Management response to the «External Evaluation of the Tech4Dev and the ETH4D"
Submitted on 1 September 2023

1. Introduction

The Analysis and Research Section (A&R) of the Swiss Agency for Development and Cooperation (SDC) commissioned an external evaluation of phase I of the "Tech4Dev" and the "ETH4D" initiatives, constituting together the "Research and Technology for sustainable development in the global South 2020-2023" project.

First of all, this evaluation looked into Tech4Dev's and ETH4D's achievements on the basis of three specific objectives[1] of SDC's support to the initiatives, as well as their strengths, weaknesses, opportunities, risks and lessons learnt. Secondly, it aimed to provide an improved knowledge base and deepened understanding of effective approaches and decisive factors to successfully bridge the gap between research and practice and thirdly, it aimed to provide actionable recommendations for EPFL, ETH and the SDC on how to improve their initiatives and partnership models in order to foster impactful research for development. Thus, the focus of this evaluation is mainly on learning and steering. The learnings and recommendations of this evaluation shall feed into further development of both initiatives and inform SDC's future engagement.

The evaluation team had access to the full range of documents. It generated its findings and conclusions through a mixed methods approach including document review, key informant interviews, literature review, an online survey as well as an encompassing data analysis methodology. An online validation meeting was held on 14th July 2023.

2. Management response

The Management Response (MR) states SDC's position on the recommendations of the external evaluation and it provides a basis for negotiations and decision-making with regard to the 2nd edition of both initiatives.

3. Assessment of the evaluation

The evaluation was conducted by a team of two independent experts in accordance with international standards; Mr. Geert Engelsman and Prof. Smita Premchander. The evaluation process was well managed and included all relevant parties[2] i.e., SDC's A&R Section as well as all involved entities at EPFL and ETH Zurich, including researchers in Switzerland and in partnering countries. These entities were interviewed by the consultants during the evaluation process.

The main objectives of the evaluation have been well covered by the evaluators. They put emphasis on what has been achieved (i) with the research and innovation grants and; (ii) through education and exchange initiatives and (iii) through facilitation efforts and effective partnership building within and beyond the institutions. In addition to the three main questions of the evaluation the evaluators looked how gender equality has been addressed.

SDC appreciates the comprehensiveness of the evaluation report and the sound analysis of key elements related to the relevance, coherence, effectiveness, efficiency, impact, sustainability and gender equality of both initiatives; Tech4Dev and ETH4D.

While the report's analysis and findings are useful for orienting SDC's support to a 2nd edition of both initiatives, this evaluation took place early in the project. It was therefore challenging to make a sound statement with regard to development impact and scaling.

4. Main findings

The overall findings of the evaluation are as follows:

- Tech4Dev and ETH4D are at once unique and complementary to comparable research for development programs in Switzerland as they harness the unique expertise, experience, and

[1] 1) interdisciplinary solutions-oriented research and multi stakeholders approaches that help address global risks and advance poverty eradication;2) the validation, implementation and scaling up of science-based (technological) solutions through innovative (entrepreneurial) models; 3) training of future leaders of sustainable development in Switzerland and in Africa and encourage the integration of sustainable development in Swiss and partner countries' technical university curricula.

[2] Key informants include besides Tech4Dev/ETH4D management and staff and SDC representatives: Steering and advisory committee members, research groups including professors, researchers, partners and practitioners, NGO Council representatives as well as participating faculty and students, including partners to scale (social enterprises, government, international organizations). In addition, representatives from the Swiss Commission for Research Partnerships with Developing Countries (KFPE) and the Swiss National Science Foundation (SNSF) were involved in this evaluation.

capacity of EPFL and ETH. They are well aligned with Swiss IC Strategy 2021-24 and related concepts and guidelines.

- Tech4Dev and ETH4D fit well into SDC research portfolio. The objective to contribute to the implementation of science-based technologies at scale in the Global South is highly ambitious, but appropriate given SDC's mandate. Both initiatives offer the opportunity to complement existing research initiatives with a more open, agile, multi-phase support system.
- The strength of Tech4Dev and ETH4D is that they bring together researchers and practitioners from EPFL, ETH and from the Global South. This collaboration leads to innovations which have the potential to address relevant development challenges in the Global South. But research covers only one part in an innovation's development impact journey. Once an innovation is technically ready and Tech4Dev's and ETH4D's current support ends, much remains to be done.
- As a consequence, the research challenges of Tech4Dev and ETH4D have not yet attained full development impact. Existing challenges pertain to (i) ownership[3], (ii) economic, commercial, social and/or political viability, and/or (iii) replicability.
- With the objective to increase development impact, emphasis has to be put on ownership, economic, commercial, social and/or political viability, and replicability. Additional support should be extended to the most promising and convincing science-based innovations, i.e., the ones with the most potential to generate development impact, entailing financial support, technical advisory, and linking with existing entrepreneurship and development programs at scale.

5. Recommendations

The evaluation proposes 5 recommendations, including 6 sub-recommendations.

Fully agree	Partially agree	Disagree

Recommendation 1: **For the SDC, to continue its support to Tech4Dev and ETH4D with a continued focus on research challenges and solution-oriented PhD scholarships.**	
Response: SDC is committed to continue to support ETH4D and Tech4Dev, but there will be more focus on innovative research and development impact, and less on solution-oriented PhD scholarships	
Responsibility	SDC, A&R Section
Deadline	Q1 2024
Recommendation 2: **For the SDC, Tech4Dev and ETH4D, to extend their (time) horizon and continue to support the most promising science-based innovations to overcome the development challenges inherent in introducing these innovations in society at scale, by introducing an agile and competitive sequence of support to guide the innovations 'from research to development'.**	
Response: SDC fully supports this recommendation and welcomes the commitment of EPFL to de-risk its investments by extending the duration of support divided into tranches, making subsequent tranches of support dependent on whether the research partnerships can increasingly evidence that they are likely to implement the promoted innovation in society at scale and generate development impact. SDC is equally supportive of ETH4D's use of a "funnel approach[4]" providing different grant sized that shall lead from research to impact at scale.	
Responsibility	SDC, A&R Section in collaboration with Tech4Dev and ETH4D
Deadline	Q1 2024 and throughout the 2nd edition of both initiatives

[3] This also includes the 'drive' and 'incentive' to implement the innovation at scale.
[4] ETH4D therewith supports applied research projects and doctoral research projects as well as programs to build prototypes, test solutions and help practitioners scale solutions as well as fellowships to build start-ups.

Recommendation 3:

For Tech4Dev and ETH4D, to spend more attention, early in the support, on:

3.1	the individuals/drivers who will bring the innovations to society/the market,	
3.2	the existing, state of the art, solutions in the Global South, and the value-added the proposed science-based innovations have to these existing solutions (if any),	
3.3	exploring possibilities to create south-south-north collaborations, binding the providers of the existing, state of the art, solutions and see how to improve on them,	
3.4	the need and opportunities to build in a gender-differentiated perspective in the design and implementation of the science-based innovations,	
3.5	the opportunities to include research duo-ships of postdocs and/or PhD fellows with one postdoc/PhD emanating from EPFL/ETH and one from the Global South, and	
3.6	the adherence—in words and deeds—of the KFPE principles in the research challenges and have a balanced North-South representation in its advisory committees.	

Response:

SDC supports the recommendation to give due consideration to the KFPE principles throughout the whole cycle from research to development. SDC believes that, by defining well thought-out selection criteria, the real chances of success could be increased.

Sub recommendations 3.1 to 3.6 are integrated into the discussions with ETH and EPFL and will be further discussed with the partners so that they are taken into consideration in a follow-up phase.

Responsibility	SDC, A&R Section in collaboration with Tech4Dev and ETH4D
Deadline	Q1 2024 and throughout the 2nd edition of both initiatives

Recommendation 4:

For ETH4D to continue investing in faculty exchange and (short- and long-term) PhD/master programs and to develop a convincing (evidence-based) narrative on how this contributes to long-term development impact and merits financial support from the SDC.

Response**:**

SDC supports this recommendation and believes that the network that ETH4D has established during phase 1 has a tremendous potential. It therefore, together with other partners, supports the proposal to further strengthen faculty exchange and PhD/master programs, using the potential of other ETH entities to build a strong and institutionally anchored network supporting ETH4D research challenges and therewith increasing impact in the Global South.

SDC believes that this network of researchers trained in transformative research approaches could potentially be involved in other research grants promoted by SDC at a later stage (e.g. SOR4D or TRANSFORM).

Responsibility	ETH4D in collaboration with SDC and potentially other research partners
Deadline	Throughout the 2nd edition of the project

Recommendation 5:

For Tech4Dev to transform its NGO Council into a semi-annual platform of exchange between the EPFL labs and the international NGOs from the Geneva-Lausanne conurbation.

Response**:**

SDC and EPFL/Tech4Dev are in close dialogue on the role of the NGO Council and how this can best strengthen the project. SDC subsequently supports the recommendation to strengthen the role of the NGO Council by using their field experience to tackle real, in the field problems using research and technology lenses. NGOs shall play a key role for identifying possible research challenges and provide the necessary context understanding for potential projects. It shall furthermore act as a backbone of Tech4Dev for scaling up successful solutions.

Nevertheless, SDC does not support the idea of supporting a semi-annual platform of exchange with the NGOs. This can be organized by the EPFL and ETH without SDC's support as this kind of activities does not fall within the SDCs research for development mandate.

Responsibility	Tech4Dev in collaboration with SDC	
Deadline	Throughout the 2nd edition of the project	

6. Final remarks and next steps

This evaluation provided SDC with crucial learning about how to foster cross-sector and technology centred research for development. It was a unique opportunity to assess the work and achievements of both innovative initiatives emerging from Switzerland's top technical Universities ETH and EPFL since their beginning. It has to be considered that little time had passed since the programmes started and that it was therefore not yet possible to fully measure impact of the individual research challenges. Nevertheless, this evaluation is a key learning element for the elaboration of the 2nd program phases.

Tech4Dev and ETH4D have both managed to become significant initiatives in their related ecosystems, as conveners able to mobilise a vast variety of stakeholders (North – South partnerships, academia and industry etc.) for advancing research challenges. Considering their value added, SDC would welcome to see the transfer from transdisciplinary and innovative initiatives towards more institutionalized entities in their institutions in the mid-term. SDC understands that this is happening as the political support for both initiatives was confirmed by the evaluation.

The main operational next steps contain preparatory work for drafting proposals for phase II as well as the internal approval. Intense discussions with ETH and EPFL have been initiated already during the evaluation process and being synthetized in subsequent meetings.

SDC would like to thank the evaluators Mr. Geert Engelsman and Prof. Smita Premchander for their professionalism and engaging collaboration and dialogue throughout the external evaluation process.

Date and signature

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Evaluation Report for the External Evaluation of the TECH4DEV and ETH4D

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Acronyms

EPFL	Federal Institute of Technology Lausanne (Ecole polytechnique fédérale de Lausanne)
ETH	Federal Institute of Technology Zürich (Eidgenössische Technische Hochschule Zürich)
GEDSI	Gender equality, diversity, and social inclusion
iNGO	international non-governmental organization
KFPE	Commission for Research Partnerships with Developing Countries, Switzerland
NGO	Non-governmental organization
R4D	Research for Development
SDC	Swiss Agency for Development and Cooperation
SOR4D	Solution-Oriented Research for Development Program
WHO	World Health Organization

Executive summary

Purpose and use

This external evaluation offers a qualitative assessment of the development effectiveness of the two 'research for development' initiatives TECH4DEV and ETH4D, which have been supported by the Swiss Agency for Development and Cooperation (SDC) since late 2019. The evaluation was to advise the SDC on whether it should continue supporting TECH4DEV and ETH4D and how it could improve this support in the future. The evaluation was also to inform the strategic plans of TECH4DEV and ETH4D. The evaluation therefore served strategic and operational decision making by the SDC, TECH4DEV and ETH4D.

TECH4DEV, ETH4D and SDC's support

TECH4DEV and ETH4D are, in part, classical 'research for development' programs in the sense that they seek to mine the knowledge, expertise and capacities of the two Swiss Federal Institutes of Technology, EPFL and ETH, to address societal challenges in the Global South. However, ETH4D is broader in mission and mandate, as it also promotes academic exchange, tertiary education, doctoral studies, and an institutional transformation of ETH.

The SDC supported TECH4DEV and ETH4D to link EPFL's and ETH's research capacity and knowledge to current development processes and '*help initiate, develop, test, and implement, at scale, science-based innovations which, through their application, can positively affect the lives of millions of people in the Global South'*. The evaluation therefore focused on the 'research for development' work that these initiatives sponsor.

From research to development

TECH4DEV and ETH4D are young initiatives. The research they sponsor is still underway or has just been completed. Most research partnerships now face classical development challenges in bringing their innovations to society and implementing them at scale. These challenges pertain to (i) ownership, incentives, and drive, (ii) economic, commercial, social and/or political viability, and/or (iii) replicability. Whilst TECH4DEV and ETH4D connect the research partnerships to their network, these partnerships are mostly left to their own devices to bring their innovations to the market or into society. Neither initiative utilized SDC's expertise, experience, capacities, and programs to this end.

TECH4DEV and ETH4D can improve their development effectiveness by more purposefully steering on development. This would benefit, first-and-foremost, from a change in perspective. Instead of labeling themselves as 'research for development', which puts the onus on the research; they should work 'from research to development', which brings into focus the whole 'development impact trajectory' of their social and/or technological innovations.

TECH4DEV and ETH4D could subsequently offer a sequence of financial, technical assistance and networking support, accompanying the research—as long as needed and cost-effective—in their development impact journey. Subsequent tranches of support should be made available subject to an ever-increasing likelihood of generating development impact.

Moreover, by starting small and continuing work only with those research partnerships with the best ingredients for success (i.e., there exists a necessity and viability of the innovation, drive of the individuals/team, and a conducive political economy/market), it will in effect place 'smaller bets' on development than some of the concurrent research for development programs sponsored by the SDC.

On gender equality

The SDC is a value-based development organization. One of the values it promotes is gender equality. Some research under TECH4DEV and ETH4D specifically targets women or problems particularly affecting women. They mostly focus on improving access to innovations and services. Few of the other research projects took a gender differentiated perspective in the problem analysis or the solution design. TECH4DEV and ETH4D could improve their gender responsiveness and transformation by (i) positively selecting research targeting women, (ii) promoting research which enhance voice/agency and change societal norms and policies in favor of gender equality, and (iii) necessitating research to apply a gender lens on their problem analysis and solution design.

Research and education

This evaluation focused on 'research for development'. Especially ETH4D gave itself a broader mission and mandate. Besides research, it also promotes PhD scholarships, faculty and student exchanges, educational courses, and master programs, at ETH and in the Global South. 'Solution-oriented' PhD fellows operate on par with the TECH4DEV and ETH4D sponsored research. The faculty exchanges and summer schools, amongst others, pave the way for new research collaborations. The master programs and PhD fellowships build the next generations of researchers, entrepreneurs, development practitioners, and public servants. They give countries the opportunity—presuming the political economy allows for it—to develop themselves. It also allows for ever more equal research partnerships between the North and the South. EPFL and ETH offer good gateways for the SDC to promote this.

The KFPE principles

At face value, the research sponsored by TECH4DEV and ETH4D adhere to the principles of the Swiss Commission for Research Partnerships with Developing Countries (KFPE) on equitable, effective, and efficient research collaboration between the North and South. The principles could however be lived more intensely, both in the selection of research challenges/projects (by raising the bar for proposals in terms of articulating their abidance, as well as allowing southern institutions to be in the lead and funding recipients) and through real community participation during the research (where so far, few research projects excel in). Together with the evaluation's other proposals (extend the horizon 'from research to development' and continue to invest in education/PhDs), this could also contribute to decolonizing the research partnerships. Having said that, EPFL and ETH researchers are heralded for their openness and ability to operate 'auf Augenhöhe' by their southern partners.

TECH4DEV's NGO Council

TECH4DEV effectively works with international NGOs from the Geneva-Lausanne conurbation: they are a source of ideas and offer a (potential) vehicle for implementation. The instituted NGO Council offers little value-added to the collaborations between iNGOs and EPFL's research labs under TECH4DEV. Important for the NGOs is to have an opportunity to individually meet and exchange with the EPFL labs (and ETH research groups for that matter). From this, research ideas and collaborations can sprout. Both the NGOs and the research labs can bring in other partners as they seem fit. It therefore makes sense to transform the NGO council into a semi-annual platform for exchange.

Institutional relevance and external coherence

TECH4DEV and ETH4D enjoy significant institutional standing within EPFL and ETH respectively. The presidents and vice-presidents want their institutions to be societally relevant; professors, postdocs, PhDs, and master students want to engage with development issues and contribute to society.

TECH4DEV and ETH4D offer a vehicle to do just that. At present, both initiatives are not unlike other SDC supported 'research for development' programs, albeit with even shorter timelines for the research. It is therefore almost by design that this research hits limits on the development impact it can attain (at least within the supported timeframes).

TECH4DEV and ETH4D carry however the potential to offer a more open, more easily accessible, lower threshold 'research for development' program and, as indicated above, provide a sequence of support over a longer time horizon, thereby allowing the research partnerships to more confidently journey 'from research to development'. They can then be a valuable addition to the current SDC portfolio of 'research for development' programs with, as said, lower bets on development.

Recommendations

1. For the SDC, to continue its support to TECH4DEV and ETH4D with a continued focus on research challenges and solution-oriented PhD scholarships.
2. For the SDC, TECH4DEV and ETH4D, to extend their (time) horizon and continue to support the most promising science-based innovations to overcome the development challenges inherent in introducing these innovations in society at scale, by introducing an agile, continuous, albeit selective channel of support to guide the innovations 'from research to development'.
3. For TECH4DEV and ETH4D, to spend more attention, early in the support, on:
   - the individuals/drivers who will bring the innovations to society/the market,
   - the existing solutions in society/the market and the value-added the proposed science-based innovations have to these existing solutions (if any),
   - the need and opportunities to build in a gender-differentiated perspective in the design and implementation of the science-based innovations,
   - the opportunities to include research duo-ships of postdocs and/or PhD fellows with one postdoc/PhD emanating from EPFL/ETH and one from the Global South, and
   - the adherence—in words and deeds—of the KFPE principles in the research challenges and have a balanced North-South representation in its advisory committees.
4. For ETH4D to continue investing in faculty exchange and (short- and long-term) PhD/master programs and to develop a convincing (evidence-based) narrative on how this contributes to long-term development impact and merits financial support from the SDC.
5. For TECH4DEV to transform its NGO Council into a semi-annual platform of exchange between the EPFL labs and the international NGOs from the Geneva-Lausanne conurbation.

1 Introduction

1. This report documents the evaluation of the support that the Swiss Agency for Development and Cooperation (SDC) has provided to the 'research for development' initiatives TECH4DEV and ETH4D of the Swiss Federal Institutes of Technology EPFL and ETH respectively. This opening chapter lays down the purpose of the evaluation, describes the two initiatives, explains the evaluation methodology and limitations, and offers a reading guide to the rest of the report.

1.1. Purpose and use

2. TECH4DEV and ETH4D were founded in late 2019 and received SDC support pretty much from the start. Now, in 2023, three-and-half-years down the road, the SDC wanted to take stock and assess the (likely) development effectiveness of the initiatives, whether they deserve continued financial support, and, if so, how best to support the initiatives into the future. The SDC commissioned this evaluation.

3. The evaluation also proved timely for TECH4DEV and ETH4D. Each is due to submit a strategic plan to their management board for continuing the initiatives. The evaluation could inform these strategic plans. As such, TECH4DEV and ETH4D were interested in learning about the strengths and weaknesses of their work, as well as the (strategic) opportunities which exist to enhance the initiatives.

4. The purpose of the evaluation was therefore to inform the strategic and operational decision-making of the SDC, EPFL and ETH.

1.2. SDC, TECH4DEV and ETH4D

5. **Historical frame**. The SDC has supported 'research for development' for decades. In the 2000s, it supported academic institutions to set up National Centers of Competence in Research (NCCR), which pursued long-term research agendas on developmentally relevant topics. In the subsequent decade, from 2012 to 2023 to be precise, the SDC shifted towards 'open calls' to support more focused, time-bound, individual research initiatives under the Research for Development (R4D) program. Then, from 2019 onwards, the SDC introduced further parallel tracks, supporting both institutional research (e.g., the Wyss Academy for Nature) and individual, time-bound, research initiatives (such as the Solution-oriented Research for Development Program, SOR4D). Through these initiatives, it sought to further *'close the gap between research and practice ... [with] the compulsory inclusion of practitioners in the North-South research partnerships'* (SDC 2023).

6. **TECH4DEV and ETH4D**. These two initiatives were initiated in late 2019 by committed individuals within EPFL and ETH who wanted to make their institutions more socially relevant and use the institutions' *'goldmine'* in knowledge, expertise, and capacities to address the challenges of the Global South.

