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ESFRI BBMRI AND JPI HEALTHY DIET FOR A HEALTHY LIFE

Markus Pasterk
COO & VP/Science

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The grand challenges

- **Global warming**
- **Supplies of energy, water and food**
- **Ageing societies**
- **Public health**
- **Pandemics and security**

Swedish Presidency, Lund Declaration 2009

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The grand challenges

- Global warming
- Supplies of energy, water and food
- Ageing societies
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} **rely on access to biological resources**

Swedish Presidency, Lund Declaration 2009


MARCH 23, 2009
Annual Special Issue
TIME
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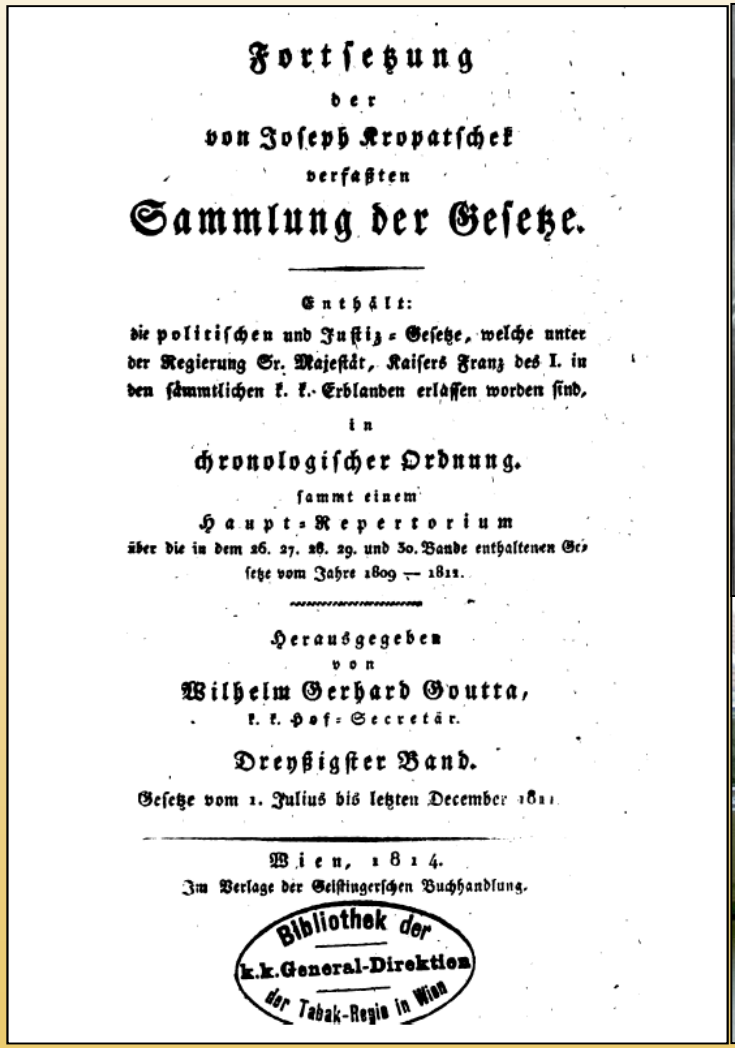
REPURPOSING THE SUBURBS
BIOBANKS: SAVING YOUR PARTS
THE NEW CALVINISM
ECOLOGICAL INTELLIGENCE
AMORTALITY: FOREVER YOUNG
AFRICA: OPEN FOR BUSINESS
REINVENTING THE HIGHWAY
www.time.com

First biobanks: pathology cabinets



Fortſetzung
der
von Joſeph Kropatſchek
verfaßten
Sammlung der Geſetze.

Enthält:
die politiſchen und Juſtiz-Geſetze, welche unter der Regierung Sr. Majeſtät, Kaiſers Franz des I. in den ſämmtlichen k. k. Erblanden erlaſſen worden ſind,
in
chronologiſcher Ordnung.
ſammt einem
Haupt-Repertorium
über die in dem 26. 27. 28. 29. und 30. Bande enthaltenen Geſetze vom Jahre 1809 — 1811.

Herausgegeben
von
Wilhelm Gerhard Goutta,
k. k. Hof-Secretär.

Dreyßigſter Band.

Geſetze vom 1. Julius bis letzten December 181

Wien, 1814.
Im Verlage der Geiſtingerſchen Buchhandlung.

Bibliothek der k.k. General-Direktion der Tabak-Regie in Wien

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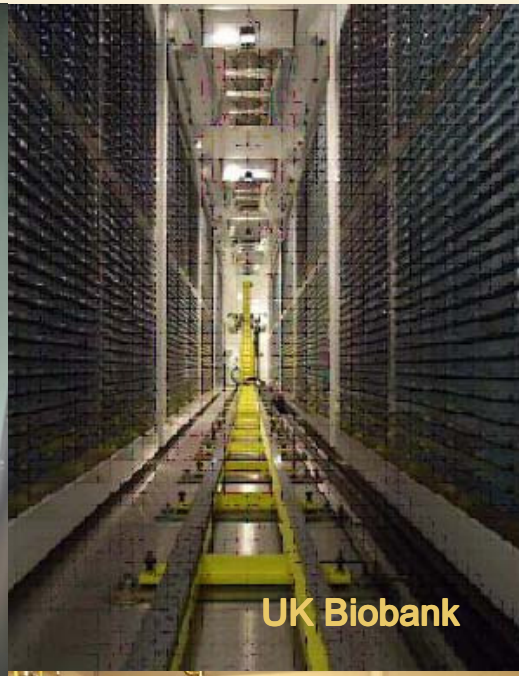
Modern biobanks: collections of biological samples and data


