INVOLVEMENT OF CZECH-BIOIMAGING RESEARCH INFRASTRUCTURE IN EOSC ACTIVITIES

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https://cbia.fi.muni.cz/

MUNI FI

CZECH BIOIMAGING

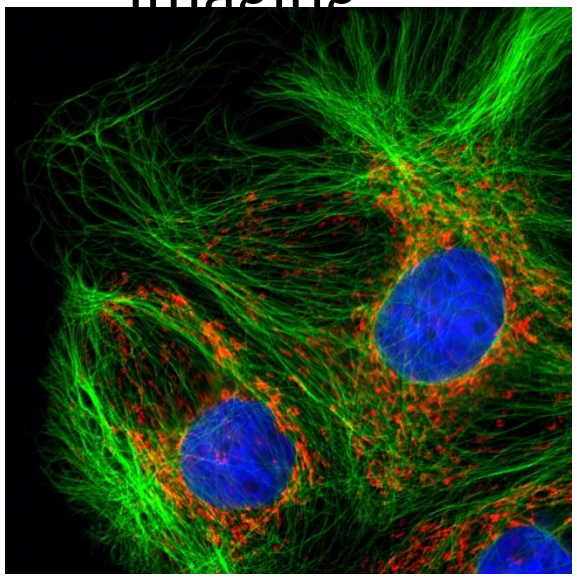
CBIA CENTRE FOR BIOMEDICAL IMAGE ANALYSIS

BioImaging = Biological Imaging + Medical Imaging

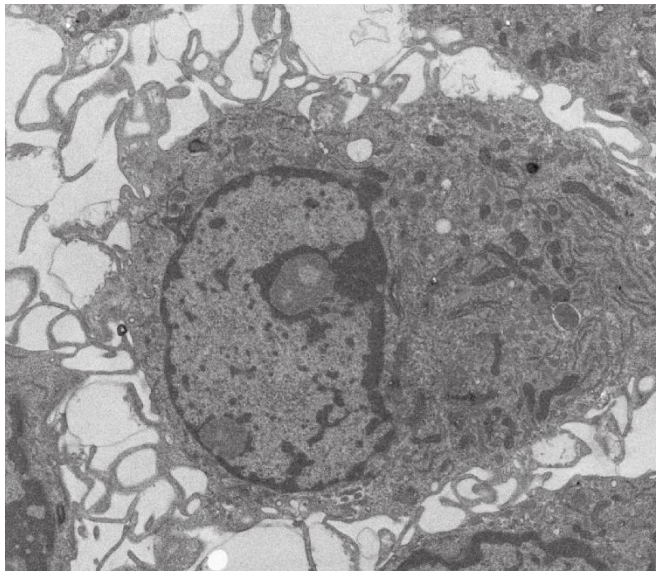
Biological Imaging = Light Microscopy + Electron Microscopy

