



Swiss TPH



Large-Scale Citizen Cohort & Biobank

Prof. Dr. Nicole Probst-Hensch

Head, Departement Epidemiology & Public Health



Swiss TPH

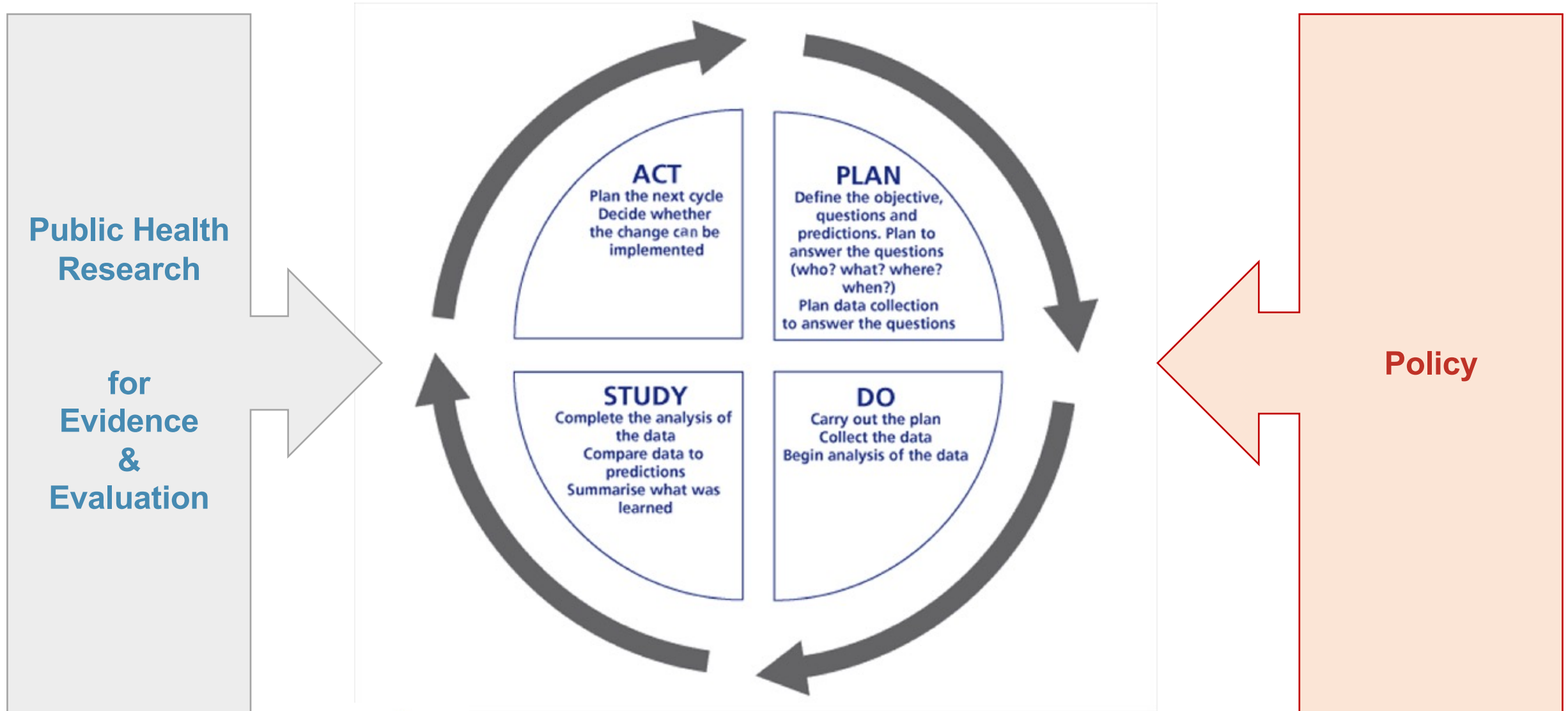


Citizen Cohorts & Biobanks

-

a key task of Public Health research

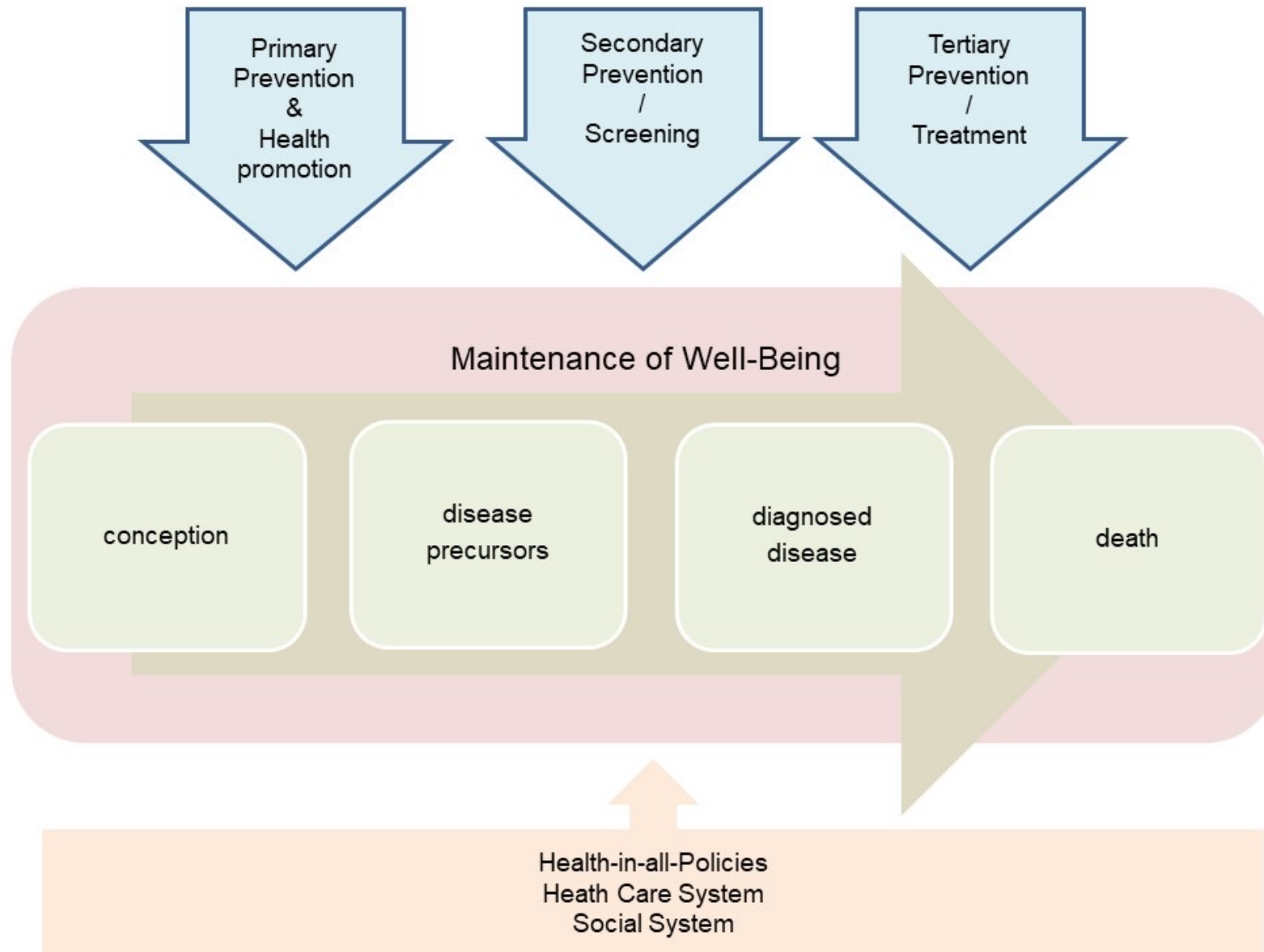
Public Health Action Cycle



Current demographic, ecological, social, digitalization and economic forces will create new priorities for public health and for future biomedical innovations.

There is a pressing need to put more emphasis on improving quality of life and less on extending life, and hence, more emphasis will need to be put on primary prevention and health promotion through health-in-all-policies.

There is a growing need for a shift to value-conscious innovation instead the “progress at any price” attitude that has dominated biomedical innovation until now. The economy will no longer be able to cope with the rapid increase in health care expenditures that arise in large part from innovations produced in an environment that ignores cost. The long-term utility and cost-effectiveness of innovations must be assessed .



Etiology

Physical, in Utero,
Social, Work, School,
Sports Environment
Social status
Lifestyle/Behaviour
Attitude
Perception
Use of (...wearables,
prevention, social
and digital media....)
.....

Screening

Biomarkers
(molecules, images)
Screening behaviour
Reference values
.....

Diagnosis

Disease incidence
Under diagnosis
Misdiagnosis
Application
(Guidelines, new
markers,.....)
.....

Prognosis

Disease control
Compliance
Treatment quality
costs
(social/health; work
absence....)
.....