7. **Objective statement**. The objective of SDC's support to TECH4DEV and ETH4D was that they:

> *help initiate, develop, test, and implement, at scale, science-based innovations which, through their application, can positively affect the lives of millions of people in the Global South.*[1]

8. **Two strategies**. TECH4DEV and ETH4D follow different paths. Table 1 highlights the core elements of, and by extension the differences between, the two initiatives. In short, TECH4DEV has concentrated

[1] This impact statement was formulated during the Inception Phase of the evaluation. It concerns a specification of the original impact statement as included in SDC's credit proposal and TECH4DEV and ETH4D project documents.

its funds on supporting a small number of research challenges[2] (namely eight). Each received a research grant of CHF 300,000 for two years. In addition, it organized an annual summer school together with Swissnex in Bangalore, India, as well as a few networking/knowledge sharing events. It also worked with an NGO Council to mobilize the iNGO expertise from Geneva and Lausanne.

9. ETH4D is much broader in scope and setup. It supports, amongst others, more and different types of research challenges[3] with smaller funding (ranging from CHF 5,000 to circa CHF 100,000), as well as PhD scholarships, student and faculty exchanges, educational courses, winter/summer schools, and master programs. Whilst ETH4D wants to support actual 'research for development', it also aims to educate and change the mindset of faculty and students and steer them towards 'research for development'. This is sought both in the short-term (through, example given, student and faculty exchanges) and the medium- to long-term (by establishing different master programs which prepare the next generation of change-makers).

Table 1 TECH4DEV and ETH4D activities

TECH4DEV	ETH4D

– 8 research challenges
– 3 summer schools w. Swissnex in Bangalore
– Small-scale engagements
  – Emerge Labs (NGO/EPFL workshops)
  – Virtual event on data & technology
  – Showcase 2030
  – Impact lunches
– NGO Council
	– 16 research challenges
	– 6 humanitarian action challenges
	– 11 PhD scholarships and 11 PhD mentorships
	– 4 seed projects
	– 18 research to action projects
	– Professorship in Development Engineering
	– >45 Faculty and student exchanges
	– Annual summer school with KNUST University, Ghana
	– Ca. 30 courses on sustainable development
	– Education incubator to develop new educational programs with African partner universities
	– Master Program of Engineering together with Ashesi University, Ghana
	– Monthly public events on global sustainable development

10. **Organization**. TECH4DEV is currently implemented by a core two-person team under the Office of the Vice President for Innovation. This team is supported on a part-time and ad hoc basis by thematic experts from EPFL. ETH4D is run by an executive office consisting of eight professionals and two interns (equaling 4,3 full-time equivalents as most work for ETH4D on a part-time basis). ETH4D is governed by an ETH internal eight-person steering committee and an eight-person external advisory board with representatives from academia, industry, iNGOs, and the SDC. The advisory board includes one academic and one entrepreneur from the Global South.

11. **Budget**. TECH4DEV's budget for the period 1 November 2019 to 31 December 2023 is CHF 6,490,384. EPFL's contribution is CHF 3,496,147 (54%); SDC's contribution amounts to CHF 2,994,237. ETH4D's budget for 1 January 2020 until 31 December 2022 is CHF 10,938,000 with an own contribution of CHF 7,038,000 (64%). SDC contributed CHF 3,000,000 to ETH4D. From SDC's budget, 40% is to flow to researchers and practitioners in the Global South—this holds for both initiatives.

[2] TECH4DEV originally referred to Research-to-Action Grants or research projects. At the evaluation outset, the SDC generally referred to the sponsored research as 'research challenges'. We adopted this terminology in this report.

[3] These include seed projects and research-to-action grants. As noted in the previous footnote, we adopted SDC's terminology and generally refer to these different research projects as 'research challenges'.

1.3. Evaluation methodology and limitations

12. The evaluation concerned a purposeful, theory-based, and qualitative inquiry into TECH4DEV and ETH4D. Purposeful, because the evaluation sought answers to the evaluation questions of the SDC, TECH4DEV and ETH4D. Theory-based, as the evaluation took the initiatives' underlying theory of change as reference point for structuring the evaluation and drawing lessons, conclusions, and recommendations on its development effectiveness. Qualitative, because the evaluation relied on the insights and perspectives gained from interviews, documents, and literature to offer a descriptive analysis and assessment of TECH4DEV and ETH4D. The evaluation's findings, conclusions, and recommendations stem from a combination of inductive, deductive and contribution analyses. The evaluation triangulated its findings across data sources and evaluators.

13. As noted above, the SDC supported the initiatives to *'initiate, develop, test, and implement at scale science-based innovations which, through their application, can positively affect the lives of millions of people in the Global South'*. The vehicle to achieve this was (and will continue to be) the research challenges. The evaluation—together with the SDC, TECH4DEV and ETH4D—purposefully selected three (out of eight) research challenges from TECH4DEV and four (out of 16) research challenges from ETH4D. This sample of seven was deemed to offer a realistic picture of all 'research for development' work. The evaluation focused to a significant degree on assessing the development effectiveness of this 'research for development' work.[4] Appendix A briefly introduces the seven research challenges.

14. At the end of the day, however, these seven research challenges constituted a probe, offering one reality of the initiatives based on a limited data set. Individual actors submerged in other research challenges or other parts of the programs may have experienced a different reality and have a (somewhat) different picture of TECH4DEV and/or ETH4D. Such differences in perceptions are natural and unavoidable; they complement and enrich each other. As such, this evaluation constituted just one building block in the SDC, EPFL and ETH's decision-making. TECH4DEV and ETH4D's own monitoring offered additional and complementary inputs.

1.4. Reading guide

15. Chapter 2 addresses the main evaluation question: How effective are the two initiatives or better—given the nascent nature of TECH4DEV and ETH4D—how likely are they to contribute to development impact in the Global South in the future? Chapter 3 subsequently reflects on the extent to which TECH4DEV and ETH4D have been gender and diversity responsive and/or transformative. Chapter 4 discusses the institutional relevance of TECH4DEV and ETH4D for EPFL and ETH respectively.

16. Chapter 5 zooms out and places TECH4DEV and ETH4D in the broader 'research for development' context in Switzerland, identifying both challenges and opportunities therein. It also evaluates the extent to which TECH4DEV and ETH4D comply with the principles set out by the Swiss Commission for Research Partnerships with Developing Countries (KFPE). Chapter 6 draws the main lessons from the evaluation and offers the evaluation's two cents—by way of recommendations—on how best to continue TECH4DEV and ETH4D and how the SDC can best support both initiatives.

17. The standard SDC assessment grid for the OECD/DAC evaluation criteria is included as an appendix to this first volume. A separate, second, volume includes the evaluation design matrix, the sampling strategy, the data collection and analysis methods, the underlying documentation, and the list of key informants to the evaluation.

[4] As such, the evaluation cannot be considered an evaluation of ETH4D as a whole which, as said, is broader in scope.

2 Development effectiveness

2.1. Introduction

18. This chapter assesses and reflects on the effectiveness and impact of the research challenges of TECH4DEV and ETH4D. The chapter starts with, and to a significant degree focusses on, the research challenges sponsored by TECH4DEV and ETH4D (and by extension the SDC) because, as noted in Chapter 1, they are the vehicle through which to attain 'development impact'. This, in turn, is the *'raison d'être'* of the SDC (FDFA 2020a) and its contribution to TECH4DEV and ETH4D (SDC 2019). For the SDC, having the research challenges contribute to sustainable development is a *sine qua non*.

19. The development effectiveness of TECH4DEV and ETH4D is ultimately measured by the extent to which the two initiatives are likely to attain their objective. As stated in Chapter 1, the initiatives' overarching goal is to contribute to *'the implementation, at scale, of science-based innovations which, through their application, will positively affect the lives of millions of people in the Global South'*.

20. Based on the information available to the evaluation, most of the research sponsored by TECH4DEV and ETH4D—whether part of this evaluation's sample or not— have yet to introduce and implement their innovations at scale and, through their use, positively affected the lives of millions of people in the Global South—with one notable example (see Textbox 1). This is not a surprise and makes sense: both initiatives are young, the research is demanding and often ongoing, and the goal is ambitious.

21. This chapter therefore assesses the research's potential and 'likely' impact in the future. We do so through a critical reflection of the initiatives' theory of change to ascertain whether this theory is likely to hold up in practice. Textbox 2 details the theory of change as reconstructed by the evaluation team during the inception phase of the evaluation. In the analysis, we draw on the observations of people directly involved in the research, the lessons learned in SDC's R4D program, and the evaluation's team experience with SOR4D and its application process[5].

Textbox 1 Uganda's logistical health emergency response system

A possible, important, and preliminary exception to this statement is ETH's support to the Ministry of Uganda in redesigning its logistical health emergency response system. As part of a comprehensive redesign of the inventory, ordering, stockpiling, distribution, and transportation system for responding to epidemic outbreaks, the Ministry of Health is setting up eight regional distribution centers to bring medical supplies closer to the areas most affected by epidemic outbreaks. These distribution centers have already been used in the government's response to the latest Ebola outbreak, thereby likely having contributed to saving lives.

We still qualify it as 'preliminary' because (i) only three of the eight distribution centers are fully operational, (ii) the distribution centers are just one part of a more comprehensive redesign as envisaged by National Counter Measures Plan (NCMP), (iii) the NCMP has yet to be approved and adopted by the Government of Uganda, and (iv) the Government of Uganda has yet to allocate the requisite funding to the implementation of the NCMP. The latter is by no means guaranteed as the Government of Uganda continues to rely on development partners for financing its emergency responses to epidemic outbreaks. Whilst these development partners have been consulted by the Ministry of Health and ETH in the redesign of the system, they were not made part of or formally integrated into the solution/plan.

[5] One of the two evaluation team members is member of the SOR4D Review Panel and as such intimately familiar with the selection process of research challenges under the program.

Textbox 2 The theory of change of TECH4DEV and ETH4D sponsored research

If TECH4DEV and ETH4D fund, support, and accompany research groups consisting of EPFL/ETH researchers, researchers and practitioners from the Global South, and possibly other international partners,

Then:

- these research groups will come up with and test science-based innovations that meet development needs and challenges of the Global South (output),
- the 'successful' innovations will be implemented at scale by members of the research group, partners closely associated to the research groups, or others, either through public interventions, (social) entrepreneurship models, or development/humanitarian aid projects (outcome),
- the implementation at scale of the successful innovations will positively affect the lives of millions of people in the Global South (impact),

Because

- the research addresses a real and present social challenge of the Global South, meets specific needs of people and organizations in the Global South and/or responds to a qualified demand for solutions from practitioners from the Global South,
- the research and innovations consider the prevailing conditions and constraints in the targeted jurisdictions in the Global South (i.e., the social, economic, political, geographic, demographic, and technological environment),
- the research (funding) applies the principles of fast prototyping, failing fast, and results-based funding to make the research success-oriented and impact driven,
- the research members and/or partners have the capacity, interest, incentive, power, and tenacity to pick up and implement at scale the innovations, either through a commercial endeavor or a development intervention.

2.2. Relevant and potentially impactful

22. It is not difficult to imagine that the innovations that the research challenges contributed to can positively affect the lives of millions of people in the Global South. For example, these innovations entail:

- 3D-printing of assistive devices for disabled people. As 3D-printers, and the filaments used therein, become ever more affordable, it offers disabled people access to affordable and tailor made assistive devices such a computer mouse, utensils, and door openers.[6]
- The use of a smartphone to make a video image of a woman's cervix and through the application of digital imaging and artificial intelligence technology pre-screen the likely prevalence of cervical cancer. If successful, the initial technology-supported screening could be done by trained nurses/midwives rather than doctors and more easily applied at scale, potentially giving millions of women access to the diagnosis (and hopefully treatment) of cervical cancer.[7]
- A low-cost and low-tech container-based dry toilet and waste treatment system to capture people's urine and excrement and turn it into fertilizer, thereby simultaneously offering (semi)rural communities in the Global South access to sanitation and organic fertilizer.

[6] The social entrepreneur behind this initiative has prepared a catalogue of 2000 assistive devices that can be produced with a 3D-printer.

[7] Under the current arrangement, one of the project partners, the University Hospital of Geneva, offers free treatment to the women who are found to have cervical cancer, which is evidence of good ethical practices and adherence to the KFPE principles of North-South partnerships of providing concrete benefits to research partners in the Global South. (Note: the KFPE principles and the adherence of TECH4DEV and ETH4D to these principles is discussed in Chapter 5.) The implementation of the solution hinges upon the ability to use the artificial intelligence-based Decision Support Tool, for which capacity building and training of the para medics in the Global South becomes important, and also the building of institutional capacity, e.g., of the Dschang Hospital in Cameroon, to host the system required for operating the Decision Support Tool and pay the trained staff. We will see later that it is important that the research challenges plan and follow-up each step of the impact chain.

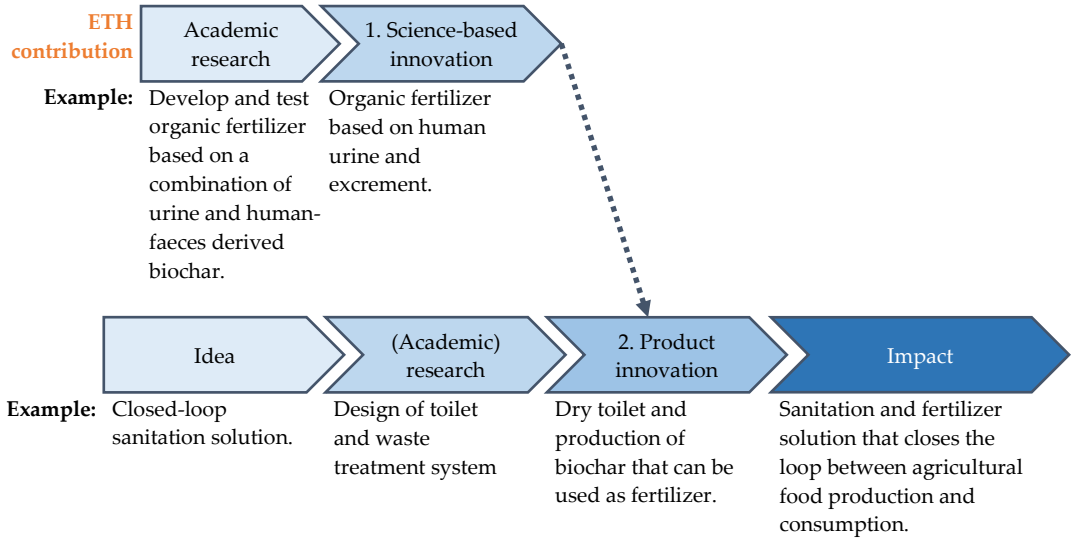
- The complete redesign of the logistics system of Uganda's health emergency response system, which should help the Uganda Ministry of Health to get the right equipment, protective clothing, and medicine more quickly to the medical professionals in the country's periphery where epidemics tend to break out.

Finding: 'Research for development' includes work on innovations that have the potential to positively affect the lives of millions of people in the Global South.

2.3. The role of research

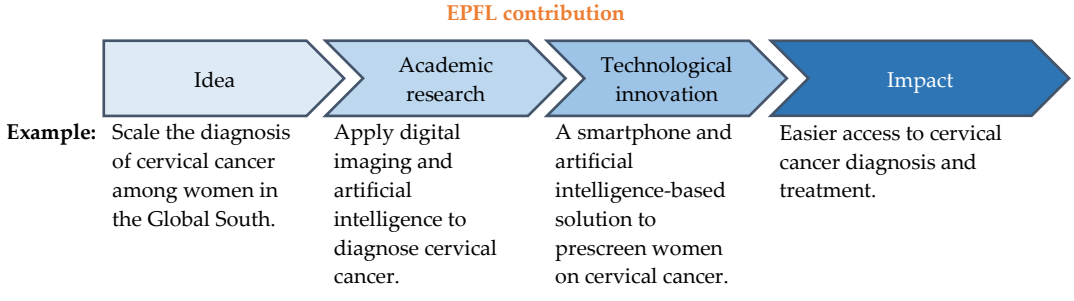
23. The observant reader may have noticed that in the opening paragraph of the previous subsection we wrote 'innovations that the research challenges contributed to' rather than 'innovations that the research challenges produced'. The reason is that, at times, there is academic research and the social or technological innovation it produces, as well as the subsequent product and social/technological innovation that this academic research ultimately contributes to. In some cases, we deal with 'embedded research' and 'multipronged innovations'. Figure 1 clarifies this graphically using the above example of the container-based dry toilet which involves both a science-based innovation (urine-enriched biochar from human excrements that is a fertilizer) and a product innovation (a dry toilet). (Reminder: Annex A briefly introduces the seven research challenges.)

Figure 1 A dual innovation



24. Above representation is not true for all research sponsored by TECH4DEV and ETH4D. For example, the redesign of the logistics system of Uganda's health emergency response system or the use of digital imaging and artificial intelligence to prescreen women on cervical cancer produce their own social and technical solution. Figure 2 graphically depicts the case for the cervical cancer research.

Figure 2 A single innovation



Finding: The research challenges generate their own innovations which, at times, feed into innovations of partner institutions.

2.4. Contribution to development impact

25. Figure 1 and Figure 2 already suggest that the research challenges 'contributed' to the potential development impact of the final product/innovation. This is undeniable, and evident from all seven research challenges that the evaluation looked at:

- EPFL and the University of Los Andes in Colombia worked together to develop a 3D-printer filament from recycled pet bottles, and when the product turned out to be too brittle, to pioneer alternative combinations of polypropylene and natural fibers.
- EPFL and the University of Juba in South Sudan co-designed and tested the envisaged mobile, multi-functional, and reusable emergency shelter for recurrently flood-affected communities.
- EPFL and the University Hospital of Geneva are developing the smart-phone and artificial intelligence-based method for prescreening women on cervical cancer.
- ETH, together with a British design team and a local builder in Morocco, designed the modular dwelling from rammed earth.
- ETH, together with the pioneer of the container-based dry toilet, found a way to combine urine and excrement-based biochar and turn it into an organic fertilizer.
- ETH together with the Ministry of Health and health professionals in Uganda redesigned the country's logistical health emergency response system.
- ETH showcased how solar lights fixed to the front façade of informal dwellings could provide an alternative system of streetlights in informal settlement in South Africa.

Finding: If the innovations are implemented at scale and achieve development impact, then the research challenges will have contributed to this development impact: they created the innovation and/or contributed to the innovation.

26. The question remains whether these social or technological innovations and products will see the light of day: will they be introduced and applied, at scale? In other words, can they fulfil their potential and have actual development impact? The next subsection answers this question.

2.5. From research to development

27. Doing the research is one thing—difficult and challenging as it is. Introducing and applying the innovation in society, at scale, is quite another. The assumption is that by involving researchers and practitioners from the Global South the innovations will consider from the start the socio-economic, political and resource environment of the targeted geography, and offer the requisite on-the-ground partners to introduce the technologies. This assumption proves to be feeble at best. The reasons vary between research challenges. All reasons constitute classical development challenges, whether pertaining to entrepreneurship or development initiatives (see Textbox 3).

28. For the social and technical innovations that qualify (in part) for the entrepreneurial route, the evaluation found that:

- the innovation is not yet developed/mature enough to be technically viable (e.g., filament for 3D-printing of assistive devices),
- the entrepreneur has yet to manifest her- or himself (e.g., prescreening of cervical cancer),
- the entrepreneur is not growth-oriented (e.g., rammed earth dwellings, 3D-printed assistive devices),
- the entrepreneur lacks the capital to scale the innovation (e.g., container-based dry toilets),

- the innovation is not affordable for target group (e.g., dwelling-based public street lighting), and/or
- the replicability and commercial viability of the innovation is yet to be proven (e.g., container-based dry toilets, rammed earth dwellings).

Textbox 3 Two proto routes to development impact

Entrepreneurship and development initiatives are the two proto routes for introducing social or technical innovations. The targeted innovations of many research challenges clearly fall in one or the other category. For example, revamping the emergency response system in Uganda concerns a public responsibility and, as such, constitutes a development challenge. Introducing assistive devices for disabled people can be done through an entrepreneurial model. Many innovations may also require, or offer possibilities for, a combination of entrepreneurship and a development initiative (for example the container-based dry toilet, the smartphone and artificial intelligence-based screening on cervical cancer, or the introduction of dwelling-based public street lighting).

Note: We use the terms entrepreneurship and development initiatives liberally. Entrepreneurship includes the purely commercial-based variant and social entrepreneurship. In both cases, it builds on entrepreneurship and the market mechanisms to introduce and disseminate the innovation. Development concerns a public or civil society led initiative, irrespective of whether it is implemented and/or funded by a (local) government, an (i)NGO, or a development organization. We make this dichotomy because each presents its distinct challenges.