Medical Imaging = Human Imaging + Animal Imaging

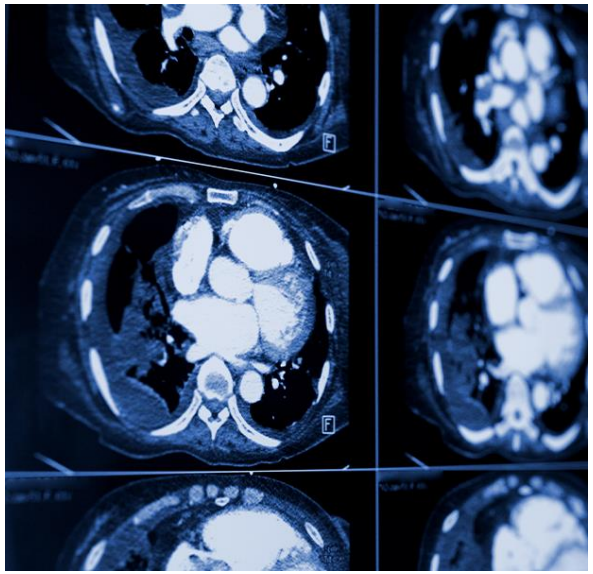
Light Microscopy Imaging



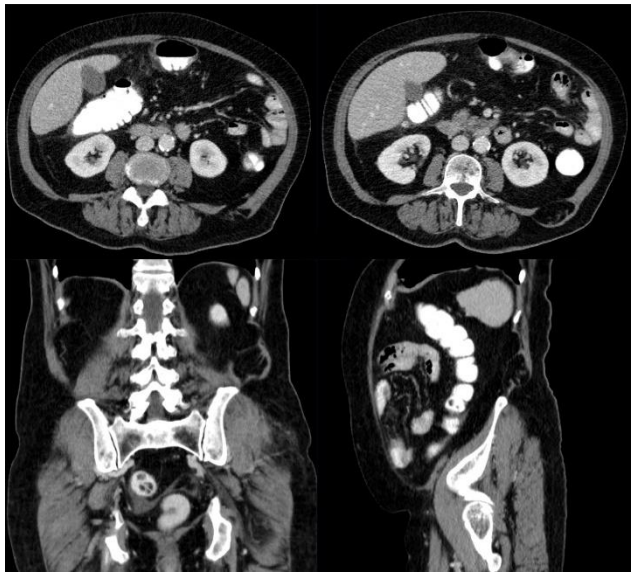
Electron Microscopy



Human Imaging

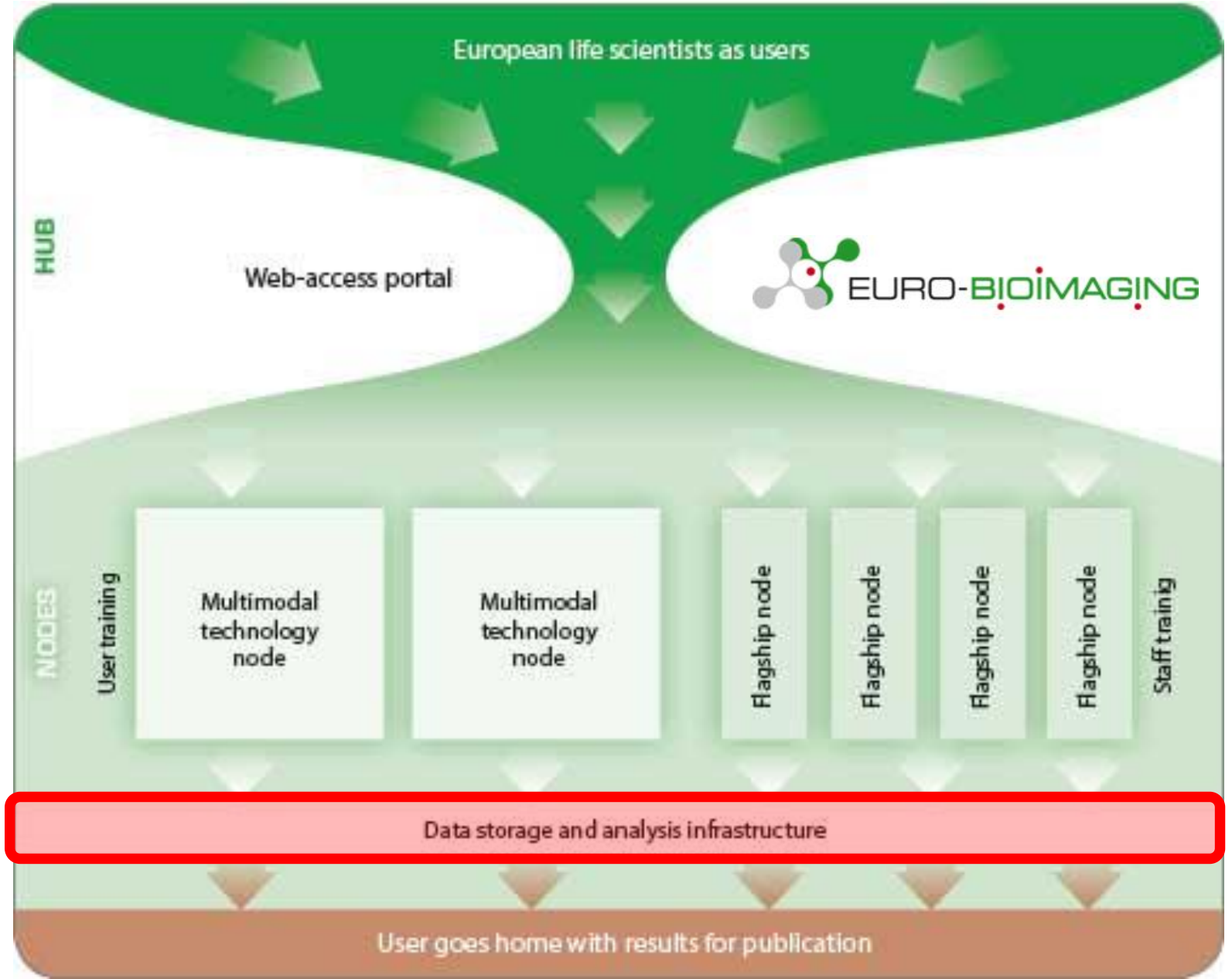


Animal



https://www.czech-bioimaging.cz/

Euro-BioImaging Research Infrastructure



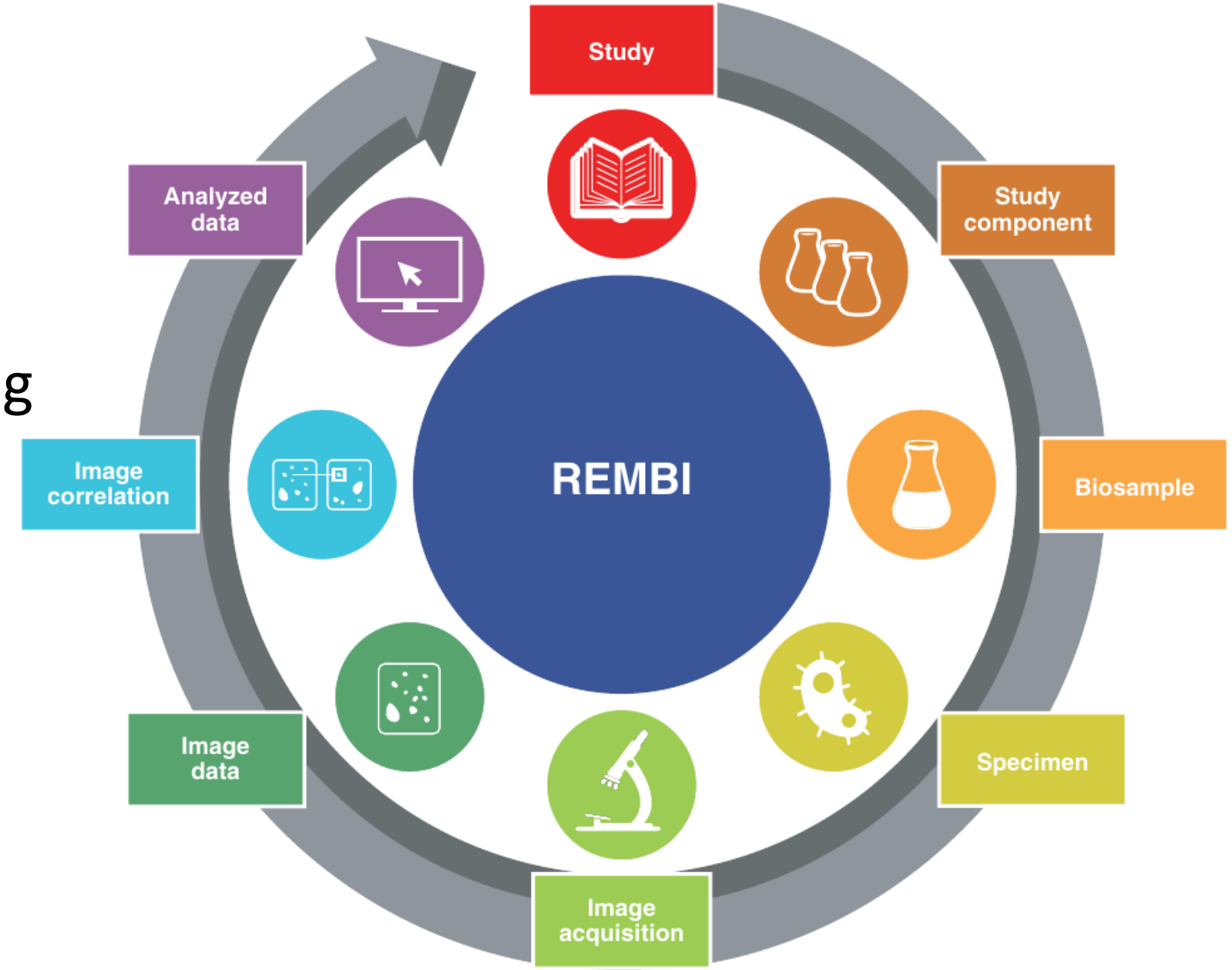
https://www.eurobioimaging.eu/

Euro-BioImaging Goals in Data Management

- Initial EU FP7 project (2010-2014) / WP11 Data Storage & Analysis
  - Chairs: Wiro Niessen (Erasmus MC), Michael Unser (EPFL)
  - Key objectives:
    - to identify the type of data and metadata that will be stored, curated and made accessible in the context of Euro-BioImaging
    - to identify the needs of clinical imaging trials and population imaging
