

Studies about strengths and weaknesses of innovation parks abroad exist and are known, such as Berlin-Adlershof, Cambridge Science Park, or High Tech Campus Eindhoven. Relevant aspects include, for example, the immediate vicinity of highly competent university labs and renowned companies, a competent location management, acquisition efforts by of companies worldwide and the support of the relevant political institutions. For the time being there is no need to go into further details.

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