

MOSAIC

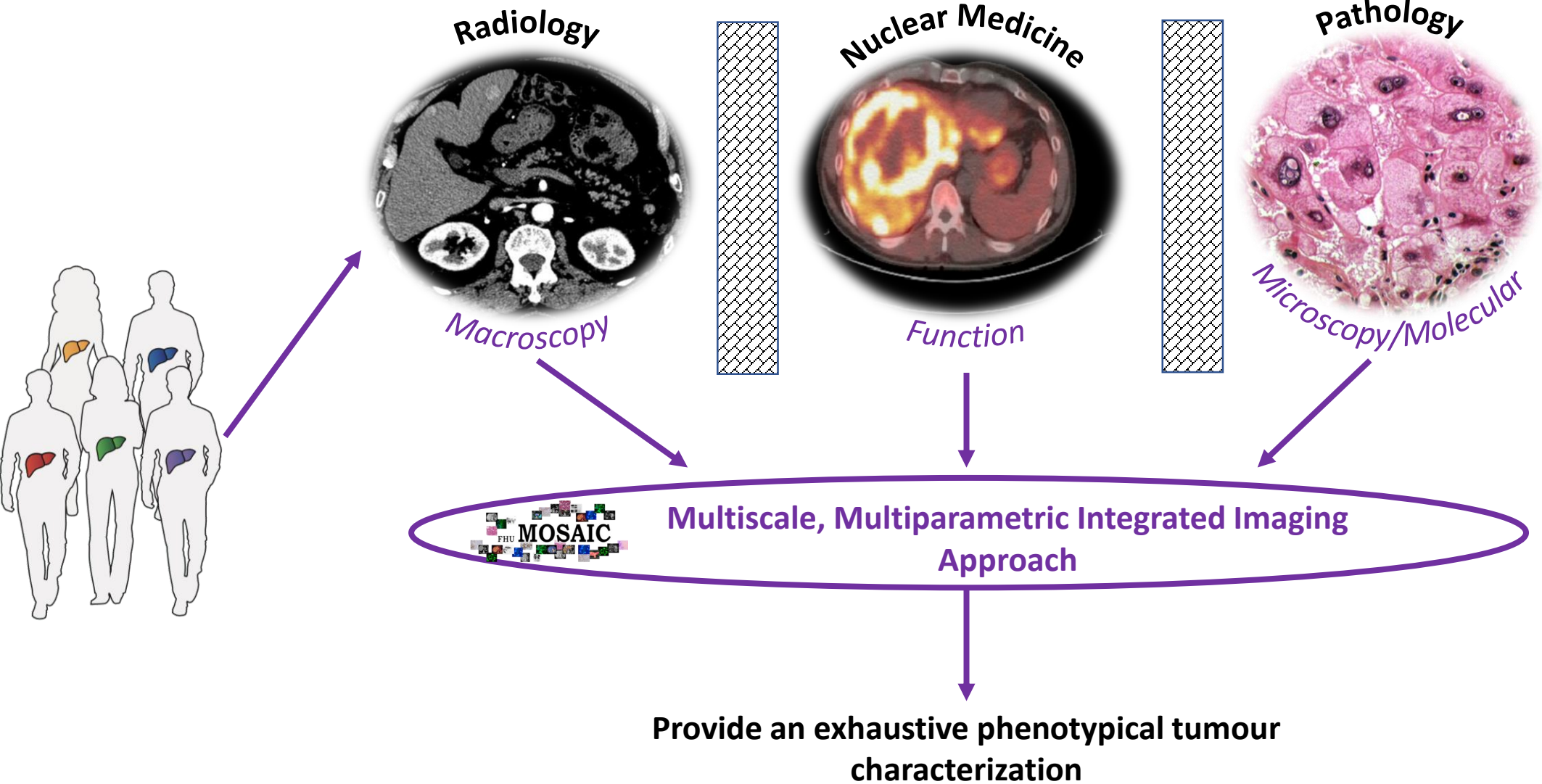
Multiscale Optimized Strategy for Artificial Intelligence-based Imaging Biomarkers in Digestive Cancer

Coordinator V Paradis (Pathologist)