    - to define and promote best practices and **standardized protocols** for biomedical image acquisition
    - to identify procedures to comply with data protection and data privacy directives
    - to contribute to **standardization for storing images and meta data**
    - to define tools for ensuring **data quality, data curation and annotation**
    - to develop a plan for **interoperability** of existing biomedical image analysis platforms and **open platforms** for biological and medical image analysis
    - to organize a **repository of validated image analysis tools** organized by tasks
    - to plan biomedical image **databases annotated with ground truth** and **gold-standard for validation and benchmarking of algorithms**
    - to develop on-line and hands-on training and education programs in biomedical image processing
    - to develop a plan for effective access to large scale image computing infrastructures

What Has Been Done (EU Level)

- **REMBI:** **Re**commended **M**etadata for **B**iological **I**mages—enabling reuse of microscopy data in biology. *Nature Methods* **18**, 1418–22 (2021)



What Has Been Done (EU Level)

BioImage Archive

Search BioImage Archive

Examples: brain, capsid

Home | Browse | Submit | Galleries | Help | Metadata Help | Policies | About us

The BioImage Archive is a free, publicly available online resource which stores and distributes biological images. It accepts submissions of data from any imaging modality, as long as the data are either associated with a peer-reviewed publication, or of value beyond a single experiment.

You can submit your data on our submission page. All data submitted to the BioImage Archive must be consented for a public release and