Cohorts and Biobanks

a Public Health task – a Public Health research infrastructure

- Who stays healthy – who turns ill
 - **Long-term cohorts provide the evidence for successful primary prevention**

- Who carries what risk for a disease – who has preclinical disease?
 - **Long-term cohorts provide the evidence for the development of molecular and digital screening and diagnostic instruments of public health utility**

- How well is health care system functioning?
 - **Long-term cohorts and evolving patient subcohorts provide the evidence-based for evaluating strengths and weakness of the health care system**

- How well does health-in-all-policy work?
 - **Long-term cohorts provide the evidence-base for improving health promotion**



Swiss TPH



Citizen Cohorts & Biobanks

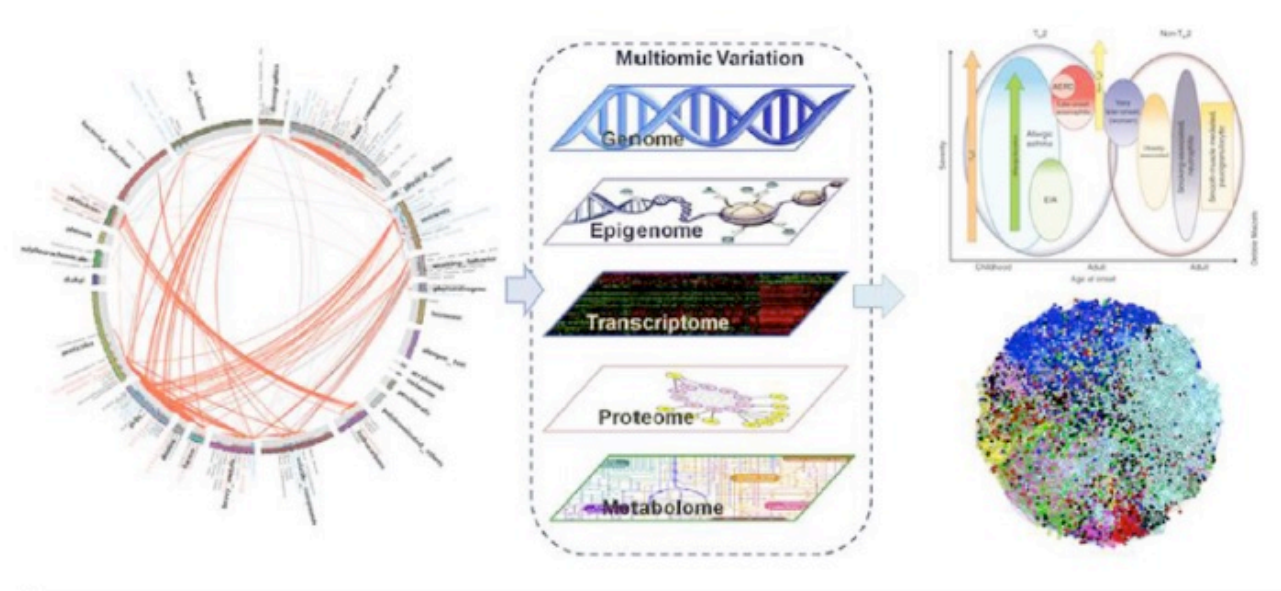
-

research for primary prevention
and health promotion

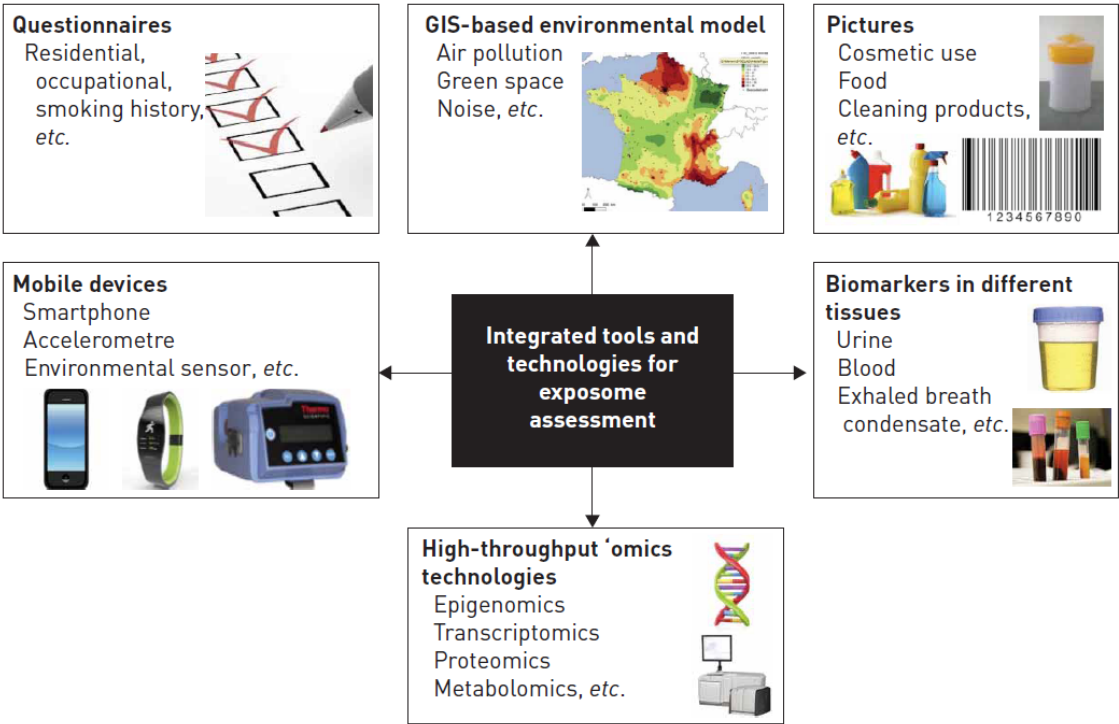
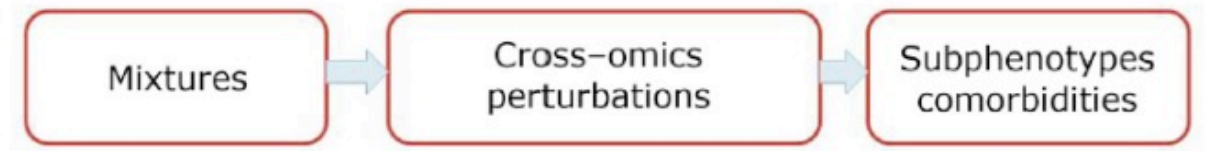
Exposom Science – towards improved causal inference

