



Medical University of Graz

BIOBANKING AND THE EXPOSOME

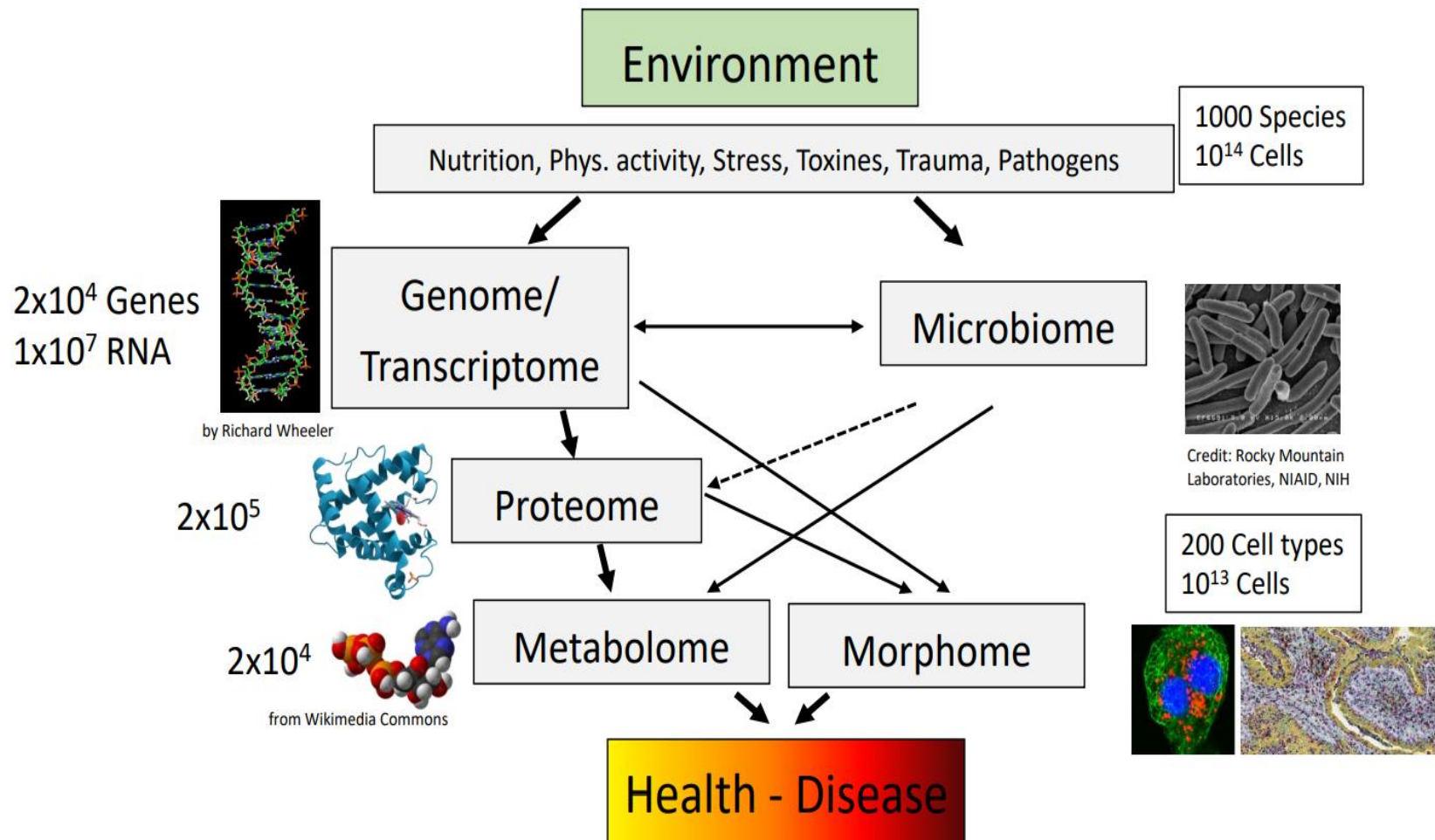
Kurt Zatloukal

Diagnostic and Research Center for Molecular Biomedicine

**HEAP Symposium Frontiers in human Exposome research
Graz 1.6.2022**



Linking Environment to Human Health Needs Exposome data - biosamples and health data



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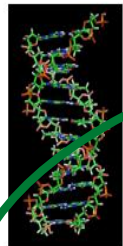
Exposome