the submitter self certifies that they have the rights to submit such data to a public archive. You can find more about our policies here.

The BioImage Archive also provides data archiving services to the broader bioimaging database community including added-value bioimaging data resources such as EMPIAR and IDR. Submission to related community resources may be more appropriate for some data types. You can find out more about the BioImage Archive's scope, and where your data should best be archived here and here. The BioImage Archive cannot accept patient-identifiable medical data, such as that derived from clinical imaging.

The BioImage Archive supports FAIR Sharing and implements the REMBI guidelines to enable FAIR data.

Further information

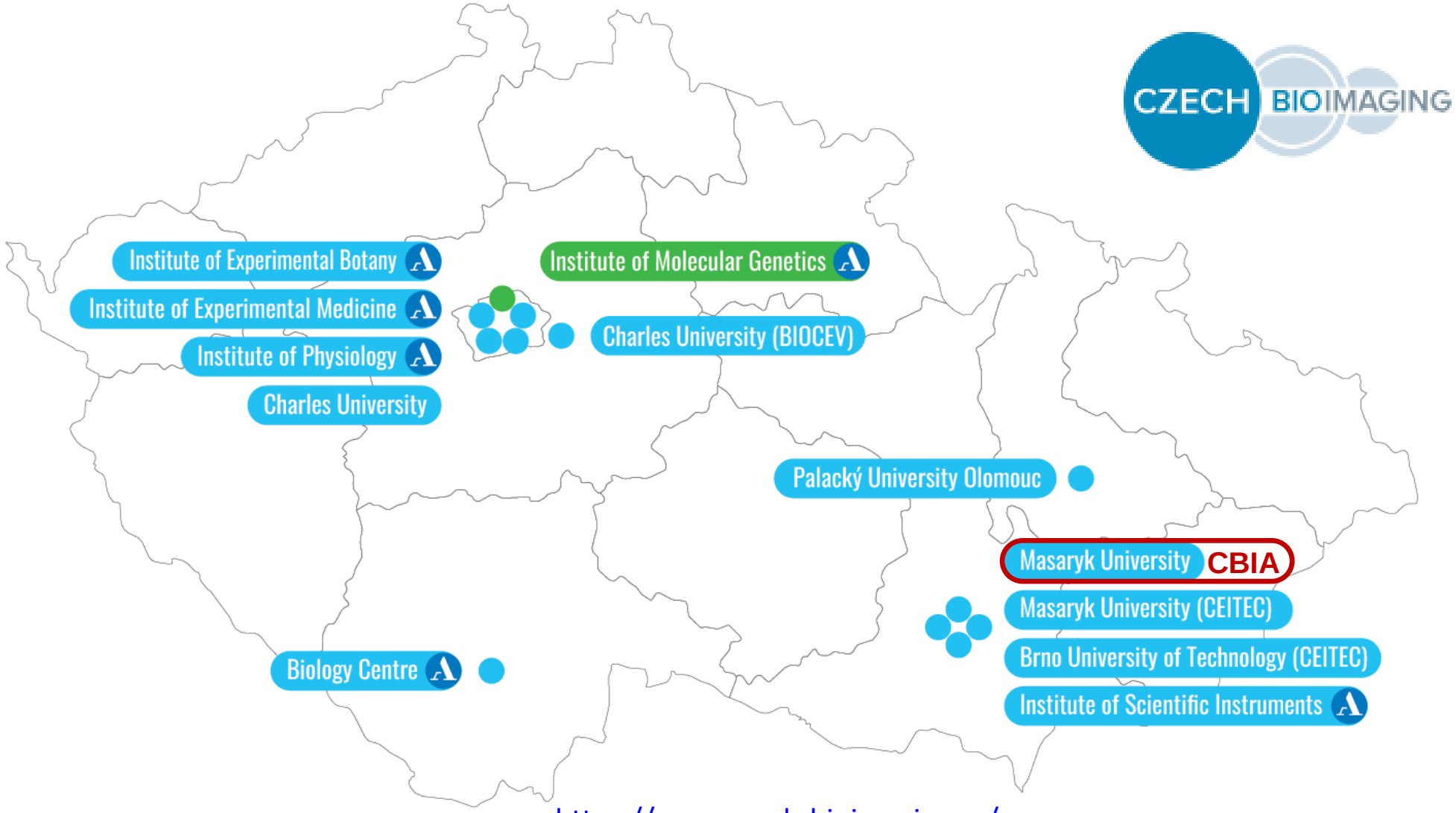
ONLINE TUTORIAL
BioImage Archive
Quick tour