Probst-Hensch N. In: Patrinos GP, (ed). *Applied Genomics and Public Health*. San Diego: Elsevier Inc./Academic Press, 2020: pp-pp.
 Siroux et al. *Eur Resp Rev* 2017; *Topol EJ Cell* 2014

Systems epidemiology



Meet-in-the-middle concept—prospective biosampling



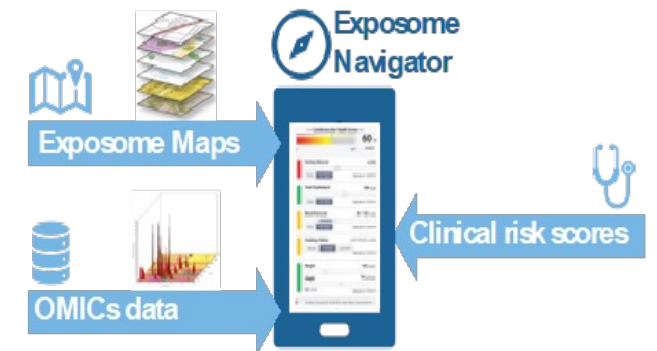
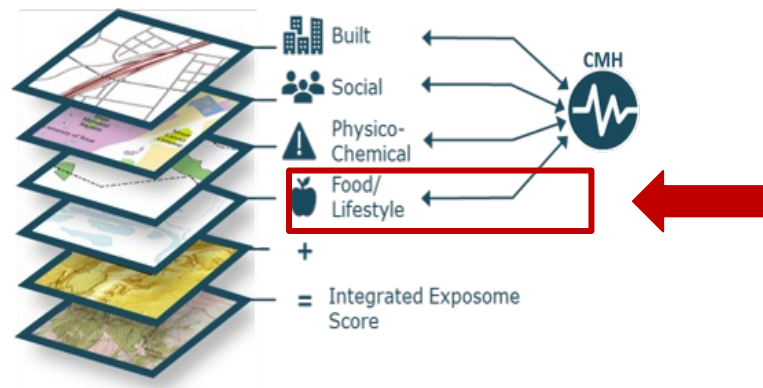
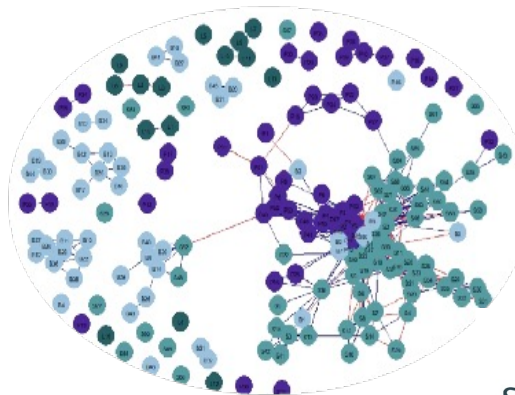
EXPANSE - a new era of epidemiological research

PI: R. Vermeulen; <https://expanseproject.eu/>

55 million cohort participants of **all ages** 12 countries – inkl. **SAPALDIA**

>25,000 biosamples for DNA methylation, transcriptomic, proteomic, microbiomics, chemical profiles – inkl. **SAPALDIA**

Linking exposome to cardiometabolic and respiratory health – inkl. **SAPALDIA**





Swiss TPH



Citizen Cohorts & Biobanks

-

research for personalized health
of utility

November 2015

Implementation of the “Swiss Personalized Health Network” (SPHN) Initiative

*Report
of the mandated Core Project Group (CPG)*

consisting of the following members:

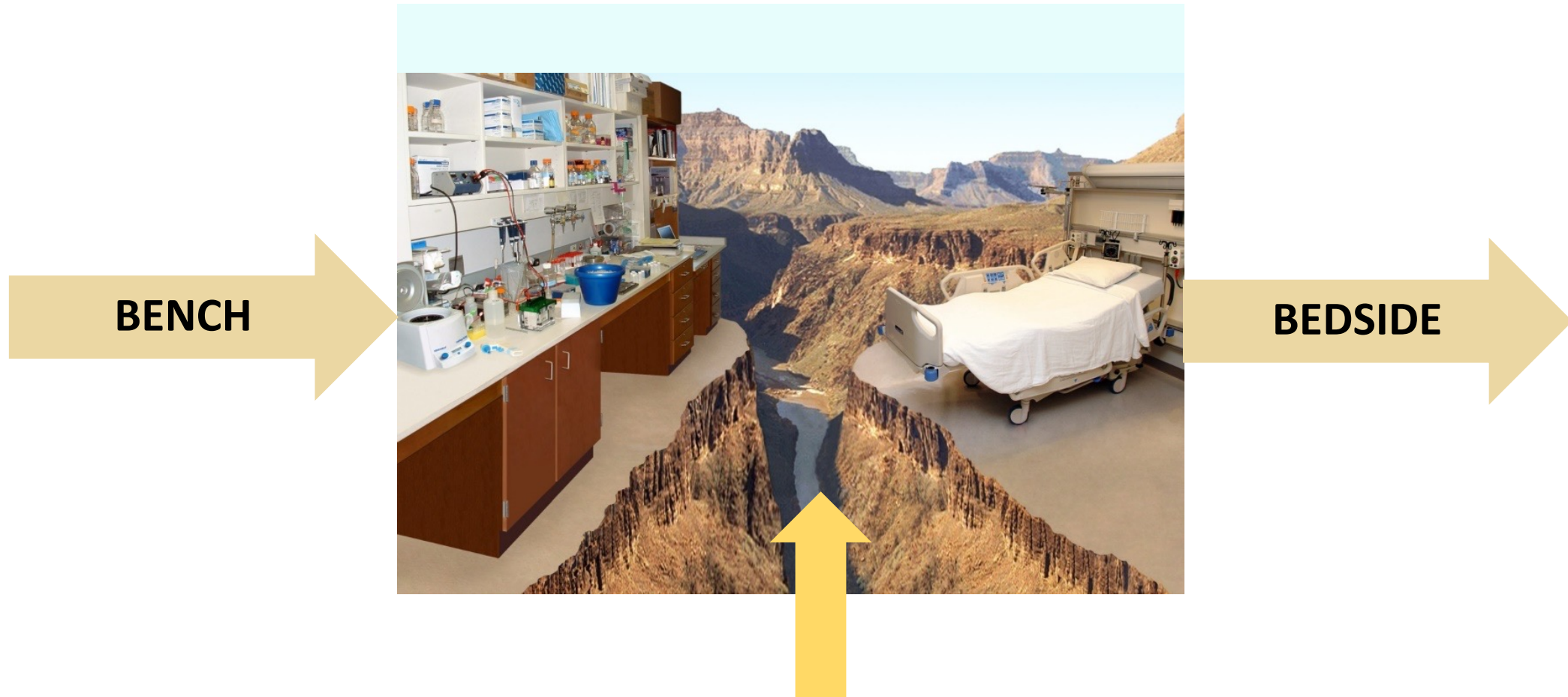
*Peter J. Meier-Abt (SAMS/chair), Ron Appel (SIB), Urs Frey (SNSF),
Detlef Günther (ETHZ), Vincent Mooser (CHUV), Nicole Probst-Hensch (UniBas),
Michael Röthlisberger (SAMS), Daniel Vonder Mühll (ETHZ)*

submitted to SERI, approved by the Steering Committee on January 7, 2016

5) In a second phase, there is a need for a large healthy population based reference cohort. Thereby, coordination and interoperability with the planned HBCP is of utmost importance.

