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Health & Food

EOSC in practice

From federated infrastructure to scientific impact:

MCVAL cancer research use case



Prof. Jens K. Habermann, MD, PhD

Board Certified Human Geneticist

BBMRI-ERIC Director General

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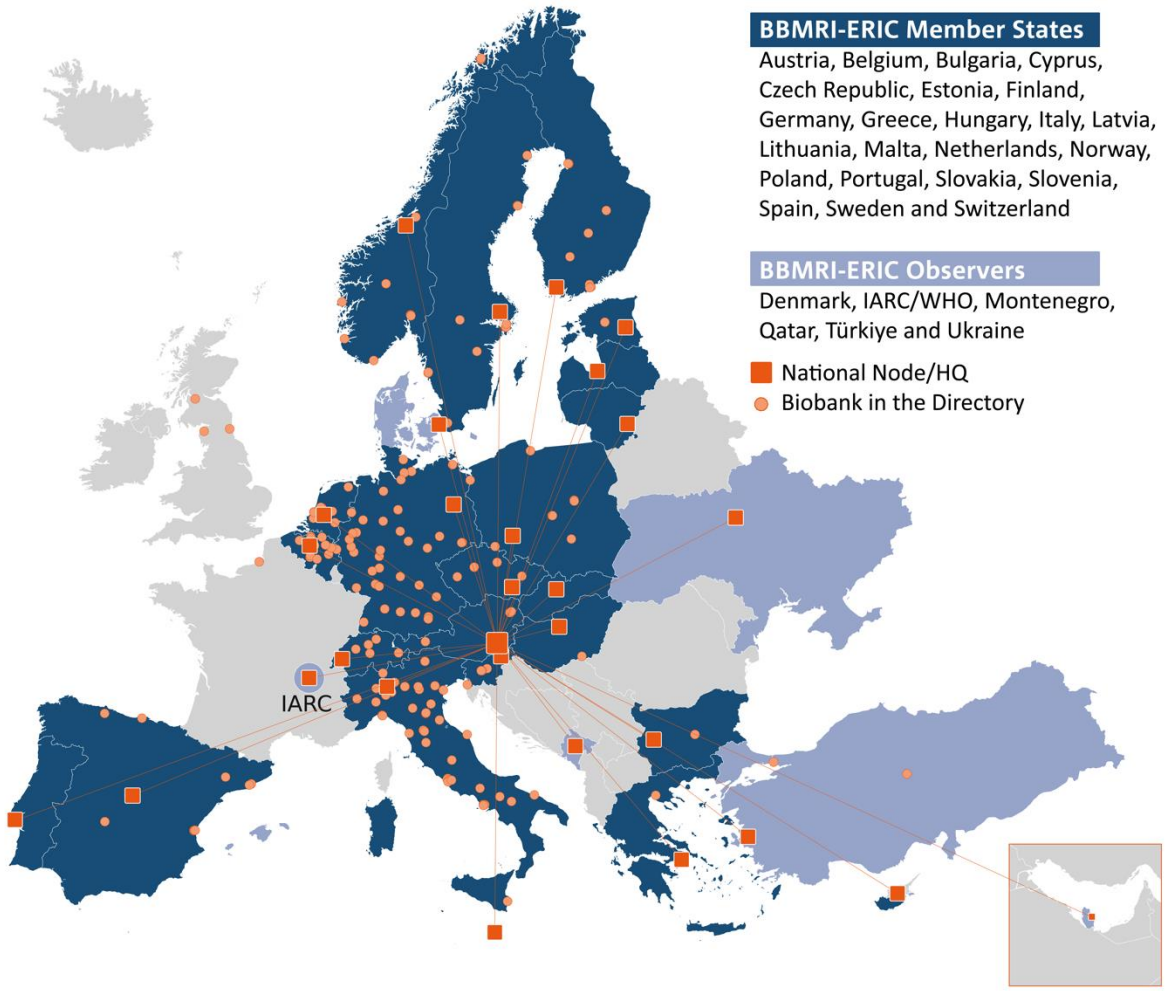
BBMRI IS A DISTRIBUTED ERIC

Operating in Health and Life Sciences

BBMRI-ERIC®
The European research infrastructure for biobanking and biomolecular resources in health and life sciences