The BioImage Archive Online Tutorial

The BioImage Archive – Building a Home for Life-Sciences Microscopy Data
Journal of Molecular Biology **434**: 167505 (2022)

Czech-BioImaging Research Infrastructure

Role of CBIA: responsible for **data management**



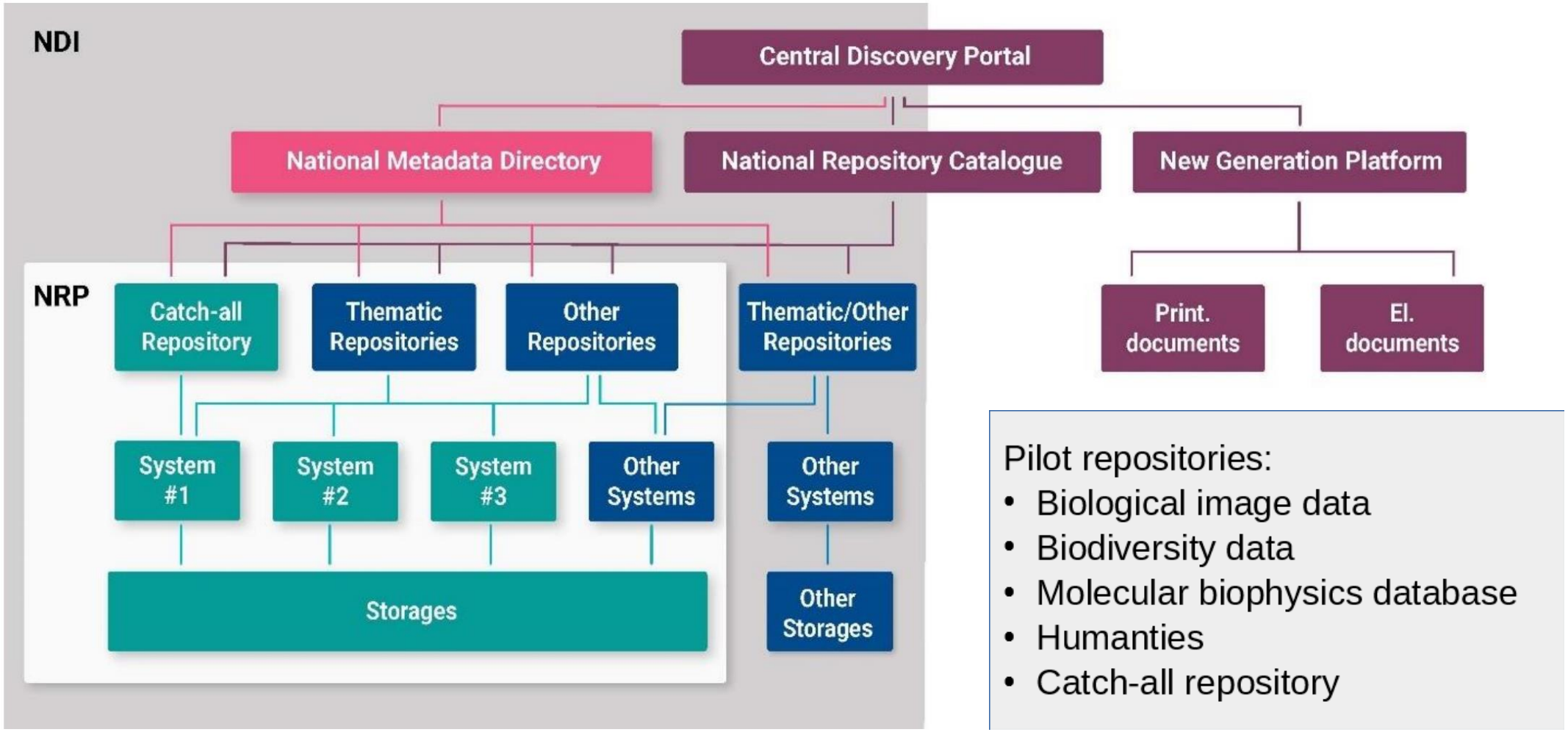
https://www.czech-bioimaging.cz/

What Has Been Planned (CZ Level)

- **Current Solution**
  - Local data storage and processing
    (at core facilities or on institutional servers)
  - Metadata not stored properly
    (only partially, e.g., acquisition parameters by imaging instruments)
- **New Proposed Solution (EOSC projects Open Science I and II)**
  - Useful curated FAIR data stored in a central repository
    (with processing support, e.g., for training AI models)
  - Division into two repositories:
    - Biological Image Data (Light + Electron Microscopy) – Open Science I Project
    - Medical Image Data (Human + Animal) – Open Science II Project
  - Metadata stored properly along with the data
  - Tools available to support data/metadata management

What Has Been Planned (CZ Level)

