GDAŃSK UNIVERSITY OF TECHNOLOGY

Virtual Microscope as a part of Bridge of Data repository – the slide imaging technology that improves the quality of pathology education and research data.

The poster aims to present the design, and technical issues of the Virtual Microscope developed as part of the Bridge of Data project from the Gdańsk University of Technology in cooperation with the Medical University of Gdańsk and CI TASK IT Center. The application employs a client/server architecture that uses raw data from Fahrenheit Biobank (e.g. fragments of biological material collected from patients during a medical examination).

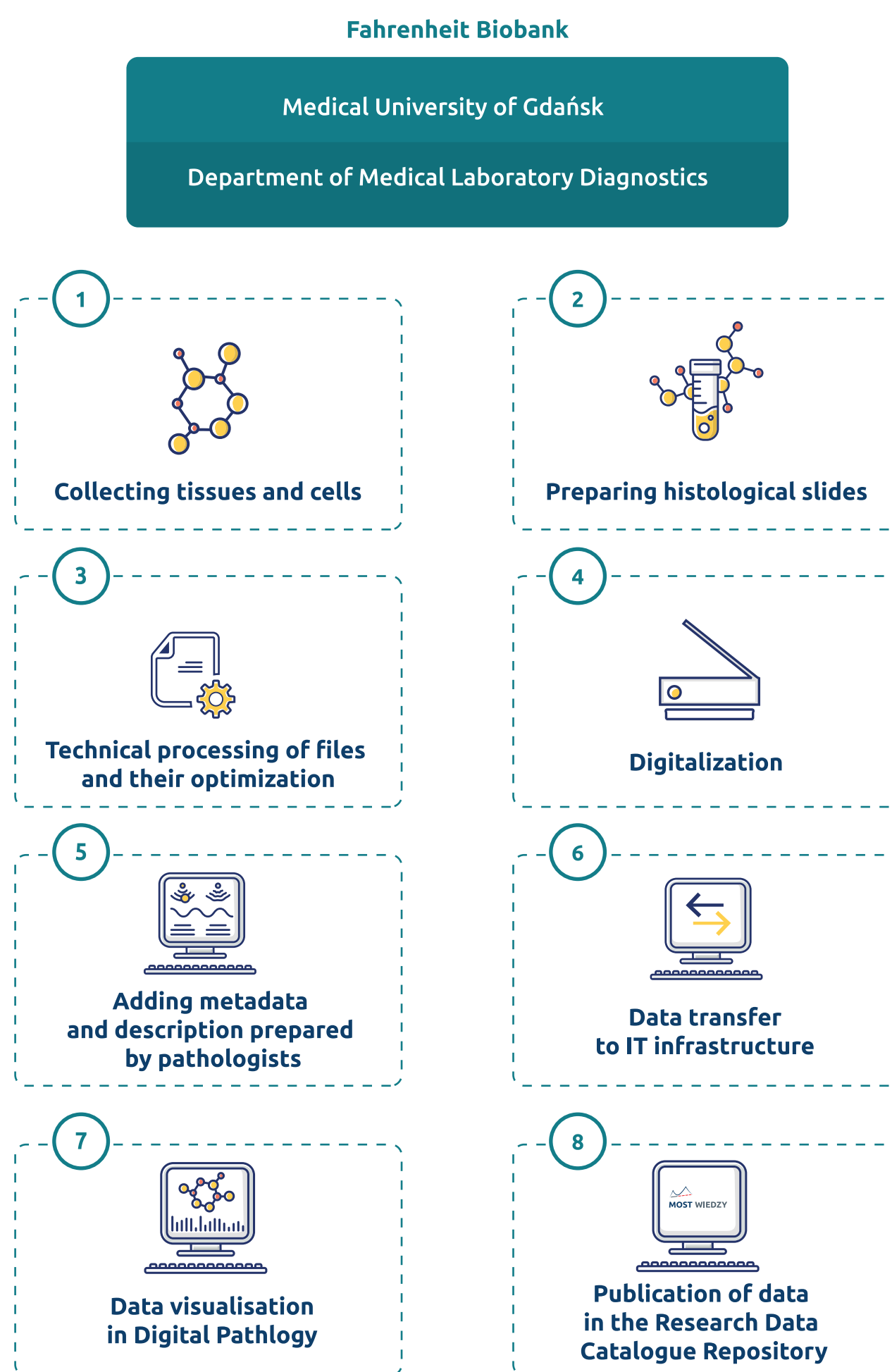The first part of the poster illustrates the main steps of collecting data:

• preparing and scanning tissues samples by the digital scanner with the Microscope

• sending images via an isolated network link to a data repository

• evaluating and adding descriptions to the images by the team of expert histopathology doctors

• publication of images in Virtual Microscope at the open repository.

The second part of the poster describes the modern architecture and IT services that ensure high reliability and safety of the system operation. Our solution is based on the cloud solution. It contains: cloud computing (a platform with dynamic with dynamically running virtual computer servers), object data storage (a system that lets us store petabytes of data), identify provider service to confidentially store information about users and enable a high level of security.