29. For the social and technical innovations that depend (in part) on public, civil society or international organizations' initiative, the evaluation observed that:

- the willingness of the target group to adopt the innovation has yet to be established (e.g., rammed earth dwellings, mobile emergency shelters),
- the willingness of key international partners to adopt and financially support the innovation has yet to be established (e.g., mobile emergency shelters, logistical health emergency response system),
- there is no qualified demand[8] for the innovation on the part of the (local) government (e.g. container-based dry toilets, dwelling-based public street lighting),
- the responsible government lacks the resources, or the political-economic environment to allocate the requisite resources, for introducing the innovation (e.g., logistical health emergency response system, dwelling-based public street lighting, container-based dry toilets, prescreening of cervical cancer), and/or
- the responsible government agencies may not be given the capacity to adopt the innovation (e.g., logistical health emergency response system, prescreening of cervical cancer).

30. These observations imply two things. First, the successful introduction of the innovations (at scale) is not guaranteed. Second, all require significantly more work to be introduced and/or be applied at scale, and many could probably benefit from additional support. This work concerns the need to:

- establish the technical, commercial and/or social viability of the innovation, as well its applicability across different geographies,
- identify and/or capitalize the entrepreneur who can introduce the innovation at scale, and/or
- build a coalition of (local) reform actors with the interest, incentive, capacity, and tenacity to introduce the innovations at scale.

[8] We define a qualified demand as follows: local reform actors acknowledge the development challenge at hand, have defined a reform agenda, committed (significant) own resources to the implementation of the reform agenda; proceeded – on their own initiative and volition – with the envisaged reforms; and, identified concrete and well-motivated areas for external support.

Finding: Addressing needs and challenges of people and organizations in the Global South through social or technical innovations involves research *and* development work. All research challenges in our sample face considerable and classical development challenges relating to (i) ownership, (ii) economic, commercial, social and/or political viability, and (iii) replicability.

31. Before we consider the implications of above findings, it is worth contemplating and necessary to bring into the discussion several other key characteristics of the research challenges, namely:

- the interests of the research partnership members,
- the origin of the targeted innovations,
- the type and timing of the support received from TECH4DEV and ETH4D,
- the selection of the research challenges by TECH4DEV and ETH4D, and
- the use of SDC expertise, experience, and capacity.

32. The next subsections reflect on each of these topics in turn.

2.6. Interests, incentives, and drive

33. The research challenges are implemented by research partnerships which—by design—consist of EPFL/ETH researchers, researchers and practitioners from the Global South, and possibly other international partners. The assumption is that these research partners *'have the capacity, interest, incentive, power, and tenacity to introduce the innovation and implement them at scale'* (see Textbox 2). Let us reflect on this assumption for each of the partners in turn:

- The EPFL/ETH researchers expressed an unequivocal wish to contribute to society and help resolve real-world challenges. Their commitment to research and society was undeniable. They also found the work to be in sync with their academic responsibilities (develop new knowledge) and incentive structure (publish academic papers), noting that the research challenges offered them access to or generated a wealth of relevant data. Still, the professors' tenure, the senior researchers' job responsibilities and hope for tenure, and the PhD students' focus on their PhD do not—generally speaking and naturally—give them the time and/or the drive to commit 150% to introducing the innovations in society and at scale; a commitment which the innovations themselves often require.[9]
- The researchers from the Global South equally expressed a commitment to serve society. Moreover, the collaboration with EPFL/ETH (further commented upon in Chapter 5) gave them access to new networks and collaboration opportunities. Like the EPFL/ETH researchers, they were committed to their academic careers and (mostly) lack the drive to introduce the innovation in society and at scale.
- The practitioners are a disparate group of individuals and organizations. First, they stem from both the South and the North (not just the South, as perhaps originally thought). Second, they include (social) entrepreneurs, small businesses owners and professionals (e.g., medical doctors, architects, etc.). Third, some drive the innovations, some merely ride the wave (i.e., they participate in the research challenge but do not drive it forward). Where they drive the innovation, especially in the cases where they have 'skin in the game', an innovation's underlying

[9] On the part of EPFL and ETH, the research challenges hinge to a significant degree on the work done by postdocs and PhD students, who carry the dual responsibility of project management and doing the research. At the same time, they are under pressure to publish. Research results from the research challenges often come in too slow to meet their requisite publication turnover. Moreover, postdocs often run several research projects in parallel. Several postdocs and PhD students therefore observed that the research challenges produce additional stress/higher than normal stress levels.

narrative gains significant credibility and power. This is, for example, the case of the container-based dry toilets.

- The international organizations featured especially in the research challenges on humanitarian aid. In the case of the mobile, multifunctional, and reusable emergency shelters, the idea and drive stems from the international aid agency Medair. In both this case, as well as the logistical health emergency response system, the actual introduction of the innovation (at scale) depends in large part on the buy-in of the international humanitarian aid community.[10] Whilst these were (at best) consulted during the research, they were neither part of the research partnership, nor the solution development.

34. From experience, the SDC knew that university-led research is not sufficient to create development impact. It was for this reason that they required the *'compulsory inclusion'* of researchers and practitioners from the Global South. The above findings suggest that their mere inclusion does not suffice. The quality/drive of the partners also matters.

35. The Global South partners are currently selected based on their ability to co-develop and pilot the innovations. The ability to take the innovation to scale might require different people and/or partners. Currently, the research challenges do not have the incentive, time, resources and/or capacities to identify and partner with the people and/or organizations who could scale up the innovations. In the current format, the research challenges are, in effect, not designed to foster implementation at scale and generate impact on the ground. EPFL and ETH also face restrictions on their expenditures. They cannot prima facie spend their budget in the Global South; let alone on implementation.

Finding: Most resource challenges still lack the agent who picks up the innovation and runs with it, i.e., implements the innovation at scale. The compulsory inclusion of practitioners in the Research Partnerships does not suffice in this regard.

2.7. The origin of the innovations

36. With one exception, all innovative ideas pursued by the research challenges can be traced back to individual persons or small teams of persons—see Table 2.

Table 2 The origin of ideas

Idea	Originator
3D printing of assistive devises	Mr. Felipe Betancourt, social entrepreneur, Colombia, and Mr. Nicolas Meyer, civil society activist.
The mobile and multi-purpose emergency shelters	Medair team in South Sudan
The IT-supported prescreening of women on cervical cancer	Prof. Patrick Petignat (Hospital of Geneva) and Prof. Jean-Philippe Thiran (EPFL)
A modular dwelling from rammed earth	Mr. Gianni Botsford, architect, UK
A container-based dry toilet and biochar-based fertilizer	Ms. Mona Mijthab, social entrepreneur, Germany/Guatemala
Dwelling-based solar public street lightning	Ms. Stephanie Briers, ETH PhD student (and now postdoc), South-Africa

37. The exception is the need to redesign the logistical health emergency response system in Uganda which was recommended by a WHO evaluation of Uganda's overall health emergency response

[10] In the case of Uganda, the Government of Uganda looks to a large extent to the international humanitarian aid community to finance its health emergency response system.

system. However, even here, a small group of individuals made it possible. The Uganda Minister of Health attended a workshop, organized by the World Food Program, where ETH's Dr. Bublu Thakur-Weigold talked about applying system thinking and supply chain management theory to improving the health emergency response system. The Minister then initiated a collaboration led by a small group of people in the Ministry of Health and ETH.

38. Back to Table 2. What is striking about the listing in Table 2 is that the actual ideas stem from people from both the South and North. In each case, it includes however individuals with deep exposure, experience and commitment to the needs and challenges of the Global South. This stems either from having grown up in the South or having worked extensively and intensively in the South.

39. For the reasons laid out in the previous subsection, the actual possibility and drive to bring the innovations forward differ markedly between these (groups of) individuals. Still, individuals matter. Successful innovations start and end with individual (groups of) people who test the commercial, social, and political viability of the innovations and push them onto the market or in society. Similarly, unsuccessful innovations either lack the commercial, social, or political viability or the individuals to make it happen.

40. Research challenges have much in common with entrepreneurship whose success depends—besides the technical and commercial viability of the idea and the prevailing market conditions—on the drive and business acumen of the founders. Unsurprisingly, angel investors and venture capitalists put a lot of weight on the track record and character of founders in deciding whether or not to invest in a particular startup (Feld 2012, Feld and Hathaway 2020, Engelsman and Tarnutzer 2017, 2022).

Finding: Innovative ideas emerge in the South and North—generally from individual persons with deep exposure and commitment to the Global South. These individuals do however not always have the incentive, drive, capacity, and tenacity to also implement the innovations at scale.

2.8. The type of support

41. TECH4DEV and ETH4D offer material and immaterial support to the research challenges. The material support takes the form of a financial grant. The size and duration differ between TECH4DEV and ETH4D research challenges. Moreover, ETH4D offers different funding modalities. Table 3 provides an overview.

Table 3 Funding modalities

Initiative	Modality	Size	Duration
TECH4DEV	Research-to-Action Grants	CHF 300,000	24 months
ETH4D	Research Challenge	~ CHF 20,000 – CHF 100,000*	6 to 18 months
	Doctoral Fellowship for Global Impact	CHF 175,000	36 months
	Pilot/Seed Grant	~ CHF 20,000	6 to 18 months
	Research to Action Grants	~ CHF 5,000	n/a
	Global Impact Pioneer Fellowship**	~ CHF 150,000	18 months (12 months if team of two fellows)

* Partners (academic and non-academic combined) must contribute 80% of the requested funding in cash.
** This was under development during the evaluation and has not been evaluated.

42. TECH4DEV and ETH4D mostly offer one-off and one-time support. Even though ETH4D funding modalities suggest a sequence of financial support, few (if any) research challenges receive multiple rounds of support. Each funding modality mostly finances different research initiatives. The size of financial support clearly differs between TECH4DEV and ETH4D with the latter providing more modest (to small) grant funding.

43. The non-material support provided by TECH4DEV and ETH4D also differs. TECH4DEV offers technical assistance in identifying and developing the appropriate business case for the innovation, and for example addressing intellectual property rights. This support is provided in-house by a thematic experts. ETH4D offers access to courses on sustainable development and actively uses its network to link the research challenges to other partners and opportunities within the ETH ecosystem.

Finding: TECH4DEV's and ETH4D's support to the research challenges is confined in terms of grant-funding, duration, or technical assistance.

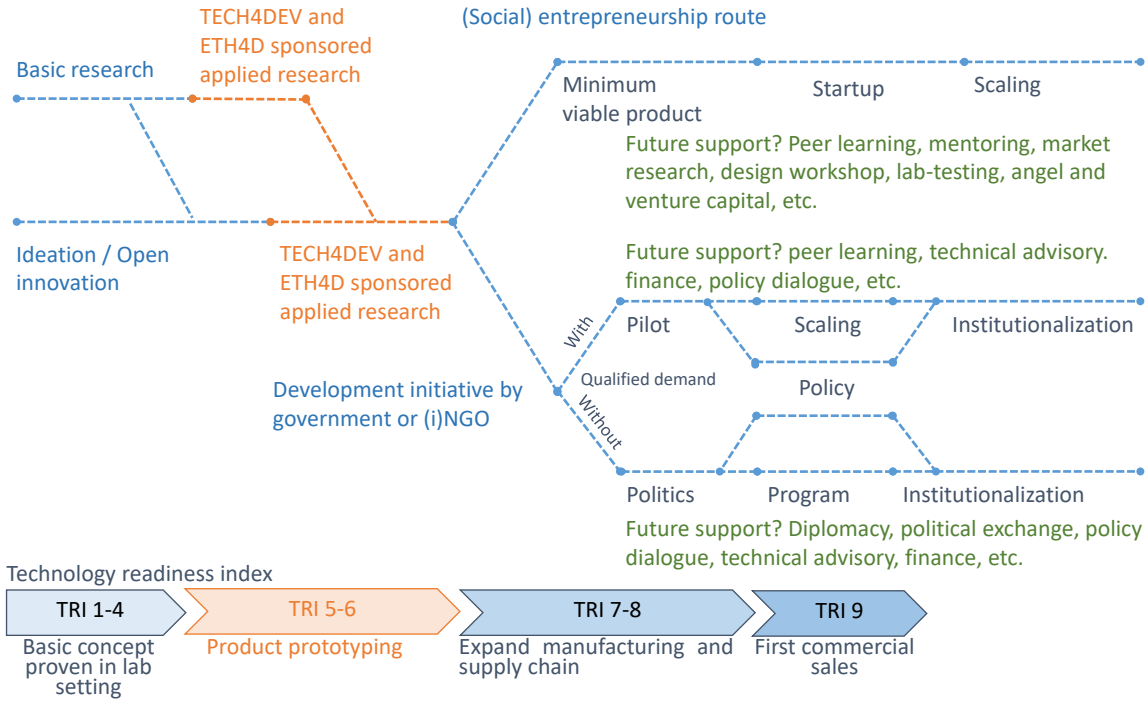
2.9. The timing of the support

44. As befits research, the research challenges take place relatively early in an innovations 'development impact journey' (if we ignore for the moment the possibility that the 'applied research' of the research challenges may have been preceded by years, if not decades, of 'basic research'). This could already be gleaned from Figure 1; Figure 3 elaborates the pathways.

45. Figure 3 offers a graphical representation of the entrepreneurship or development impact journey of a research challenge, highlighting where in this process TECH4DEV and ETH4D support is located and relating it to the technical readiness index often used to denote (as the name suggests) the technical readiness of an innovation to be deployed in society (in this case also applying to social innovations). As already argued before, Figure 3 shows graphically that after the TECH4DEV and ETH4D current support ends, their remains much work to be done.

Finding: The research challenges cover one part—and one part only—in an innovation's development impact journey.

Figure 3 The entrepreneurship and development impact journey



2.10. The selection of research challenges

46. In ETH4D, the main applicant for research funding is an ETH research group. They have—twice a year—the possibility to submit a research proposal which will subsequently be evaluated by a selection commission consisting of *'three academic members of ETH4D, the executive director of ETH4D, and a member of the ETH Zürich Research Commission, as well as a practitioner (from industry, policy, or NGO)'* (ETH4D 2019). At least one of the members is from the Global South and 50% of the committee members are women. The research proposal is to follow a pre-set format including, amongst others, a three-to-four-page narrative description, a milestones-overview, a budget, and CVs.

47. In TECH4DEV, EPFL labs could submit research proposals twice during the 2019-2023 period. An *'international expert panel consisting of a North-South and gender balanced group of worldwide experts from academia, international organizations, NGOs, governments and finance'* will evaluate and select the winning proposals (TECH4DEV 2019).

48. In both TECH4DEV and ETH4D, the research partnerships are to include academic and non-academic institutions and at least one partner from the Global South. The proposals are, in short, evaluated on:

- the clarity of the research question,
- the extent to which the research/innovation addresses a need of the Global South/is relevant for the people in low- or low-to-middle-income countries,
- the research's contribution to the development, testing or implementation of an innovative product, policy, or service, including an assessment of the maturity of the technology,
- their potential to create positive impact in the Global South,
- the likely application, at scale, of the results in the Global South/the use of the results by the partnering non-academic institution,
- team qualifications, and
- budget and own financial contribution by the research partnership members (see also Appendices E and F).

49. In the case of ETH4D, the narrative proposal must also discuss *'the two most important alternatives/interventions to address the challenge'* (ETH4D 2019).

50. At this point, we also bring in the practice of the 'research for development' program SOR4D and the lessons learned from the NCCR N-S program. The SOR4D selection process offers some criteria which could help strengthen the partnership formation and enhance the transformative potential of the research challenges (see Textbox 4). The NCCR N-S program prioritized a system of pairing PhDs (one candidate from the North and one from the South) around the same research theme. This promoted high levels of collaboration between PhD students (and resulted in long term relationships, although structural inequalities could often not be eliminated).

51. We observe the following: selection is done based on a (short) written proposal and expert opinion. The credibility of the proposal, and—importantly—the likelihood that members of the research partnership will (upon success) introduce the innovation in the market/society and achieve development impact is not independently verified and reconfirmed.

Finding: The research challenges can be more thoroughly and more frequently scrutinized on the quality of the development partnerships and likely development impact.

Textbox 4 Valuable selection criteria from SOR4D

- The review panel for the proposals has a varied profile, with representation of reviewers from several countries outside of Switzerland and, increasingly, from the Global South. (Note: the final decision remains with the Swiss National Science Foundation, however.)
- The SOR4D programme is focused on transformative research partnerships, and so trans-disciplinarity, co-creation of proposals with southern partners, and involvement of key stakeholders who will implement and scale up the solutions in the South are an integral part of the proposal evaluation. Although some of these elements are currently included in ETH4D and EPFL proposals, the emphasis on trans-disciplinarity, co-creation of research-innovation ideas could be increased.
- Adherence to KFPE principles (see also Chapter 5) is to be written into the proposal. Whilst non-adherence to all of them do not lead to rejection, they may result in lower valuation of the proposal and/or need to be considered for the further development of the proposals. In ETH4D and EPFL too, some KFPE principles are mandated, e.g., partnership with a research and development organization in the Global South, relatively less attention is given to some others, e.g. benefits of profits arising from the research (challenge partnerships).
- Budget sharing 50-50 between Switzerland and the Global South is mandatory (up from the 60/40 rule in TECH4DEV and ETH4D. ETH4D and TECH4D may wish to review their budget sharing rule too, as it may positively impact capacity creation in the global south and the potential development outcomes.

2.11. The role of SDC

52. TECH4DEV and ETH4D consider the SDC a valuable counterpart and advisory board member. SDC offers a thoughtful, constructive, and critical voice, whether in bilateral exchanges or steering committee meetings, which allows TECH4DEV and ETH4D to reflect on and improve their initiative. At times and when relevant, the SDC connected individual research partnerships with SDC offices in the Global South, for example regarding the artisanal gold research in Burkina Faso.

53. The evaluation is however not aware of any research challenge which has made active use of SDC's capacity and expertise. The SDC has a proven track record in successfully conducting and/or facilitating a political dialogue.[11] The SDC (and SECO for that matter) have experienced professionals in value-chain development (indeed including gold), water, climate, and humanitarian aid, amongst others.

54. There can always be practical reasons why the SDC cannot deliver on a request for support (other priorities or shortage of capacity) but there will equally be instances where interests meet. And in some of the challenges faced by the innovations (as highlighted above), the SDC should be able to help/contribute, most notably when it concerns much needed political and policy dialogue to assess (and to the extent possible foster) a qualified demand for support from the side of government. It makes sense to more consciously assess the research challenges and innovations and see where the SDC support could prove beneficial.

Finding: the SDC is insufficiently mobilized to help overcome some of the development challenges faced by the research challenges.

2.12. A possible pathway forward

55. How can TECH4DEV and ETH4D (even) better support the research challenges? There are, of course, limits to what they can contribute. In short, they can:

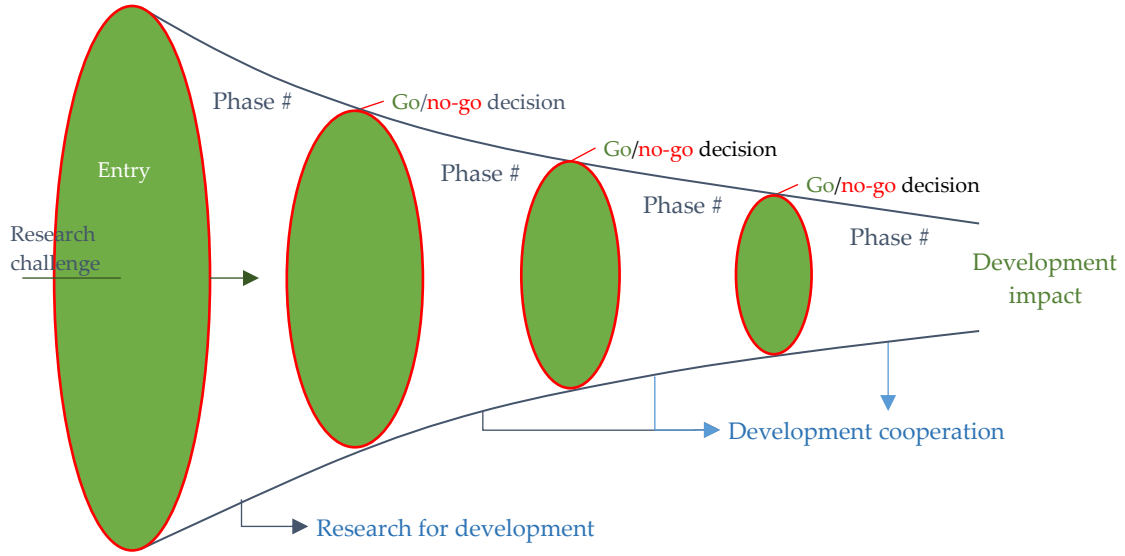
- offer financial support,

[11] For example, in promoting a federal form of government and implementing the 2015 Constitution in Nepal (Engelsman and Hobley 2022) or supporting the decentralization process in Ukraine (Engelsman and Maksymenko 2021).

- link to other, existing, support programs, most notably the established startup ecosystem (see Appendix D for the ETH startup ecosystem), and Swiss development cooperation expertise and programs, and
- make available, or link to, relevant expertise whether peers (e.g., from EPFL or ETH spin-offs), diplomacy or development (e.g., Swiss Cooperation Offices), or subject specialist (e.g., business case development or on angel investment and venture capital).