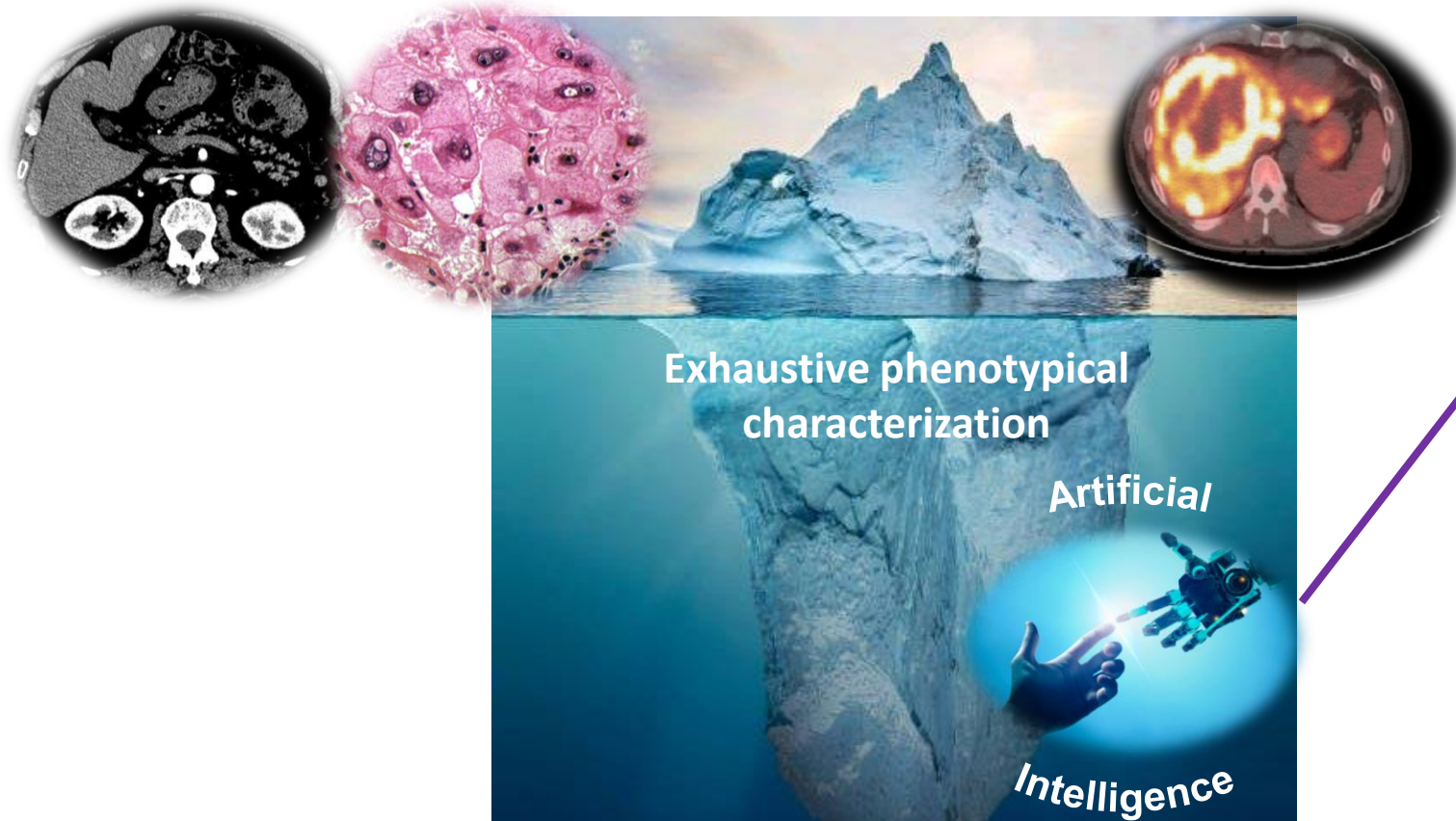
L de Mestier (Clinician) & R Sinkus (Physicist)



MOSAIC: A Concept



MOSAIC: The Rationale



Find correlations in our data currently hidden to the human eye

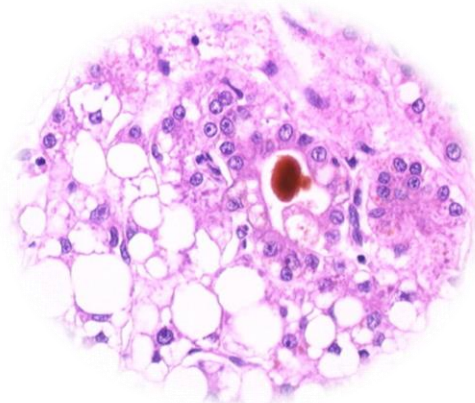
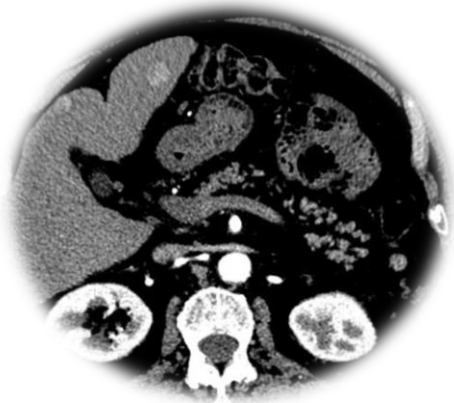
MOSAIC
Ultimate Goals

1. Improve tumor characterization of aggressiveness and response to therapy
2. Generate a comprehensive understanding to link imaging biomarkers to tissue changes *via* AI

To offer a personalized clinical management, considering individual prognosis and response to treatment

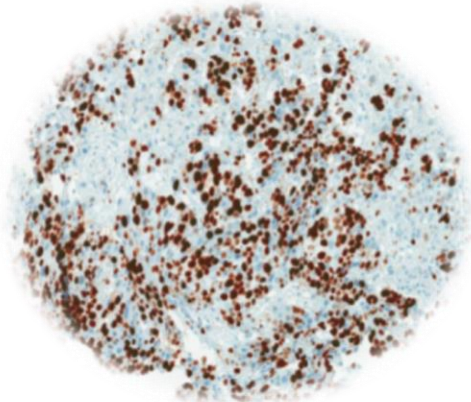
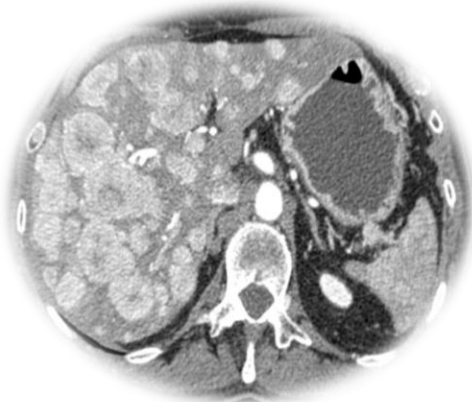
MOSAIC: The Topic

1. Hepatocellular carcinomas (HCC)



- Hypervascular neoplasms
- Diagnosis well-defined & standardized
- **Unmet needs** (clinical and therapeutic challenge)