- **Biological Image Data Repository (EOSC Open Science I)**

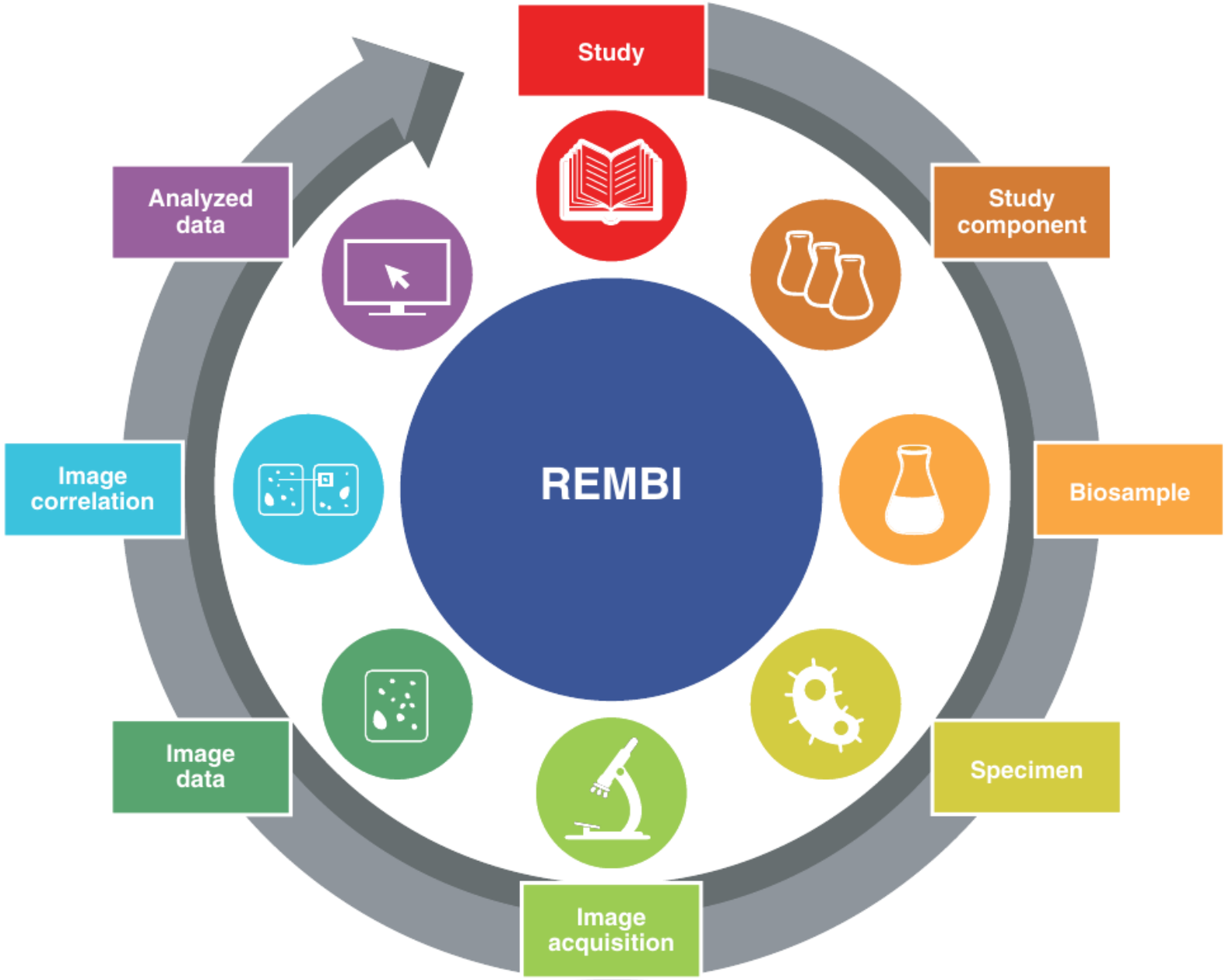


Pilot repositories:

- Biological image data
- Biodiversity data
- Molecular biophysics database
- Humanties
- Catch-all repository

What Has Been Done (CZ Level)

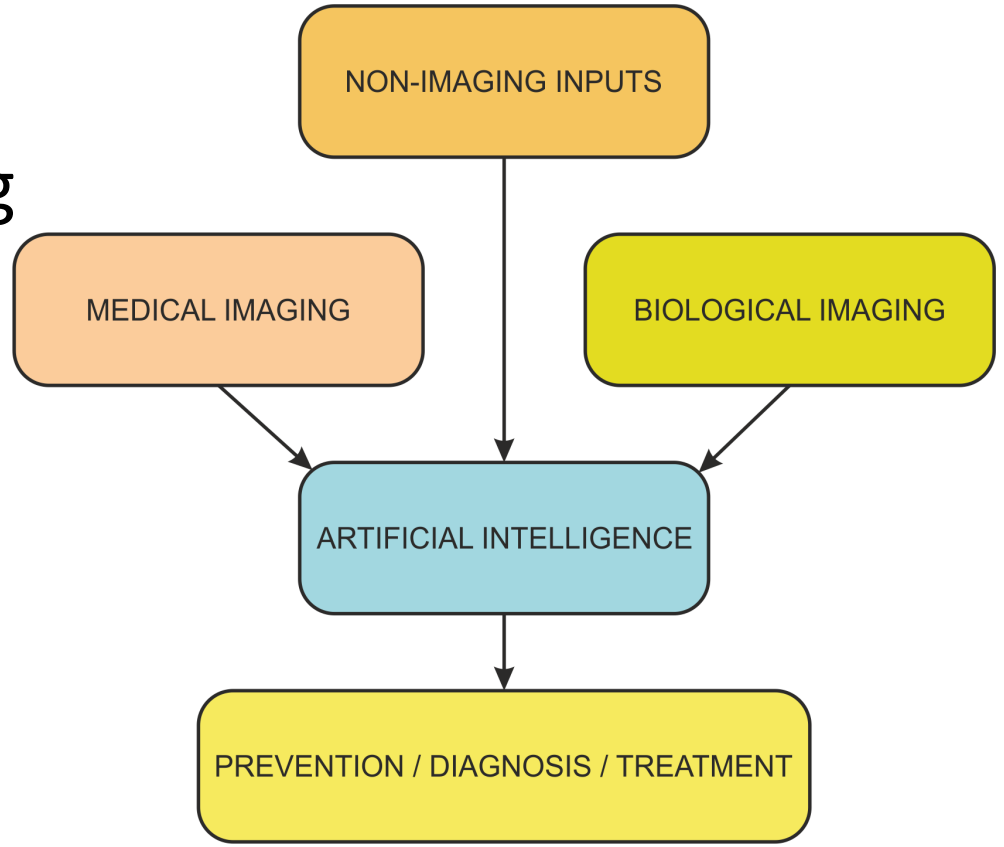
- **REMBI.CZ**
  - Based on REMBI 1.5 used in BioImage Archive
  - Freetext replaced with ontologies wherever possible
  - Mandatory items only (for now)
- **Biological Image Data Repository**
  - First version to be launched in 2025



CENTRE FOR AI IN ONCOLOGY

CONCEPT / INPUTS

- Added value by joining
  - Medical imaging
  - Biological imaging
  - Non-imaging inputs