56. TECH4DEV and ETH4D can **organize this support into a single, flexible, multi-phase, and competitive funnel**, wherein research challenges are selected at the gate (just like currently the case) but are subsequently offered multiple rounds of support if they can—after each phase—prove an increased likelihood that they will indeed be able to attain the envisaged development impact. The idea is shown graphically in Figure 4.

Figure 4 A funnel to development impact—only the exceptional survive and deliver impact



A sequence of support with ever-increasing demands on:
- Team and commitment, and
- Technical, commercial/social, and financial viability (the latter can be commercial, fiscal or a combination)

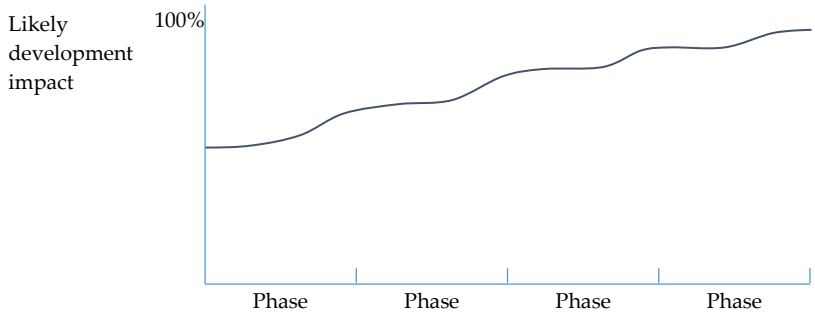
57. Key is that, upon having entered the funnel, a research challenge can **receive multiple rounds of support to address and overcome both the research *and* the development challenge at hand** (thereby enabling it, if successful, to travel the whole development impact journey). After each phase, a research challenge must show—ever more convincingly—that its innovation is:

- technically feasible,
- politically and socially acceptable and aspired,
- suited to prevailing market and/or societal conditions,
- financially feasible, either commercially or through a sustainable public investment plan (or a combination thereof), and
- carried by a credible team, 100% committed to bringing the innovation to the market/into society, with the business acumen and/or political cloud to make it happen, and with skin-in-the-game (whether financially, politically, or emotionally).

58. The rational nature of how international development cooperation is organized, and its eternal attempt to define and plan most things upfront, would require us to define ex ante the number of

phases, the type of support and amount of financial support per phase, and the selection criteria to qualify for a next round of support. This is impossible and counterproductive. Each research challenge and innovation are different, both in terms of their 'technology readiness'[12] and the on-the-ground challenges they face. It therefore makes much more sense that, upon submission to the funnel, each research challenge/innovation is given its own short-term and medium-term goals, split into a sensible number of phases, whereby after each phase the research partnership must prove that it is ever more likely to attain development impact. For example, where upon entry into the funnel the likelihood for development impact is say 50/50, this likelihood should increase after each phase. Figure 5 offers an—again 'indicative'—representation; what the likelihood of development impact should be at the front gate (in so far that can be estimated) is for TECH4DEV, ETH4D and the SDC to decide.

Figure 5 An ever-increasing likelihood of development impact



Finding: For TECH4DEV and ETH4D to support successful research challenges along their development impact journey through multiple round and variegated support (of course, only as long as valid, needed, and cost-effective).

2.13. Some more, practical, implications

59. Four more observations and implications of this proposal that are worth highlighting. First, **the lead in the research partnership—and therefore the main counterpart of TECH4DEV and ETH4D—may shift over time**. For example, whereas a research lab may submit the proposal for the research challenge and lead the initial research, a social entrepreneur from the South, an iNGO, or a postdoc turned entrepreneur may pick up the research results and introduce the innovation to the market/in society. The latter then become the natural recipient of further support from TECH4DEV and ETH4D. This would imply that TECH4DEV and ETH4D would effectively extend their remit from 'research for development' to 'research to development' and actively support the 'development trajectory' of the innovations.

60. **Second, the work of the selection panel would change: from a one-time assessor, it would become a permanent gatekeeper,** reviewing the progress of each selected research challenge and deciding whether it merits continued support into a next phase. The selection panel would need to engage with the innovation at hand, form an opinion on what is needed and what constitute the main challenges to introducing the technology at scale in society, and formulate (and negotiate) what the research challenge should reach to qualify for subsequent rounds of support. This will require a solid mix of research, development, and entrepreneurial expertise in the selection commission.

[12] We deliberately connect here to the 'technology readiness index' terminology but note that this can equally apply to social innovations.

61. **Third, the funnel would give meaning to the so far rather elusive assumption in the theory of change of fast prototyping and results-based funding**, as continued support will be made dependent on the extent to which a research challenge is able to show convincingly that it is moving toward implementing the innovation at scale and attaining development impact.

62. **Fourth, TECH4DEV and ETH4D will need to connect much more closely to both the entrepreneurship ecosystem at EPFL and ETH, and the (Swiss) development community** to access (excellent) resources which already exist and/or garner support that goes beyond their own capacities.

Textbox 5 A final note on efficiency

With the knowledge gained through this evaluation, could TECH4DEV and ETH4D—in hindsight—have achieved the same results with fewer resources (i.e., cost minimization) or better results with the same resources (i.e., yield maximization)? The short answer is no. If anything, TECH4DEV and ETH4D need to spend more resources to support the research partnerships to overcome—over and beyond the 'research' challenge—the development challenges of introducing the innovations into the market/society. To prevent wasteful spending, such extra resources should, as best as possible, be targeted to the innovations with the highest potential of reaching the market/society and positively influencing the lives of millions of people in the Global South. This means trying to find and support those innovations which not only meet a need of people in the Global South and are technically, socially, politically, and economically viable, but also have the people behind them to make it real.

2.14. Conclusion

63. This section highlighted the development potential of the research challenges. The promoted innovations can, in theory, positively affect the lives of millions of people in the Global South. Most research challenges and innovations, however, face several, classical, development challenges which prevent them (for now) from seizing their potential. These challenges pertain to (i) ownership[13], (ii) economic, commercial, social and/or political viability, and/or (iii) replicability. The research challenges would therefore benefit from a sequence of support which would accompany and support the most promising research challenges along its development impact trajectory.

[13] This also includes the 'drive' and 'incentive' to implement the innovation at scale.

3 Gender equality and diversity

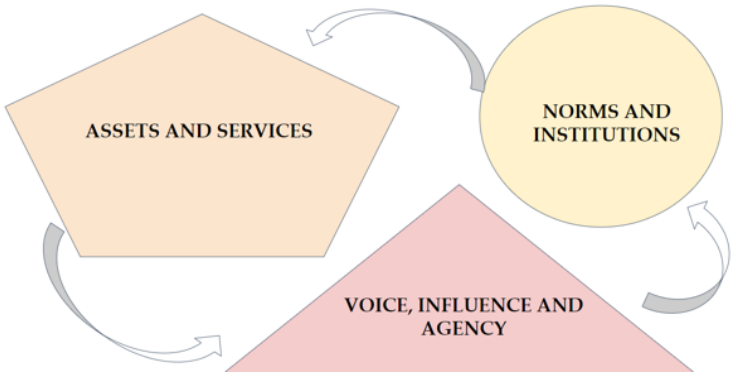
64. Switzerland is committed in its international development cooperation '*to promoting gender equality and women's rights in all its interventions ... with a particular emphasis on the prevention of gender-based violence, economic empowerment, and women's political participation'*. Beyond gender equality, Switzerland is also committed *'to reducing factors of exclusion and promoting equal opportunities and equitable access to resources, public services and decision-making processes'* (FDFA 2020a).

65. In EPFL, gender equality and diversity are transversal themes, promoted by the President's office and part and parcel of the institutional strategy. ETH4D sees the promotion of diversity—in all its aspects—as an integral part of its mission. It strives for cultural awareness and linguistic sensitivity amongst ETH faculty and students and promotes the decolonization of research collaboration with the Global South.

66. Against this background, to what extent have TECH4DEV and ETH4D contributed to gender equality and diversity? The Gender Equality, Diversity, and Inclusion Framework offers a normative model for answering this question. It distinguishes three (interrelated) domains through which gender equality, diversity and social inclusion can be garnered (see Figure 6). These three domains are:

- improved access to assets and services,
- enabling greater voice and agency, and/or
- changing the norms and institutions that govern society.

Figure 6 Gender Equality, Diversity and Social Inclusion framework



3.1. On the research challenges

67. The research challenges mostly target the first domain 'access to assets and services' with a varying degree of inclusivity and gender responsiveness. Some research challenges target highly vulnerable groups, for example people with disabilities or communities caught up in emergency situations. Other challenges address problems faced by women (e.g., cervical cancer, especially for women with the human papillomavirus) or affect them more (e.g., fostering public safety through better street lighting). However, few if any of the challenges take a gender responsive approach in developing the technological solutions, i.e., solicit and consider gender differentiated perspectives on both the problem and the solution.

68. Some challenges have the potential to directly increase the capacities of women (e.g., midwives involved in the prescreening of the women on cervical cancer). Such potential could however be identified and addressed in a more focused manner. Most research projects do not target enhanced voice or changes in norms. A notable exception may be the public lighting project in Cape Town which

seeks help the community induce the municipality to replace the Apartheid-era high masts with more community responsive street lighting alternatives.

3.2. At the institutional level

69. Whilst we did not count representation, it was not hard to select a gender-balanced sample of research challenges in terms of female and male professorship. Similarly, in many research challenges female researchers and PhD students performed leadership roles. Equally, the summer schools organized by TECH4DEV and ETH4D had gender balanced participation. True to its mission, ETH4D also organizes a workshop on diversity three-times-a-year for ETH researchers and students.

70. An important forum for voice at the institutional level are the NGO Council at TECH4DEV and the Advisory Committee at ETH4D. In both cases, membership includes people from the Global South, who can highlight problems in the Global South that can be addressed through technology. They form however a minority and their representation could be increased in the future. In the latest round of hiring at EPFL, 64% of the professors recruited were women. Further, EPFL has established a Vice Presidency for Responsible Transformation, led by a senior woman.

3.3. Conclusion

71. Both EPFL and ETH, and TECH4DEV and ETH4D, are serious about and actively promote gender equality and diversity. Female participation is high in the research challenges and educational courses. The research challenges mostly introduce innovations for the 'humanities' without differentiation in gender. Few research challenges target enabling voice and/or changing societal norms. In moving forward, TECH4DEV and ETH4D could:

- introduce a gender differentiated perspective in the problem analysis and innovation design,
- promote social innovations which strengthen women's voice and political empowerment, and
- strive for a balanced North-South representation in the NGO Council and/or advisory boards.

Finding: EPFL and ETH, and TECH4DEV and ETH4D are on the right track in promoting gender equality and diversity with room for improvement.

4 Relevance

72. This chapter turns to:

- the institutional relevance of TECH4DEV and ETH4D for EPFL and ETH respectively
- TECH4DEV's and ETH4D's alignment with Switzerland's international development cooperation, and
- the role and functioning of the NGO Council in TECH4DEV.

4.1. Institutional relevance

73. For the SDC, it is important that EPFL and ETH 'own' TECH4DEV and ETH4D. Ownership means that they pick up the ball, run with it, and (hopefully) score a few goals. It also means that they invest in the initiatives—financially, timewise, and intellectually—to make them better and durable. Such ownership is the *sine qua non* for the development effectiveness and sustainability of the initiatives.

74. The evaluation picked up many signs which, collectively, suggest strong ownership of the initiatives, both by EPFL and ETH.

- There are historical roots and/or a history of engagement with development in general and the Global South in particular. ETH's original mission was to help modernize Switzerland after the end of civil strife in the mid-eighteenth century. Its new strategy reconnects to these roots, putting ETH at the service of society. Moreover, ETH4D was born out of NADEL, ETH's 50+-year old center for development economics. Similarly, EPFL has a history of working in development whether under the Development and Cooperation Center (CODEV) or the NCCR initiative on French-speaking Africa.
- There are parallel, complementary, initiatives such as Essential Tech and Excellence for Africa in EPFL, which—together with TECH4DEV—is referred to as the Tech for Humanities program of EPFL. ETH and EPFL have jointly started with the ICRC the Engineering for Humanitarian Action initiative, which is similar to TECH4DEV and ET4D albeit geared towards humanitarian action.
- Not surprisingly given the above, both the EPFL and ETH president expressed strong commitment to serving society, contributing to sustainable development, and TECH4DEV and ETH4D respectively. ETH4D also responded to an open call for proposals from the President's Office for new topics and research initiatives and was one of ten that were selected by the President's Office out of 80 submissions. The President's Office subsequently committed [in 2019] part of ETH surplus reserves to ETH4D.
- The Vice-President's Office of Innovation in EPFL and ETH Global (which falls under the President's Office) have committed staff resources to TECH4DEV and ETH4D respectively.
- EPFL has institutionalized a core course about climate change which all bachelor and master-level students must take. ETH4D offers an ETH-wide course on gender and diversity, as well as a range of courses on sustainable development.
- As already noted in Section 5.3, ETH4D is the platform for researchers to engage in development and roughly 10% of the research groups/professorships have already signed up as member. At EPFL, there are more such platforms, including Essential Tech and the Excellence for Africa Centre. These appear however to be similarly appreciated, offering mostly complementary/additional opportunities for 'research for development'.

75. The Swiss government needs to cut its expenditures. As government-funded institutions, EPFL and ETH need to contribute. At present, they face budget cuts of two-to-five percent. The institutions recognize the relevance, value, and opportunity of the initiatives. Barring any need for more dramatic

budget cuts, the two institutions made clear—partly implicitly, partly explicitly—that they are, in principle, interested in and willing to:

- continue the initiatives *'with or without the SDC'*, and
- cover the core funding of the initiatives, i.e., the costs of the secretariat/program management. (Note: in the case of ETH4D, this may need to be phased in and SDC's core funding phased out, as ETH4D still needs to be 'structurally integrated' into ETH, which may still take some time.)[14]

76. All in all, the above findings offer a good and solid basis for SDC's continued engagement with TECH4DEV and ETH4D.

4.2. Alignment with Swiss development cooperation

77. The Swiss International Cooperation Strategy 2021-24 states that *'the academic community is a key partner in the development of technological, social, and political solutions. Academic partners include international research institutions, as well as universities and research facilities in Switzerland and developing countries'* (FDFA 2020a). Moreover, SDC's Global Programs '*champion'* research in agriculture, health, and migration (FDFA 2020a).

78. Switzerland's commitment to 'research for development' was elaborated in the Policy Sector Development and Cooperation Research Concept 2021–24 (FDFA 2020b). It emphasizes the need for research to contribute to solving global problems, support the implementation of the 2030 Agenda for Sustainable Development, and foster cross-border interaction and international understanding. The Concept acknowledges the role of research in strengthening development policies and programs, integrating scientific findings into decision-making processes, and promoting innovation and knowledge dissemination. Research is recognized as a vital tool for generating knowledge, addressing global challenges, and supporting evidence-based decision-making in development cooperation.

79. Research funded by the SDC follows several key principles. It must be related to the agency's long-term strategic objectives and thematic priorities, and—importantly—be solution-oriented. It also needs to be exemplary in terms of quality and relevance to development and conducted with research freedom. Communication, dissemination, and application of research findings are essential, and a portion of the project budget should be allocated for these purposes. Research cooperation is based on partnerships, adhering to the principles established by the Swiss Commission Research Partnerships with Developing Countries (KFPE).

80. The ETH4D and Tech4D programmes are fully aligned with these objectives, strategies, and principles of the SDC and have put into practice processes and tools that advance these. For example. all research challenges must have a research and implementation partner from the Global South. Still, more attention could be given to adherence to the KFPE principles, as elaborated in Section 5.2.

Finding: TECH4DEV and ETH4D are well-placed within EPFL's and ETH's interests and strategies and are fully aligned with Swiss International Cooperation Strategy 2021-24 and the Policy Sector Development and Cooperation Research Concept 2021–24.

4.3. The NGO Council of TECH4DEV

81. The NGO Council *'is a crosscutting and collaborative platform [of iNGOs from the Geneva-Lausanne vicinity] ... to collaboratively source EPFL's research and innovation that could strategically accelerate [the*

[14] ETH4D is currently a 'project'. If it is to be extended beyond 2024 and be formally a part of the ETH structure, it needs to become a so-called Article 61 education and research center within ETH.

iNGOs] impact in the field' (TECH4DEV 2019). The NGO Council was adopted from TECH4DEV's mother program TECH4IMPACT. As for TECH4DEV, the NGO Council formally exists, but in practice hardly. Each iNGO whose proposal for a research challenge is accepted automatically becomes a member of the Council. According to the interviewed NGO Council members, the Council only met in person once (of course, in part, due to the Covid-19 pandemic). Moreover, the Council does not play a role in the selection, support, and guidance of the research challenges. Unsurprisingly, the NGO members perceived the NGO Council as neither active nor particularly useful.

82. The original premise that the iNGOs located in the Geneva-Lausanne vicinity offer a source of ideas and can serve as a bridge to local partners is certainly true. This was evidenced by the emergency shelter project in South Sudan and the 3D printing of assistive devices for disabled people in Colombia. In these research challenges, they also played a key role in the research or facilitating the collaboration. In the case of the emergency shelters in South Sudan, the question is whether the iNGO has the product and cloud to convince the logistics cluster of international humanitarian aid agencies to adopt the shelter design. In the 3D printing of assistive devices, the NGO plays no role in either implementation or scaling the innovation.

83. Each research challenge requires—besides its individual drivers—its own unique coalition of (on-the-ground) reform partners, which is unlikely to coincide with (part of) the Council membership. At best, individual members may prove to be useful partners. These can be solicited individually.

84. The NGOs expressed that their prime interest in participating in the Council is to gain access to EPFL, i.e., its professors and researchers. What is needed in practice is simply the opportunity for iNGOs and EPFL Labs to meet, intermingle and exchange. Rather than a Council, TECH4DEV may therefore want to consider offering a regular (semi-annual?) platform for exchange between iNGOs and the EPFL Labs. (ETH could offer a similar platform. EPFL and ETH could, in theory, also collaborate and jointly offer such a platform. In practice, it may, however, prove more practical and efficient for each to organize their own platform.)

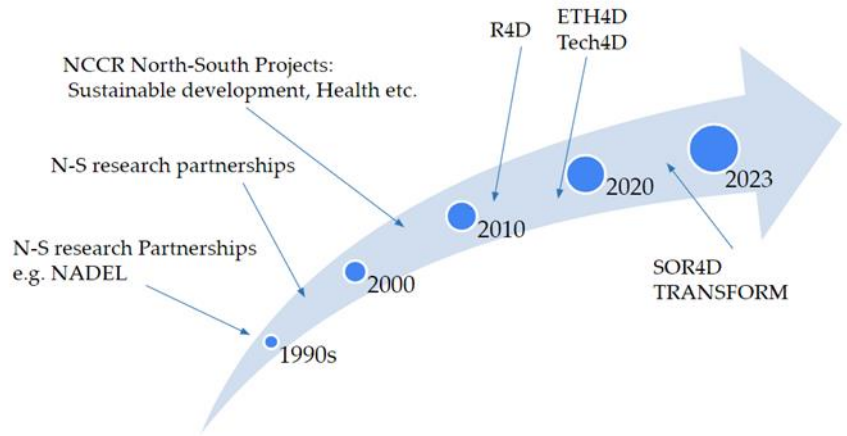
5 Coherence

85. This chapter places TECH4DEV and ETH4D within the historical and current Swiss landscape for 'research for development' and evaluates their compliance with the 11 principles for research partnerships from the Swiss Commission for Research Partnerships with Developing Countries (KFPE). This chapter also looks into the internal coherence of ETH4D, i.e., the complementarities and synergies between the research challenges, PhD scholarships, faculty and staff exchanges and educational courses and programs of ETH4D.

5.1. Complementarity with past and current R4D initiatives in Switzerland

86. Swiss research partnerships for development took shape in the 1990s, when the paradigm of aid was questioned and moved towards more collaborative approaches. The evolution of Swiss research partnerships is indicated in Figure 7.

Figure 7 The evolution of Swiss research partnerships with the Global South



87. In the 1990s, Swiss university-departments initiated partnerships for research and education with developing countries. Some of these were disconnected from the SDC. By the mid-1990s, the SDC initiated flexible tools (e.g., small student projects), which helped build relationships between research institutions in Switzerland and the Global South.

88. Over time, these collaborations became more structured. The most long lasting were the National Centers for Competence in Research North-South (NCCR N-S), which involved North-South research partnerships across specific themes. The NCCR program lasted from 2004-16 and created university-based centers of competence across Switzerland. The program brought together Swiss research institutions and partner organizations in Africa, Asia, and Latin America to address poverty, conflict, migration, health, sanitation, and governance.

89. By the time the NCCR projects came to an end, development orientation and the concept of trans-disciplinarity in research, was getting better embedded in the partnerships, and was well articulated in the KFPE principles (which are discussed in Section 5.2). The next iteration of research partnerships was the Research for Development (R4D) program. The time horizon of the supported research was however shorter, namely three to six years.