Nutrition, Phys. activity, Stress, Toxines, Trauma, Pathogens

1000 Species
 10^{14} Cells

2×10^4 Genes
 1×10^7 RNA



by Richard Wheeler

Genome/
Transcriptome

Microbiome



Credit: Rocky Mountain Laboratories, NIAID, NIH

Bio-banks

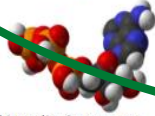
2×10^5



Proteome

200 Cell types
 10^{13} Cells

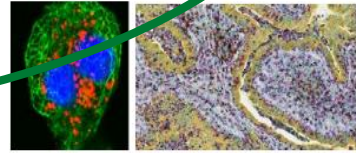
2×10^4



from Wikimedia Commons

Metabolome

Morphome



Health - Disease



BBMRI-ERIC: Europe's Biobanking Research Infrastructure



18 Full Members

Austria: European Headquarters

Belgium

Bulgaria

Czech Republic

Estonia

Finland

Germany

Greece

Hungary

Italy

Latvia

Malta

Netherlands

Norway

Poland

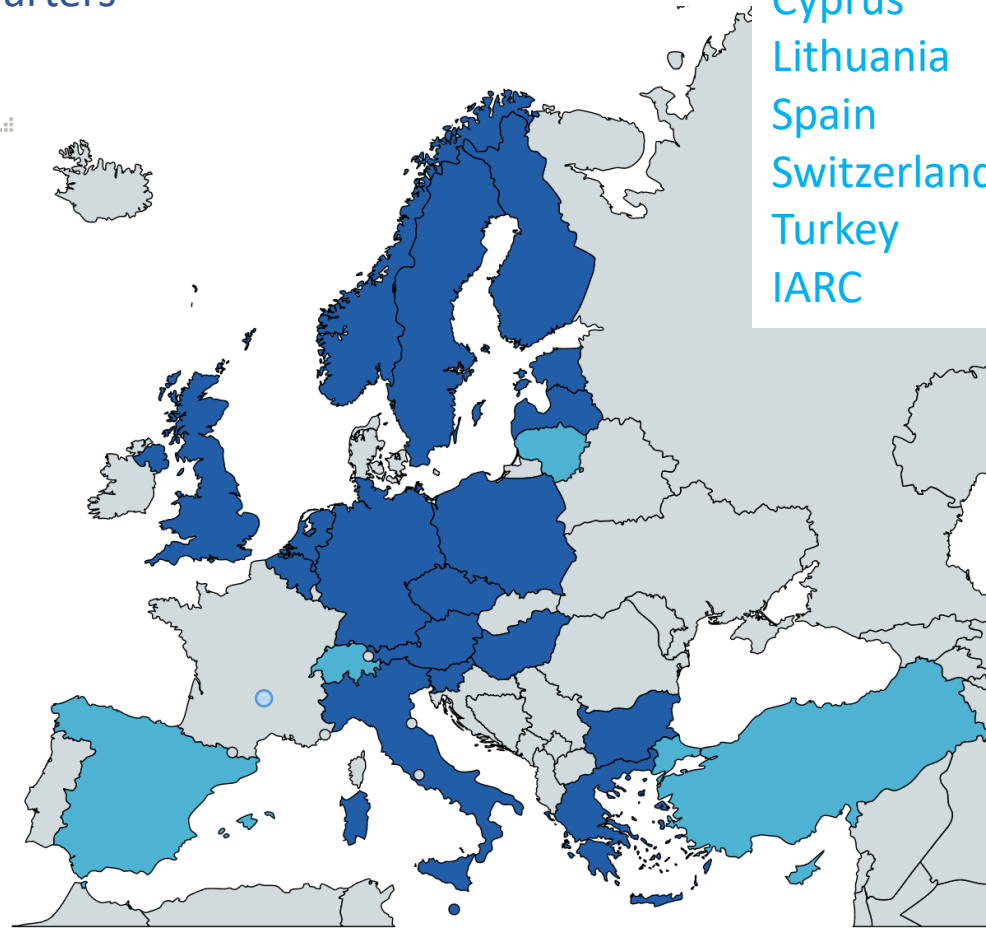
Slovenia

Sweden

United Kingdom

BBMRI-ERIC 2022

- Full members
- Associated members



6 Observer Members

Cyprus

Lithuania