Biobank MUG


UK Biobank


HIV Bank Fraunhofer Saarland


EPIC IARC Lyon

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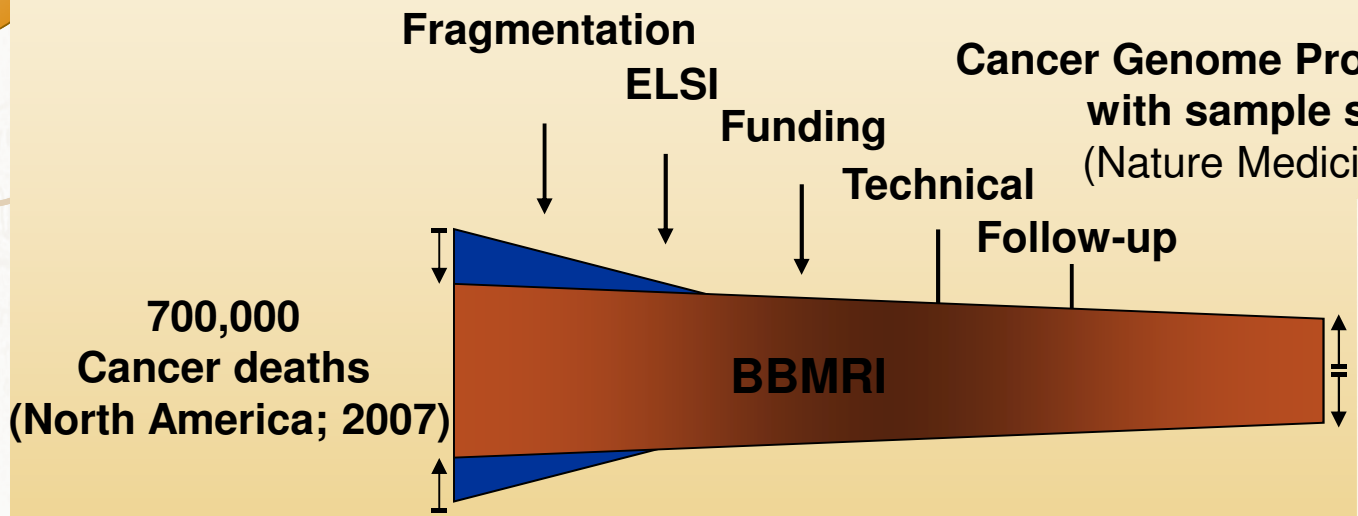
What has changed?

- **New medical challenges (ageing population, personalized medicine)**
  - → More samples, different genetic backgrounds
- **New analytical technologies**
  - → Specific quality requirements
- **Need for international collaboration**
  - → Standardisation, harmonisation, interoperability
- **Complex regulatory framework**
  - → Institutional biobanks

Biobanks in Medical Research



Cancer Genome Project struggels with sample shortage
(Nature Medicine 2007)

Long haul: The Lung Cancer Tissue Bank has only 20 of the 500 samples required.

- NCI: Biological sampels are #1 roadblock
- OECD: Global Biological Resource Centre Network
- WHO/IARC: Standards for biological resource centres
- ESF: Science Policy Briefing: Need for integration
- EU/ESFRI: Research infrastructure for Biobanks and Biomolecular Resources (BBMRI)

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The facility

A pan-European and broadly accessible network of existing and de novo biobanks and biomolecular resources. The infrastructure will include samples from patients and healthy persons, molecular genomic resources and bioinformatics tools to optimally exploit this resource for global biomedical research.