90. TECH4DEV and ETH4D followed the R4D program. These two initiatives became more solution-oriented and had the *'compulsory inclusion of practitioners in the North-South research partnerships'*, i.e.,

extended the research partnerships from researchers to practitioners. At the same time, the time-horizon for the 'research for development' became even shorter, from six months to two years and the financial grants concomitantly smaller.

91. The ever-shorter duration militates against completion of the whole cycle of research—innovation—pilot—implementation—scale up. This results in projects being funded at the early and middle stages of the research-to-development cycle but not seeing through the completion of the whole cycle, including the scaling up through for example the commercialization of production and marketing. As a result, the 'research for development' initiatives are almost designed to NOT reach the commercialization and impact stage by the time the funding under these projects ends. This calls for further support and connecting to an eco-system for scale up and funding (see Chapters 2 and 6).

Textbox 6 The other side of the coin—longer is not always better

Several Swiss key informants highlighted that small tickets and short-term exchanges among southern and Swiss students and researchers have lost out over the past few years. This results in a bias towards already existing institutional partnerships and gives very little room for new partnerships to form. They pointed towards the need to retain, in some SDC-funded programmes (read ETH4D or TECH4D) the possibility of funding small ticket, one time exchange programmes, which have the potential to develop into longer north-south research and development partnerships with significant development impacts.

92. The SDC reversed the trend of shorter time-horizons and smaller grant funding with the SOR4D and Transform programs. Both SOR4D and Transform offer big(ger) tickets to pre-established research partnerships than TECH4DEV and ETH4D—see Table 4.

Table 4 'Research for development' initiatives: time-horizon and budget for research projects

	R4D	TECH4DEV	ETH4D	SOR4D	Transform
Period	2012-23	2019-23	2019-24	2022-26	2020-30
Time-horizon	36-72 months	24 months	6 – 18 months	36 months + 12 months	48-60 months
Budget	CHF 100,000 to CHF 2,000,000*	CHF 300,000	CHF 20,000 to CHF 100,000	CHF 500,000 to CHF 1,000,000	CHF 4,000,000 to CHF 5,000,000

* Most R4D projects appear to have received either around CHF 500,000 or CHF 1,500,000 (with exceptions upward and downward).

93. Moreover, the SDC traditionally supports pre-defined research partnerships. This has been true in all programs, including TECH4DEV and ETH4D. This evaluation showed, however, that these research partnerships are seldomly complete: in the sense, that they include all individuals and organizations needed to implement the science-based innovations at scale in society. The evaluation also showed that most research-for-development projects face significant development challenges. Not all projects will be able to overcome these. The SDC therefore, in effect, places significant bets on the success of individual research-for-development projects. This offers room for a program which de-risks the investments.

94. The current landscape of SDC-supported 'research for development' initiatives offers the opportunity to establish, in addition, a more open, flexible, agile, lower-threshold, and multiphase channel of support for research challenges. A channel which:

- allows for slightly less upfront pre-defined ideas and research partnerships,
- takes a longer time-horizon to allow research to be translated in development,
- splits this time-horizon in phases and subsequent tranches of support, and
- makes any subsequent tranche of support dependent on the ever-increasing likelihood that the promoted innovation will be implemented at scale and attain development impact in the Global South.

95. TECH4DEV and ETH4D can fill this space. The SDC, TECH4DEV and ETH4D can create the opportunity to place smaller bets on development and only support and continue to support those research-for-development projects with the highest potential to generate development impact.

Finding: The current 'research for development' landscape offers room for (i) a more open, flexible, agile, lower-threshold, and multiphase channel of support for research projects; and (ii) small ticket support, including exchange and shorter research, with the potential to enable a professors/researchers/students to pursue a topic and/ or forge north-south research partnerships with development impact in the Global South.

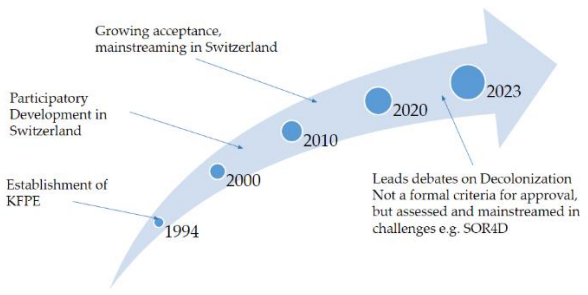
5.2. Adherence to the 11 KFPE principles

Introduction

96. The Commission for Research Partnerships with Developing Countries (KFPE) is a uniquely Swiss construct, with no parallel among government donor agencies anywhere in the world. The Commission was established in 1994. It promotes equitable, effective, and efficient research cooperation between Swiss and low- and middle-income country research institutions.

97. In the first decade of the 21st century, around 2004, the KFPE outlined 7 principles of equitable research partnerships with developing countries, highlighted the equitable sharing of funds, profits, and credits, and ensuring the impact of research at the community level. Right from the beginning, the two major official Swiss donors of international research and development programmes (SNSF and SDC) participated in the development, and promoted the principles, of KFPE. The KFPE principles evolved alongside the trajectory of development of Swiss-led and funded international development programmes (see Figure 8). Along the way, the seven principles were elaborated to 11 principles (see Textbox 7).

Figure 8 The KFPE timeline



Textbox 7 The 11 KFPE principles

1. Set the agenda together
2. Interact with stakeholders
3. Clarify responsibilities
4. Account to beneficiaries
5. Promote mutual learning
6. Enhance capacities
7. Share data and networks
8. Disseminate results
9. Pool profits and merits
10. Apply results
11. Secure outcomes

98. Subsequent SDC and SNCF 'research for development' programs mainstreamed the KFPE principles into their work. For example, NCCR N-S designed projects for communities where the research was based, so that research was not extractive and helped to solve immediate problems the communities faced. The R4D programme included KFPE principles in the sanctioning of programs. The more recent programmes, TRANSFORM and SOR4D, have mandated a trans-disciplinary approach, which calls for the co-creation of research proposals and active participation of southern partners in all phases of the 'research for development' project. SOR4D has included some conditions for ensuring equal partnerships, e.g., equal division of financial resources among the partners in Switzerland and the Global South. All in all, there is a growing acceptance, and mainstreaming, of the KFPE principles in 'research for development' projects in Switzerland.

99. Finally, the KFPE has led, in recent years, debates on the decolonization of research partnerships. These debates have generated positive feedback on the Swiss partnerships with developing countries, but also strong critique, which is highlighted later in this section.

Compliance

100. Having provided a brief overview of the growth and acceptance of KFPE principles in Switzerland, we now examine to what extent TECH4DEV and ETH4D have respected and responded to the KFPE principles. We discuss each principle or a group of principles in turn.

101. On Principle 1 'Set the agenda together', we observed in Chapter 2 that some of the research challenges have been set up based on a demand from the South, whilst others were brought forward by researchers in the North. Both were deemed relevant to the Global South, as they always emerged from people with deep exposure and commitment to the Global South. We concluded that idea generation for the research challenges could be agnostic to where the idea stems from. However, it is important to validate the idea, directly with the stakeholders in the South, and ensure that—at some point in the development journey—all actors relevant for implementation of pilot and scale up are mobilized and included.

102. We found research challenges with strong community consultations (e.g., container-based dry toilets, dwelling based public lighting, and prescreening of women on cervical cancer), as well challenges were this was not sufficiently done (e.g., rammed earth dwellings, emergency shelters and 3D-printing of assistive devices). Most research challenges have not yet fully gotten their head around who or which organizations will implement the innovations at scale. This suggests that, initiative-wide, the consultation of local communities and beneficiaries and the mobilization of implementation partners could be strengthened.

103. In terms of Principles 2 to 6, which all revolve around the collaboration with the research partners and direct stakeholders, research challenges have generally been in abidance. EPFL and ETH collaborated nicely with the researchers and practitioners in the Global South with good interaction, clear responsibilities, mutual learning, and enhancing capacities. Mutual learning is evidenced by postdocs, PhDs and master's students participating in the research challenges. Moreover, EPFL and ETH researchers received rave reviews from southern partners on collaboration, which was consistently evaluated as open and 'auf Augenhöhe'.

104. However, anomalies occur. The situation on the ground is never static. For example, in the prescreening on cervical cancer challenge, women vulnerable to cervical cancer responded well in the first round, but now the flow of women has reduced, necessitating further investment in awareness generation. This highlights the importance of continuous interaction, and the flexibility of repeating activities at the ground level, e.g., more awareness creation and facilitating participation of women in the program.

105. Similarly, institutional capacity building, in terms of creating long term capacities for research, could bear further improvement. A positive example stems from Columbia, 3D printing of assistive devices project, where the University of Los Andes has increased its capacity to research sustainable yarn for 3D printing. An example of where more effort is needed, is the prescreening of cervical cancer challenge, wherein the Dschang Hospital in Cameroun needs further training of its staff, so that the diagnosis can be done in country, rather than in Geneva.

106. The research challenges have by-and-large followed the data and networking principle (Principle 7). Under the 3D printing of assistive devices project, a data set of over 2,000 designs for assistive

devices for disabled people has been collated and put online as a free resource. Again, under the prescreening for cervical cancer project, Dschang Hospital staff need more training on and better access to Decision Support Tool; currently they wait 6-12 months per patient for the diagnosis to come from Geneva.

107. As for Principles 8 to 11, on the realization, dissemination and securing of the research results and the fair allocation of credits, it is too early to tell as none of the research challenges have completed the research and development cycle.

Reflections

108. The KFPE principles are guiding principles, including for TECH4DEV and ETH4D; they do not serve as criteria for selection or rejection of projects. Their application would be strengthened by ensuring that projects applications are profoundly assessed based on the KFPE principles. For instance, SNSF now mandates that every application for SOR4D program budgets at least 50% of the funds for partners in the Global South (up from the 40% in TECH4DEV and ETH4D), and that gender and trans-disciplinarity are mainstreamed into the proposals. Co-creation of the proposal with the partners in Global South, implementation and scale up planning, and expected impact at institutional and community level is mandated and assessed in the proposal applications. These lessons could be learnt and adopted from the SOR4D programme.

109. It bears reiterating, however, that Swiss funding programmes still do not allow for an institution from the Global South to be the lead applicant, possibly except for TRANSFORM. In all other cases, Swiss researchers need to be the lead applicant, which by design assigns greater power to Swiss institutions over those in the Global South. As put by the development geographer Pia Hollenbach *'money is still a very powerful argument'*, i.e., who has or transfers the money is in the lead and decides (Staubesand 2022).

Decolonizing research for development

110. Finally, the question arose whether the EPFL and ETH researchers are aware of issues and debates relating to decolonization. This is a deep question and needs reflection among both southern and Swiss research and development actors, as not only northern actors, but also southern ones, can have colonized minds. Further, colonial attitudes, or North-South biases are deeply embedded in organizational structures and processes, and social institutions. An example is the granting of Swiss aid for research partnerships, only with Swiss institutions as lead research partners. Another is the reduced duration of development programmes, which prioritizes research and development outcomes, and constrains investment in institution building in developing countries. The structuring of the latest iteration of research and development partnerships also favors already existing partnerships over new partnership formation. These shortcomings are not only those of TECH4DEV and ETH4D but apply across all North-South partnership funding programs of the SDC and SNSF, and need the highest consideration in these organizations if the goals of the KFPE principles are to be well respected.

Finding: Care should be taken to live the KFPE principles in the selection and implementation of the research challenges and that they are not done pro forma.

5.3. Internal coherence of ETH4D

111. For ETH4D, the research challenges—in all their variants[15]—are just one part of the equation. ETH4D also includes PhD scholarships, PhD student and faculty exchanges, a summer school, educational courses, and a master's program in development engineering at Ashesi University in Ghana. The reason for this comprehensive set of initiatives is that ETH4D wants to steer the university towards working for development and contributing to the 2030 Agenda for Sustainable Development. Besides the research challenges, the SDC also supports PhD scholarships, student and faculty exchanges, and the summer school.

112. As argued in Chapter 1, this evaluation focused on the research challenges and only touched the other elements of ETH4D lightly and the master's program in development engineering not at all. In the process, we made the following observations:

- The SDC sponsored scholarships encompass both solution-oriented and knowledge-generation focused research. The solution-oriented research is akin to the research challenges (for example, one PhD student is developing cheap ways to make new buildings in the Global South earthquake proof). The ETH spin-off, Oxara AG, evidences that such PhD work can result in successful, development-relevant, entrepreneurship.[16]
- The PhD student and faculty exchanges between ETH and southern academic institutions expose researchers from ETH and the Global South to different realities, expertise, capacities, and experience, and—importantly—to new research collaborations. It exposes ETH researchers to the realities and challenges of the Global South. It offers a breeding ground for future proposals for research funding by ETH4D. It also provides bridge support to a faculty or student, to continue working on a development issue in the global south, till (s)he finds a good path forward or the next round of funding.
- The summer school both exposes students to development questions and challenges and offers ETH faculty the opportunity to exchange with their counterparts at the KNUST University in Ghana. Whilst it offers a rich personal experience for students, the question is how development relevant the summer school is. Even if the students may come up with innovative ideas for resolving intractable development problems, there appears—generally speaking—little follow-up to turn these ideas into reality (if only because most students will simply continue their education and are not ready or driven to become entrepreneurs or development actors). As for the faculty exchange, see previous bullet.
- The educational courses sensitize researchers and students both about the general topic of sustainable development, as well as specific topics such as gender equality, social inclusion, and diversity. It contributes to the 2030 Agenda for Sustainable Development, in particular Sustainable Development Goal 4.7.[17]

113. These observations evidence that the different initiatives are complementary and cross-fertilize. Still, whilst the long-term development objective may be the same, some initiatives are closer aligned

[15] i.e., including the seed funds, research-to-action grants, and the upcoming pioneer fellowship program.
[16] The founder of Oxara AG, Dr. Gnanli Landrou, is a member of the ETH4D advisory board.
[17] SDG 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development; Target 4.7.1: Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment (IAEG-SDG 2017).

to ETH's primary mandate (education and research) and others to SDC's primary objective (fostering current development processes). From this perspective, it makes sense that the SDC gears its funding more to research challenges, solution-oriented Masters, PhD or post-doc scholarships and selected student/ faculty exchanges, whilst ETH spreads its resources more evenly among the different initiatives.

114. We also reflected on the issue of which educational initiatives bear being part of the ETH4D and TECH4D programmes (see Textbox 8 for a brief critical reflection on this).

Textbox 8 Research for development versus education for development

At SDC's behest and the evaluators' understanding of SDC's mission, this Review focused on the research challenges and the potential development impact of the innovations that these challenges bring about. The reason is that these research challenges and innovations are seen as the vehicle for linking to current development processes and generating development impact.

In a way, this is a short-sighted view. Several key informants pointed out that investing in education—in particular master and PhD scholarships—in the Global South will reap benefits in 10-15 years' time as a new echelon of researchers and PhD students emerge which can do on-the-ground, development relevant, and solution-oriented research in the Global South, from the perspective of the Global South, intrinsically taking into account both what is needed and what is possible. In other words, the seeds sown now, can flower later. At the end of the day, both investments are needed, relevant and worthwhile.

Teaching was also emphasized as an essential element in driving research and innovation. By exposing professors to different teaching environments, such as teaching in Ghana, new perspectives are brought to the table. This exposure and interaction with diverse students from across Africa can lead to a reevaluation of research approaches and foster innovative thinking. The integration of teaching and research creates a feedback loop where professors' teaching experiences influence their research focus and vice versa, resulting in a transformative impact on both fronts.

Moreover, the courses offered by NADEL/ ETH4D are very well attended by the students and especially students who want to study with a bit more of a Global Perspective. Small support (e.g. exchange visits, masters or PhD funding) with small pieces of work on development themes can help students develop and advance their interest in topics concerning development and southern contexts, which allows them to follow a different career path, and so has a transformative impact.

When the prime objective is educational, the offerings could be part and parcel of the offering of any university. To be considered for funding under these programmes, the initiatives would need to align with SDC's perspective and mandate and have development relevancy. This calls for development of clear criteria by which educational support would be considered for SDC funding under ETH4D and TECH4DEV and is discussed further under recommendations.

6 Lessons and recommendations

115. This final chapter draws the two main lessons from the evaluation and offers the evaluation's recommendations to the SDC, TECH4DEV and ETH4D.

6.1. Lessons learned

116. Two important lessons can be drawn from this evaluation.

1. The evaluation brought to the fore that science-based innovations face classical development challenges when seeking to introduce the innovations in society, at scale. These challenges pertain to (i) ownership[18], (ii) economic, commercial, social and/or political viability, and/or (iii) replicability. This means that it is not enough to support and conduct 'research for development', but that it entails a longer journey that may best be described as 'from research to development'.

   Over the last two decades, SDC's support to 'research for development' came with ever shorter time-horizons. The NCCR N-S program entailed support for two periods of six years each. The R4D program reduced this to three to six years. TECH4DEV and ETH4D had even shorter time-horizons of 24 months and 6 to 24 months respectively. The recent programs SOR4D and Transform appear to reverse the trend with support programs of three (plus one) years and four-to-six years respectively. Both SOR4D and Transform, however, involve single-tranche support entailing relatively big bets on large, pre-selected, research initiatives.

   TECH4DEV and ETH4D offer the opportunity to create a more open, flexible, agile, lower-threshold, and multi-phase support system which come with smaller bets on development. It can open up and lower the entry barrier by focusing the selection on 'the quality of the idea' and 'the drive of its promoters' rather than a pre-set constellation of the research partnership. It can become more flexible and agile by starting with smallish support tickets[19], but subsequently offering multiple rounds of additional research and development support if the promoters can make it ever more credible that their innovation is likely to generate development impact.

   By offering smallish tickets and by ascertaining whether the innovations are on track to attain development impact before extending subsequent rounds of support, one can lower the risks of sticking out too long with research initiatives which, at the end of day, are unlikely to fly and generate impact in the Global South. In other words, we see room for creating a multi-phase support channel which builds on the flexibility of TECH4DEV and ETH4D but with the time-horizon of Transform.

2. This evaluation focused on research and innovation challenges, with a light touch assessment of the educational initiatives, which are more prominent in ETH4D. The educational initiatives in ETH4D aim to mainstream a development orientation in the teaching of technology at ETH, and to promote South-North partnerships that will focus attention to problems faced in the global south. These initiatives include funding of student and faculty exchange visits, Masters, PhD, and post-doc programs. ETH4D also facilitates the networking and fundraising of its member

[18] Again, this also includes the 'drive' and 'incentive' to implement the innovation at scale

[19] Again, we are wary to put a Swiss Franc figure and a time-horizon to it as both should be idea-dependent. When push comes to shove, however, we would expect the first tranche of support to lie anywhere between CHF 50,000 and CHF 200,000 for a time-period of 6 months to 24 months. This initial tranche may however be followed up with two to three additional rounds of support, which can entail both financial support, technical advisory, and/or linkages with other support programs within the entrepreneurship ecosystem or international development cooperation.

professorships to be able to continue south focused research and develop and maintain relationships with southern institutional partners. This is highly valuable in the current context, when such small ticket, short term and flexible funding is not available in Switzerland.

117. The subsequent recommendations are built on these lessons and insights.

6.2. Recommendations

118. The evaluation recommends:

1. **For the SDC, to continue its support to TECH4DEV and ETH4D with a continued focus on research challenges and solution-oriented PhD scholarships.**

   The research challenges and the solution-oriented PhD research at TECH4DEV and ETH4D have the potential to generate or contribute to development impact. EPFL and ETH have strong linkages to the Global South and the expertise, capacity, and interest to address, with their partners, challenges faced by the Global South. It would be a shame not to mobilize this and seize the opportunities for development that this provides. For the SDC, supporting current development processes in the Global South is its raison d'être. TECH4DEV's and ETH4D's research challenges and PhD scholarships are the vehicle to achieve this in the short-to-medium term. The evaluation reckons that research challenges and solution-oriented PhD scholarships have an equal chance of generating development impact.

2. **For the SDC, TECH4DEV and ETH4D, to extend their (time) horizon and continue to support the most promising science-based innovations to overcome the development challenges inherent in introducing these innovations in society at scale, by introducing an agile and competitive sequence of support to guide the innovations 'from research to development'.**

   In implementing science-based innovations in society, research partnerships face classical development challenging pertaining to (i) ownership/drive, (ii) economic, commercial, social and/or political viability, and/or (iii) replicability. The present 'research for development' models are not geared to helping the research partnerships overcome these challenges. Moreover, they entail relatively big bets on the success of individual research projects.

   The SDC, TECH4DEV and ETH4D can support the research partnerships in trying to overcome the development challenges by offering financial support, technical advisory or linking the research partnerships to existing expertise and support programs in the entrepreneurship ecosystems of EPFL and ETH or (Swiss) international development cooperation (including better collaboration on substance with SDC headquarters, global programs, and country offices).