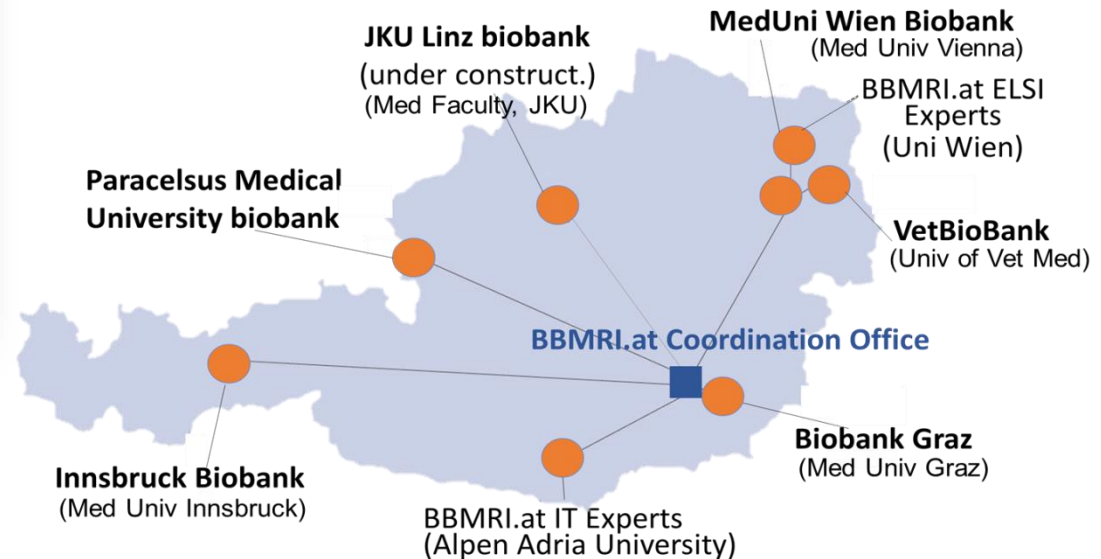
Spain

Switzerland

Turkey

IARC

THE AUSTRIAN NATIONAL NODE OF BBMRI-ERIC



Funded by BMBWF:

1.12.2013 -30.11.2018 3.50 m€ 5 yrs

1.12.2018 -30.11.2023 3.65 m€ 5 yrs

Funded by BMBWF-10.470/0010-V/3c/2018 (2018-2023)

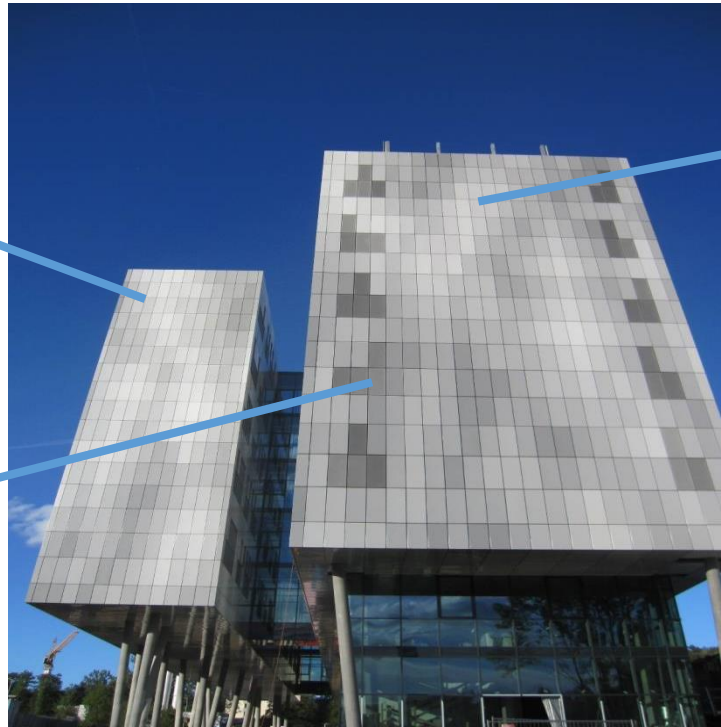
The Biobanking Hub Graz, Austria



Austrian node coordination



MUG biobank



European headquarters



BBMRI-ERIC: Impact

- Enabling high quality collaborative research of academia and industry
- Supporting access to quality controlled biosamples and data in an ethically and legally compliant manner
- Providing research services; education & training

Additional impact:

- Structuring national scientific community
- Harmonization of procedures & enhancing collaboration
- Stimulating public and private R&D investments



Biobanking and Exposome Research



What can BBMRI contribute?

