Strategic Focus Area

Personalized Health and Related Technologies

Ruedi Aebersold, Chair Executive Committee PHRT
Daniel Vonder Mühll, Executive Director PHRT
Outline

1) What is PHRT

2) How does it relate to SPHN

3) What was the outcome of the first call for proposals (including review process)

4) What are the plans for the second call (timeline, types of projects and expected numbers)

5) Outlook
1) The ETH Board approved three Strategic Focal Areas for 2017-2020

- Personalized Health and Related Technologies (PHRT) CHF 50Mio (www.sfa-phrt.ch)
- Swiss Data Science Center (SDSC)
- Advanced Manufacturing
1) The ETH Domain PHRT: Frame and Objectives

The Strategic Focus Area Personalized Health and Related Technology (PHRT) as defined in the Strategic Planning 2017-2020 by the ETH Board will focus on core contributions of the ETH Domain institutions that are complementary to the efforts undertaken by other initiatives, such as the Swiss Personalized Health Network (SPHN).

An important goal of the SFA is to allow ETH Domain institutions to be in a position to collaborate most fruitfully with partners from SPHN and with international programs.
1) The ETH Domain PHRT: Key points

- Program Period: 2017-2020
- Budget: CHF 50 Mio
- Executive Committee (EC) is responsible for the program and reports to the Strategic Committee (SC) and the ETH Board
- Funds awarded solely based on peer review (panel of 14 natl/intl experts). No institutional quotas
- Slim administrative structure
2) How does PHRT relate to SPHN (and SDSC)

- Education / Fellowships: ~ 5 million
- Technology Platforms: ~ 10 million
- Technology Translation Projects: ~ 11 million
- PM/H Research Projects: ~ 22 million

SDSC

BioMed-IT
DCC

Driver Projects

SPHN
Swiss Personalized Health Network
2) How does PHRT relate to SPHN (and SDSC)

Coordinated with SPHN

Call for Proposals

Documents for the first call for proposals

Please find below the relevant documents describing the project types, requirements etc. The templates for submission of a proposal will be available here at the end of June.
3) Procedure and results: Platforms

Patients biospecimens, clinical data and questions

- SPHN Driver projects
- SNF projects
- Institutional projects
- Industry projects
- International projects
- Clinical samples

ELSI – Ethical, data sharing and publication policies agreed upon & signed

**PHRT Proteomics Center**
Infrastructure & Expertise

**PHRT Genome Center**
Infrastructure & Expertise

Sample and Data exchange

**Digital Patient Records**
Data Coordination Center (DCC)

Data Scientists
Clinicians
Clinical Scientists
Citizen Scientists / Patients
Researchers

Fine-grained disease stratification and contextual diagnostic

Personalized treatment

Strategic Focus Area
Personalized Health and Related Technologies
### 3) Procedure and results of the 1st call for proposals

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun 16, 2017</td>
<td>Publication call for</td>
<td></td>
</tr>
<tr>
<td>Sep 15, 2017</td>
<td>Deadline: 48 proposals</td>
<td></td>
</tr>
<tr>
<td>Oct 26, 2017</td>
<td>External reviewers (≥2 reviews per proposal)</td>
<td></td>
</tr>
<tr>
<td>Oct 27, 2017</td>
<td>Review Panel: 14 Swiss and international experts (different disciplines)</td>
<td></td>
</tr>
<tr>
<td>Oct 30, 2017</td>
<td>Decision</td>
<td></td>
</tr>
<tr>
<td>Nov 2, 2017</td>
<td>Decision confirmed</td>
<td>3  4  8</td>
</tr>
<tr>
<td>Nov 8-24, 2017</td>
<td>Decision letters; success: 27% 57% 89% 57% 57%</td>
<td></td>
</tr>
</tbody>
</table>
4) Plans for the 2\textsuperscript{nd} call for proposals