   Moreover, they can de-risk the investment by extending the support in tranches, making subsequent tranches of support dependent on whether the research partnerships can increasingly evidence that they are likely to implement the promoted innovation in society at scale and generate development impact. We explicitly point in this regard to the lessons and ideas brought forward in sections 6.1, 5.1, 2.12 and 2.13. A graphical summary is offered by Figure 4 in Section 2.12.

   Finally, TECH4DEV and ETH4D should of course only extend further support if it can add value and there are no other programs better placed to offer such support. TECH4DEV and ETH4D best support may indeed be to link research partnerships to existing programs and expertise in the Swiss or international entrepreneurship ecosystem of Swiss development cooperation (something which TECH4DEV and ETH4D already do to a considerable extent).

3. **For TECH4DEV and ETH4D, to spend more attention, early in the support, on:**
   - the individuals/drivers who will bring the innovations to society/the market,
   - the existing, state of the art, solutions in the Global South, and the value-added the proposed science-based innovations have to these existing solutions (if any),
   - exploring possibilities to create south-south-north collaborations, binding the providers of the existing, state of the art, solutions and see how to improve on them,
   - the need and opportunities to build in a gender-differentiated perspective in the design and implementation of the science-based innovations,
   - the opportunities to include research duo-ships of postdocs and/or PhD fellows with one postdoc/PhD emanating from EPFL/ETH and one from the Global South, and
   - the adherence—in words and deeds—of the KFPE principles in the research challenges and have a balanced North-South representation in its advisory committees.

   The research challenges in TECH4DEV and ETH4D are selected based on a relatively 'light' selection process. The evaluation found that the research challenges had not always thought through key criteria for success (e.g., having an individual/organization on board with the drive to implement the envisaged innovation in society at scale, or the actual value-added of the proposed technology to existing/state-of-the-art solutions in society) or opportunities to make an even bigger difference (e.g., by taking into account gender-differentiated perspectives on the problem and the solution requirements, or simultaneously and mutually building capacities of and relations between researchers of the North and South).

   Similarly, more attention could be given to the adherence to the KFPE principles to ensure that they are respected in the research ideation, proposal and—importantly—in practice. With the recommendation to build a multi-tranche support channel encompassing the whole cycle from research to development, it makes sense to give these requirements and opportunities greater attention early in the support process to embed them in the research challenges.

4. **For ETH4D to continue investing in faculty exchange and (short- and long-term) PhD/master programs and to develop a convincing (evidence-based) narrative on how this contributes to long-term development impact and merits financial support from the SDC.**

   Faculty exchange leads to new insights and collaborations, a building block for future collaborative South-North research (challenges). PhD fellowships and full-fledged master programs build a new echelon of researchers who can support long-term research partnerships between ETH and southern research institutions. Small ticket support to PhD/master students allows them to explore new/additional research and career pathways. All can sow the seeds of future 'research for development' and ideally help forge new partnerships to work 'from research to development'.

5. **For TECH4DEV to transform its NGO Council into a semi-annual platform of exchange between the EPFL labs and the international NGOs from the Geneva-Lausanne conurbation.**

   TECH4DEV effectively works with international NGOs from the Geneva-Lausanne conurbation: they are a source of ideas and offer a (potential) vehicle for implementation. The instituted NGO Council brings little value-added. Important for the NGOs is to have an opportunity to individually meet and exchange with the EPFL labs. From this, research ideas and collaborations can sprout. Both the NGOs and the research labs can bring in their partners as they seem fit. It therefore makes sense to transform the NGO council into a semi-annual platform for exchange.

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Appendices

A Brief introduction of the reviewed research challenges

TECH4DEV

3D printing for assistive devices, Colombia

Colombia has suffered from armed violence for over 50 years. It is also the second most mined country in the world, resulting in, if not death, severe injuries, and long-term disabilities. Disability equipment and assistive technologies are scarce and expensive. This project aimed to create affordable and sustainable 3D-printed assistive devices for disabled people in Colombia using plastics and natural fibers, including from recycled waste. The research partnerships included EPFL's Laboratory for Processing of Advanced Composites, the University of Los Andes, OMNIS Institute (an iNGO) and the Fundacion Todos Podemos Ayudar (a local social NGO).

Prescreening of cervical cancer, Cameroun

Each year, around 266,000 women die of cervical cancer globally and this number is projected to reach 416,000 by 2035. More than 85% of these deaths occur in low- and medium-income countries where the availability of trained healthcare providers and access to expensive screening devices are limited. The project aimed to implement a smartphone- and artificial-intelligence-based solution that automatically detects cervical cancer from videos of the cervix collected during a 'visual inspection of the cervix with acetic acid' (VIA). The visual inspection of the cervix with acetic acid is a well-established technique for cervical cancer screening in low- and medium-income countries, but it is subjective, and its accuracy is limited. The research would offer a low-cost solution for cervical cancer prescreening by combining smartphone imaging with artificial-intelligence-based diagnosis. The research partnerships consisted of EPFL's Signal Processing Laboratory, the Department of Gynecology and Obstetrics of the University of Geneva, and Dschang University Cameroon.

Mobile emergency shelters, South Sudan

Some communities in South Sudan are recurrently affected by seasonal flooding. Each time, they need to flee to higher grounds, lose their housing, and need to be provided emergency shelters (which are discarded as soon as the refugees return to their homeland). The humanitarian aid agency Medair wondered if these communities could not be offered more sustainable solutions, by developing a mobile construct which could serve as the roof of people's traditional dwellings and as emergency shelter in the refugee camps. The research aimed to develop such 'resilient and mobile shelters' through a computational design, based on the traditional dwellings in the affected communities and locally available construction materials. The research partnership consisted of EPFL's Structural Exploration Lab, Medair East Africa (an iNGO), the University of Juba in South Sudan.

ETH4D

Container-based dry toilets, Guatemala

Mrs. Mona Mijthab observed that in many developing countries modern wastewater facilities—from water-based toilets to wastewater plants—were either not available or not functioning for vast populations. She subsequently developed a container-based dry toilet to capture and recycle human excrement. To close the loop between human consumption and production of food, she needed to find a way to make the human faeces derived biochar into an effective fertilizer. The research partnership with ETH aimed to enrich the biochar with different blends of source-separated urine and organic composts to identify and produce an effective organic fertilizer. The research partnership consisted of

ETH's Institute of Agricultural Sciences, Mrs. Mona Mijthab's NGO Mosan, and the local NGO Vivamos Mejor.

Rammed earth dwellings, Morocco

The project initiators observed a need in Morocco for affordable housing solutions and more sustainable construction practices using earth-based materials rather than concrete and timber. The research aimed to develop traditional dwellings using customized earth blocks made with a block press. By merging technology with locally available materials, infrastructure, and fabrication methods, the research aimed to create low-cost dwellings that are robust and eco-friendly. The use of compressed earth bricks, 3D-printed molds, and linseed oil as a binding agent are some of the technology solutions offered by the project. The research partnership included ETH's Department of Mechanical and Process Engineering, Gianni Botsford Architects (UK), Ove Arup & Partners (UK), and Cooperative Belarej and Argilex Sarl (Cooperatives, Morocco).

Dwelling-based public street lighting, South Africa

Many informal settlements in South Africa still have the 'high masts' for public lighting from the days of Apartheid. The project introduced solar lighting affixed to the front façade of informal dwellings in the PJS Settlement as a cheap and effective alternative public lighting solution. This should improve public lighting, thereby promoting safety (especially for women), nighttime activities, and a reduction in (petty) crime. The research assessed the impact of these dwelling-based public street lighting on night-time activities, safety, and crime levels. Additionally, the project is working with Majru Investments and the City of Cape Town to explore ways to introduce solar public lighting to other informal settlements, addressing the broader social challenge of inadequate lighting in similar communities. The project is also collaborating with the leadership committee and residents of the pilot informal settlement to develop a fault reporting and maintenance system for the solar public lights. The research partnership consisted of ETH's Nadel, Centre for Architecture and Urban Design, and the Department of Humanities, Social and Political Sciences, as well as the Social Justice Coalition, City of Cape Town, Majru Investments, and PJS Leadership Committee in South Africa.

Logistical health emergency response system, Uganda

Uganda's emergency healthcare supply chains are weak, specifically related to the distribution of medical supplies and life-saving materials during infectious disease outbreaks. The project sought to improve the preparedness and responsiveness of the distributed medical supply chain to effectively respond to public health emergencies such as epidemics. The project focused on addressing the question of preparedness for infectious disease outbreaks by setting up and operating a distributed medical supply chain that can respond effectively to public health emergencies. The aim was to identify and implement improvements in the logistics system to ensure timely response, reduce infection rates, and maximize the return on investment in pre-positioned (stockpiled) materials. The research partnership included ETH's Humanitarian Supply Chain Management Lab and the Uganda Ministry of Health.

B Succinct answers to the main evaluation questions

Main lines of inquiry / overarching evaluation questions of the SDC, TECH4DEV and ETH4D

What has (not yet) been achieved and why? An assessment of the results so far.
The research challenges of TECH4DEV and ETH4D have not yet attained development impact. On the one hand, this is logical as both the initiatives are young, and the challenges have only run for max. 2 years. On the other hand, TECH4DEV and ETH4D are not designed to really give the research challenges the opportunity to progress into their development impact journey (up to 'the point of no return'). There lacks a coherent sequence of funding, assistance, and networking to promising science-based innovations (although ETH4D now intends to give at least some research challenges follow-up support through the envisaged Pioneer Fellowship program). This is an important observation as all research challenges face classical development challenges in introducing the innovations at scale in society.

What can the SDC realistically expect from these initiatives?
SDC can expect that TECH4DEV and ETH4D contribute to science-based innovations that when applied can positively affect hundreds of thousands (if not millions) of people. However, only few innovations will reach this point. This makes it necessary to have a selection process—a funnel—which weeds out the nice to have from the ones which will really generate development impact. It requires both TECH4DEV and ETH4D to steer more on development impact.

Is social-entrepreneurship the best route to implement science-based innovations?
As articulated in Textbox 2, there are basically two proto routes for attaining development impact through science-based innovations, namely (social) entrepreneurship and development initiatives (with the latter pertaining to public/government funded, iNGO, and international development/humanitarian aid organization interventions). The route is determined by the characteristics of the innovation and the possibilities and opportunities seen and created by the driver behind the innovation and its implementation at scale. It is important to envisage the impact route early on the process, even if this may need review later.

What strategic opportunities exist, making use of the uniqueness of the two initiatives?
The SDC supports multiple 'research-for-development' programs. As explained below in the lessons-section, TECH4DEV and ETH4D offer the opportunity to complement the existing initiatives with a more open, agile, multi-phase support system which come with smaller bets on development than the SOR4D and Transform programs. Given the paucity of initiatives in Switzerland that offer exchange visits and engage post-docs/PhDs/master students in S-N research projects, the TECH4DEV and ETH4D offer a good opportunity to provide short term support in the long trajectory of a researchers/student's career (from the south or north), to explore and deepen their interests, and advance their careers, in sustainable development.

How to effectively involve researchers and practitioners from the Global South? How best to facilitate network and working relations between researchers and practitioners?
EPFL and ETH possess extensive networks with researchers in the Global South. ETH4D, through its faculty exchanges and joint educational work, effectively extends this network. The research challenges generate effective research partnerships. These research partnerships are focused on doing research and bringing innovation about. This part works. Whilst the research partnerships mostly include practitioners, they often fail to find the person(s) or organization with the drive, capacity, resources, and/or tenacity to bring the innovation to society and implement it at scale.

At the same time, the latter cannot be forced. There is no recipe for identifying and mobilizing drivers of change. In a way, someone simply needs to step to plate and hit the ball. Having said that, it is a sine qua non for success. The research challenges therefore have to spend time and brainpower on it and extend support whenever the 'seeds of drive' are located and ensure that the baton is passed, in a timely manner, from the research innovators to the implementors who will create development impact. And if these seeds do not blossom and no one steps to the proverbial plate, then TECH4DEV and ETH4D should be prepared to pull the plug from future support and concentrate on the innovations with the people who can introduce the innovation in society at scale.

What are the strength and weaknesses of the Initiatives?
The strength of TECH4DEV and ETH4D is that it brings together researchers and practitioners from EPFL, ETH and the Global South together and, through their collaboration, leads to innovations which have the potential to address relevant development challenges in the Global South. Their weakness is that they are singularly focused on the research and pay too little attention to the development challenges inherent in bringing innovation to society and implementing them at scale.

How can the initiatives be strengthened?
The initiatives can be strengthened by expanding their horizon and complement the current (mainly) financial support to subsequent rounds of support entailing financial support, technical advisory, and linking with existing entrepreneurship and development cooperation programs. To ensure that this extended support system remains cost-effective, additional support should only be extended to the most promising and convincing science-based innovations, i.e., the ones with the most potential to generate development impact.

How can SDC better support the initiatives?
The SDC can better support TECH4DEV and ETH4D by better linking research partnerships to expertise, experience, capacities and programs within SDC and within its network of development partners, which can help these research partnerships overcome the development challenges inherent in introducing the innovation in society and implementing the innovations at scale. This support should not become proforma but concentrate on the research and development challenges where the SDC (or its partners) can make a difference.

On effectiveness and impact

To what extent have the initiatives reached the objectives at outcome (and impact) level and are the set objectives and targets realistic? Who and how many did benefit/might benefit from developed technologies?
The objective to contribute to the implementation of science-based technologies at scale in the Global South is highly ambitious, but appropriate given SDC's mandate. TECH4DEV and ETH4D are too young to have been able to achieve this as of now. The research challenges carry the potential but face classical development challenges. The support to research should ideally be followed by support in the 'development' process.

Are the new technologies integrated in a local system and financially viable? Linkages to country/local systems: How well are the supported initiatives linked to country/local systems?
Most research challenges are weakly embedded in local country systems and raise questions both about who will drive the innovation forward and introduce it in the market/society, and whether the innovations will—at the end of the day—be financially viable.

Are the chosen approaches (grant mechanisms/ education and teaching/ partnership models/ etc.) of the initiatives suitable to reaching the stated objectives?
Grant funding and inclusive partnership models are necessary, but not sufficient conditions for success. The research/innovations also require drivers with skin-in-the-game who will give their all to proof the technical, social, political, and financial viability of the innovation and introduce it in the market/society.

How effective was the collaboration between the SDC and ETH/EPFL?
The SDC is considered a valuable counterpart and advisory board member, offering thoughtful, constructive, and critical feedback on TECH4DEV and ETH4D, as well as individual research challenges. However, SDC's expertise, experience, and capacity is not used to help overcome some of the development challenges faced by the research challenges.

What are the motivation and vision of the researchers at the ETH/EPFL with regards to impactful research and teaching and why do they participate/contribute to the initiatives?
The EPFL/ETH researchers want to contribute to society. The research also serves their academic responsibilities of generating new knowledge and publishing about it.

What are some of the fostering and hindering factors for a) use/implementation of research results; and for b) the upscaling of approaches/technologies resulting from EPFL's/ETH's and their partners' research in the Global South?
As noted above, key is that the innovations are technically, socially, politically, and financially viable, and that there are driven individuals with skin-in-the-game who will give their all to introduce the innovation at scale in the market/society.

Were the duration and amount of the grants adequate to reach the objectives?
No. The research is just one part of a longer development trajectory.

What has been the role of the local non-academic partners (NGO, local government, etc.) and the local academic partners in the research partnerships/education partnerships?
The local non-academic partners have been key to develop and test the innovation on-the-ground in real-world settings. In part, they have also been key to driving the innovations (and the potential for development impact) forward. The local academic partners offer both knowledge of the realities on the ground and much needed and appreciated research capacity.

Is the NGO Council composed of the adequate organizations to credibly identify the demand for impactful research from the Global South? What is the interest/motivation of the NGO Council members in being part of the initiative? What has been their role?
NGO Council members have proven that they are able to come up with credible proposals for innovation. For this, you do however not need a formal Council. The Council members are first-and-foremost interested in connecting to the EPFL labs to identify opportunities for collaboration.

Did NGOs implement developed technologies?
Not yet.

Gender equality and diversity

To what extent and how did the two initiatives support and foster women, and respond to their needs (end beneficiaries, researchers in CH and Global South)? To what extent are the technological solutions gender responsive?
Some research challenges address problems faced by women or which affect them more, potentially offering women access to new technologies which will ameliorate these problems. Most research challenges did not take a gender-differentiated perspective on the problem and /or solution. The research challenges include many women researchers. The Review did not investigate the extent to which TECH4DEV and ETH4D responded to the individual researchers' needs. The Review did find that, generally speaking, the research challenges matched the interests of the researchers. This position was voiced by women and male researchers. TECH4DEV and ETH4D took care to promote gender balance in its summer schools.

What are the fostering and hindering factors for reducing the gender diversity gaps (in academia, at beneficiaries level, etc.)?
The Review did not dive into this question.

Relevance

What is the strategic relevance and institutional standing of the Tech4Dev within the EPFL and the ETH4D within the ETH? Are the initiatives coherent with the EPFL's and the ETH's strategies?
TECH4DEV and ETH4D have a high institutional standing and fit EPFL's and ETH's strategic orientation to serve society and work on development challenges.

To what extent have the two initiatives managed to establish sustainable structures, networks, or partnerships?
Both TECH4DEV and ETH4D, as well as the research groups of EPFL and ETH, appear to have extensive and enduring networks which are both needed and useful for the institutions' education and research work. Neither TECH4DEV and ETH4D are, at present, institutionalized and as such posses a sustainable structure. TECH4DEV is run from and at the pleasure of the Office of the Vice-President. ETH4D is a time-bound project. Going forward, TECH4DEV is to continue to operate from the Office of the Vice-President. The current vice-president fully embraces and promotes the initiative. ETH4D is in discussion with the Office of the President and ETH research groups to institutionalize the initiative as a formally recognized education and research center within ETH.

Are the initiatives coherent with Switzerland's International Cooperation Strategies 2021-24, and with the Swiss Research Concept for the Policy Sector on Development and Cooperation 2021-2024?
TECH4DEV and ETH4D are fully aligned with both the Swiss International Cooperation Strategy 2021-24 and the Policy Sector Development and Cooperation Research Concept 2021–24.

Coherence

To what extent are the two initiatives unique or complementary to comparable initiatives in Switzerland?
TECH4DEV and ETH4D are at once unique and complementary to comparable research for development programs in Switzerland as they harness the unique expertise, experience, and capacity of EPFL and ETH. ETH4D also adds an important education and capacity building component to the otherwise research focused initiatives. At the same time, the TECH4DEV and ETH4D research challenges are similar in set up and goal as previously R4D and now SOR4D. They have however the opportunity to distinguish themselves from the pack by offering more flexible, agile, and longer-term support to address both the research and development challenges inherent in 'research-for-development'.

To what extent, how and with what results did EPFL and ETH exchange and collaborate? To what extent are there synergies and overlaps between the ETH4D at ETH and the Tech4Dev & Essential Tech at EPFL (incl. the ETH/EPFL/ICRC co-implemented initiative Engineering for Humanitarian Action), and the Geneva Technical Hub (UNHCR)?
EPFL and ETH/ETH4D jointly implement the collaboration with the ICRC 'Engineering for Humanitarian Action', which copies the TECH4DEV and ETH4D model and applies it to humanitarian aid. As noted, in Section 1.3, the SDC and the evaluation team decided not to include the ICRC collaboration in this Review. Other than that, the evaluation encountered few instances where EPFL and ETH (or the Geneva Tech Hub) collaborated. They mostly focus on implementing their own initiative. At the same time, we did not come across overlaps or duplications.

How do the Initiatives complement already existing initiatives at the EPFL and at the ETH? To what extend do the initiatives use synergies with other initiatives and organizational units within ETH/EPFL?
ETH4D occupies a unique place within ETH, which has no similar type of initiatives or centers. TECH4DEV complements EPFL's Essential Tech which is located earlier in the research to development cycle, translating basic research to possible applications. These can then be picked up through TECH4DEV as has for example been the case in the prescreening of women on cervical cancer research challenge.