- Standardized collection and preservation of biosamples
 - Experience in processing indentifiable data for research
 - Knowledge on ELSI compliance for international collaboration
- We can share knowledge, technologies and tools

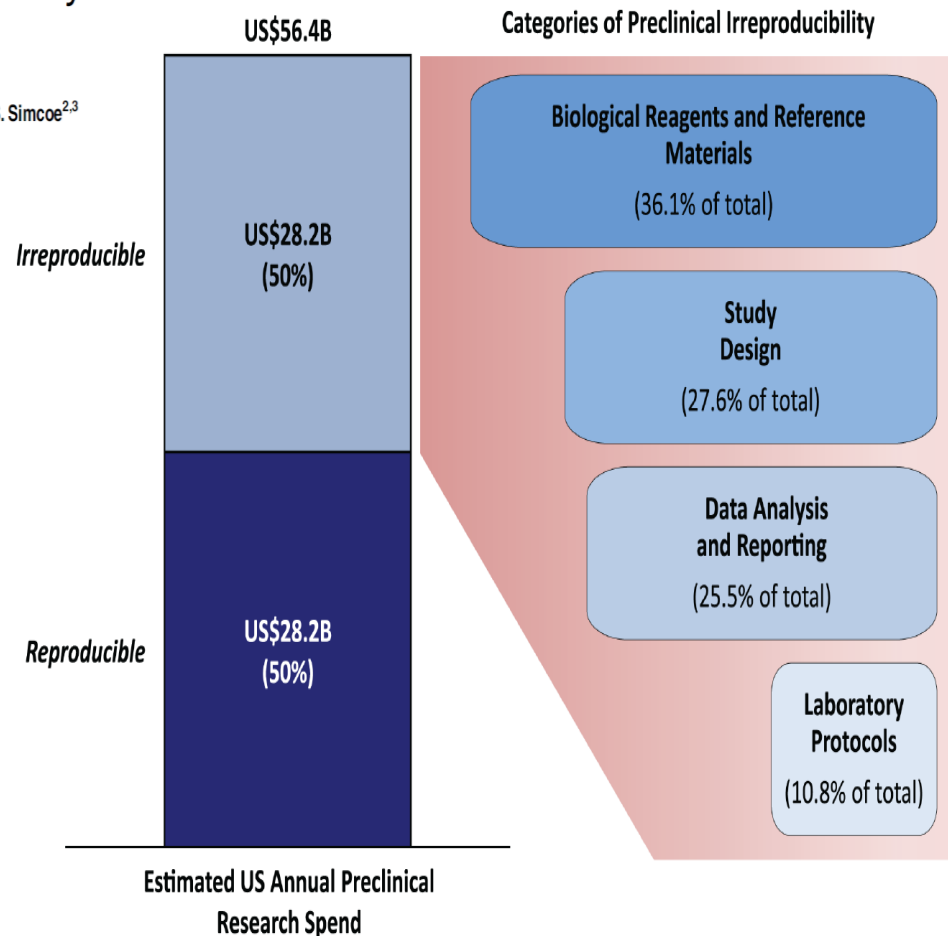


The Sample Garbage In Garbage Out Issue

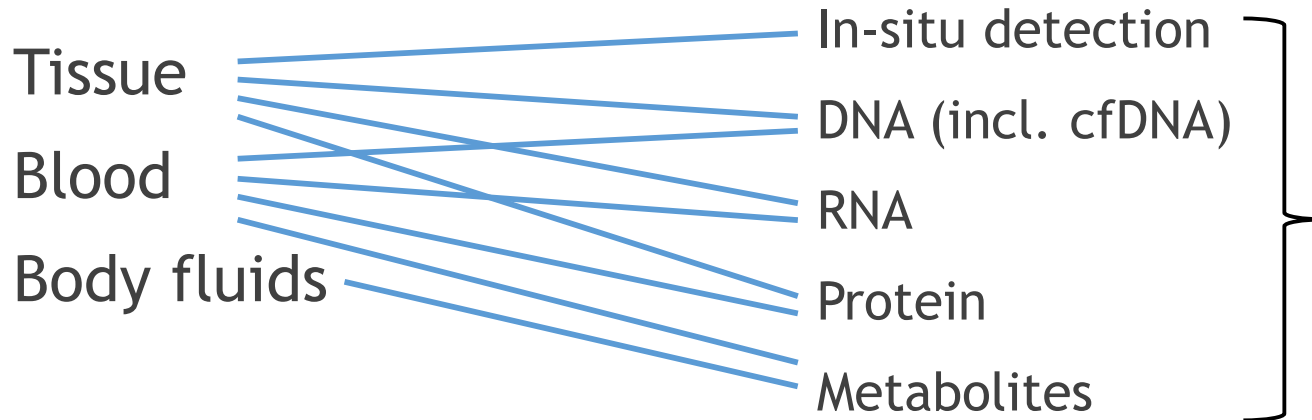
PERSPECTIVE

The Economics of Reproducibility in Preclinical Research

Leonard P. Freedman^{1*}, Iain M. Cockburn², Timothy S. Simcoe^{2,3}



Standards for Sample Quality: ISO Standards and CEN/TS for Pre-examination Processes