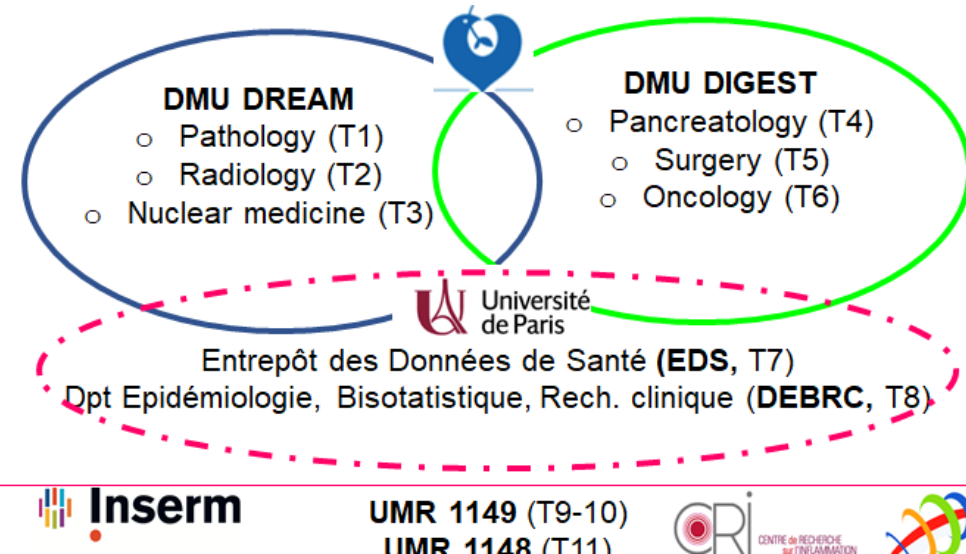
2. Neuro-endocrine tumors (NET)



- Clinical heterogeneity
 - Potential of aggressiveness / molecular features
 - Current lack of relevant and reproducible imaging markers that correlate with molecular signatures