BBMRI-ERIC

- 28 Member and Observer countries and IARC/WHO
- Facilitates responsible access to high-quality **samples**, **data** and **biomolecular resources** to advance R&I for the benefits of patients, the public and the planet
- Brings together a **community** of
  - > **29** National Nodes & **500** biobanks,
  - > **40** ELSI experts,
  - > **130** IT experts,
  - > **300** Quality Management experts,
  - **3** Biotechnology Expert Centres, and
  - **1** Headquarter



SERVING SOCIETY, ACADEMIA AND INDUSTRY ALSO AS DATA INFRASTRUCTURE

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Biobanking Explained

BBMRI-ERIC: The European research infrastructure for biobanking and biomolecular resources in health and life sciences

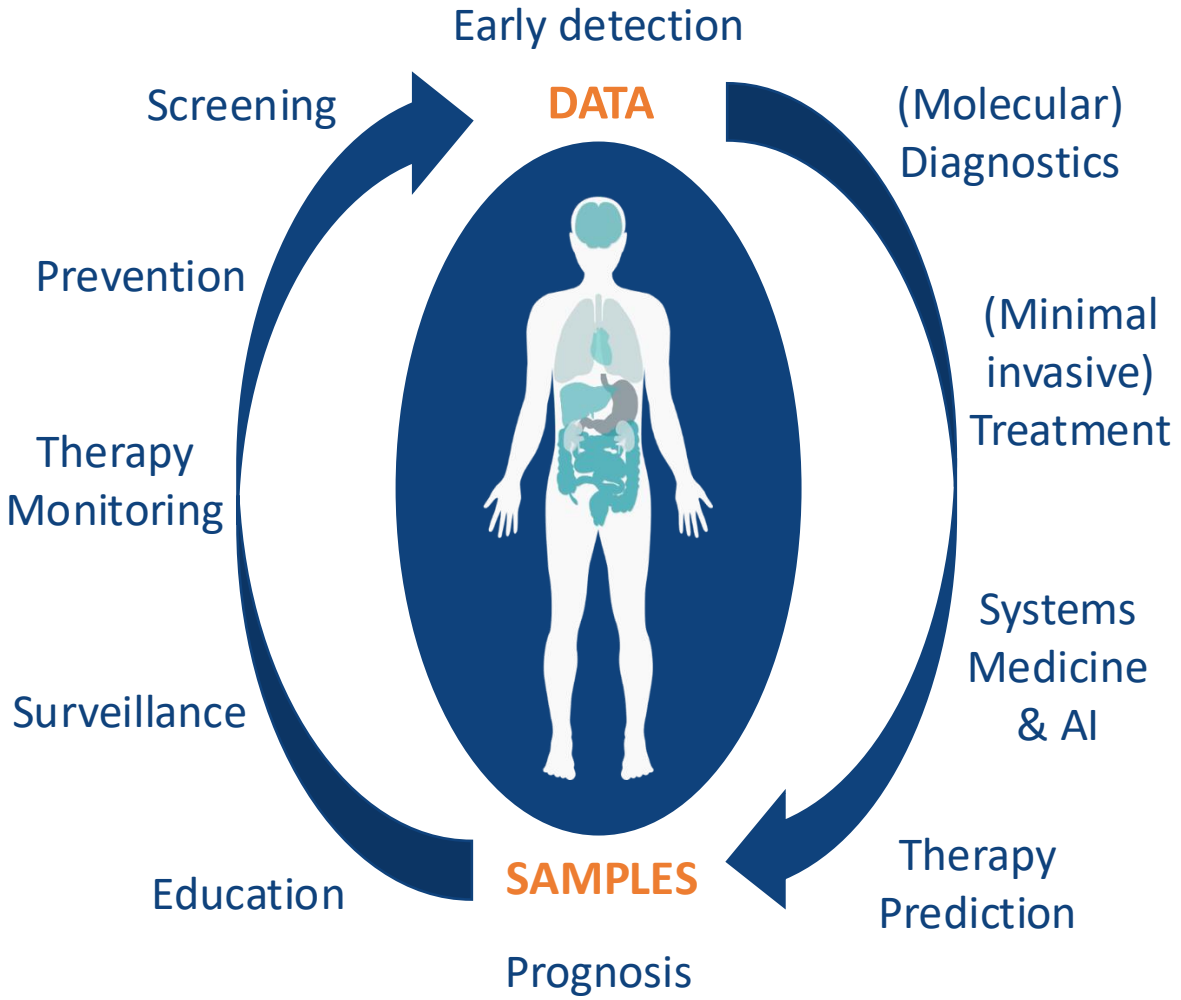
BBMRI-ERIC: Facilitating responsible access to high-quality samples, data, and biomolecular resources