EN ISO 20166 series
EN ISO 20186 series
EN ISO 20184 series

In addition: FNA, CTCs, exosomes, saliva, microbiome

➡ Standards as enabler of innovation

Biobanking and Health Data



The Data Garbage In Garbage Out Issue

Report of UN Secretary-general's high-level Panel on Digital Cooperation:

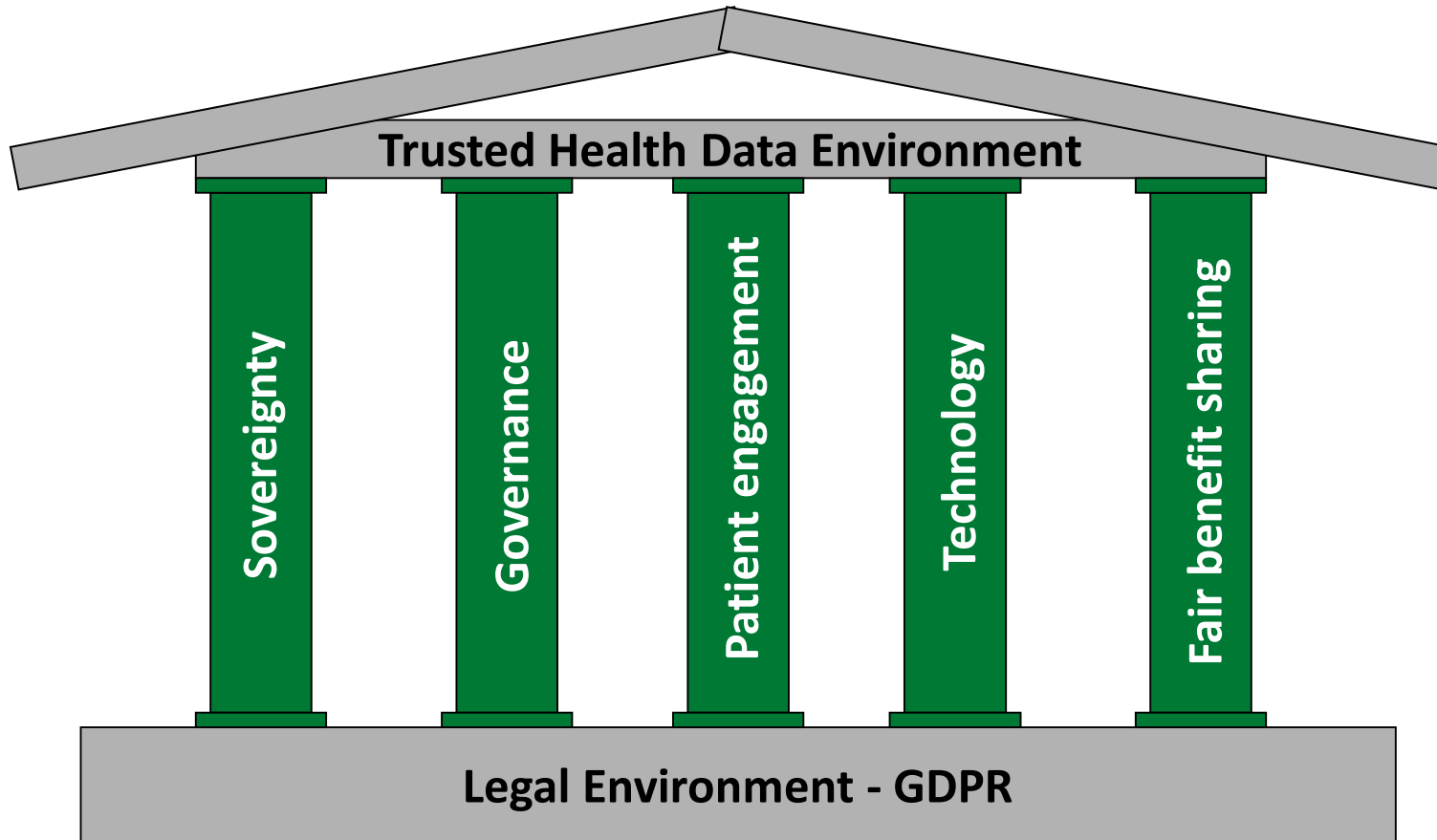
"Gaps in the data on which algorithms are trained can likewise automate existing patterns of discrimination, as machine learning systems are only as good as the data that is fed to them."