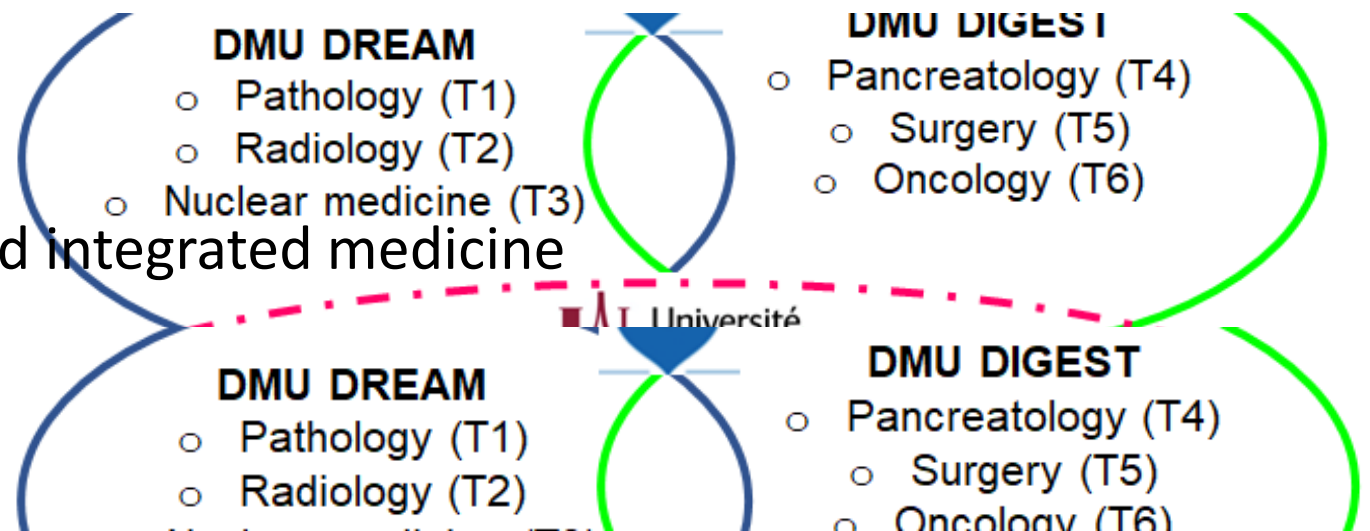
MOSAIC : A Multidisciplinary Project

1. Acquire and integrate all available morphological heterogeneous data

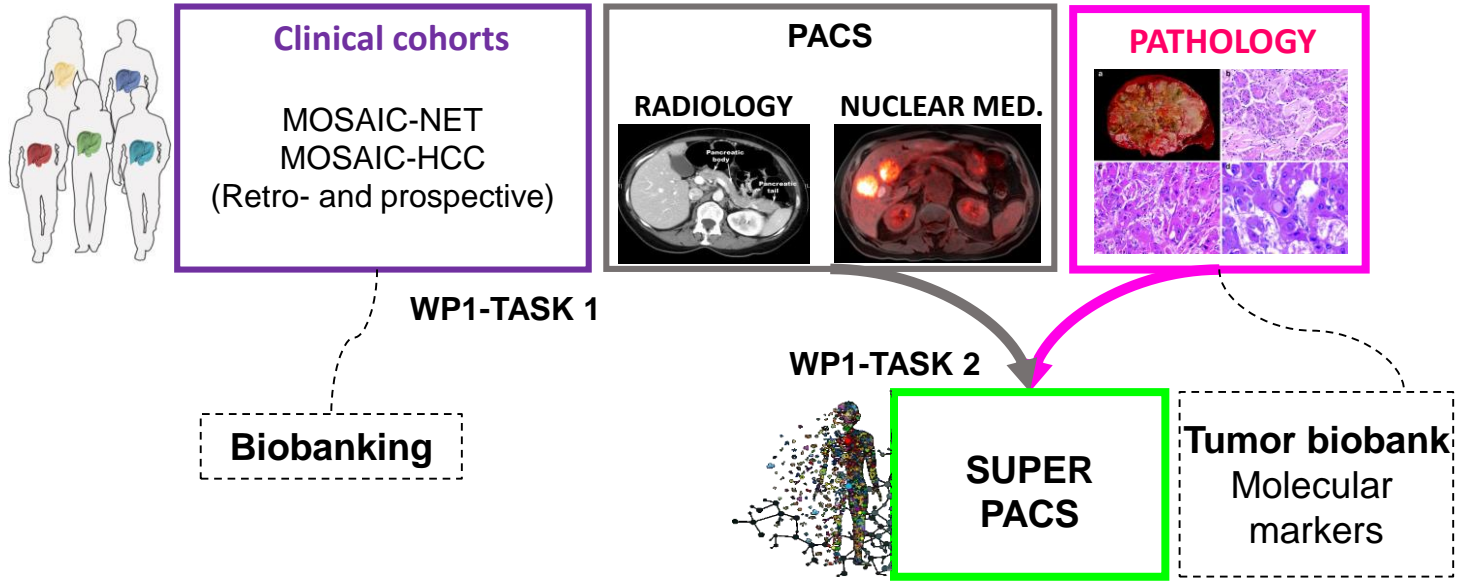


2. Develop new concepts based on cutting-edge imaging approaches

- Industrial support for database and integrated medicine



WP leader
M Ronot

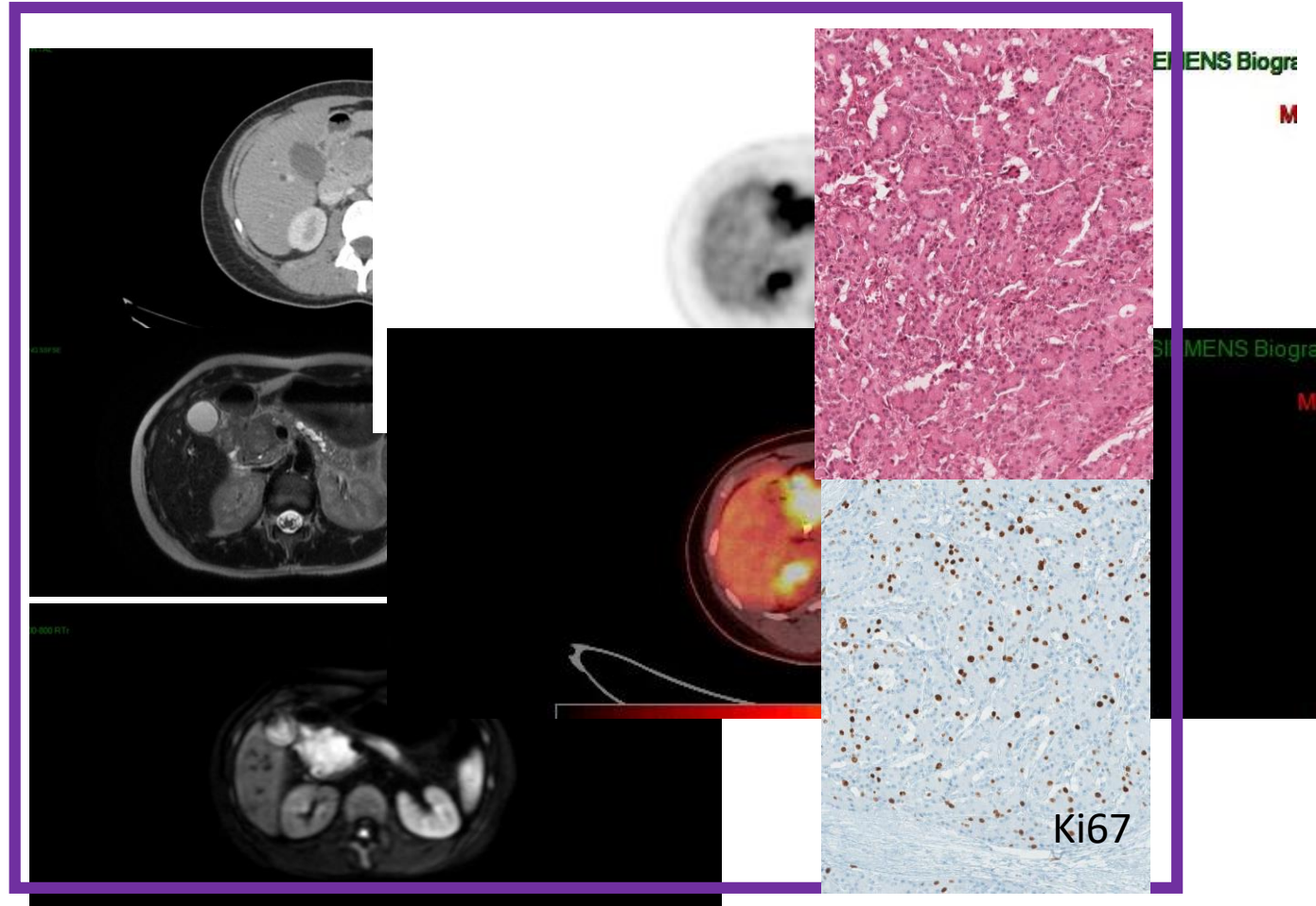
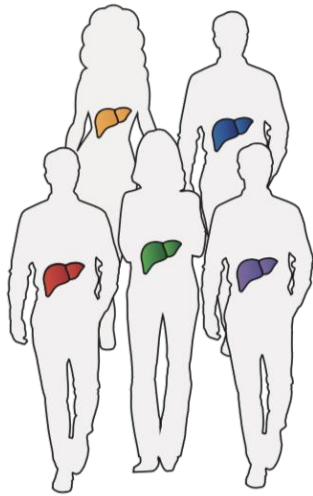