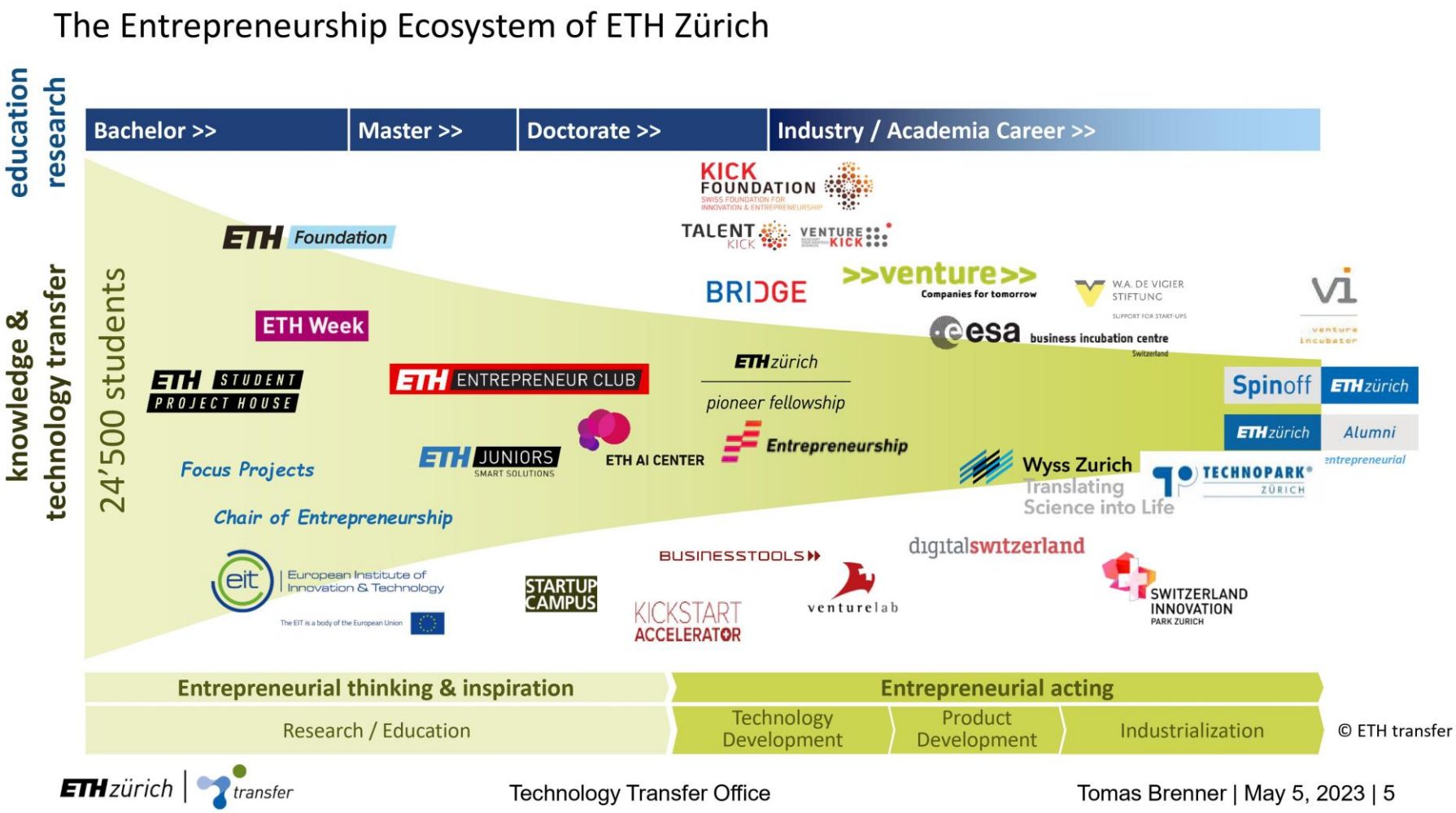
C SDC Assessment Grid on the OECD/DAC Evaluation Criteria

Key aspects based on DAC criteria	Score	Justification
Relevance		
1. The extent to which the objectives of the intervention respond to the needs and priorities of the target group.	Highly satisfactory	TECH4DEV and ETH4D in general and the research challenges specifically target development challenges which are real and relevant for people, communities, and organizations in the Global South.
2. The extent to which the objectives of the intervention respond to the needs and priorities of indirectly affected stakeholders (not included in target group, e.g. government, civil society, etc.) in the country of the intervention.	Highly satisfactory	Same as above
3. The extent to which core design elements of the intervention (such as the theory of change, structure of the project components, choice of services and intervention partners) adequately reflect the needs and priorities of the target group.	Unsatisfactory (albeit with significant upward potential)	The research challenges cover only one, and an insufficient, part of the 'from research to development' pathway. Moreover, the research partnerships mostly do not include the people and organizations with the incentive, drive, capacity, and tenacity to bring the innovations to the market/society and implement them at scale.
Coherence		
4. Internal coherence: the extent to which the intervention is compatible with other interventions of Swiss development cooperation in the same country and thematic field (consistency, complementarity, and synergies).	Highly satisfactory	TECH4DEV and ETH4D are consistent with and complementary to the 'research for development' programs sponsored by the SDC and SNSF. Complementarity can be enhanced by instituting a more open, agile, selective, multi-tranche channel of support extending the support 'from research to development'.
5. External coherence: the extent to which the intervention is compatible with interventions of other actors in the country and thematic field (complementarity and synergies).	Highly satisfactory	Same as above
Effectiveness		
6. The extent to which approaches/strategies during implementation are adequate to achieve the intended results.	Unsatisfactory (albeit with significant upward potential)	Same as row three
7. The extent to which the intervention achieved or is expected to achieve its intended objectives (outputs and outcomes).	Unsatisfactory (albeit with significant upward potential)	This criterion is rated unsatisfactory, but with the explicit comment that TECH4DEV and ETH4D have the potential to be highly satisfactory. None of the research challenges have (yet) achieved development impact. They nonetheless carry the potential. The current setup of TECH4DEV and ETH4D do not offer sufficient reason to expect that the research challenges

		will attain development impact. Therefore, the rating 'unsatisfactory'. All research challenges face classical development challenges. TECH4DEV and ETH4D do not have the resources and processes to continue supporting the research challenges to overcome these development challenges. If TECH4DEV and ETH4D adopt a more open, agile, selective, multi-tranche channel of support, extending the support 'from research to development', then TECH4DEV and ETH4D can significantly boost the chances of success and a rating of highly satisfactory would in the offing.
8. The extent to which the intervention achieved or is expected to achieve its intended results related to transversal themes.	Unsatisfactory (albeit with significant upward potential)	The rating on this criterion is limited to the mainstreaming of gender quality. TECH4DEV and ETH4D score well on female leadership and participation in research challenges and summer schools. Some research challenges address problems faced (in particular) by women. Critically, however, most research challenges did not take a gender-differentiated perspective in their problem analysis and the solution design. Most research challenges are restricted to providing improved access to innovations; few target enhancing women's voice/agency or changing society's 'rules of the game'. A more active and purposeful approach to gender equality is warranted.
Efficiency		
9. The extent to which the intervention delivers the results (outputs, outcomes) cost-effectively.	Satisfactory	From SDC's perspective, TECH4DEV and ETH4D correctly spend most funds on research challenges. The research challenges draw the maximum amount of money; yet must draw more to complete their transition 'from research to development'. Higher efficiency would call for examining the development challenges and investing more in those research challenges that hold greater promise for completion of the impact pathway
10. The extent to which the intervention delivers the results (outputs, outcome) in a timely manner (within the intended timeframe or reasonably adjusted timeframe).	n/a	The timeframe of the research challenges (6 to 24 months) was unrealistic to expect development results to have occurred. The research challenges need to be embedded in a longer time-horizon and support frame.
11. The extent to which management, monitoring and steering mechanisms support efficient implementation.	Satisfactory	There are currently serious limits to how much TECH4DEV and ETH4D can steer on development. These limits stem from the design of the initiatives which, for most part, envisage one-off support to the research challenges and the culture of the institutions which grant significant academic freedom to the researchers. Within these constraints, the initiatives appear to be managed well. Efficiency gains can be achieved by adopting a more open, agile, selective, multi-tranche channel of support,

		extending the support 'from research to development', albeit under a competitive regime.
Impact		
12. The extent to which the intervention generated or is expected to generate 'higher-level effects' as defined in the design document of the intervention.	Unsatisfactory (albeit with significant upward potential)	Same as under effectiveness
Sustainability		
13. The extent to which partners are capable and motivated (technical capacity, ownership) to continue activities contributing to achieving the outcomes.	Satisfactory	There is significant buy-in into TECH4DEV and ETH4D, institutionally and from leading persons in both institutions. The only reason for not rating this criterion highly satisfactory is that neither initiative is structurally embedded in the institution. TECH4DEV operates at the behest of the Vice-President of Innovation. ETH4D is a project without formal status. ETH4D and ETH are in discussion to upgrade ETH4D into an formal article 61 research and education center.
14. The extent to which partners have the financial resources to continue activities contributing to achieving the outcomes.	Satisfactory	EPFL and ETH may have the funds to provide both core (administrative) funding and operational budget. There are however limits to what extent the institutions can spend financial resources/operational budget in the Global South. One level down, at the level of research challenges, most face financial and/or ownership challenges, to bring the innovations forward and implement them at scale. These are normal constraints for academic institutions. 'Research for development' relies, by default, on federal/SDC funding. The criterion is therefore still rated satisfactory.
15. The extent to which contextual factors (e.g. legislation, politics, economic situation, social demands) is conducive to continuing activities leading to outcomes.	Satisfactory	Swiss international development cooperation embraces the 'research for development' agenda. The conduciveness of the political economy at the level of research challenges is case-specific and dependent. Most research challenges can however do more to embed the challenges in a qualified demand of support from local (reform) actors.

D The Entrepreneurship ecosystem of ETH Zürich



E Selection criteria TECH4DEV for the research challenges

On SDC's request, we list here the selection criteria in TECH4DEV for the research challenges. (Source: Project document, Annex 1, 2019)

Selection and Eligibility Criteria of Projects

1. Eligibility criteria

- Inclusion of scientific or implementing partner from the global south
- Implementing partner has to contribute to the budget (in-kind and/or cash
- 40%o of the total budget has to be disbursed in the global south

2. **Selection criteria**

Innovativeness

- Pertinence of technology innovation in addressing the needs in the global south
- Assessment of the maturity of the technology
- Competitiveness vis-à-vis to existing solutions on the ground

Social and environmental impact

- Social and/or environmental relevance of the considered need in the project
- Potential to create social and environmental impact on the long term in the global south
- Strength of the EPFL-NGO fit in addressing a common need in the global south
- Ensuring that the global South beneficiaries' needs are met by EPFL research

Implementation and scaling

- Transferability potential of EPFL technology towards application in practice
- Implementation and testing in the global south
- Potential for scalability of the project after implementation
- Financial sustainability of the project (e.g., other funding options after the 2-year grant)

Budget

- Validity of proposed use of the budget with clear break downs
- Balanced budget allocation to different stakeholders, including EPFL researchers, global South partners or entities

Team

- Team's ability to realize the project
- Team composition (multidisciplinary, diversity, gender-balanced, etc.)
- Team dynamics and cooperation between researchers and global south partners, following the KFPE principles

Ethical issues & open access

- Assessment of team's abilities to deal with ethical issues (if applicable)
- Ensuring open source and open access of the specific technology to other global South partners

F Selection criteria ETH4D for the research challenges

On SDC's request we list here the selection criteria in TECH4DEV for the research challenges. (Source: Project document, Annex 3, 2019)

Research challenges criteria

Background

The objective of ETH for Development (ETH4D) is to develop innovative solutions that effectively address the challenges of the global population and to educate the future leaders of sustainable development, who will work towards decreasing global poverty and inequality, as well as protecting our planet.

The goal of the ETH4D Research Challenges is to support project-based research between ETH Zurich researchers, practitioners (i.e. from the private sector, NGOs, governmental organizations) and partners from the global South to identify effective solutions to poverty reduction. Promising solutions include innovations in technologies, policies and a profound understanding of human behavior.

Definition of ETH4D Research Challenges

An ETH4D Research Challenge needs to be a clearly defined research question that has the objective of creating a positive impact for the Global South. It must be a research question related to (a) the research interests of an ETH Zurich research group or (b) the current or future work of a private or public organization.

The objective of ETH4D Research Challenges must be the development, testing or implementation of an innovative product, policy or service-involving a technology (as part of the solution or part of the research) that responds to a specific development challenge.

The challenges addressed must be relevant for poor people in low- and lower-middle income countries.

Examples include:

- remote sensing for micro-insurance products based on weather risks
- a mobile-phone application for identification in low governance setting
- policies to support the use of solar energy
- a system for recycling plastic bottles in low-income settings
- a mobile-phone application to improve governance of public infrastructure
- low energy refrigeration
- medical equipment that can be used without access to electricity
- 3D printing for the physically disabled in low-income settings
- a mobile-phone decision support tool for optimal agronomic practices
- information and education programmes for energy literacy and public health

Eligibility

A team of academic and non-academic institutions from Switzerland and low- or lower middle- income countries can formulate an ETH4D challenge.

The team must consist of at least one ETH4D member as main applicant and at least one non-acdemic partner (such as industry, a NGO or a policy organization). An ETH4D member is a professor of ETH Zurich and includes his/her group members. Eligible to submit a proposal are therefore also doctoral students, postdoctoral researchers and senior scientists. If the main applicant is not a professor, the

proposal must be accompanied by a letter of commitment by the host professor, indicating his/her contribution to the project in cash or kind. ETH Zurich research groups, which are not yet a member of ETH4D, can also apply and will become a member if they are awarded an ETH4D Research Challenge Grant (ETH4D RCG).

At least one partner (academic or non-academic) must be from a low- or lower middle-income country, as defined by the OECD DAC list in A. 3. 2. A limited amount of funding can be used for research in upper middle-income countries, if a justification is provided.

Funding

Projects must last between 6-18 months. This includes potential iterations of prototyping and user testing, as well as informing key stakeholders of the findings.

The funding level of an ETH4D RCG is at minimum of 10 kCHF, and at maximum 100 kCHF. A total of 200 kCHF per year is available for ETH4D RCGs.

Funding from an ETH4D RCG can be used for travel, materials and services and for research costs incurred by partners in low-or lower middle- income countries. Funding from the ETH4D RCG cannot be used to pay the salary of participating ETH member (professors, postdocs, doctoral students, students assistants) or industry or policy partners in Switzerland.

The partners (academic and non-academic combined) must contribute at least 80% of the requested ETH4D RCG in cash. Cash contributions can come from third-party funding (from industry, public organizations, NGOs etc.), professorship reserves or base funding. The wages of student assistants at ETH Zurich hired specifically for the ETH4D Research Challenge can be part of the cash contribution.

Submission Procedure and Deadlines

Proposal submissions are possible twice a year. Application deadlines are February 28th and September 30th. Applications must be written in English and must be submitted electronically (in one single PDF file) to [ETH4D]. They must include the following elements, in the following order:

- Application form (using the template in Appendix A. 3. 2), containing:
  - Cover sheet
  - Abstract
  - 3-4 page research narrative, including background and motivation, the research plan and expected results and strategy for their implementation
  - Bibliography Milestones
  - Budget (using the budget template Appendix A. 3. 3
  - Letter(s) of support from the non-academic partner(s), clearly stating the question of interest, its relevance to the organization, and the time-related and financial contributions the partner is willing to make to the project.
  - CVs of all involved partners (2 pages max. per partner)

Please note that ETH Zurich strives to promote gender equality in scientific research. Gender must be consistently taken into account from the proposal to the research and dissemination phase. If the project involves humans as research objects (e.g., as end-users or as citizens in surveys), gender must be considered in experimental design, data collection, analysis and interpretation of the outcomes. If the gender dimension is not being considered, a short justification of why it is not being addressed must be included.

If applicable, relevant ethical, legal and social considerations should be included in the proposal. The prospective research must comply with the existing ethics regulations and adhere to the principles of research integrity valid at the ETH Zurich.

Recipients of the ETH4D Challenge Grant whose research includes human subjects have to receive approval from the ETH Ethics Commission and submit the approval documents to ETH4D as soon as they receive approval and before starting field work (note: this only applies once projects have been selected for funding by ETH4D).

Evaluation and Selection

All proposals will be evaluated by an ETH4D selection committee consisting of three academic members of ETH4D, the executive director of ETH4D, and a member of the ETH Zurich Research Commission as well as a practitioner (from industry, policy, or NGO).

In addition to the quality and feasibility of the research proposal, particular attention will be given to the following selection criteria:

- Relevance of the project: The project has the potential to address a pressing challenge faced by poor people in low- or middle-income countries. In that sense, it tackles important but understudied - problems that affect a large number of people in low-income countries, and develops scalable solutions. Projects should provide clear arguments for why the research project differs from and/or improves upon existing or similar efforts.
- Applicability: The results will be used by the partnering non-academic institution. Having a realistic long-term implementation plan and measurable goals is important. We advise applicants to be explicit about how their partner organization (and, potentially, other organizations) will use the results of their research.
- Team qualifications and diversity as well as own financial contributions

Notification of the decision will usually be given within two months of the submission deadline. Projects may start at the latest within three months after the reception of the notification letter.

Deliverables

- Grant recipients are required to present their progress and discuss their open questions at the ETH4D Research Challenge Seminar, which will take place twice a year. During the seminar, they will also support other grantees' work in peer-to-peer learning sessions.
- Grants recipients must submit a 1-2-page scientific report no later than three months after the completion of the project. The report outlines research and other activities conducted with grant money, the results of the research and the planned next steps.
- Grant recipients shall also submit a financial report, which includes the relevant excerpts from Refine no later than three months after completing the project. Each ETH4D challenge project will be assigned a new project account (PSP element) where all funds will be budgeted. The ETH4D member (main applicant) will be the budget manager of this project.
- In addition, recipients can choose one of the following deliverables, which has to be submitted/presented to the ETH4D Executive Office no later than three months after the grant period has ended:
  - A prototype of a new product or service
  - A short video that explains the project to a non-scientific audience
  - An article in the ETH Zukunftsblog (or other ETH outlet)
  - A policy brief that presents the findings to a non-scientific audience

An important aspect of ETH4D is building bridges between science and society at large. The submitted material will be made public on our website and may be used for reporting and other outreach activities.

Terms of collaboration between partners of granted projects

Data exchanged within the ETH4D challenge programme are generally not considered confidential information. A non-disclosure agreement should be signed before exchanging confidential data. An agreement between ETH Zurich (for the involved ETH4D member) and the non-academic partner(s) must be signed. Such an agreement will define the rights and obligations of the partners. It may allow the partners to use the results of the project for commercial and non-commercial purposes and will specify the relevant conditions.

If personally identifying information is used, exchanged, or collected in the framework of the ETH4D research programme, the involved partners shall comply with applicable data protection laws and regulations, and shall establish a data protection concept and appropriate data protection agreements in writing.

The projects must comply with the KFPE principles.

All collaborations must follow the Code of conduct for scientific cooperation of ETH Zurich (RSETHZ 416) and the Guidelines concerning Contracts in the Field of Research at ETH Zurich (RSETHZ 440.31).

JaLogisch Consulting GmbH
development evaluation with global reach

Evaluation Report for the External Evaluation of the TECH4Dev and ETH4D

Volume 2: Appendices

Final version, 1 September 2023

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Content

A Evaluation design matrix

Evaluation area	Basis for assessment / Judgement criteria	Data collection methods	Data sources	Data analysis techniques
Effectiveness and impact	– The extent to which the Initiatives have contributed to science-based innovations that are (likely to be) implemented at scale and benefit millions of people in the Global South. – Contribution analysis to ascertain whether the Initiatives or other (contextual) factors contributed to, or hindered, results achievement. – The extent to which the Initiatives' theory of change held up in practice to draw lessons on 'what worked, what didn't and why'.	– Document review – Key informant interviews	**Documents** – Project and progress reports – Research project documentation – R4D literature **Key informants** – TECH4DEV/ETH4D management and staff – Steering and Advisory Committees – Research groups: professors, researchers, partners, practitioners – NGO Council – Participating faculty and students – Partners to scale: social enterprises, government, international organizations – SDC	– Inductive and deductive analysis – Contribution analysis
Coherence	– The extent to which synergies exist, are or can be exploited in the future, between TECH4DEV, ETH4D, the SDC, and other Swiss research for development programs. – TECH4DEV and ETH4D's adherence to the 11 principles of the Swiss Commission for Research Partnerships with Developing Countries (KFPE).	– Document review – Key informant interviews	Same as above, plus – Swiss Commission for Research Partnerships with Developing Countries (KFPE) – Swiss National Science Foundation – Academia, development cooperation, industry, and other relevant institutions in Switzerland and the Global South.	– Inductive and deductive analysis
Gender equality and diversity	– The extent to which the research projects, summer schools and exchange initiatives are gender responsive, and inclusive in terms of diversity. – The extent to which women gained access to assets and services, gained agency/voice, or benefited from changes in societal norms and policies.	– Document review – Key informant interviews	Same as above	– Inductive and deductive analysis (the latter based on the Framework on Gender Equality, Diversity and Social Inclusion)

Evaluation area	Basis for assessment / Judgement criteria	Data collection methods	Data sources	Data analysis techniques
Efficiency	– The extent to which better results could have been achieved through a different allocation of resources.	– Document review – Key informant interviews	**Documents** – Budget and expenditure profile **Key informants** – TECH4DEV and ETH4D **Evaluation** – The outcome of the evaluation's development effectiveness and contribution analysis	– Follow the money approach – Contribution analysis
Relevance and sustainability	– The extent to which EPFL and ETH show and express continued ownership of the Initiatives and (likely) build the institutional framework to continue and improve the Initiatives. – The extent to which TECH4DEV and ETH4D are aligned with or adapted to Switzerland's Research Concept 2021-24 and Switzerland's International Cooperation Strategy 2021-24.	– Document review – Key informant interviews	Same as under Effectiveness, plus **Documentation** – Policy Sector Development and Cooperation Research Concept 2021–24 – Swiss International Cooperation Strategy 2021-24 **Key informants** – EPFL and ETH Directorate	– Inductive and deductive analysis

B Evaluation criteria and questions

This appendix organizes the evaluation questions from the Terms of Reference per evaluation criterion. The evaluation report explicitly answers all assessment- and learning-oriented evaluation questions (in succinct form at the end of the relevant chapters). The recommendation-oriented questions guided us in formulating the evaluation's recommendations (see Chapter 6 of the main evaluation report).