Key Components of BBMRI

Human biological samples and data

Healthy Population

Patients

Serum

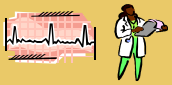
PBMC

DNA

FFPE tissues

Frozen tissues

Cells



Fam. history
Lab. param.
Treatm. outcome
Lifestyle

Analysis tools

Antibodies
Affinity binders
Recomb. proteins

Gene clone collections*
siRNA libraries*
Cell lines*
Model organisms*

Infrastructure

Sample storage

Data storage
Biocomputing

Application

Basic research
Life sciences

Targets for
Drug discovery

Biomarkers for
Drug development

New diagnostics

Personalized medicine
Public health

*: ESFRI BMS report but not funded

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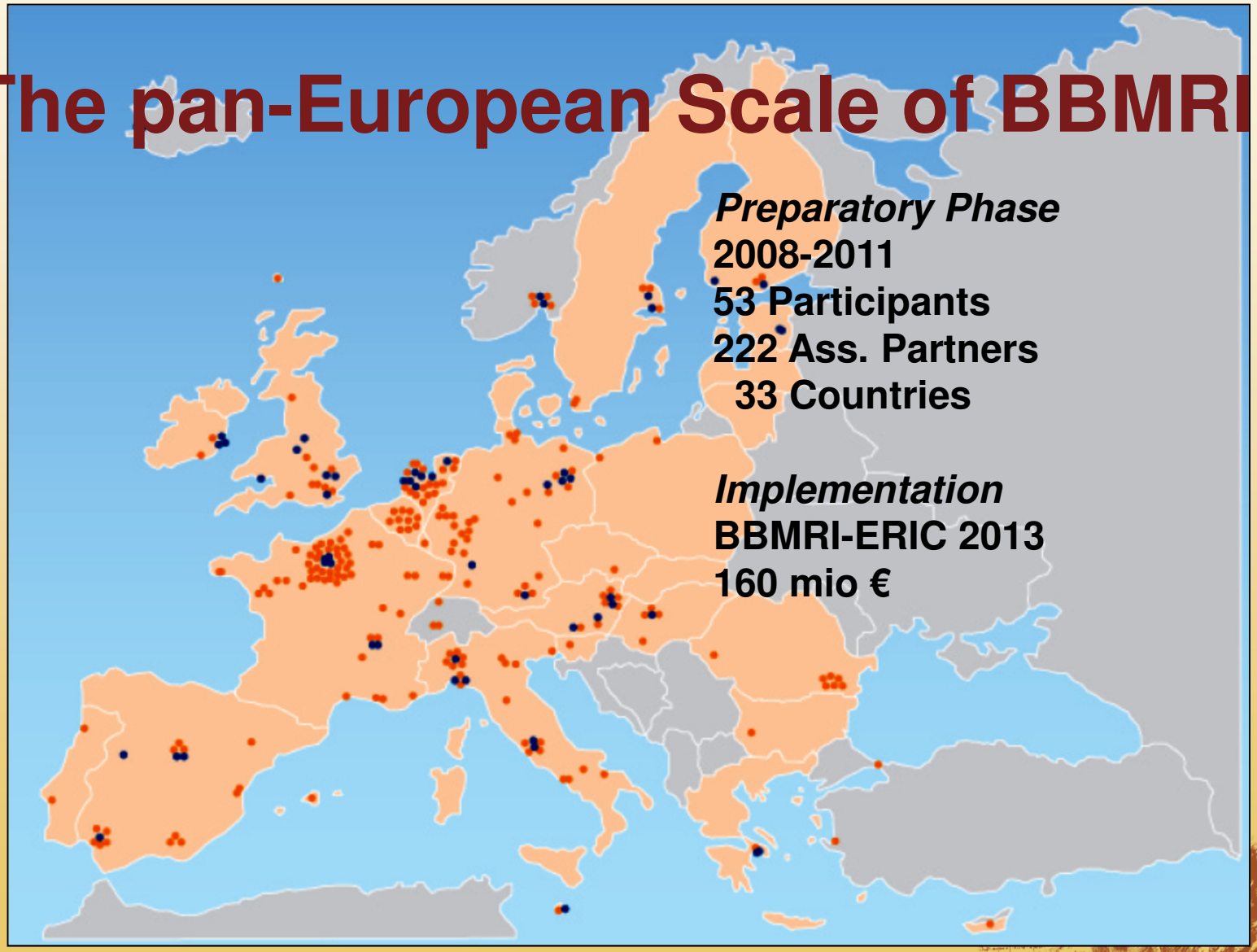
The pan-European Scale of BBMRI



Preparatory Phase
2008-2011
53 Participants
222 Ass. Partners
33 Countries

Implementation
BBMRI-ERIC 2013
160 mio €

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The Preparatory Phase of BBMRI #1

BBMRI has provided, will extend and consolidate:

- Biobanks of different formats (based on collections of DNA, tissue, cells, blood and other body fluids, together with pertinent medical, environmental, life-style and follow-up data)
- Population cohorts, including prospective and twin cohorts
- Clinical case/control cohorts including disease-focused cohorts
- Cohorts from isolated populations
- Biomolecular resources (comprising antibody and affinity binder collections, ORF clone collections, siRNA libraries, proteins, cellular resources etc.)

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The Preparatory Phase of BBMRI #2

- An inventory of enabling technologies and high-throughput analysis platforms and integration of sites specialized in development of molecular tools to decipher gene, protein and metabolite functions and their interactions
- The first steps towards harmonized standards for sample collection, storage, and analysis, in close coordination with previous and parallel activities like the worldwide P3G programme
- The first steps towards harmonized data collection, logistics and database- and biocomputing infrastructure
- An inventory of the ethical, legal and societal landscape in Europe, with an outlook towards providing guidance towards future harmonization of regulations.

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BBMRI will provide:

- Access to high quality human biological samples and associated data
- Access to biomolecular resources (antibodies, gene clones, model organisms, pathogens)
- Data management infrastructure
- Ethical and legal services
- Research services

- Long-term sustainability
- Pan-European implementation
- International integration