**# approved: 29 projects**

**approx # 2\textsuperscript{nd} Call**

\begin{itemize}
  \item Education / Fellowships
    \begin{itemize}
      \item 1\textsuperscript{st} Call: 12 (8+4)
      \item 2\textsuperscript{nd} Call: \sim 10
      \item \sim (2.1+3.0) million
    \end{itemize}
    \item Interdisciplinary doctoral student and postdoctoral fellowships
  \item Technology Platforms
    \begin{itemize}
      \item 1\textsuperscript{st} Call: 8
      \item 2\textsuperscript{nd} Call: \sim 8
      \item \sim (4.0+6.0) million
    \end{itemize}
    \item Genomics platform, western Switzerland
    \item Proteomics platform, eastern Switzerland
    \item 10'000 samples per year capacity
  \item Technology Translation Projects
    \begin{itemize}
      \item 1\textsuperscript{st} Call: 7 (3+4)
      \item 2\textsuperscript{nd} Call: \sim 3
      \item \sim (5.1+5.6) mio
    \end{itemize}
    \item Translate pioneering technologies to “clinical level” of performance
  \item PM/H Research Projects
    \begin{itemize}
      \item 1\textsuperscript{st} Call: CHF (24.6+6.0) million
      \item 2\textsuperscript{nd} Call: CHF (13.2+4.0) million
      \item \sim (6.0+16.0) million
    \end{itemize}
    \item Research projects with high direct clinical relevance
      \textit{(incl. Driver project with SPHN)}
\end{itemize}
### 4) Time line 2nd call for proposals

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Driver</th>
<th>Resrch</th>
<th>iDoc</th>
<th>TPdF</th>
<th>TeTra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb 15, 2018</td>
<td>Publication call for (Driver) Research iDoc TPdF TeTra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jun 30, 2018</td>
<td>Deadline</td>
<td></td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Sep 30, 2018</td>
<td>External reviewers (≥2 reviews per proposal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>October 2018</td>
<td>Review Panel meeting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct/Nov 2018</td>
<td>Decision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January 2019</td>
<td>Project start</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5) Outlook 2018

**Short-term:**
- Kick-off event (Bern): **March 23, 2018** - 09:00-14:00h

**Mid-term:**
- Implementation of the approved projects and develop technology platforms with direct relevance for the patient in collaboration with the SPHN and with the Swiss Data Science Center (SDSC)
- Contribute to an education environment and a cultural change joining science, engineering and medicine to a coherent Personalized Health community in Switzerland.

**Long-term (2021-2014):**
- Second PHRT phase with a consolidation of the structures achieved by then. Deepen links to international research efforts, including “The Cancer Genome Atlas” (TCGA) and the “Cancer Moonshot” initiative, both at the National Institutes of Health (NIH, USA).
### Approved PHRT Projects 2017

#### Driver Projects (jointly with SPHN)  
**CHF 6’908’000**

<table>
<thead>
<tr>
<th>#</th>
<th>Project title</th>
<th>Principle Investigator</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>103</td>
<td>PRECISE: Identification of biomarkers and therapeutic targets in inflammatory disease immunotherapy by high-dimensional single cell analysis and cluster proteomics</td>
<td>Claassen, Manfred</td>
<td>CHUV, ETHZ, InselBe, USB, UZH</td>
</tr>
<tr>
<td>106</td>
<td>Swiss Molecular Pathology Breakthrough Platform (SOCIBP)</td>
<td>Rubin, Mark Rätsch, Gunnar</td>
<td>CHUV, ETHZ, HUG, InselBe, USZ</td>
</tr>
<tr>
<td>110</td>
<td>Personalized Swiss Sepsis Study (PSSS): Detection and modelling of sepsis using machine learning to analyse continuous ICU monitoring, laboratory, microbiology, and -omics data for personalized sepsis management.</td>
<td>Egli, Adrian Borgwardt, Karsten</td>
<td>CHUV, ETHZ, HUG, InselBe, UniBas, UniBE, USB, USZ, UZH</td>
</tr>
</tbody>
</table>
## Approved PHRT Projects 2017