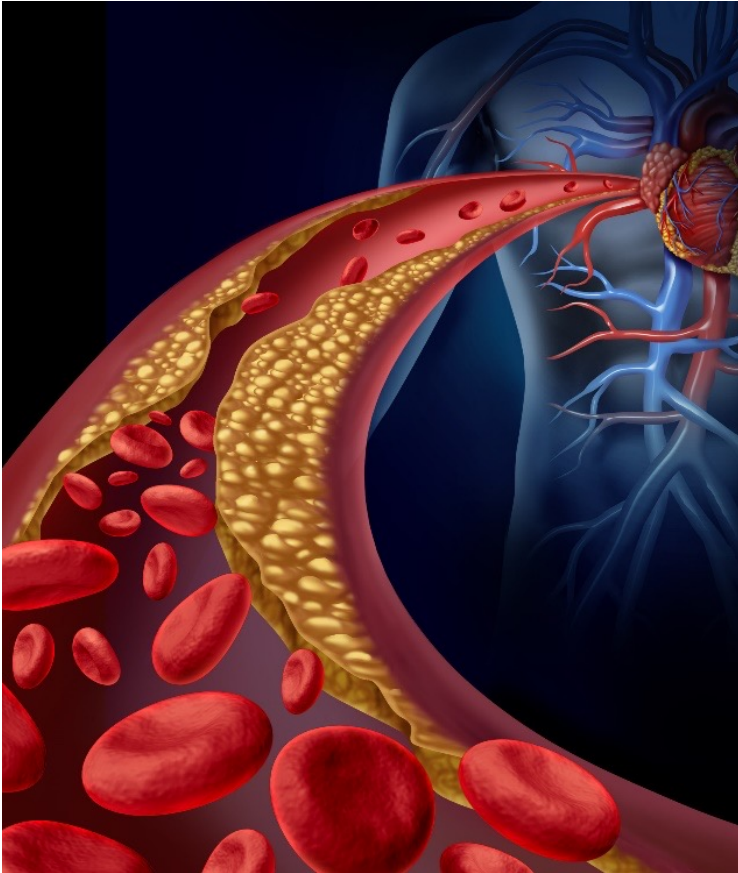
- **In the absence of Citizen Cohorts & Biobanks Swiss Personalized Health research will remain marginalized**
- **With Citizen cohorts it will be possible to independently evaluate the public health utility of novel personalized health innovations**

«The death valley of healthy citizens» in the «bench-to-bedside» era



130 von 215 Mio US\$ Investments für U.S. Präzisionsmedizin gehen an die **1 Mio Citizens "All of Us" cohort & biobank**

Biomarker measured while healthy – what keeps us healthy?



Blood lipids and cardiovascular diseases



Pesticide mixtures and neurological effects



Brain image patterns and Alzheimer's



Swiss TPH 



Citizen Cohorts & Biobanks

-

Public Health Research Institutes know
«how to» – in translational and clinical
collaboration