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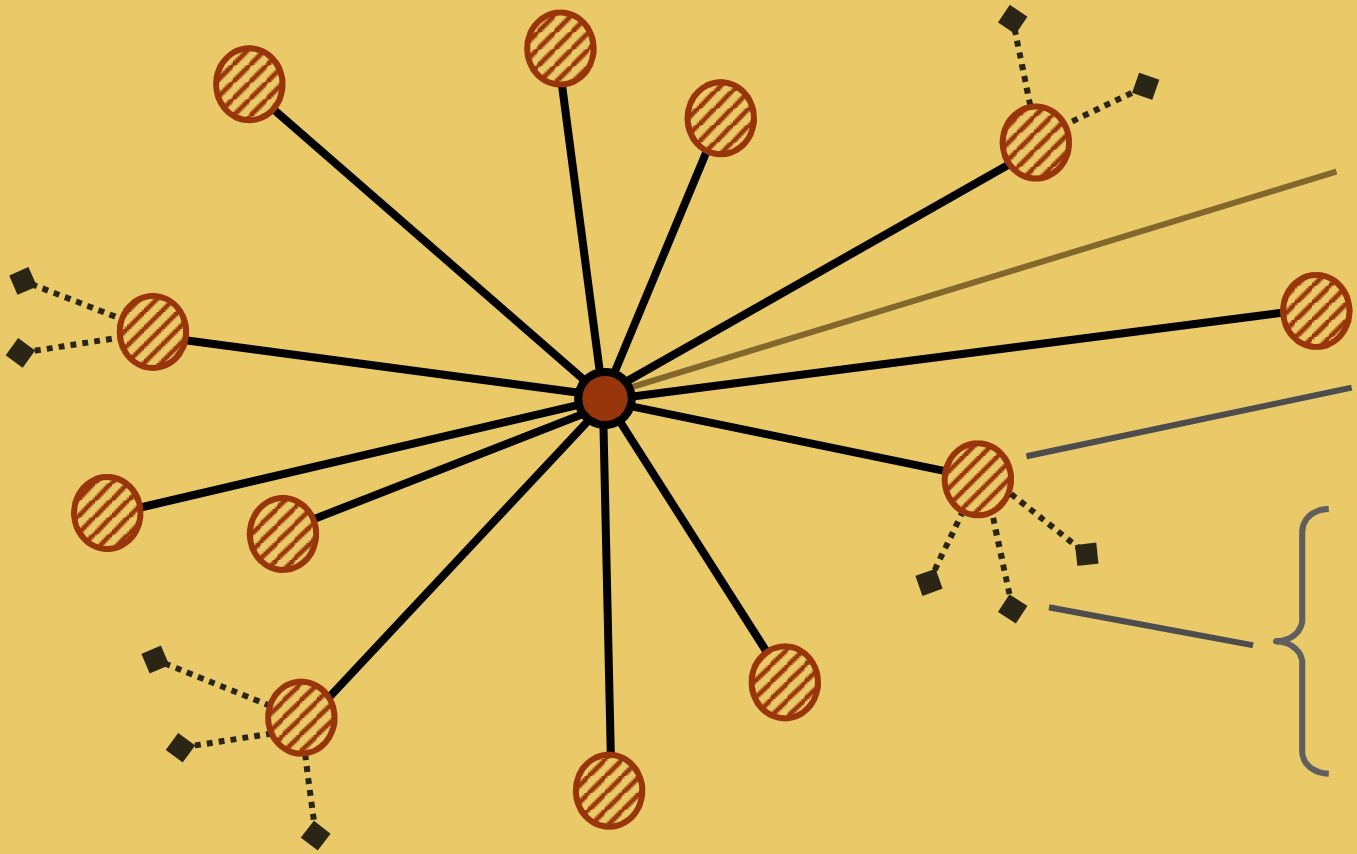
Expected Impact of BBMRI

- BBMRI should provide a pan-European framework to foster excellence in biomedical research
- projects become better, faster, cheaper
- Access to high quality resources, technologies, services, education and training
- Partner for academia and industry
- SMEs: Strategic partner, customer
- Pharma and Biotech: Biomarker and drug development
- Incubator for regional development
- Start-up packages

Distributed Structure of BBMRI-ERIC

hub and spoke structure



Headquarter
(Austria)