What are biobanks

- With participants' **informed consent**
- A biobank collects, processes, stores and shares donated **biological samples and related health data** for research
- Human Biobanks store **blood, tissue, cells, DNA** and other **biological material**
- Preserved for future **research**

Biobanks as Data Centers

- Centralized data hubs for **high-quality biological, associated clinical and research data**
- Govern secure and controlled **access** to data
- Enable collaboration, reproducibility, and **open science** in health care



How does it work

- Data and samples are registered, prepared and stored under **controlled conditions**
- Specialist teams monitor **quality, security and continuity**
- **Research requests** are reviewed before data and/or samples are made accessible

Significance

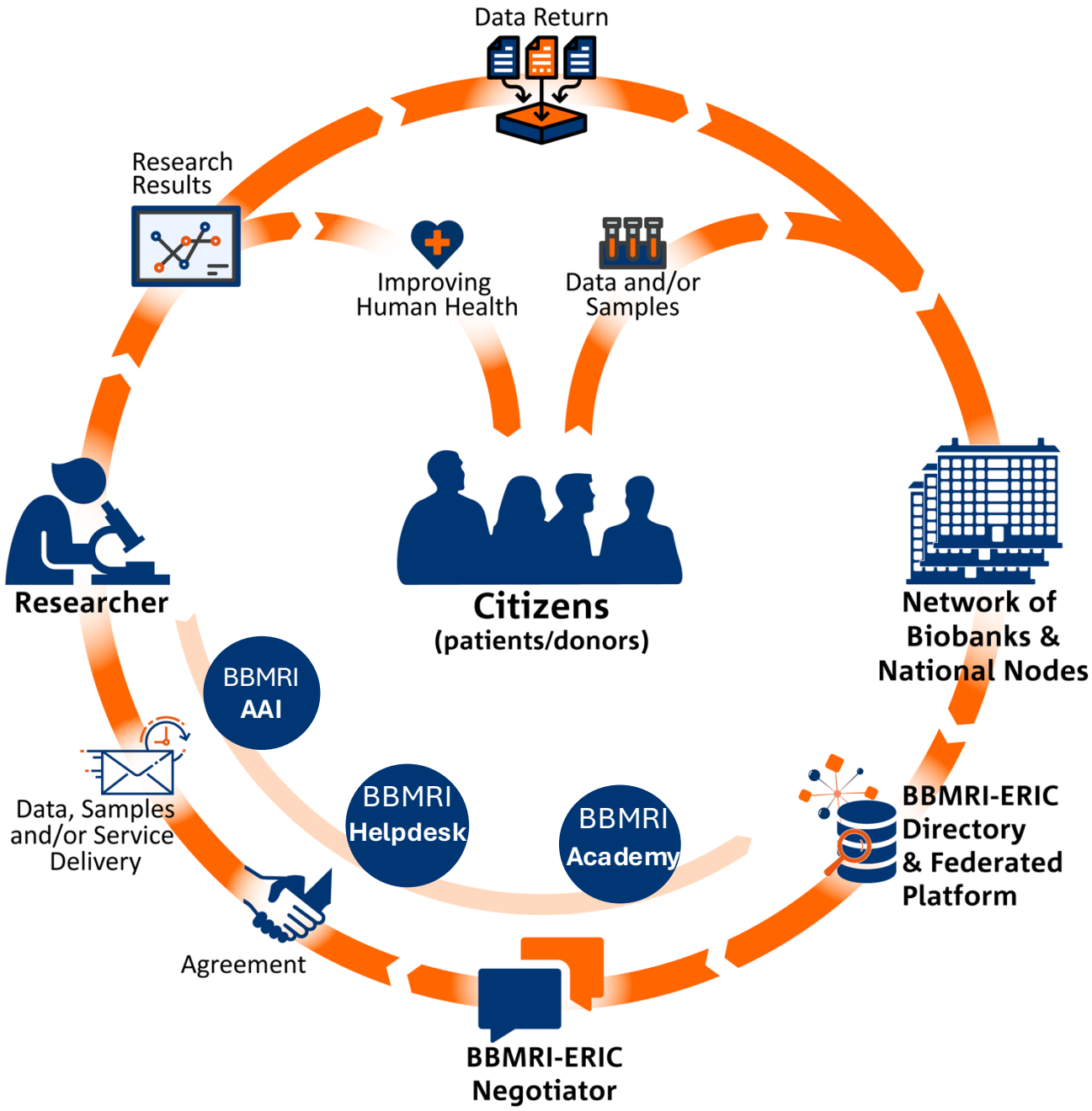
- Helps scientists **understand disease**
- Supports better **diagnostics** and more **targeted treatments**
- Enables progress in **personalised medicine**