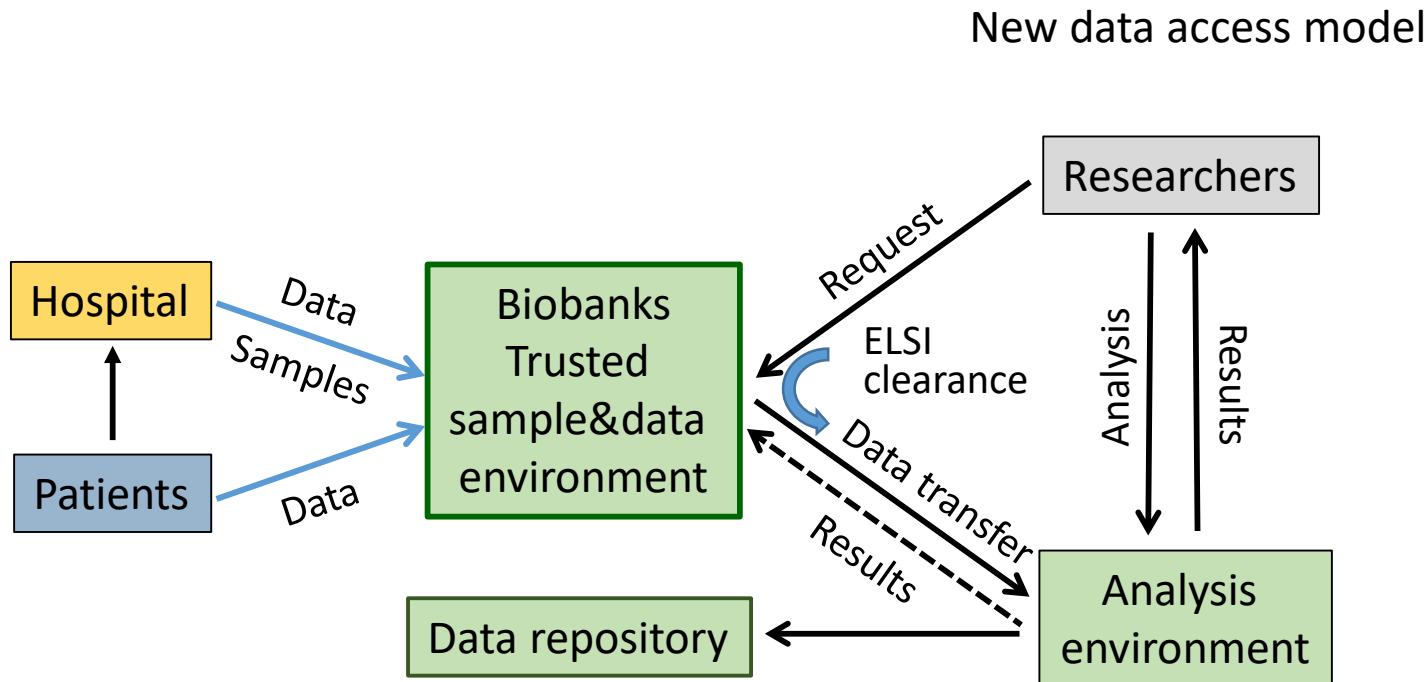
Data should include:

- Various disease types and comorbidities
- Information on life style and environmental exposure
- Data from different populations