National nodes

Associated partners
Hospitals
Universities
Service providers …

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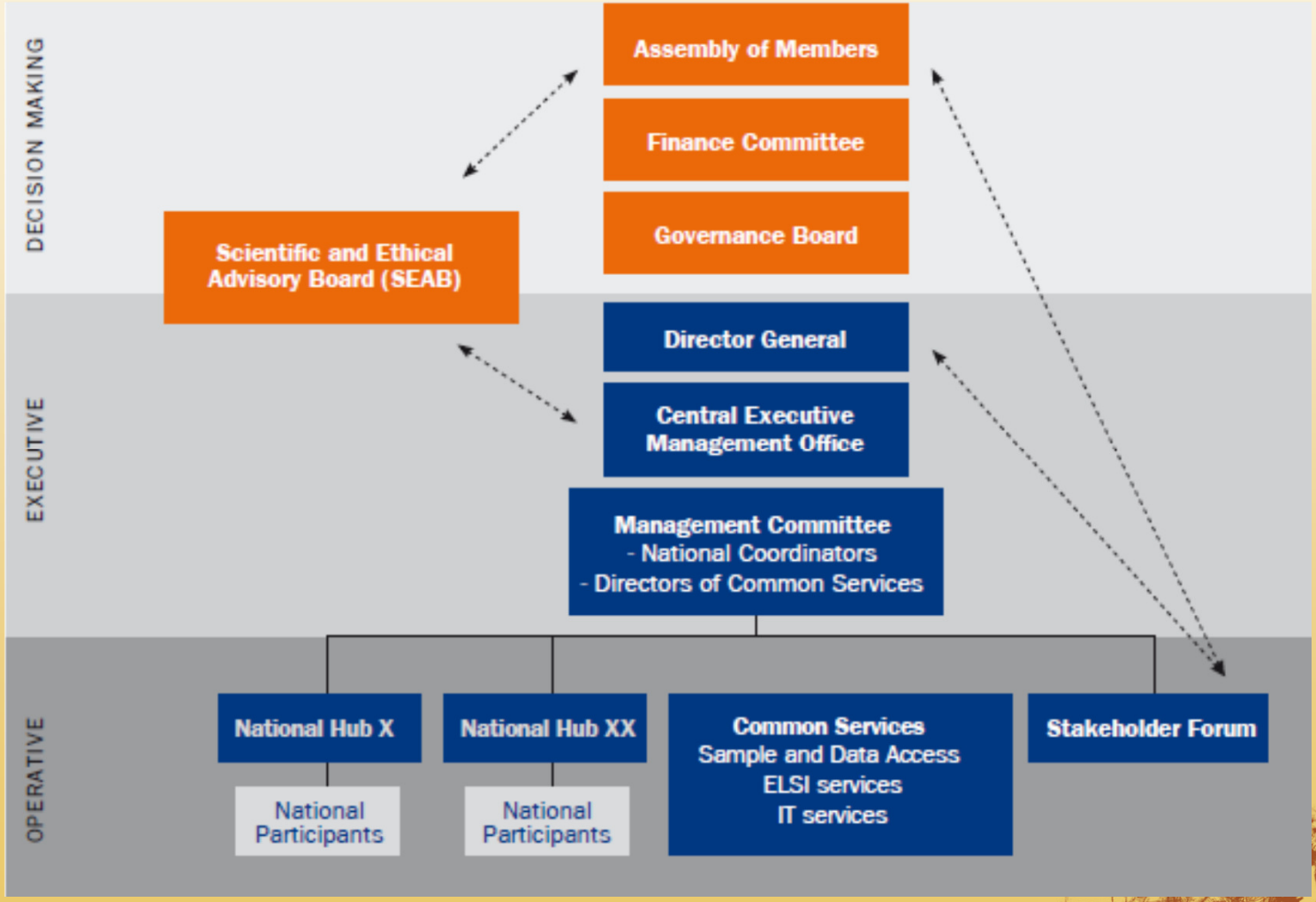
BBMRI Governance Structure



Future Founding Members of BBMRI-ERIC

Full Members:

Austria, Bulgaria, Czech Republic, Estonia, Finland, France, Greece, Italy, Latvia, the Netherlands, Malta, Spain, Sweden, Norway (MoU signed)

Germany (declared intention)

Observer:

Ireland, Poland, Switzerland, UK

160 million € funding allocated

The BBMRI Team: WP Leaders and Chairs

Coordination/Executive Mgmnt.	**K. Zatloukal, AT; E. Vuorio, FI**
	M. Yuille, UK; M Pasterk, FR
Population-based Biobanks:	**L. Peltonen+, FI/UK; M. Perola, FI**
	A. Metspalu,EE
Disease-oriented Biobanks:	**E. Wichmann, GER, T Meitinger, GER**
Biomolecular Resources:	**U. Landegren, SE; M. Taussig, UK**
Databases & Biocomputing:	**J-E Litton, SE**
Ethical, Legal and Societal Issues:	**A. Cambon-Thomsen, FR**
Funding and Financing:	**G. Dagher, FR; J. Ridder, NL**
	C. Brechot, FR;
Governance Council Chair:	**L. Peltonen+; E. Vuorio, FI**
Advisory Board Chair:	**G-J van Ommen, NL**
Coordination Board Chair:	**K. Zatloukal, AT**
Stakeholder Forum Chair:	**M. Griffith, IR**

53 Participants (6 Ministries, 18 Funding Organizations)

222 Associated Organizations 33 Countries

Joint Programming Initiative

Joint Programming – a concept introduced by the European Commission in July 2008 – is one of the five initiatives for implementing the European Research Area (ERA).

COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 15.7.2008
COM(2008) 468 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

TOWARDS JOINT PROGRAMMING IN RESEARCH :
Working together to tackle common challenges more effectively

{SEC(2008) 2281}
{SEC(2008) 2282}

(presented by the Commission)

The aim of Joint Programming is to increase the value of relevant national and EU R&D funding by concerted and joint planning, implementation and evaluation of national research programmes.

A healthy diet for a healthy life

- **Vision**

  The vision of the JPI ***A healthy diet for a healthy life*** is that by 2030 all Europeans will have the motivation, ability and opportunity to consume a healthy diet from a variety of foods, have healthy levels of physical activity and that the incidence of diet-related diseases will have decreased significantly.

- **Strategy**

  Joint programming will contribute significantly to the construction of a fully operational European Research Area on the prevention of diet-related diseases and, by strengthening leadership and competitiveness of the food industry by effectively integrating research in the food-, nutritional-, social- and health sciences, will increase knowledge and deliver innovative, novel and improved concepts and products.