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BBMRI-ERIC's Federated Access Services

BBMRI-ERIC is the Thematic Node for Sensitive Health Data in EOSC



Through **EOSC Federation** BBMRI-ERIC is connecting:

The **BBMRI-ERIC Directory,** largest biobank catalogue worldwide:

- ✓ 500 biobanks with
- ✓ 10 Mio. citizens across
- ✓ 33 countries.

and the **BBMRI-ERIC Federated Platform** that features:

- ✓ 450,000 citizens with
- ✓ 155,000 genomes across
- ✓ 10 EU countries today.

to **other EOSC Federation nodes** and **users of EOSC**.

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EOSC Federation Use Case ***MCVAL***

VISION

Provide a service for the **M**ulti-**C**entric **VAL**idation of **AI models for prostate cancer screening** on sensitive health data in compliant frameworks

CLINICAL NEED

1 in 8 men

will be diagnosed with prostate cancer during their lifetime (risk varies with age, ethnicity and other factors).

TRANSFORMING DIAGNOSES

Early detection

strongly influences survival. Pathology and AI are transforming what diagnosis can do.

THE CHALLENGE

Siloed health data

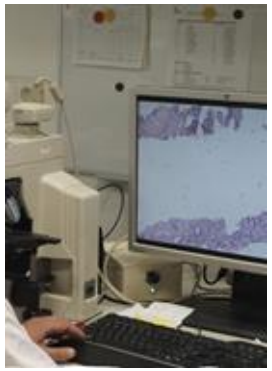
Regulatory, ethical and legal constraints make it hard to combine data from several sources.

MOTIVATION

- AI models are often trained on data from a single health institution
- AI models do not generalise well to data from other health institutions
- AI model performance must be validated on new, independent data

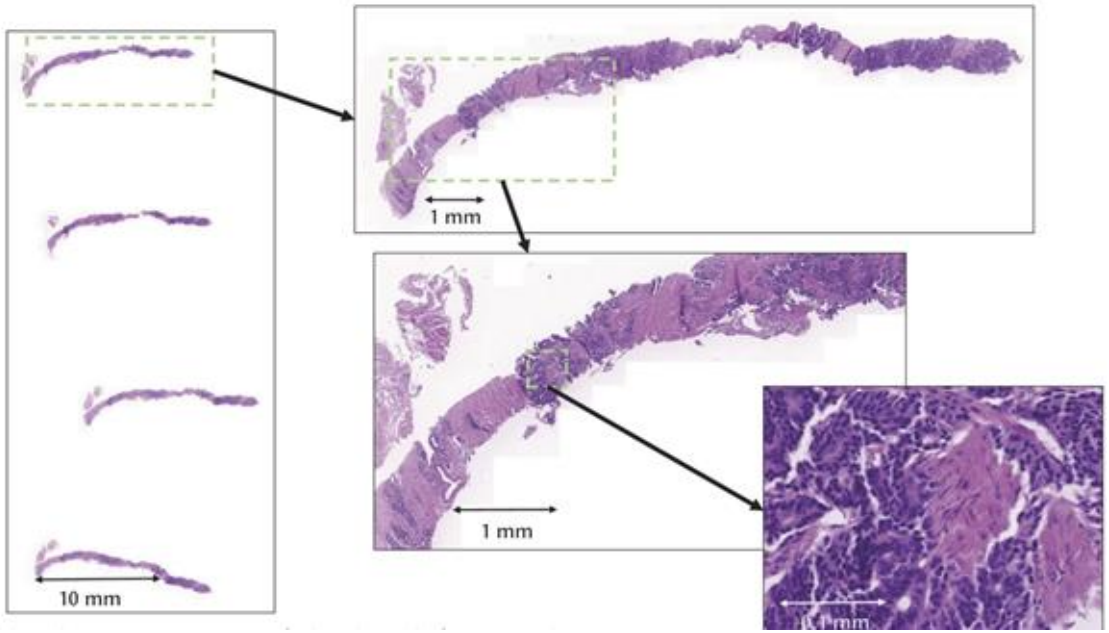
EOSC Use Case ***MCVAL***: AI for Prostate Cancer Screening