Evaluation area	Basis for assessment / Judgement criteria	Evaluation questions
Effectiveness and impact	– The extent to which the Initiatives have produced technological innovations that are (likely to be) implemented at scale and benefit millions of people in the Global South. – Contribution analysis to ascertain whether the Initiatives or other (contextual) factors contributed to, or hindered, results achievement. – The extent to which the Initiatives' theory of change held up in practice to draw lessons on 'what worked, what didn't and why'.	**Assessment oriented questions** – To what extent have the initiatives reached the objectives at outcome (and impact) level and are the set objectives and targets realistic? – Who and how many did benefit/might benefit from developed technologies? – Are the new technologies integrated in a local system and financially viable? – Are the chosen approaches (grant mechanisms/ education and teaching/ partnership models/ etc.) of the initiatives suitable to reaching the stated objectives? **Learning oriented questions** – What are the motivation and vision of the researchers at the ETH/EPFL with regards to impactful research and teaching and why do they participate/contribute to the initiatives? – Linkages to country/local systems: How well are the supported initiatives linked to country/local systems (for example to public health systems, to food systems, to transport systems)? – What are some of the fostering and hindering factors for a) use/implementation of research results; and for b) the upscaling of approaches/technologies resulting from EPFL's/ETH's and their partners' research in the Global South? – Were the duration and amount of the grants adequate to reach the objectives? – What has been the role of the local non-academic partners (NGO, local government, etc.) and the local academic partners in the research partnerships/education partnerships? – Is the NGO Council composed by the adequate organizations to credibly identify the demand for impactful research from the Global South? – Did NGOs implement developed technologies? – What is the interest/motivation of the NGO Council members in being part of the initiative? What has been their role?

Evaluation area	Basis for assessment / Judgement criteria	Evaluation questions
		Recommendation oriented questions

		– Which elements of the initiatives could be strengthened, replaced or newly introduced in order to promote research and education that has an impact at scale in the Global South?
		– How could use/implementation and upscaling of research-based innovations in the Global South be further supported? For example:
		  – Shall linkage to policy makers be improved and if so how?
		  – Shall the collaboration with partners from the private sector, NGOs, foundations, Ministries etc. be strengthened and if so, how?
		– What (else) could be done to support the establishments of spin offs?
		– For fostering impactful research, what could be alternative or complementary approaches to research grants?
		– How could the linkage to country systems be improved?

Coherence	– The extent to which synergies exist, are or can be exploited in the future, between TECH4DEV, ETH4D, the SDC, and other Swiss research for development programs. – TECH4DEV and ETH4D's adherence to the 11 principles of the Swiss Commission for Research Partnerships with Developing Countries (KFPE).	**Assessment oriented questions**
		– How do the Initiatives complement already existing initiatives at the EPFL and at the ETH? – How effective was the collaboration between the SDC and ETH/EPFL? – To what extent, how and with what results did EPFL and ETH exchange and collaborate? – To what extent are there synergies and overlaps between the ETH4D at ETH and the Tech4Dev & Essential Tech at EPFL (incl. the ETH/EPFL/ICRC co-implemented initiative Engineering for Humanitarian Action), and the Geneva Technical Hub (UNHCR)? – To what extent do the initiatives use synergies with other initiatives and organizational units within ETH/EPFL? – Do the initiatives respect the KFPE North-South research principles?
		Learning oriented questions
		– To what extent are the two initiatives unique or complementary to comparable initiatives in Switzerland?
		Recommendation oriented questions
		– How could these initiatives improve complementarity to the existing funding instruments in research for development (for ex. SOR4D, The Geneva Technical Hubs, etc.) and to the Section A&R's research portfolio? – How could the complementarities between SDC (impact driven agency) and the ETH/EPFL (academia) be better used?

Evaluation area	Basis for assessment / Judgement criteria	Evaluation questions
Gender equity	– The extent to which the research projects, summer schools and exchange initiatives are gender responsive, and inclusive in terms of diversity. – The extent to which women gained access to assets and services, gained agency/voice, or benefited from changes in societal norms and policies.	**Assessment oriented questions**
		– To what extent and how did the two initiatives support and foster women, and respond to their needs (end beneficiaries, researchers in CH and Global South)? – To what extent are the technological solutions gender responsive, and responsive to the needs of southern partners/target populations? – What are the fostering and hindering factors for reducing the gender diversity gaps (in academia, at beneficiaries level, etc.)?
		Recommendation oriented questions
		– How could aspects of gender equality and female leadership be improved? – How could the grant mechanisms and other dimensions of the initiatives be improved to ensure gender equality and fostering women/diversity?
Efficiency	– The extent to which better results could have been achieved through a different allocation of resources.	–
Relevance and sustainability	– The extent to which EPFL and ETH show and express continued ownership of the Initiatives and (likely) build the institutional framework to continue and improve the Initiatives. – The extent to which TECH4DEV and ETH4D are aligned with or adapted to Switzerland's Research Concept 2021-24 and Switzerland's International Cooperation Strategy 2021-24.	**Assessment oriented questions**
		– What is the strategic relevance and institutional standing of the Tech4Dev within the EPFL and the ETH4D within the ETH? – Are the initiatives coherent with the EPFL's and the ETH's strategies? – To what extent have the two initiatives managed to establish sustainable structures, networks or partnerships? – Are the initiatives coherent with Switzerland's International Cooperation Strategies 2021-24, and with the Swiss Research Concept for the Policy Sector on Development and Cooperation 2021-2024?

C Sampling

Below table lists the main components of TECH4DEV and ETH4D. The evaluation's time resources did not allow us to assess all these components. The evaluation needed to draw a credible sample of activities to assess the Initiatives on. Together with the SDC, TECH4DEV and ETH4D, the evaluation decided to focus on the **blue** highlights in the table which, in short, are:

- the financially substantive research projects,
- the faculty and student exchanges, and
- the summer/winter schools.

The evaluation covered the other components only lightly, in passing, or not at all.

Table 1 TECH4DEV and ETH4D activities

TECH4DEV	ETH4D
– **8 research challenges**	– **15 research challenges**
– **3 Summer/winter schools w. Swissnex in/with Bangalore**	– 6 humanitarian action challenges
	– **10 PhD scholarships**
– Small-scale engagements – Virtual event on data & technology – Showcase 2030 – Impact lunches	– 4 seed projects
	– 13 research to action projects*
	– Professorship in Development Engineering
	– **Research exchanges** (visiting research groups to ETH)
	– **>45 Faculty and student exchanges**
	– **Summer school with KNUST, Ghana**
	– Courses on sustainable development of Global South
	– Education incubator – develop graduate programs
	– Master Program of Engineering with Ashesi University
	– 5 doctoral mentorships
	– 4 Internships in Africa

* ETH4D's research to action projects receive less than CHF5,000 in funding.

Within this choice, the evaluation again focused on the sponsored research (the so-called research challenges). The reason is that research is the vehicle through which TECH4DEV and ETH4D connect to and promote current development processes, which is SDC's mandate. It is through this research program that TECH4DEV and ETH4D can *'help initiate, develop, test, and implement, at scale, science-based innovations which, through their application, can positively affect the lives of millions of people in the Global South'*, which forms the main reason for SDC's funding of TECH4DEV and ETH4D. Concomitantly, it is where the SDC contributed most funds.

The SDC and the evaluation team also agreed not to include EPFL's and ETH's joined program with the International Committee of the Red Cross (ICRC) 'Engineering for humanitarian action'. It is a distinct field of operation. Whilst of interest to the SDC, it is not where SDC's support went to. Given the large number of research challenges and research in action challenges and the limited resources available for this evaluation, the choice was to concentrate on 'development' and not on 'humanitarian action'.

From the research challenges, we selected three TECH4DEV and four ETH4D challenges based on the following selection criteria:

- Advanced research challenges, i.e., not research challenges which have just started.
- A combination of relatively successful cases, potentially successful cases,, and struggling cases.
- Different partnership and scaling routes: through entrepreneurship, international organizations, or public interventions (the latter including public-private partnerships).
- Variety of technologies.

- Geographic diversity: Africa, Asia, Latin America.
- Gender balance, including research challenges led by female and male professors, in the North and Global South.

Based on above criteria, a qualitative description of the research challenges, and a qualitative reflection by the TECH4DEV project team on the research challenges, the evaluation team selected the three TECH4DEV research challenges, as shown in table below, for a closer look. As none of the research challenges have been able to scale their technologies (yet), the evaluation selected two potentially successful cases.

Research challenge	Country	Sector	Cohort	Qualification	Scaling route	Professor
3D4Peace	Colombia	Health	1: 2020-22	Struggling	Social entrepreneurship	Female
Computational Design for Resilient Shelters	South Sudan	Humanitarian aid	2: 2021-23	Potentially successful	International organizations	Male
Comprehensive Cervical Cancer Prevention	Cameroun	Health	2: 2021-23	Potentially successful	Social entrepreneurship	Male

As for the ETH4D research challenges, ETH4D prepared—based on above criteria—a preselection of eight research challenges. The evaluation team subsequently selected four, again based on above selection criteria—see below table.

Research challenge	Country	Sector	Start date	Qualification	Scaling route	Professor
Low-Cost Sustainable Compressed Earth Blocks (CEB) Dwellings	Morocco	Construction	July 2022	Ongoing (Too early to tell)	Local cooperative	Female
Human Faeces-Derived Biochar	Guatemala	Agriculture	August 2021	Ongoing (Too early to tell)	Social enterprise	Male
Logistics Preparedness for Disease Outbreaks	Uganda	Humanitarian Aid / Logistics	July 2020	Potentially successful	Public health system	Male
New Public Lighting for Informal Settlements	South Africa	Municipal infrastructure	May 2020	Not yet scaled, but with potential	Municipal government	Female

This sample of seven research challenges were deemed, by the SDC, TECH4DEV, ETH4D and the evaluation team, to offer a realistic picture of the research sponsored by TECH4DEV and ETH4D.

D Data collection and analysis methods

Document review

The purpose of the document review was to:

- understand the design, scope and intent of the Initiatives and its component parts,
- deduce the Initiatives' theory of change,
- frame the Initiatives against SDC's and EPFL's/ETH's research strategies, and
- collect stories and data on the development effectiveness of the Initiatives.

The document review encompassed:

- SDC's credit proposal, research concept, and Switzerland's International Cooperation Strategy.
- Tech4Dev and ETH4D project documents, latest progress reports, budget reports, and descriptions of a selection of research challenges, exchange activities and educational programs.

Key informant interviews

The purpose of the key informant interviews was to discuss in-depth the main themes/questions of the evaluation and collect qualitative information on the development effectiveness of the two Initiatives. The key informants included:

- SDC's program manager
- Program directors and managers Tech4Dev and ETH4D
- NGO Council, steering committee, and advisory committee/panel members
- EPFL and ETH directorate.
- Research teams: professors, researchers, students, external partners
- Research partners in the Global South to scale innovations.
- Participants to research, faculty, and student exchanges
- Educational program managers, lecturers, and students from the summer/winter schools
- Other EPFL/ETH stakeholders, e.g., relevant labs and centers.
- Other relevant stakeholders, e.g., student associations, Geneva Global Tech Hub, etc.

The key informant interviews entailed semi-structured interviews. Based on the evaluation questions, we prepared a checklist for the interviews. We started each interview in an open, non-judgmental fashion and invited each interview partner to express their involvement, experiences, and views freely. This approach provided unbiased answers, tending to cover (roughly) 30% of the interview questions and provide insight into which other questions were likely to receive informative answers (often another 20 – 30% of the questions). Over time, the interviews also drew into the discussions emerging themes from other interviews / the evaluation.

Literature review

The purpose of the literature review was to draw on past lessons learned on 'research for development'. This entailed the knowledge products on 'research for development' in general and SDC's Research for Development (R4D) program specifically. The latter also included the recent R4D program evaluation.

Data analysis

The evaluation applied various data analysis techniques for answering the evaluation questions:

- Inductive analysis: 'making sense' of the collected data during the data collection (for example the field mission) and identify 'emerging themes and patterns'.
- Deductive analysis: 'a structured analysis' of the collected data to answer the evaluation questions.

- Contribution analysis: a structured and qualitative inquiry to ascertain to what extent the Initiatives 'contributed' to the observed results—see Textbox 1.
- Follow-the-money analysis: together with TECH4DEV and ETH4D, we establish the expenditure profile of the Initiatives. Drawing on the results of the Contribution Analysis, this allowed us to assess whether – with hindsight – better results could have been achieved through a different allocation of resources.
- GEDSI analysis: a structured analysis to ascertain whether women gained access to assets and services, gained voice/agency, and benefited from changes in societal norms and policies.

In drawing conclusions from the above analyses, the evaluation applied the principle of 'triangulation' across data sources and/or evaluators. Triangulation across data sources means that findings and conclusions rest on data that stem from different categories of documentation and key informants. Triangulation across evaluators means that both evaluators reached the same findings and conclusions based on the collected data.

Textbox 1 On contribution analysis

Contribution analysis answers 5 questions: (i) are the assumptions underlying the Theory of Change plausible and uncontested? (ii) did the envisaged activities take place? (iii) is there evidence that the assumed changes in behavior, decisions and actions occurred in practice? (iv) were the envisaged results achieved? (v) could other contextual factors have reasonably and significantly contributed to the results? The answers to these five questions tell whether the Theory holds up in practice and the extent to which any results can be attributed to the program. (Mayne 2008)

E List of documentation

ETH Project documents

- Project Document
- Theory of Change
- Operational Report 2021
- ETH4D External Advisory Committee presentation (16 March 2023)
- ETH Zürich Entrepreneurship Ecosystem. Presentation ETH4D-DEZA evaluation (5 May 2023)
- ETH4D budget
- ETH4D members survey
- New Public Lighting for Informal Settlements. Final Scientific Report
- Logistics Preparedness for Infectious Disease Outbreaks, Uganda. Final Scientific Report
- ETH4D website

EPFL Project documents

- Project Document
- Operational Report 2021
- TECH4DEV. Accelerating innovative and beneficiary-centered technological solutions in the Global South. Presentation
- EPFL Tech4Humanities Map
- TECH4DEV budget
- 3D4P. 3D printing of assistive devices for disabled people. Operational Report 2022
- Cervix. Smartphone and artificial intelligence supported diagnosis of cervical cancer. Operational Report 2022
- CDRS. Design and production of mobile, multi-functional, and reusable (emergency) shelters. Operational Report 2022

SDC documents

- Credit Proposal. Research and Technology for sustainable development in the global South (SDC contribution to ETH4D and EPFL's Tech4Dev initiatives)
- Policy Sector Development and Cooperation Research Concept 2021–24.
- Switzerland's International Cooperation Strategy 2021-2024
- Solution-Oriented Research for Development Program. https://www.sor4d.ch/en

Swiss Academy of Sciences

- A Guide to Transboundary Research Partnerships. 11 Principles
- Commission for Research Partnerships with Developing Countries (KFPE). https://kfpe.scnat.ch/en/about_kfpe

Literature

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F Key informants

#	Date	Place	Name	Designation	Organization	Female	Male	South	North	N-S
1	19-Apr-23	Virtual	Adina Rom	Executive Director	ETH4D	1			1	
2			Tiphaine Detoudeville	Program Manager	Tech4D	1			1	
3			Ferran Ubierna Caceres	Head of Innovation Initiatives	EPFL		1		1	
4	20-Apr-23	Virtual	Isabelle Gunther	Professor Development Economics	EPFL	1			1	
5	21-Apr-23	Virtual	Nathalie Wyser	Program Manager Transform	SDC	1			1	
6	01-May-23	Lausanne	Ferran Ubierna Caceres &Tiphaine Detoudeville	Head of Innovation Initiatives & Program Manager	Tech4D					
7			Ursula Oesterle	Vice President of Innovation	EPFL	1			1	
8			Martin Vetterli	President	EPFL		1		1	
9			Nicholas Myers	Regional Director	Omnis Institute		1			1
10			Veronique Michaud	Professor	EPFL	1			1	
11			Joanna Vaucher	Postdoc	EPFL	1			1	
12	02-May-23	Zürich	Johanna Jacobi	Professor	ETH	1			1	
13			Samira Cadulle	Student Exchange	ETH	1				1
14			Kaleb Mwendwa	Assistant Professor			1	1		
15			Sutirtha Bandyopadhyay	Visiting Professor			1	1		
16			Dr. Bublu Thakur-Wiegold	Director HumOSCM Lab	ETH	1				1
17			Dr. Joël Mesot	President	ETH		1		1	
18			Kristina Shea	Professor Mechanical Engineering	ETH	1			1	
19			Dr. Fritz Brugger	Co-director Nadel	ETH		1		1	

#	Date	Place	Name	Designation	Organization	Female	Male	South	North	N-S
20	03-May-23	Bern	Odile Robert & Nathalie Wyser	Head of Section Analysis and Research	SDC	1			1	
21			Mirjam Macchi	Program Manager SOR4D	SDC	1			1	
22			Kyllian Douhou	African Students Association	SDC		1			1
23	03-May-23	Zurich	Dr. Jürg Brunnschweiler	Office of the President & Steering Committee	ETH		1		1	
24			Dr Gnanli Landrou	Advisory Board Member	Oxara AG		1			1
25	04-May-23	Lausanne	Marius Aeberli	Project Leader- Summer School	EPFL		1		1	
26			Xavier Estrella	Researcher and Project Manager	EPFL		1			1
27			Joel Kaiser	NGO Council Member	Medair		1		1	
28			Prof. Jean-Philippe Thiran	Professor	EPFL		1		1	
29			Narcisse Mavoha	Researcher/ Project Manager	EPFL		1	1		
30			Megali Cattin	PhD	EPFL	1			1	
31			Ismail Benkirane	Student	EPFL Summer School		1	1		
32			Sarah Soussou	Student	EPFL Summer School	1		1		
33		Bern	Jacqueline Schmid	Pollicy Advisor- Disaster Risk Reduction, SDC	SDC	1			1	
34	05-May-23	Zurich	Ben Wilde	Postdoc / project manager	ETH		1		1	
35			Dr. Yael Borofsky	Researcher	ETH	1			1	
36			Thomas Brenner	ETH Transfer	ETH		1		1	
37			Churchill Agutu	PhD	ETH		1	1		

#	Date	Place	Name	Designation	Organization	Female	Male	South	North	N-S
38			Sergio Reges	ETH4D PhD students	ETH		1	1		
39			Helena Strom	ETH4D PhD students	ETH	1			1	
40			Deepika Raghu	ETH4D PhD students	ETH	1		1		
41	08/05/2023	Bern	Dr. Thomas Breu	Director, CDE, Department of Geography	University of Berne		1		1	
42		Bern	Dr. Prof. Peter Messerli	Director, Wys Academy	University of Berne		1		1	
43	Virtual		Abaksonj Eshter	Nurse, Cameroon		1		1		
44			Limofack Benite	Midwife, Cameroon		1		1		
45			John Hans Waswa	Policy advisor	Ministery of Health, Uganda		1	1		
46			Mona Mithjab	Entrepreneur	Mosan	1				1
47			Eugene Appiah-Effah	Senior lecturer	KNUST, Ghana	1		1		
48			Calvin Buhler	Advisory Committee member	Buhler Group		1		1	
49			David Svarin	Programme Manager, SOR4D, Swiss National Science Foundation	SNSF		1		1	
50			Xolelwa Maha	Community Leader	PJS Informal Settlement	1		1		
51			Felipe Betancourt	Social entrepreneur	Colombia		1	1		
52			Alida Moukam	Antropologist	Consultant	1		1		
53			Alexander Widmer	program manager Geneva Tech Hub	SDC		1		1	

#	Date	Place	Name	Designation	Organization	Female	Male	South	North	N-S
54			Edgar Alejandro Maranon Leon	Assistant Professor	Universidad de los Andes		1	1		
55			Maria Alejandra Morales Sanchez	PhD	Universidad de los Andes	1		1		
56			Fabian Kaiser	Head,Swiss Commission for Researach Partnerships, KFPE			1		1	
57			Niclas Meyer	Evaluator R4D program	BSS		1		1	
58			Sebastian Dotteri	Associate Professor	ETH		1		1	
59			Bruno Pascual	Head, Hands4health programme	Terre de Hommes	1			1	
60			Eva-Maria Meemken	Asssistent professor	EtH	1			1	
61			Annie Hartley	Professor	EPFL	1			1	
			Total			**29**	**31**	**17**	**36**	**7**