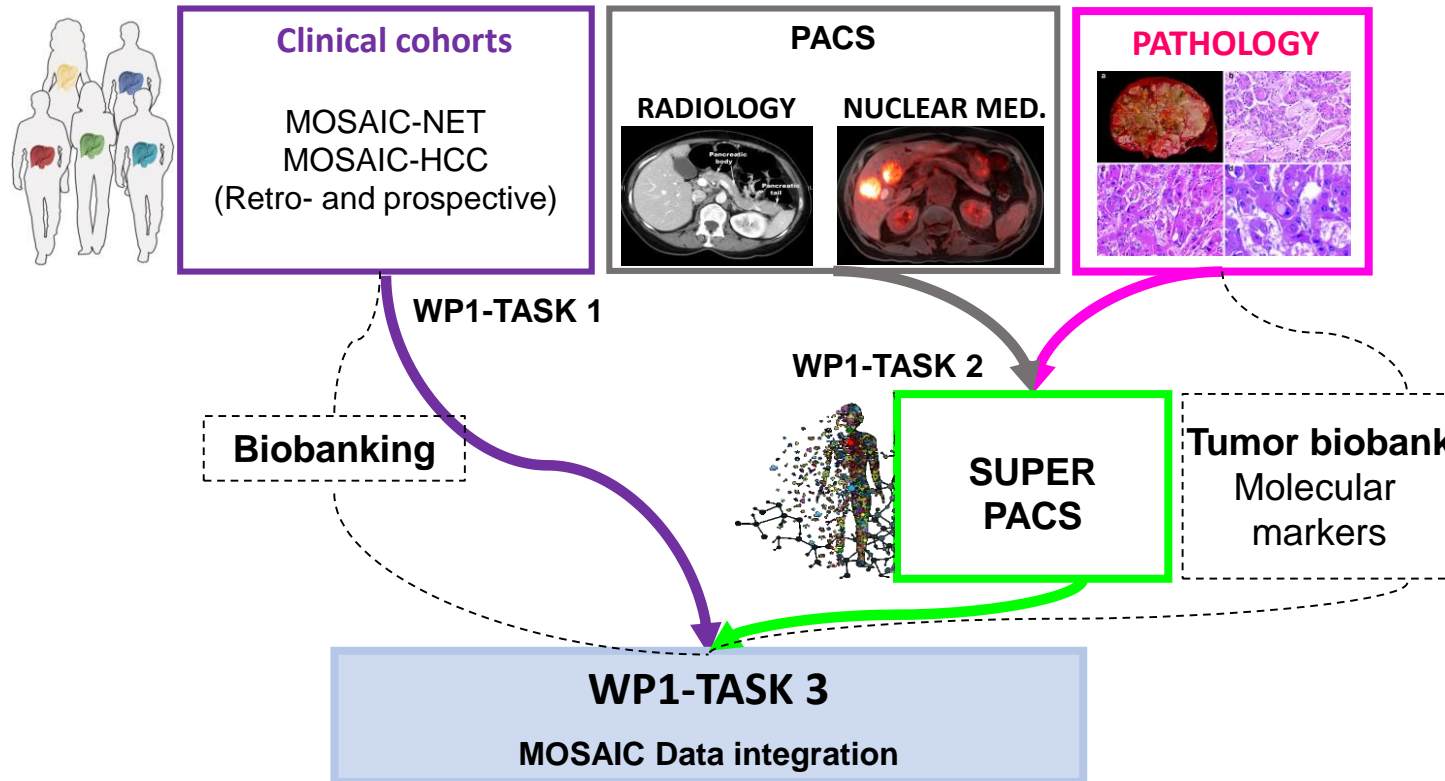
Upgrade PACS to a « SUPER-PACS »

PACS (Pictures Archiving and Communication System)
SUPER PACS (Pictures Archiving and Communication System)