The end result is an environment for education and research purpose that provides user-friendly and fast access to the high-resolution digital images of tissues and cells that support diagnostic accuracy. A Virtual Microscope is available to the public via The Bridge of Knowledge platform **(https://wirtualnymikroskop.mostwiedzy.pl/).**
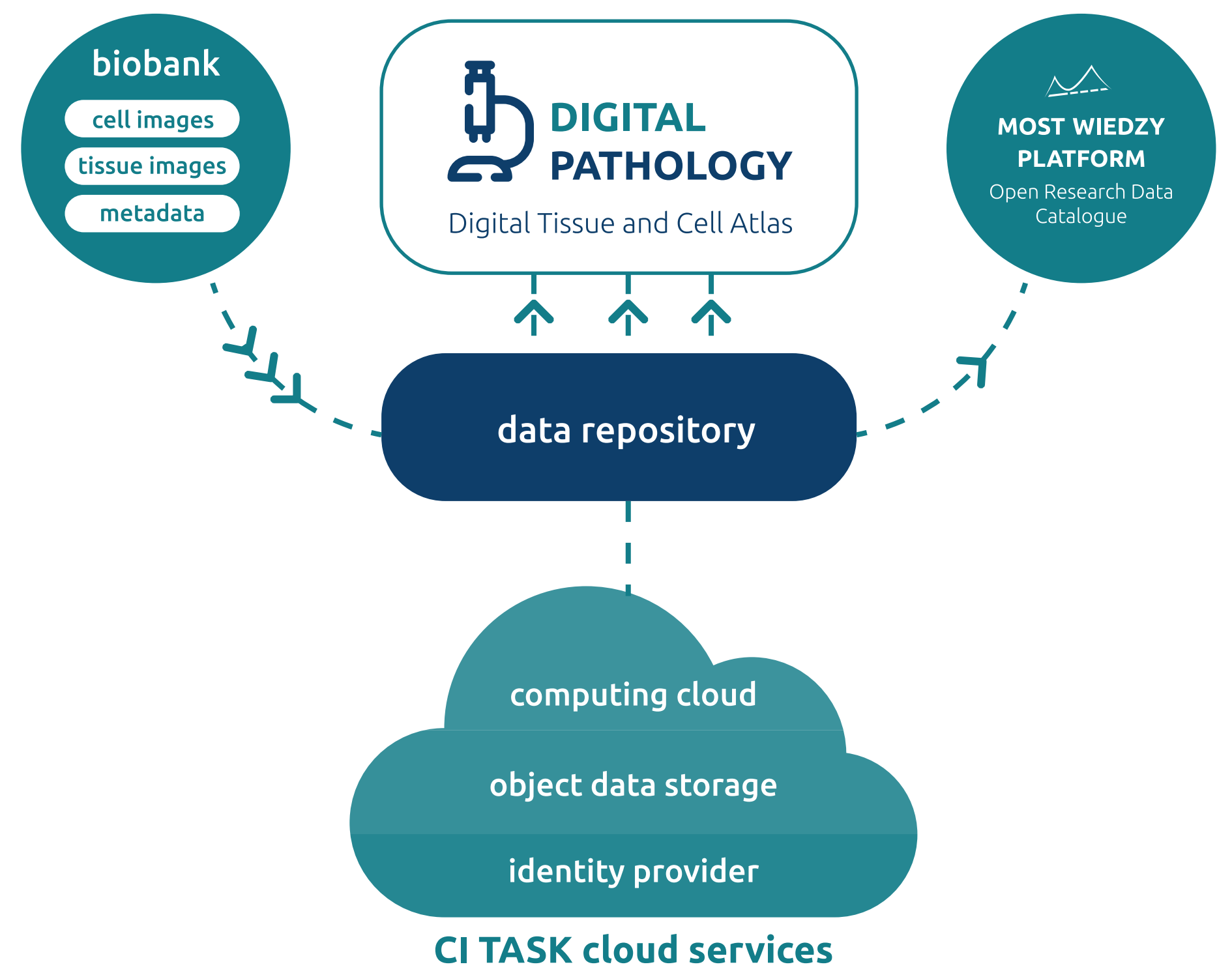
DIGITAL PATHOLOGY

1 Digital Pathology Worflow **General Scheme**

Fahrenheit Biobank

Medical University of Gdańsk

Department of Medical Laboratory Diagnostics

1 **Collecting tissues and cells**

2 **Preparing histological slides**

3 **Technical processing of files and their optimization**

4 **Digitalization**

5 **Adding metadata and description prepared by pathologists**

6 **Data transfer to IT infrastructure**

7 **Data visualisation in Digital Pathlogy**

8 **Publication of data in the Research Data Catalogue Repository**

• Digital pathology -> creating, viewing, managing, sharing, analysing and interpreting digital images of microscope slides
• Role of pathomorphologists – preparing a description of each image, describing the parameters relevant from the point of view of the diagnosis and further use of the sample – must be made individually for each sample and can not be automated

2 Architecture

biobank
- cell images
- tissue images
- metadata

DIGITAL PATHOLOGY
Digital Tissue and Cell Atlas

MOST WIEDZY PLATFORM
Open Research Data Catalogue

data repository

computing cloud
object data storage
identity provider

CI TASK cloud services

• The collection of digital slides consists of twenty thousand high definition images of human tissues and cells accompanied by structurised clinical metadata.
• CI TASK (Supercomputing Center) provides a high-speed Internet network, which has direct connections to the PIONIER and GEANT networks to ensure maximum functionality and reliability.
• Dedicated, duplicated fibre optic connections
• Fast object storage – a system that enables strong enormous amouts of data
• Special application architecture – created especially for the presentation of microscopic images in very high resolution

3 Results

• creating Digital Tissue and Cell Atlas
• creating Digital Pathology (Virtual Microscope tool)
• supporting new methods of long distance education
• supporting scientific research
• supporting telepathology/teleconsultation and routine diagnostics

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BRIDGE OF DATA

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