Background



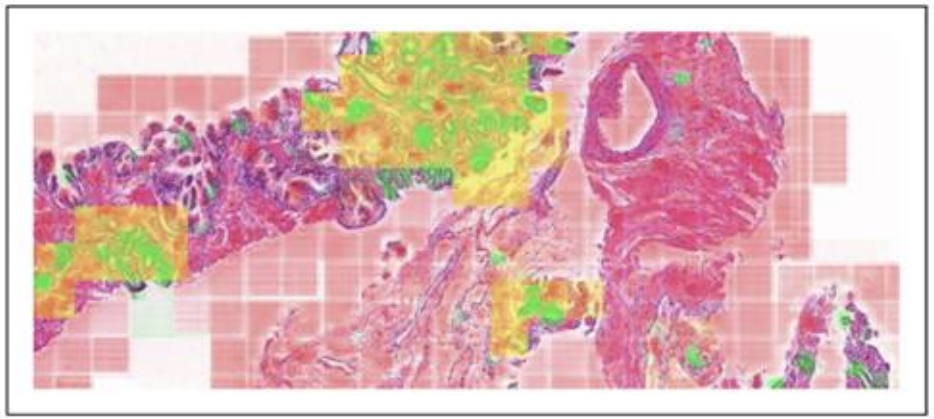
Manual whole slide image (WSI) screening

- Select region of interest
- Zoom into region
- Analyse selected region
- Repeat