### PM/PH Research Projects

<table>
<thead>
<tr>
<th>#</th>
<th>Project title</th>
<th>Principle Investigator</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>DPPH: Data Protection in Personalized Health</td>
<td>Hubaux, Jean-Pierre</td>
<td>EPFL, ETHZ</td>
</tr>
<tr>
<td>203</td>
<td>Genetically engineered humanized mice for personalized drug discovery in cancer immunotherapy</td>
<td>Reddy, Sai</td>
<td>ETHZ, UniBas</td>
</tr>
<tr>
<td>204</td>
<td>Engineering and clinical validation of scalable organoid models for personalized oncology</td>
<td>Lutolf, Matthias</td>
<td>EPFL, CHUV</td>
</tr>
<tr>
<td>205</td>
<td>Towards personalized precision medicine for stroke recovery: a multi-modal, multidomain longitudinal approach</td>
<td>Hummel, Friedhelm</td>
<td>EPFL</td>
</tr>
</tbody>
</table>
## Approved PHRT Projects 2017

### iDoc Projects

<table>
<thead>
<tr>
<th>#</th>
<th>Project title</th>
<th>Principle Investigator</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>301</td>
<td>Post Surgical Auger Electron Therapy of Prostate Cancer Patients with Localized Disease: Development and Assessment of a New Concept for High Risk Patients</td>
<td>Müller, Cristina</td>
<td>PSI, Insel BE</td>
</tr>
<tr>
<td>302</td>
<td>A microfluidic device for high throughput screening of tumor-reactive T cells for clinical applications in personalized cancer immunotherapy</td>
<td>Renaud, Philippe</td>
<td>EPFL, UniL, CHUV</td>
</tr>
<tr>
<td>303</td>
<td>eXCITING: X-ray Cardiac tIssue Tomographic ImagiNG</td>
<td>Bonnin, Anne</td>
<td>PSI, ETHZ, USZ</td>
</tr>
<tr>
<td>304</td>
<td>Combining bone proteotype and multiscale excellular matrix properties for improved clinical fracture risk prediction</td>
<td>Schwiedrzik, Johann Jakob</td>
<td>Empa, UniBE, InselBE</td>
</tr>
<tr>
<td>306</td>
<td>Morphometric analysis of epithelial bladder cancer progression</td>
<td>Iber, Dagmar</td>
<td>ETHZ, UniBas, USB</td>
</tr>
<tr>
<td>307</td>
<td>The role of Aregs in adipose biology and metabolism</td>
<td>Deplanke, Bart</td>
<td>EPFL, CHUV</td>
</tr>
<tr>
<td>308</td>
<td>Novel tools for quantitative pathology : testing the prognostic value of stromal evolution in hematopoietic malignancies</td>
<td>Naveiras, Olaia</td>
<td>EPFL, CHUV</td>
</tr>
<tr>
<td>309</td>
<td>Leukemia on Chip – Microphysiological Multi-Tissue System for Real-Time Monitoring of Patient-Derived Acute Lymphoblastic Leukemia</td>
<td>Hierlemann, Andreas</td>
<td>ETHZ, USZ</td>
</tr>
</tbody>
</table>
## Approved PHRT Projects 2017

### Transition Postdoc Fellowship Projects  
**CHF 895’000**

<table>
<thead>
<tr>
<th>#</th>
<th>Project title</th>
<th>Principle Investigator</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>Immunogenomic engineering of a T cell display platform for personalized cancer therapy</td>
<td>Vazquez-Lombardi, Rodrigo</td>
<td>ETHZ (Reddy)</td>
</tr>
<tr>
<td>402</td>
<td>Stratifying intermediate-risk prostate cancer subtypes by complex-centric mass spectrometry-based proteome analysis</td>
<td>Martelli, Claudia</td>
<td>ETHZ (Aebersold)</td>
</tr>
<tr>
<td>403</td>
<td>Computational neuroimaging for personalised psychiatry</td>
<td>Harrison, Samuel</td>
<td>ETHZ (Stefan)</td>
</tr>
<tr>
<td>407</td>
<td>Single-cell transcriptome profiling of AML stem cells</td>
<td>Maritins, Filipe</td>
<td>EPFL (Trono)</td>
</tr>
</tbody>
</table>
# Approved PHRT Projects 2017