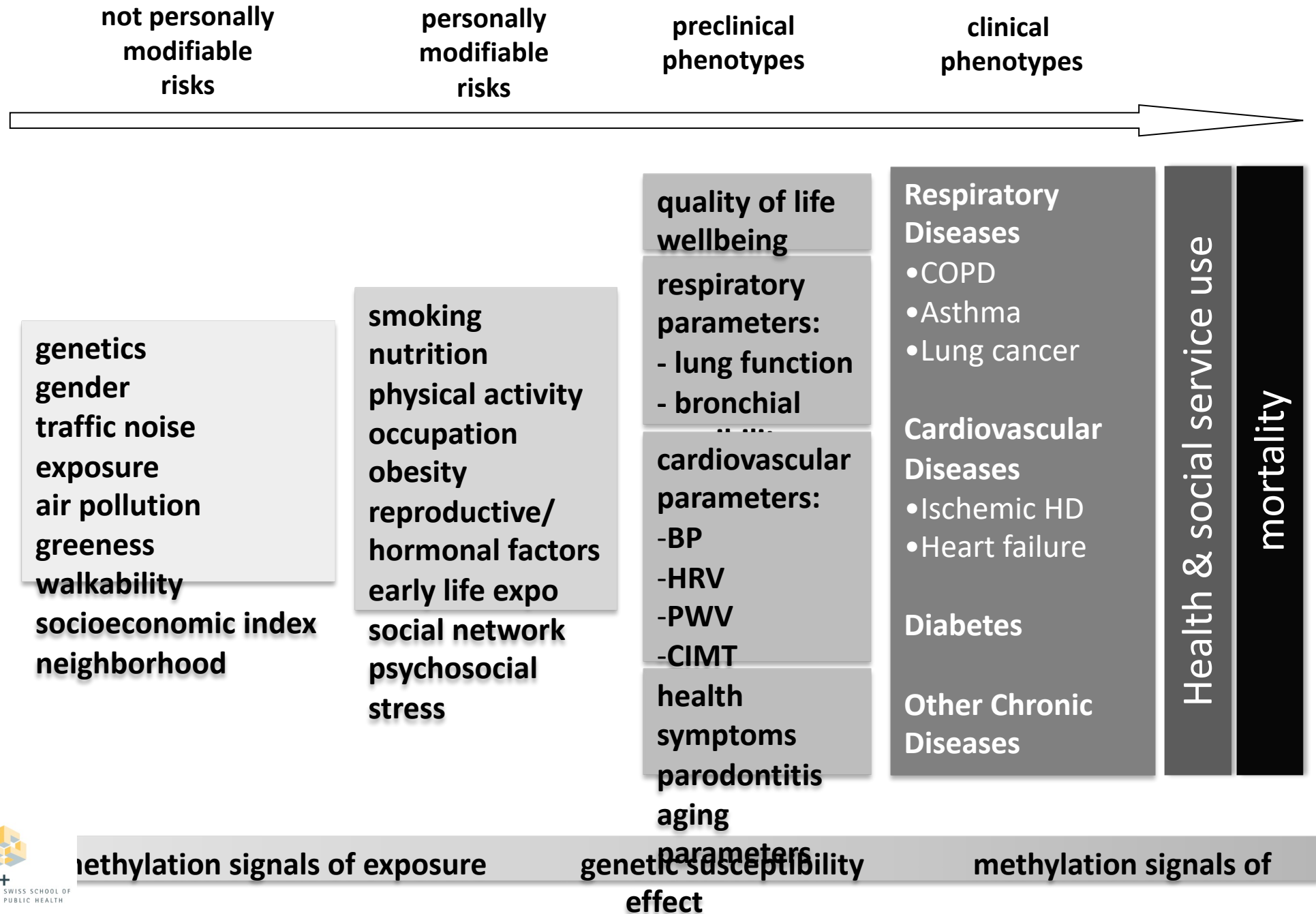
SAPALDIA

only Swiss-wide citizen cohort

> 30 years of follow-Up

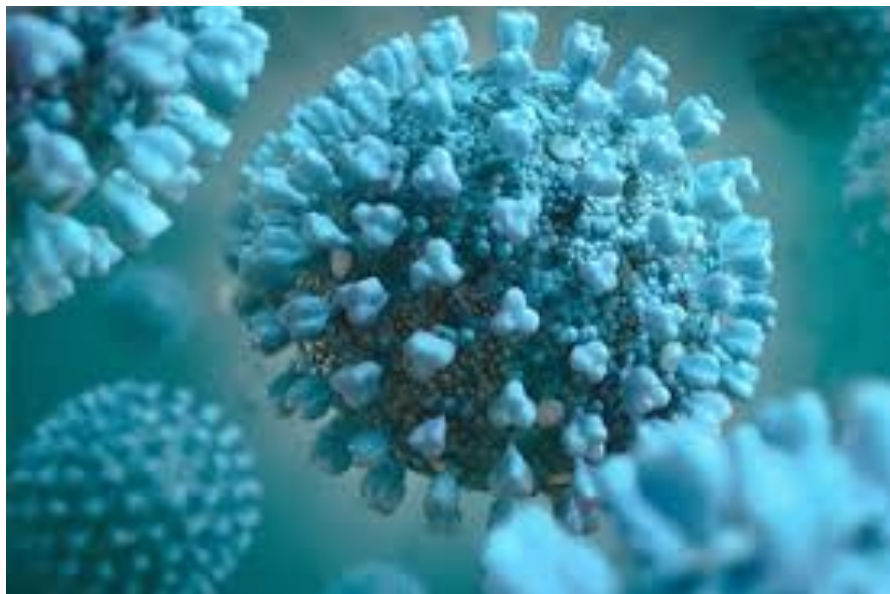
basis and protocols for Swiss Health Study pilot

first Swiss-wide genome



Corona Immunitas – a national public health success story

Impact of SARS-CoV-2 Virus



Impact of containment measures





Swiss TPH 



It is high time for a Swiss
large-scale Citizen Cohort
with associated Biobank

Switzerland needs its own, yet internationally harmonized, large scale cohort for several reasons:

For **Swiss citizens** to benefit directly from high-quality research that captures their context-specific chronic exposures to beneficial and/or potentially damaging exposome factors and their impact on health and well-being, while taking into account individual-specific factors (e.g., genetic, social, environmental, cultural, etc.)

For the **Swiss healthcare systems** to benefit from population-based long-term information to evaluate their functioning

For **cantonal and federal public health authorities** to benefit from timely evidence-based information and human biomonitoring to plan and orient public health policies and interventions and to effectively investigate and respond to novel technological trends, medical innovations, as well as new environmental or pathogenic health threats

For **Swiss researchers** to be internationally competitive by a) having access to and bringing to the international negotiating table high-quality longitudinal data, biological specimens and medical images on a large scale and b) benefitting from access to international genetic and exposome data for providing novel insight into disease processes through comparative approaches.