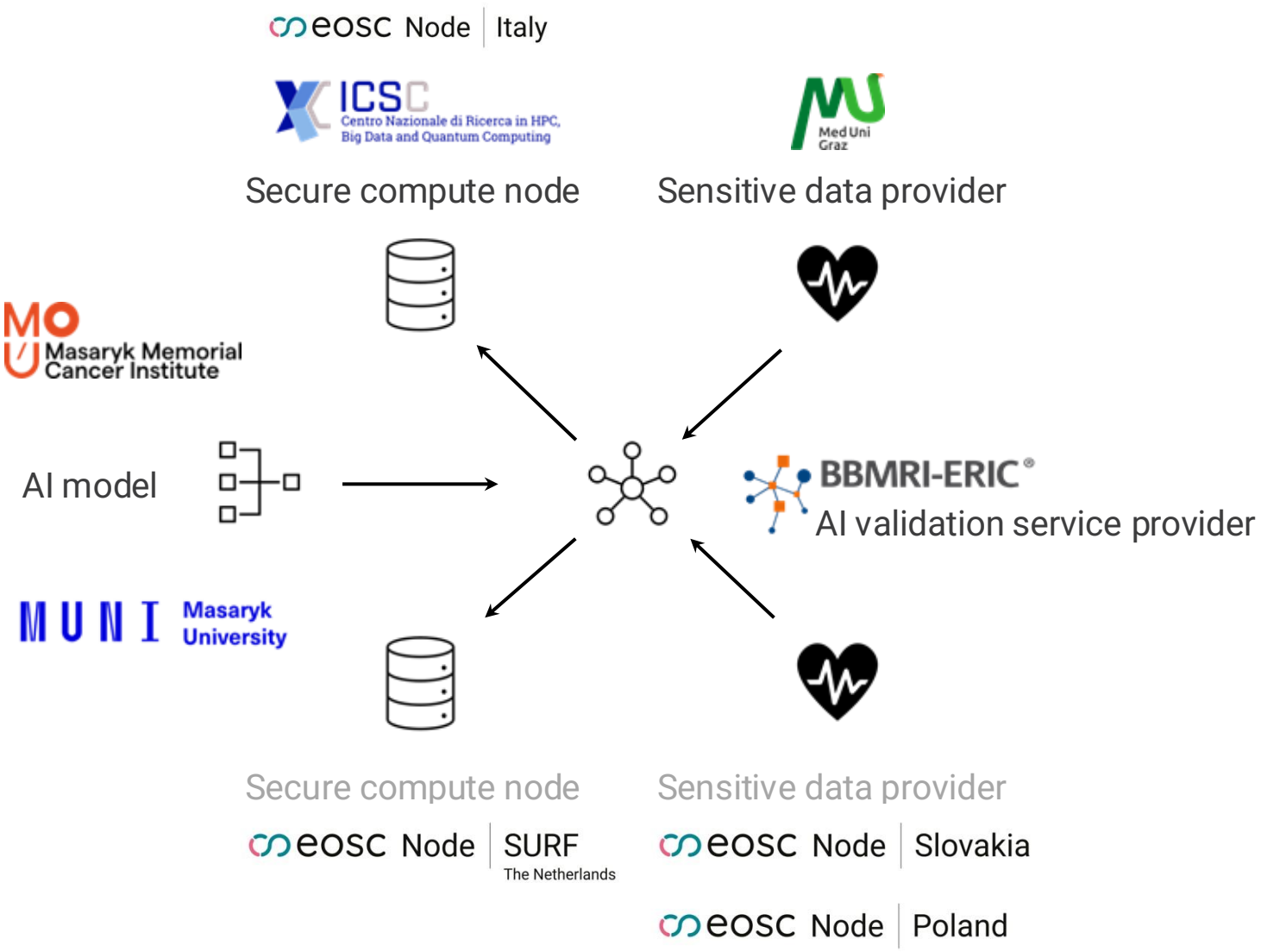
AI assisted WSI screening

- Image segmentation
- Individual segment analysis
- Analysis summary of <u>all</u> segments
- <u>Guide pathologist by highlighting segments of interest: Human decision</u>



EOSC Use Case ***MCVAL***: AI for Prostate Cancer Screening

Participants, roles and requirements:



Requirements for implementation

- **Ethical and legal compliance:** Institutional authorisations for model and data use
- **Data governance:** Agreements and allocation of responsibilities
- **Interoperability and secure access:** Identity management, authentication and secure computing connections

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MCVAL use case: Future potential

Early Findings MCVAL use case

MASARYK MEMORIAL CANCER INSTITUTE · BRNO

100% Sensitivity

94% Specificity

MEDICAL UNIVERSITY OF GRAZ

All positive patients so far were correctly identified.

External validation not completed in this stage: performance may differ across datasets/locations

Preliminary potential:

- Model **speeds up diagnosis**
- Provides **additional safety to minimize the risk overlooking cancer**
- AI model **supports pathologists**: Focusses attention to areas that need attention

Challenges:

- Need to **scale up** and **externally validate** with **appropriate computing environments**
- Adhering to **ethical** and **legal compliance**
- Addressing **data governance**
- Enabling **interoperability** and **secure access**

EOSC CONTRIBUTION

- Cross-border institutional data sharing and collaboration strengthens scientific evidence and advances the Fifth Freedom.
- Ability to expand the MCVAL approach to new diseases and research communities.
- MCVAL underscores the need for sustained strategic investment in the EOSC Federation to ensure continuity and enable further developments.

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Vision: a European secure workspace for Sensitive Health Data and AI

GDPR-compliant, built on EOSC resources, open to many data holders and stakeholders

Sensitive data and Computing FROM MANY EOSC NODES

- BBMRI-ERIC
- Netherlands
- Italy
- Slovakia
- Poland
- + more countries

secure transfer →

Secure research workspaces (EOSC nodes)

GDPR-compliant **Certified** **Audited**

- Train and run AI on combined data
- Larger cohorts, pooled across countries
- Fine-grained access: who sees what, when
- Every action logged, no downloads

remote access ↔

USED BY

- Researchers
- Clinicians
- Companies and start-ups

Potential outputs: stronger evidence and reusable validation approaches

BUILT ON EOSC RESOURCES

- **EOSC EU Node:** one eID login and a shared catalogue
- **Nodes** such as BBMRI-ERIC: find, request and facilitate data access
- **Compute nodes** such as ICSC Italy: certified secure processing

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From one use case in EOSC to a future European capability

What it means, and what it takes

WHAT IT MEANS

For patients

Faster and more accurate diagnoses for patients, supported by AI tools validated on representative patient data.