## TechTrans Projects

<table>
<thead>
<tr>
<th>#</th>
<th>Project title</th>
<th>Principle Investigator</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>502</td>
<td>A Single Cell Transcriptomics Platform</td>
<td>Deplancke, Bart</td>
<td>EPFL</td>
</tr>
<tr>
<td>503</td>
<td>Monitoring protein-RNA interaction signatures for neurodegenerative and myodegenerative diseases by mass spectrometry</td>
<td>Leitner, Alexander</td>
<td>ETHZ</td>
</tr>
<tr>
<td>504</td>
<td>Strategies and standards for high-throughput, long-term, non-targeted metabolome analysis of human biofluids</td>
<td>Zamboni, Nicola</td>
<td>ETHZ</td>
</tr>
<tr>
<td>506</td>
<td>Protein structures as biomarkers of disease progression to support personalized patient care</td>
<td>Picotti, Paola</td>
<td>ETHZ</td>
</tr>
<tr>
<td>507</td>
<td>The MIDATA Platform for Ethical and Fair Citizen/Patient Participation in Personalized Health Research</td>
<td>Hafen, Ernst</td>
<td>ETHZ, BFH, USZ</td>
</tr>
<tr>
<td>508</td>
<td>TEs as cancer biomarkers and therapeutic targets</td>
<td>Trono, Didier</td>
<td>EPFL</td>
</tr>
<tr>
<td>510</td>
<td>Single Cell Genomics Core</td>
<td>Beisel, Christian</td>
<td>ETHZ</td>
</tr>
<tr>
<td>512</td>
<td>Advanced Translational Imaging</td>
<td>Schibli, Roger</td>
<td>PSI, ETHZ</td>
</tr>
</tbody>
</table>
Thank you for your attention
Goals of PHRT

“The overarching goal of the strategic focus area Personalized Health and Related Technology (PHRT) is to establish and sustain the ETH Domain in a worldwide leading position in the ongoing life science revolution that will ultimately transform medicine as it is today into ‘individualized medicine’. In essence a person’s unique biological makeup will guide decisions on how to maintain and restore health”.
Personalized Health and Related Technologies: key points

- Program Period: 2017-2020
- Budget: CHF 50 Mio
- Executive Committee (EC) is responsible for the program and reports to the Strategic Committee (SC) and the ETH Board
- Funds awarded based on peer review; no institutional quotas
- Slim administrative structure
How is PHRT organized

- **Executive Committee (EC):**
  - Ruedi Aebersold (chair; ETHZ)
  - Bart Deplancke (EPFL)
  - Alex Dommann (EMPA)
  - Gunnar Rätsch (ETHZ | SPHN)
  - Didier Trono (EPFL | SDSC | SPHN)
  - Olivier Verscheure (Director SFA SDSC)
  - Daniel Vonder Mühll (ETHZ)
  - Damien Weber (PSI)

- **Strategic Committee (SC):**
  - Detlef Günther (chair; ETHZ)
  - Andreas Mortensen (EPFL)
  - Joël Mesot (PSI)
  - Gian-Luca Bona (Empa)

- **Administration (Office):**
  - Daniel Vonder Mühll (Executive Director SFA PHRT)

- **Review Board**
  - Uwe Sauer (Chairman)
  - 13 experts (ETH Domain, external, abroad)
The ETH PHRT Mass Spectrometric Platform provides team, technologies, facilities and logistics to convert large sample cohorts of clinical specimens into digital representations of their molecular makeups (proteotypes) suitable, along with their clinical/phenotypic metadata, for further *in silico* research. The platform provides assistance at all stages of the project:

- Collaborative experimental design, grant and manuscript preparation
- Sample preparation for clinical proteotype analysis (cells, biofluids and tissues)
- Data-Independent Acquisition (DIA) workflow enabling the comprehensive and quantitative analysis of the proteotype of clinical specimens across cohorts.
- Fast track data analysis
- Sharing of the data with the DCC for deep track analysis and community sharing.
### Personalized Medicine / Personalized Health Research Projects – Drivers Projects (II)