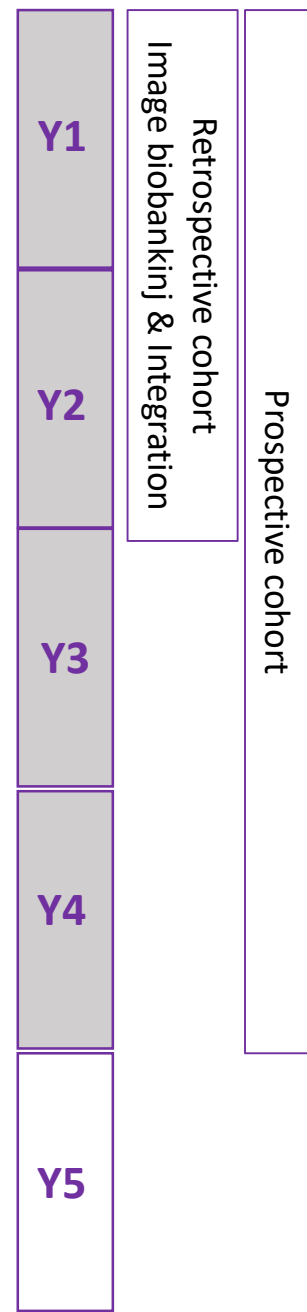
Pathology

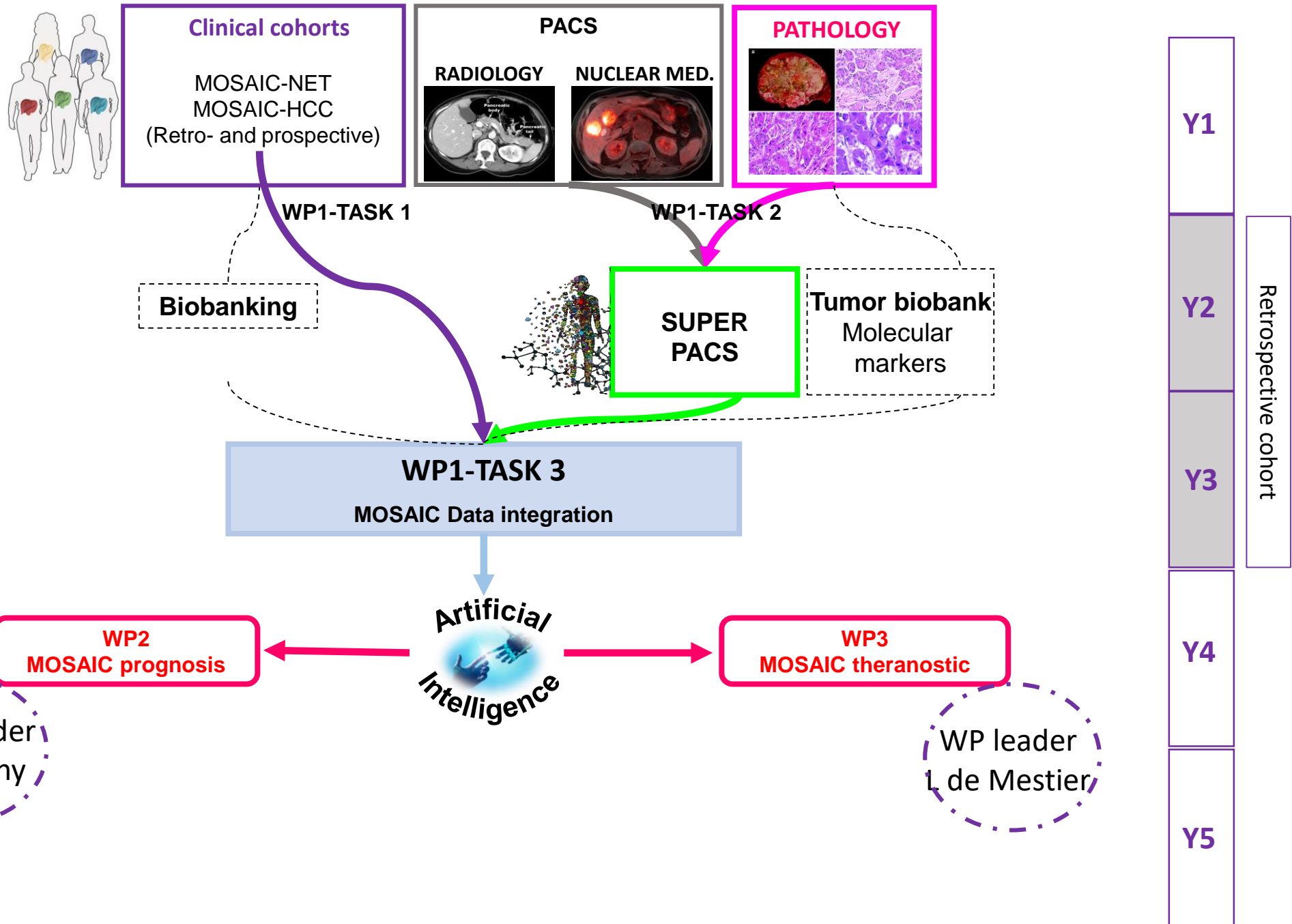
33 year-old woman
Pancreatic NET (G3)
Liver metastasis