For Europe

Decades of hospital archives become usable for trustworthy European AI, analysed only in certified secure environments..

For policy

A working blueprint for the EOSC and European Health Data Space, aligned with GDPR: the same path fits any disease, data holder or country.

For industry

Companies can validate AI models on large, multi-country cohorts in a secure environment, under clear data access conditions..

From one use case in EOSC to a future European capability

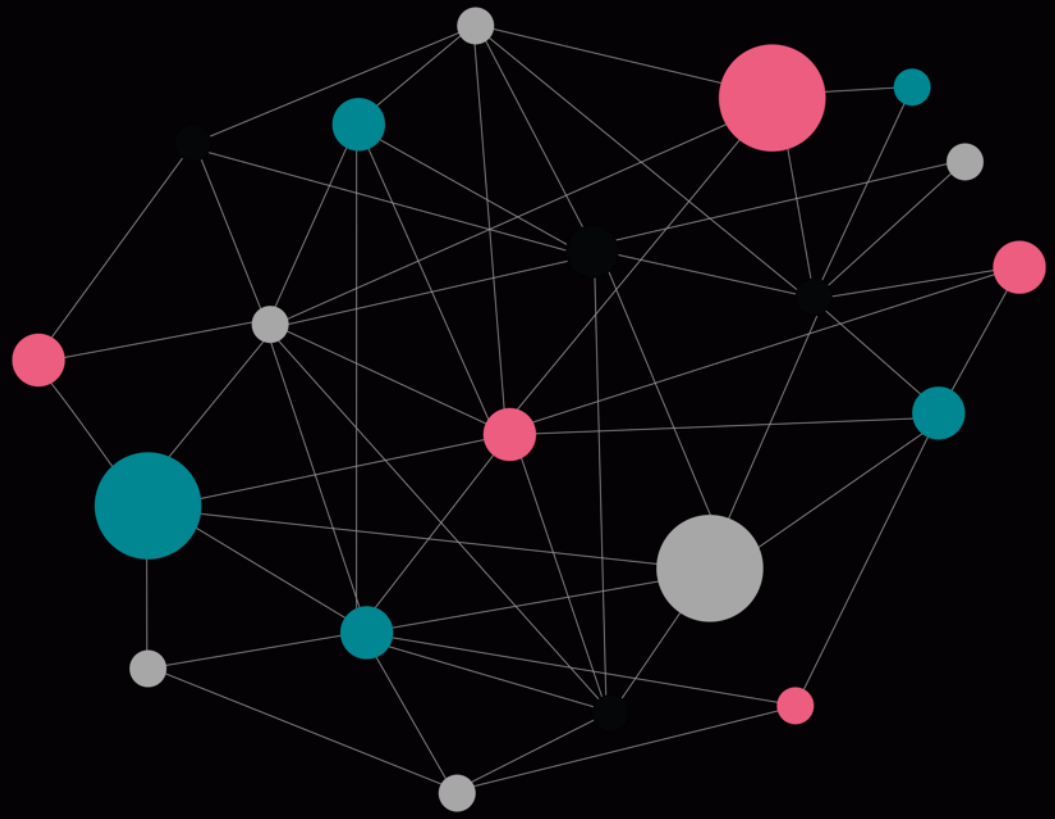
What it means, and what it takes

WHAT IT TAKES

- **Continuous support for the EOSC Federation: centrally and for EOSC Nodes**;
- **EOSC as a federation of Research Infrastructures, e-Infrastructures and National Nodes**: Key role in supporting data hosting, interoperability, and curation and possibly data return;
- **EOSC has a role to play in Health Research:** Cancer research needs cross-border validation, secure access, data hosting, interoperability and curation, while EHDS will serve as an access gateway with its own governance;
- **EOSC is a key enabler of ERA objectives and the 5th freedom**: advancing **Open Science**, facilitating access to and reuse of research data, and connecting Europe's research infrastructures into an interoperable ecosystem.

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Thank you



Jens.Habermann@bbmri-eric.eu

www.bbmri-eric.eu