<table>
<thead>
<tr>
<th>Project duration</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHRT funding (max.)</td>
<td>CHF 1,000,000 per year, i.e. CHF 3,000,000 in total for personnel, equipment, consumables</td>
</tr>
<tr>
<td>Number of research groups</td>
<td>typically 3 to 6 from different complementary disciplines</td>
</tr>
<tr>
<td>Number of approved projects with this call</td>
<td>approx. 5</td>
</tr>
</tbody>
</table>
| Full cost budget consists of different funding sources | a) funding requested from PHRT  
b) funding requested from SPHN  
c) matching funds from the university/university hospital partner institutions in cash and/or in kind  
d) others: funds directly linked to the project obtained from competitive research institutions such as SNSF, CTI, EU, NIH, etc.  
e) private funds: collaboration with partners from private industry and SMEs |
| Scope                  | Clinically relevant |
| Starting date          | Jan 2018 |
PHRT Genome Sequencing and Analysis Platform

The Genome Center aims to provide for the large-scale sequencing needs of Switzerland, thereby facilitating genomic research and the implementation of genomic-based medicine.

**Missions:**

- To develop and **deploy genomic technologies** in support of research and clinical activities at the national and international levels
- To develop **analytical tools** and pipelines for genome analysis
- To serve as **big data hub** for the growing genomic needs of hospitals and research institutions
- To foster strong **partnerships** with existing genomic platforms in Switzerland to ensure mutual exchange of know-how, experience and technology development
- To support public **education** in genomics and familiarize clinicians with genomic data
Interdisciplinary Doctoral Projects (iDocs)

- To support interdisciplinary research and education for the next generation of scientists in the field of personalized health
- Students will be matriculated at an ETH Domain institution and will be enrolled in one of the established doctoral student programs
- Projects are expected to bridge the gap between science/engineering and medicine, and the student will have two mentors, one from each field of research
- iDoc Projects are limited to 36 months (three (3) years as a rule) and may be extended to 48 months
- iDoc Project: salary and social charges of the doctoral student according to rules of the SNSF, plus on request a yearly amount for consumables (up to CHF 10,000 per year)
Translation Postdoc Fellowship (TPdF)

- to facilitate the transition of young scientists into the interdisciplinary research culture of personalized health research.
- proposals are accepted from PhD or MD scientists within a maximum period of five (5) years since receiving their highest degree.
- the fellowships will be awarded for 24 months (two (2) years).
- research projects must show direct clinical relevance within the field of personalized health.
- projects that show a link between basic science/engineering and clinical applications will be prioritized.
- applicants require the commitment of one host research group located at one of the ETH institutions working.
- PHRT will fund the postdoc salary (maximum excluding social charges: 1\textsuperscript{st} year CHF 85,750; 2\textsuperscript{nd} year CHF 90,050) and on request, consumables of up to CHF 10,000 per year.
- Postdoc Fellowship projects are limited in time to two years.
Technology Translation Project

- Personalized medicine is evolving rapidly and depends heavily on technological developments. Research within the institutions of the ETH Domain presents a rich and diverse source of technological innovation with potential applications for personalized health.

- To harvest the richness of technological innovation in the ETH Domain institutions and to accelerate the development of selected technologies towards clinical utility in the field of personalized health.

- In this context the term “technology” is used in a broad sense and is not limited to specific laboratory techniques or instruments. Examples include technical advances for the collection of quantitative phenotypic, clinical or lifestyle data from populations or clinical cohorts; computational technologies for the integration of diverse data types; or technologies for the preservation of clinical samples for experimentation in the laboratory (iPS cells, organoids, etc.) – as long as their direct relevance for personalized medicine is demonstrated.

- It is expected that successful TechTrans Projects will be strong candidates for the generation of second-generation technology platforms.
Personalized Medicine / Personalized Health Research Projects – Drivers Projects (I)

- The interdisciplinary research projects will be carried out by consortia composed of a moderate number of research groups (typically 2 to 6) with complementary expertise.

- Applications for projects that bridge institutional and scientific discipline boundaries are particularly encouraged.

- The main applicant is responsible for the whole project proposal and will act, if the proposal is funded, as Principal Investigator (PI) who coordinates the co-PIs.

- Projects must show an interdisciplinary character by linking research groups from traditionally separate disciplines.

- Potential proposals may cover a wide range of research methods, technologies, and development tools. Therefore, PM/PH Research Projects with different scopes can be envisaged.