For **Swiss academic career promotion** in various research domains including digital and e-health to have access to rich longitudinal exposure, health and biomarker data

For **Swiss citizen science** to benefit from research conducted in close collaboration with citizens to assure that it reflects their needs

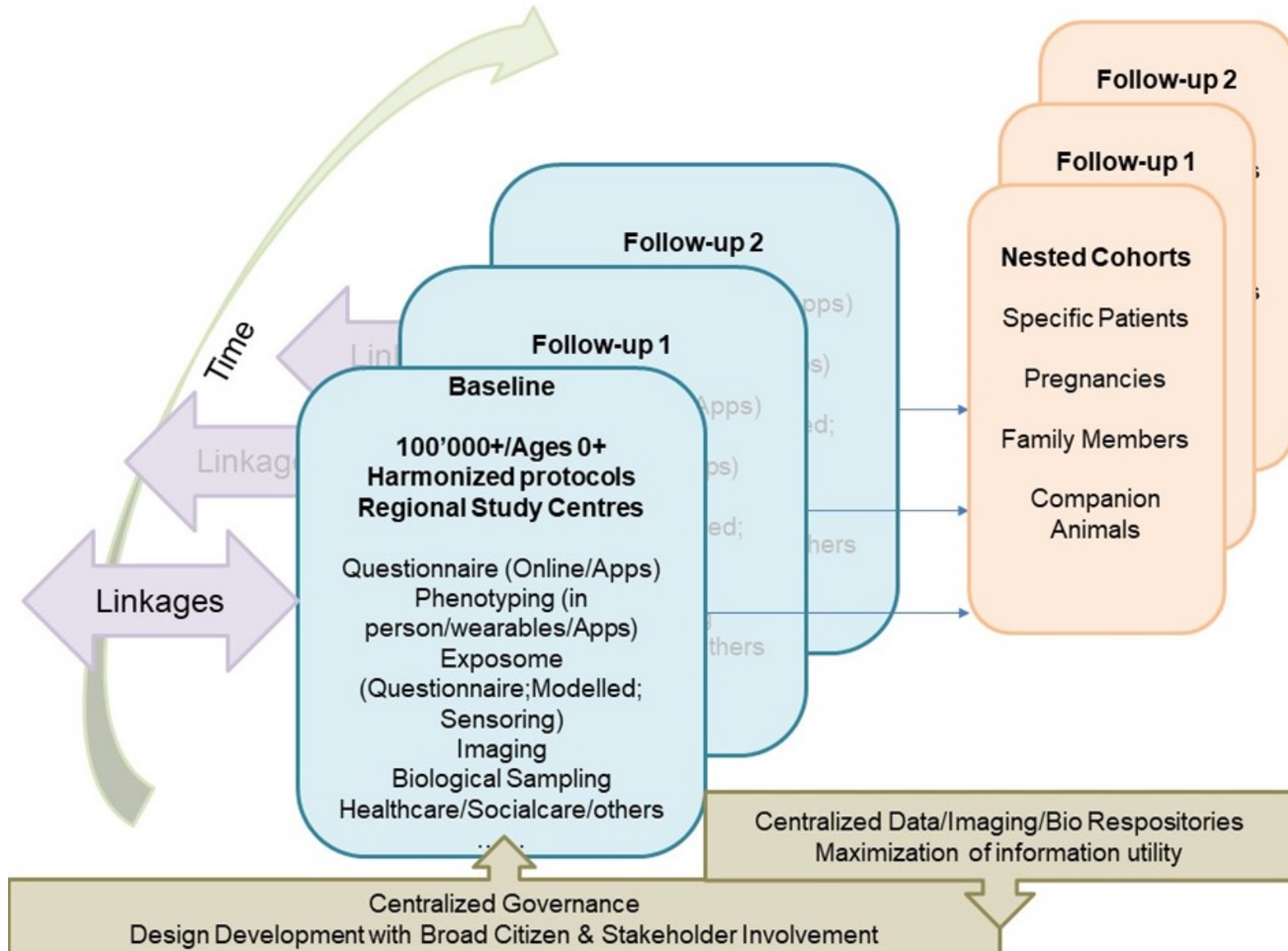
For **Swiss public-private partnerships** to benefit from ample opportunities offered by a large citizen biobanks in life sciences and life science technology

Switzerland is not able to contribute a sufficiently large cohort to the international cohort and biobank research community consortium as of today. In the era where health data is the “new gold”, this will jeopardize the scientific and also digital and economic success of the country

The available Swiss cohorts enable research on a wide range of public health subjects, in particular in combination with other longitudinal or environmental data. But their sample size, their stronger focus on adults, their lack of harmonization, and their lack of sufficiently sized biobanks by now limit the international competitiveness of public and personalized health research in Switzerland.

SAPALDIA remains for now the only Swiss-wide citizen biobank based on the visionary set-up of a high quality biobank linked to a research promoting consenting procedure. Through SAPALDIA, Corona Immunitas and the pilot phase of the Swiss Health Study, as well as more local biobanks linked to CoLaus and Bus Santé, the Swiss public health research community of the SSPH+ network has proved its ability to set-up and lead citizen cohort programs in a national inter-university and transdisciplinary collaboration.

The public health research community has the competencies, experience and the will to jointly develop and implement a Swiss large-scale citizen cohort in close translational partnership with other scientists and with policy makers





Swiss TPH



Thank you