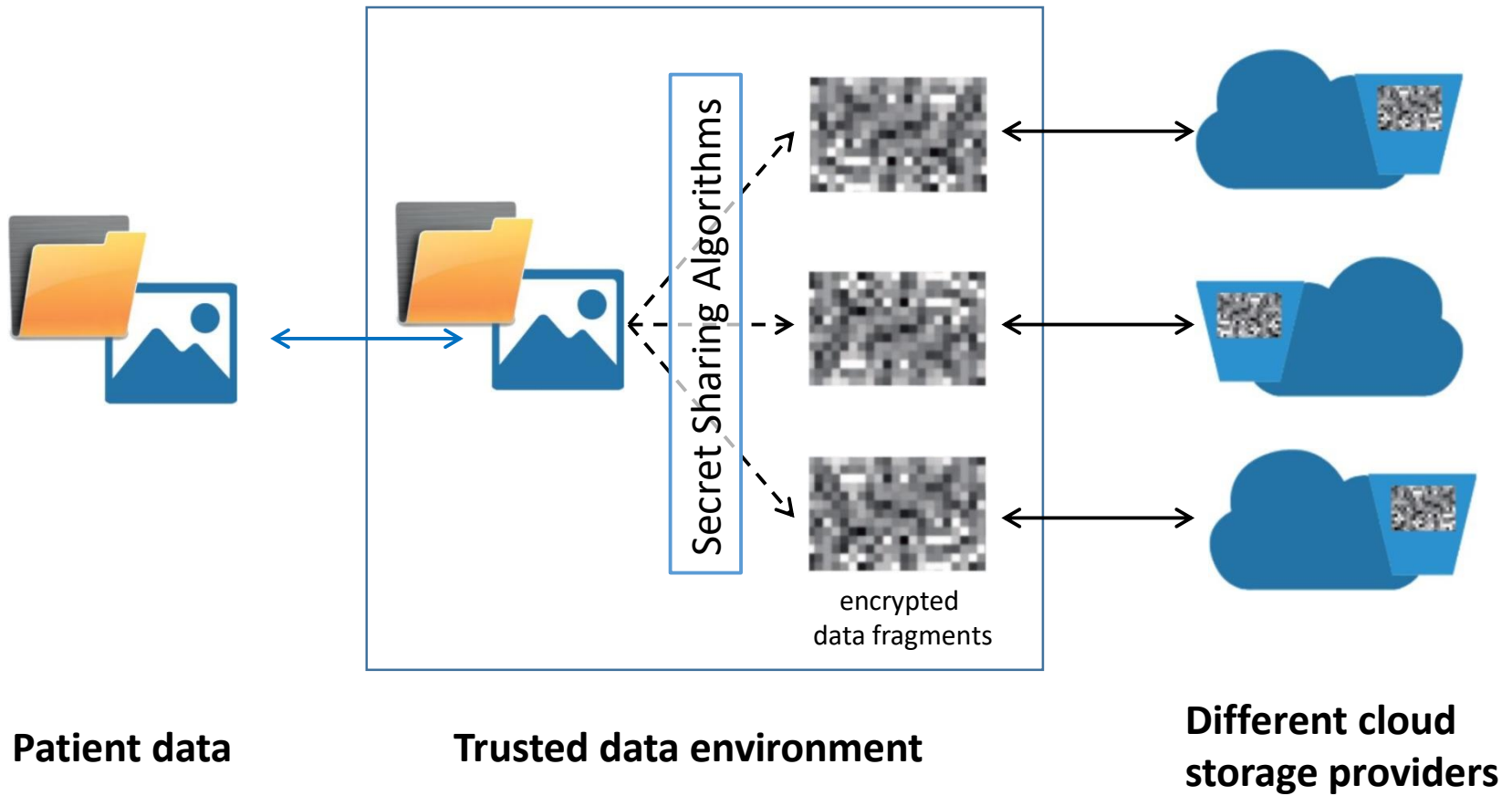
How to Build a Trusted Research Environment for Patient Data