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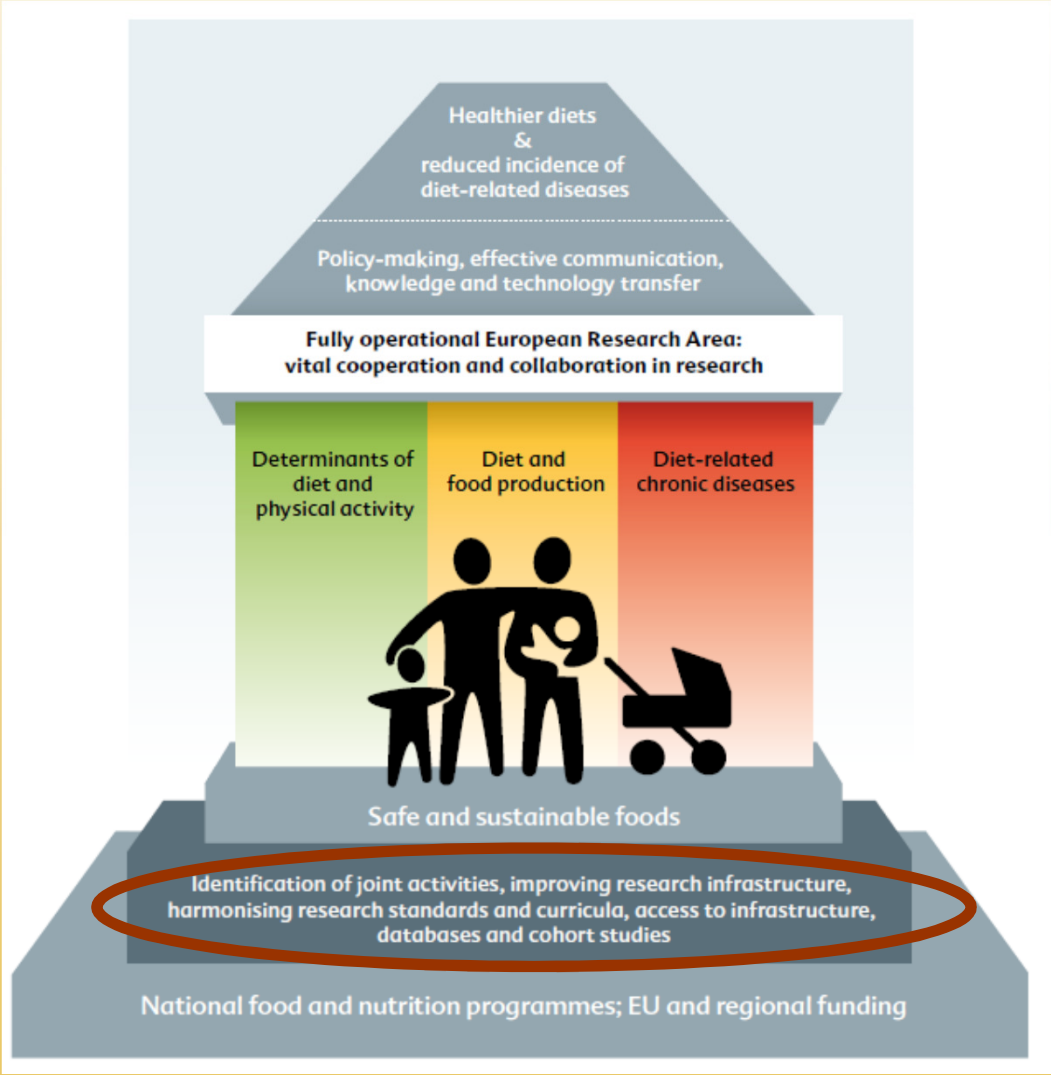
Schematic presentation of the activities and research areas of the JPI *A healthy diet for a healthy life*



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Discussion

- **Critic on the JPI SRA**
  - Short hand research challenges are collecting and using harmonized data (existing prospective cohorts), but BBMRI is not mentioned at all!
  - Research challenges on understanding diet-related diseases and the central organ in metabolism – the liver – is not mentioned at all!

- **Better coordination**
  - Member States are setting up RIs and JPIs, but the responsible people do not talk to each other: a task for the NCPs!
  - BMS RIs develop joint activities: BIOMEDBRIDGES
  - Use the RIs as the basic infrastructure for any european wide initiative!

- **Evaluation**
  - Use the RIs with their power on SOPs, hamonized guidelines and datasets for evaluating JPIs and other European-wide initiatives!