NON-IMAGING INPUTS
Personal / Anamnesis / Test / Exam
Text / Number / Category / 1D Signal
Patient data / Medical records

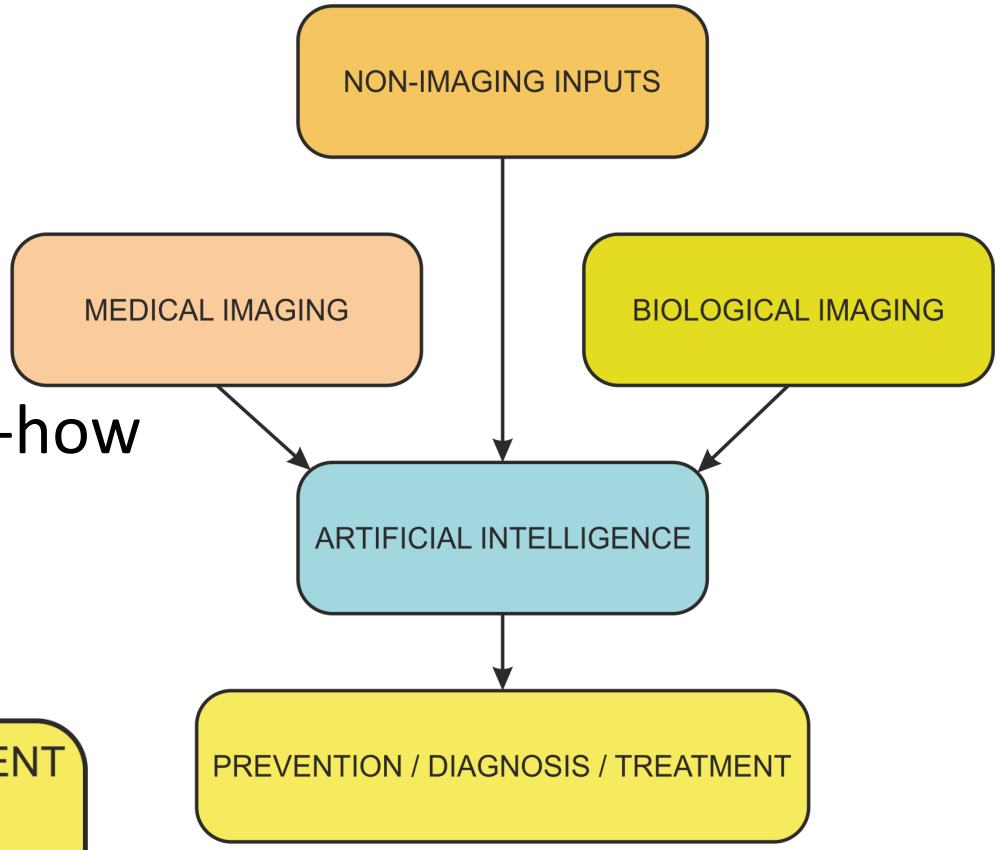
  - In future: genomics + proteomics

CENTRE FOR AI IN ONCOLOGY

OUTPUTS

- What is it good for
  - Complex analyses
  - General findings / know-how
  - Basis for decisions
  - Personalized care

PREVENTION / DIAGNOSIS / TREATMENT
Personalized patient care
Predisposition / Cancer type / Grade / Response
Recommendations / Therapy options / Expectations



CENTRE FOR AI IN ONCOLOGY

THREE PILLARS OF BIOMEDICAL IMAGING

Physician

Computer Scientist

Biologist

https://all-free-download.com

CENTRE FOR AI IN ONCOLOGY

VISION: BREAKING DOWN BARRIERS

Barriers

- Language – technical terms
- Legal – sensitive data
- Technical – data transfer and storage
- Time – experts too busy
- Motivation – why to change status quo

Breaking down barriers

- Concept – agreement on common policy
- Coordination – forming Coordinating Board
- Communication – frequent discussions
- Integration – sharing capacities/know-how
- Education – what can we offer each other

CENTRE FOR AI IN ONCOLOGY

CURRENT CONSORTIUM

MUNI

MOU Masaryk Memorial Cancer Institute

FAKULTNÍ NEMOCNICE BRNO

FAKULTNÍ NEMOCNICE U SV. ANNY V BRNĚ

DCB Actuaries and Consultants

BRNO

Coordinator

CBIA CENTRE FOR BIOMEDICAL IMAGE ANALYSIS

Link to large research infrastructures

CZECH BIOIMAGING Imaging principles of life

BBMRI.CZ

e-INFRA CZ

Thank you for attention!