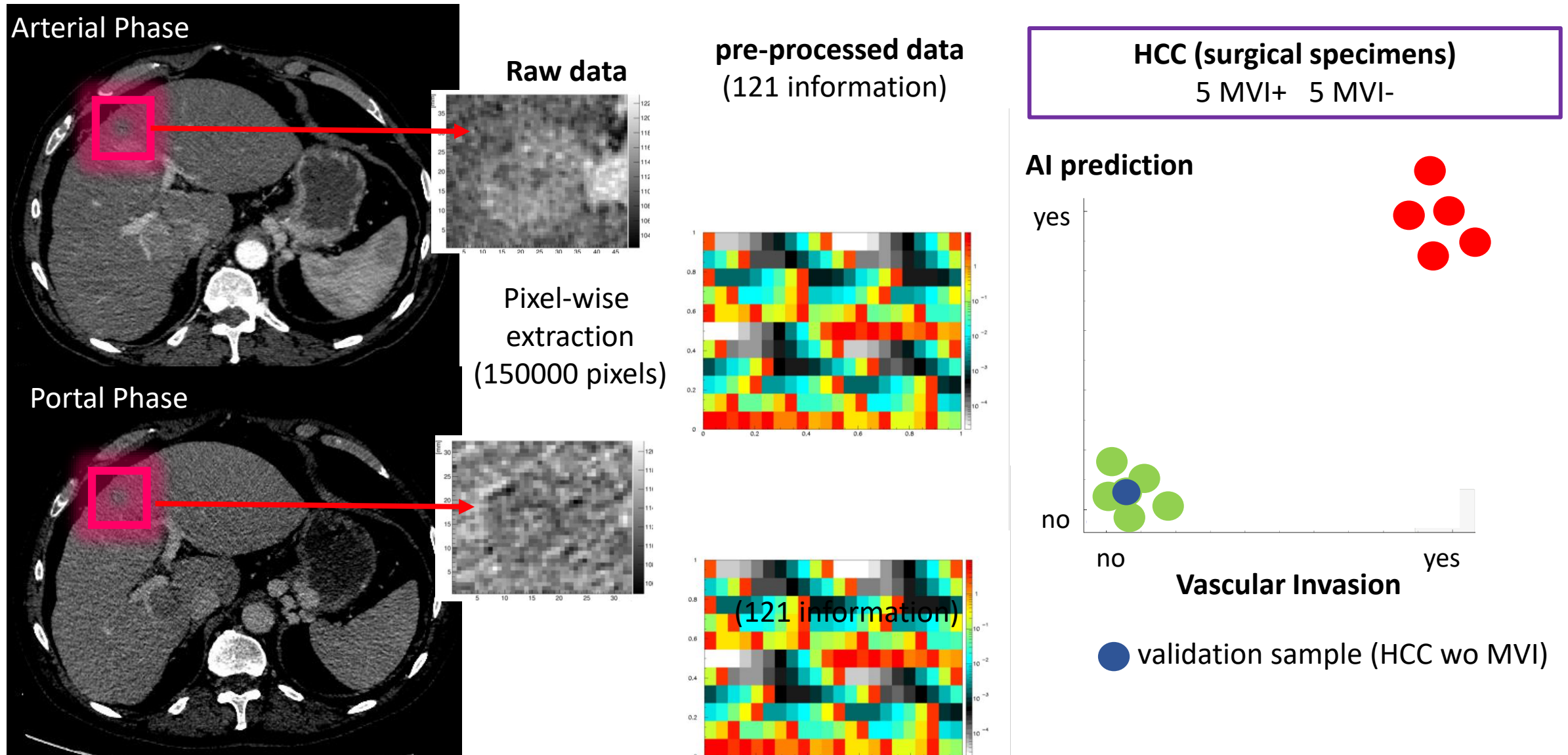


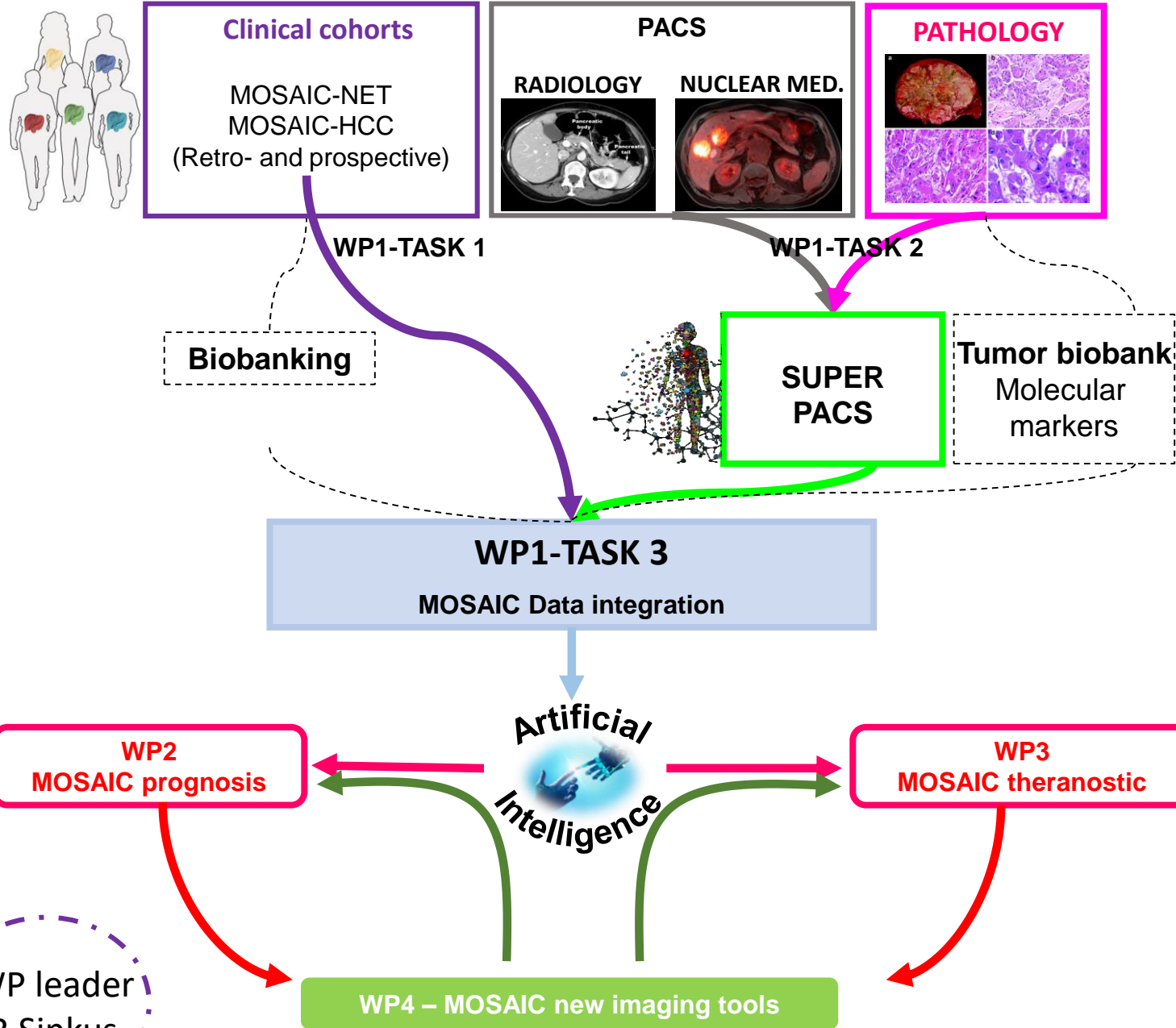
WP leader
M Ronot



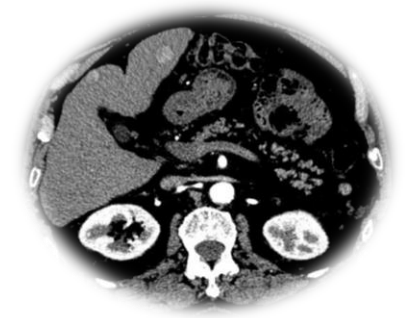


HCC : Predict Microvascular Invasion (MVI)





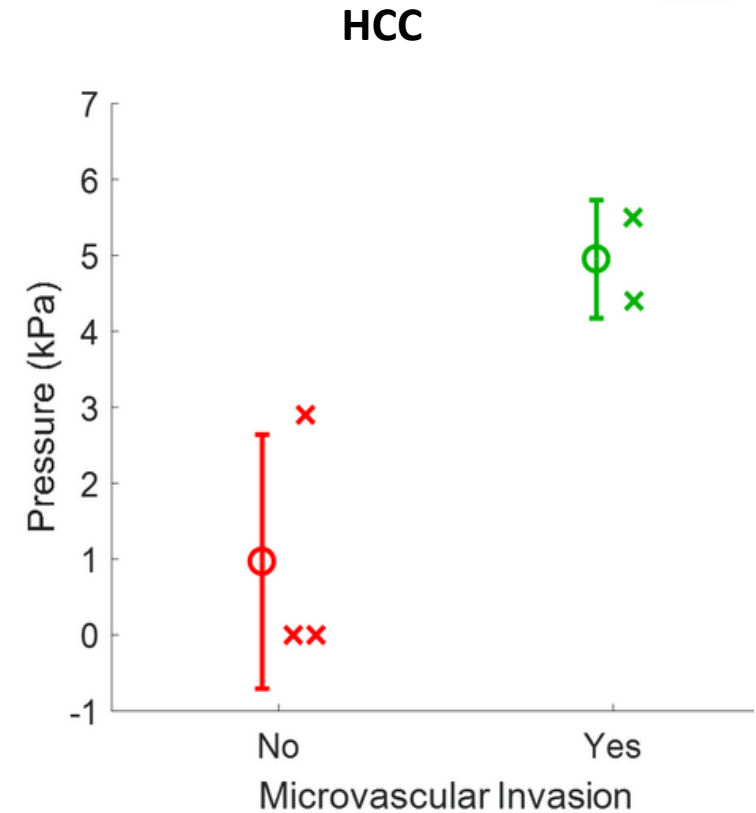
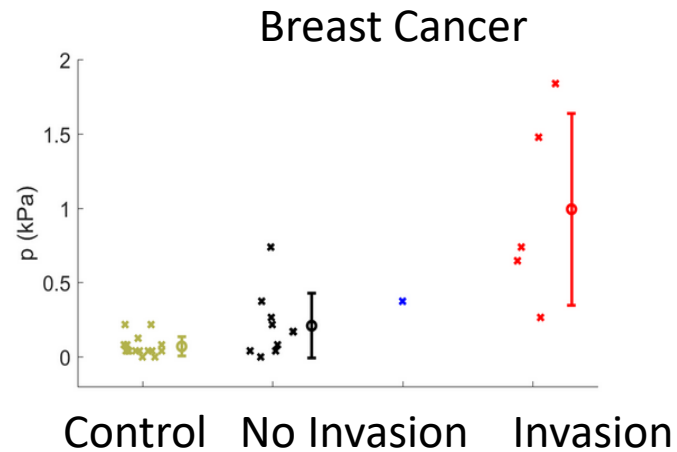
New Imaging Approaches (1)