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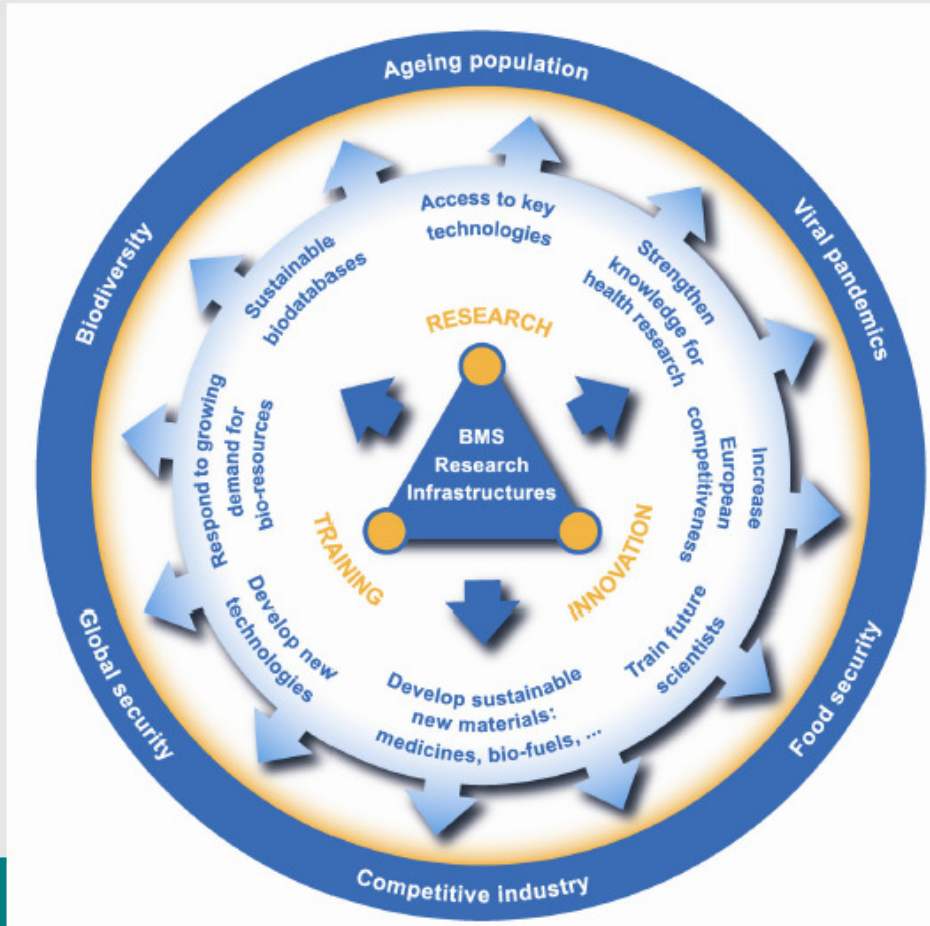
Potential synergies between ESFRI RIs and JPIs



From Ian Mattaj, DG of EMBL, **ESFRI research infrastructures and Joint programming initiatives in the field of Life Sciences** Workshop, 23 June 2011


Thank You
Merci
Danke
Grazias
Asante
Dankie
Agyamanak
Köszönöm
Obrigado
Salamat
Terima Kasih
Matur Nuwun
Khob-kun-ka
Gahm-sah-hahm-ni-da
Tapadh Leat
Cheers Mate
Dhanyavad
Gracias
Medasi
Tak
Toda
Spasiba
Dakujem
Efxaristo
Molte Grazie
Faleminderit
Hatur Nuhun
Khob Chai Lai Lai
AlexanderTaylorDesign.com

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Definitions

- **The definition of a BRC involves:**
- Infrastructure for collection**, archival and storage of biospecimens and data aka BIOBANK**
- Procedures and services **for informing patients, obtaining consent, collecting and processing specimens for secure, long-term storage, accessing and retrieving specimens appropriate for analysis, processing for preparation of biomaterials (e.g. DNA, RNA, proteins), for quality control, packaging and shipping specimens, etc…**

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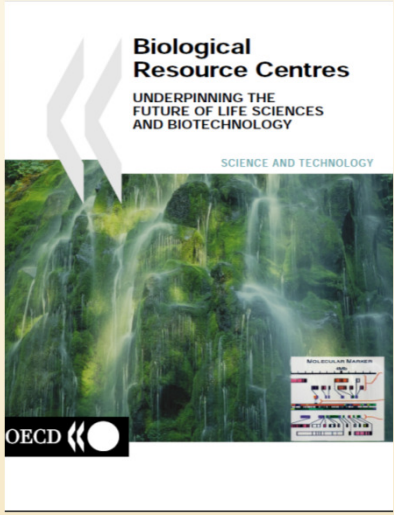
Biological Resource Centres



Definition (OECD, 2001)

- *"Biological resource centres are an essential part of the infrastructure underpinning life sciences and biotechnology. They consist of service providers and repositories of the living cells, genomes of organism, and information relating to heredity and the functions of biological systems. BRCs contain collections of culturable organisms (*e.g. *micro-organisms, plant, animal and human cells), replicable parts of these (*e.g. *genomes, plasmids, viruses, cDNAs), viable but not yet culturable organisms, cells and tissues, as well as databases containing molecular, physiological and structural information relevant to these collections and related bioinformatics.*"

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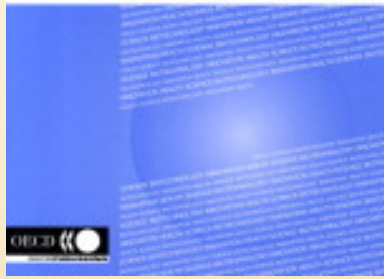
Creation and Governance of Human Genetic Research Databases

Biobank



Definition (OECD 2006):

- *"A collection of biological material and the associated data and information stored in an organised system, for a population or a large subset of a population."*

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Impact of Biobanking

Biobanks are the foundation of several rapidly expanding domains of biological/medical sciences:

- Molecular pathology (developing molecular-based classification and diagnosis procedures for diseases)
- Molecular and genetic epidemiology (assess the genetic and environmental basis of diseases in general population and families)
- Pharmacogenomics/Pharmacoproteomics (understanding the correlation between and individual patient's genotype/ phenotype and response to drug treatment)
- Personalized Medicine (identification of risk factors and drug sensitivity)
- Health systems (evaluate diagnosis, treatment and outcome in populations)