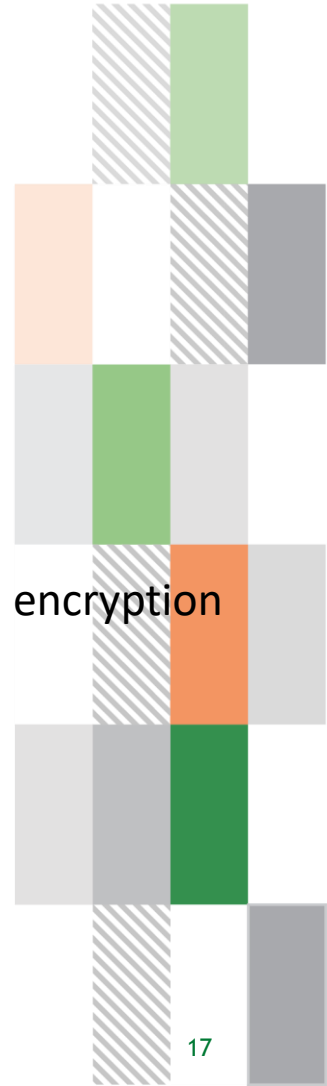
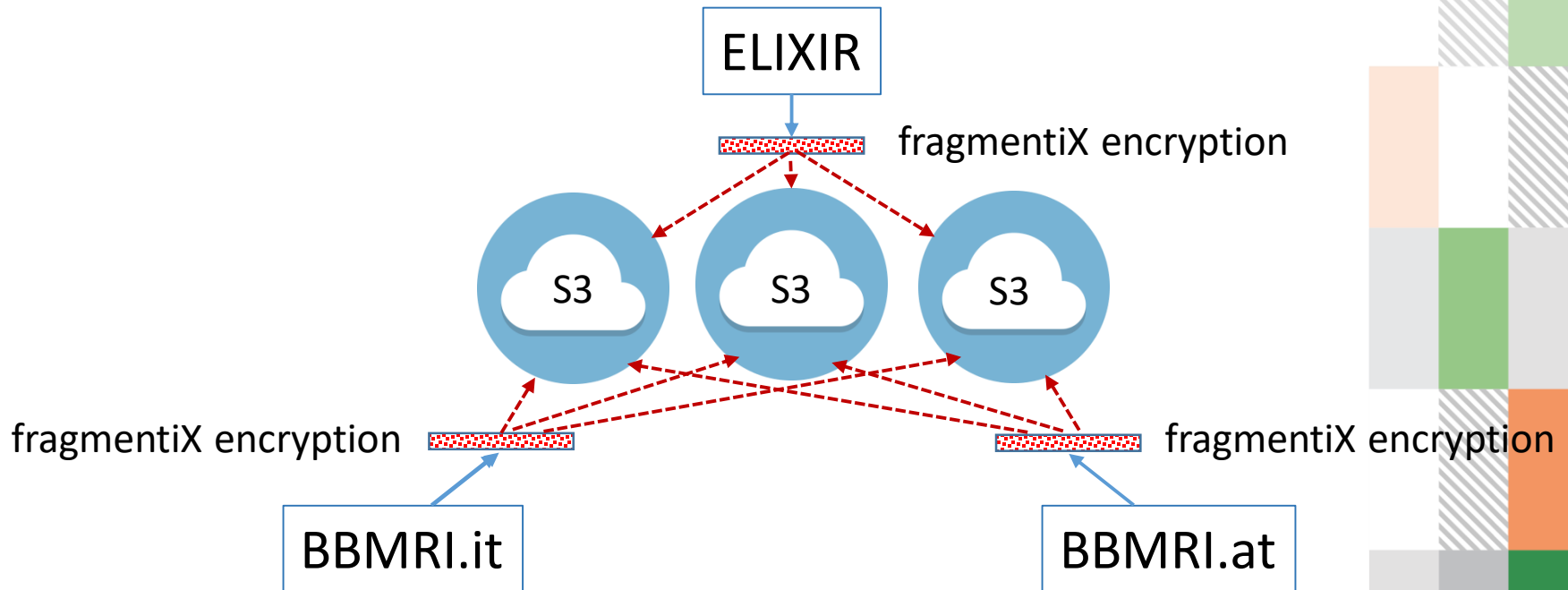
Example of a Trusted Health Data Environment for Research and Innovation



Shamir Secret Sharing



Planned Use Case: Secure joint health data space for research



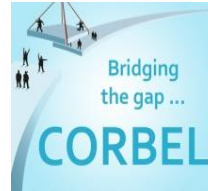
Acknowledgement



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Biobanking and
BioMolecular Resources
Research Infrastructure
Austria

Funded by:
BMBWF-10.470/0010-V/3c/2018
(2018-2023)



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BioMolecular Resources
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Austria



**ADOPT
BBMRI-ERIC**
gateway for health

Project number: 676550



BRIDGING BIOBANKING AND BIOMEDICAL RESEARCH
ACROSS EUROPE AND AFRICA



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IDE@S ist von der Regierung des Landes
Steiermark gefördert (ABT08-24920/2020-14)



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HRSM Digital Pathology Consortium
SPIDIA consortium
Biobank Graz
Student scanning team



**Thank you for your attention
and
Looking forward to collaboration!**