Difference: Archive vs. biobank

- **Access**
  - Searchable databases
  - ELSI clearance
  - Access rules
  - Capacity
- **Quality**
  - Requirements of –omics technologies
  - International harmonization

Format of biobanks

- **Population-based / Epidemiological biobanks**
  - Simple banked biospecimen, very often only blood
  - Long term storage
  - Typical examples:
    - Random cohorts
    - Twin-registries
    - Population isolates

- **Disease driven / hospital based biobanks**
  - More complex in types, liquid and solid samples
  - 3 categories: to be used for
    - Basic reseach
    - Translational research
    - Clinical trials

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Study design

- **Cross sectional/longitudinal**
- **Retrospective/prospective**
- **Cohort studies**
  - Risk ratio of exposed and non-exposed (e.g., smoking and lung cancer)
- **Case-control studies**
  - Odds ratio for diseased and non-diseased (e.g., SNP in T2D; 4 controls/1 diseased; also for rare diseases <5/10000)
- **Nested case-control studies (same risks affected and non-affected)**
- **Matched case-control**
  - Cancer tissue banks (tumour/non-affected of same individual)

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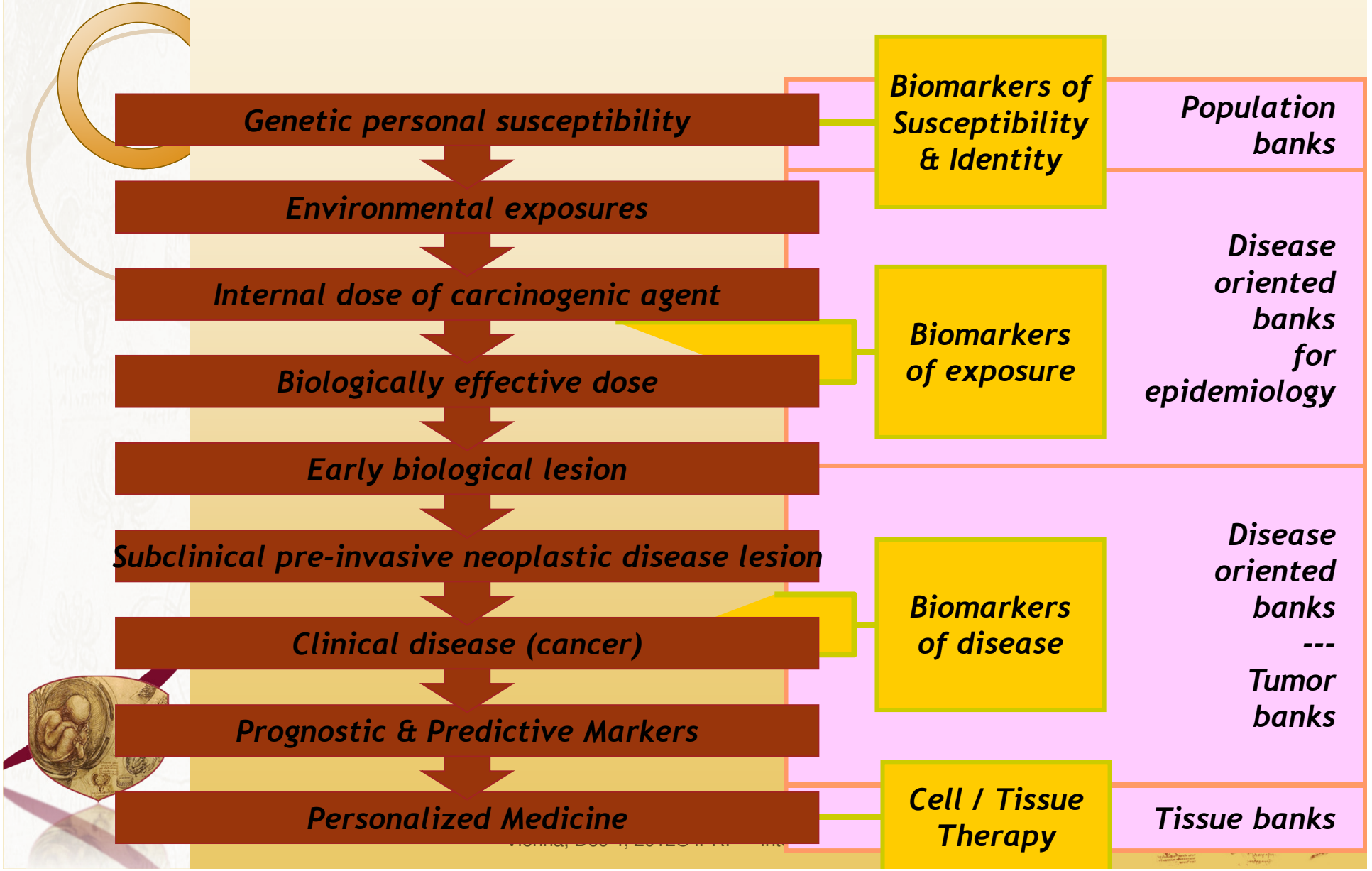
The importance of the design



Clinical samples: Oportunities

- **Tissues, blood, urine, cells, DNA**
  - Discovery of gene function
  - Identification of disease relevance of genes
  - Identification of new targets for drug discovery
  - Identification and validation of biomarkers for individualized therapy

Key resource for advancement of personalized medicine and improvements in drug development