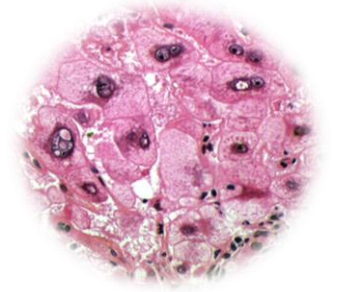
Non-invasive quantification of tumour pressure *via* MRI

➤ Tumor pressure

- Significant potential for characterization of tumour aggressiveness and response to therapy



New Imaging Approaches (2)



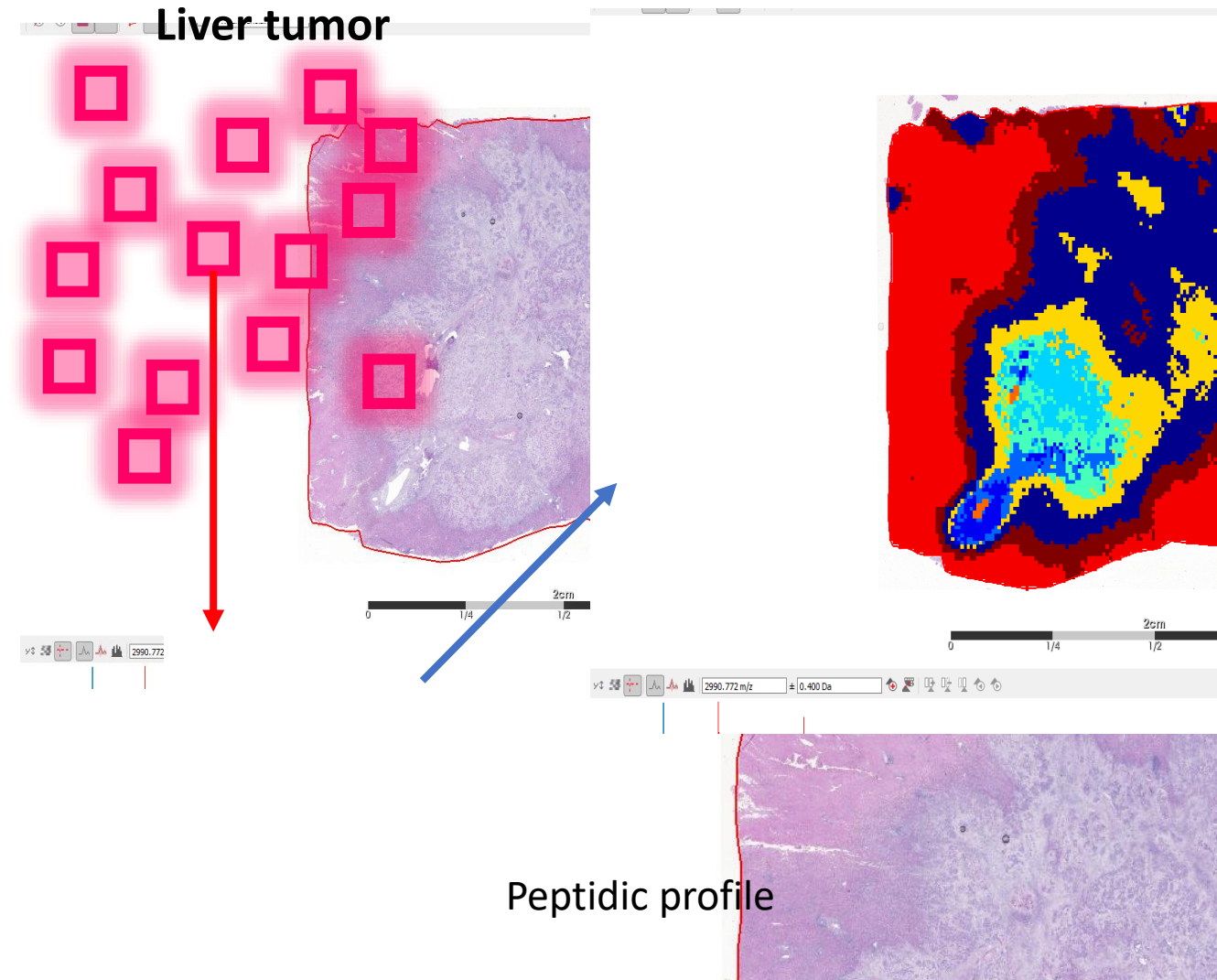
Identify new tissue biomarkers *via* MALDI imaging

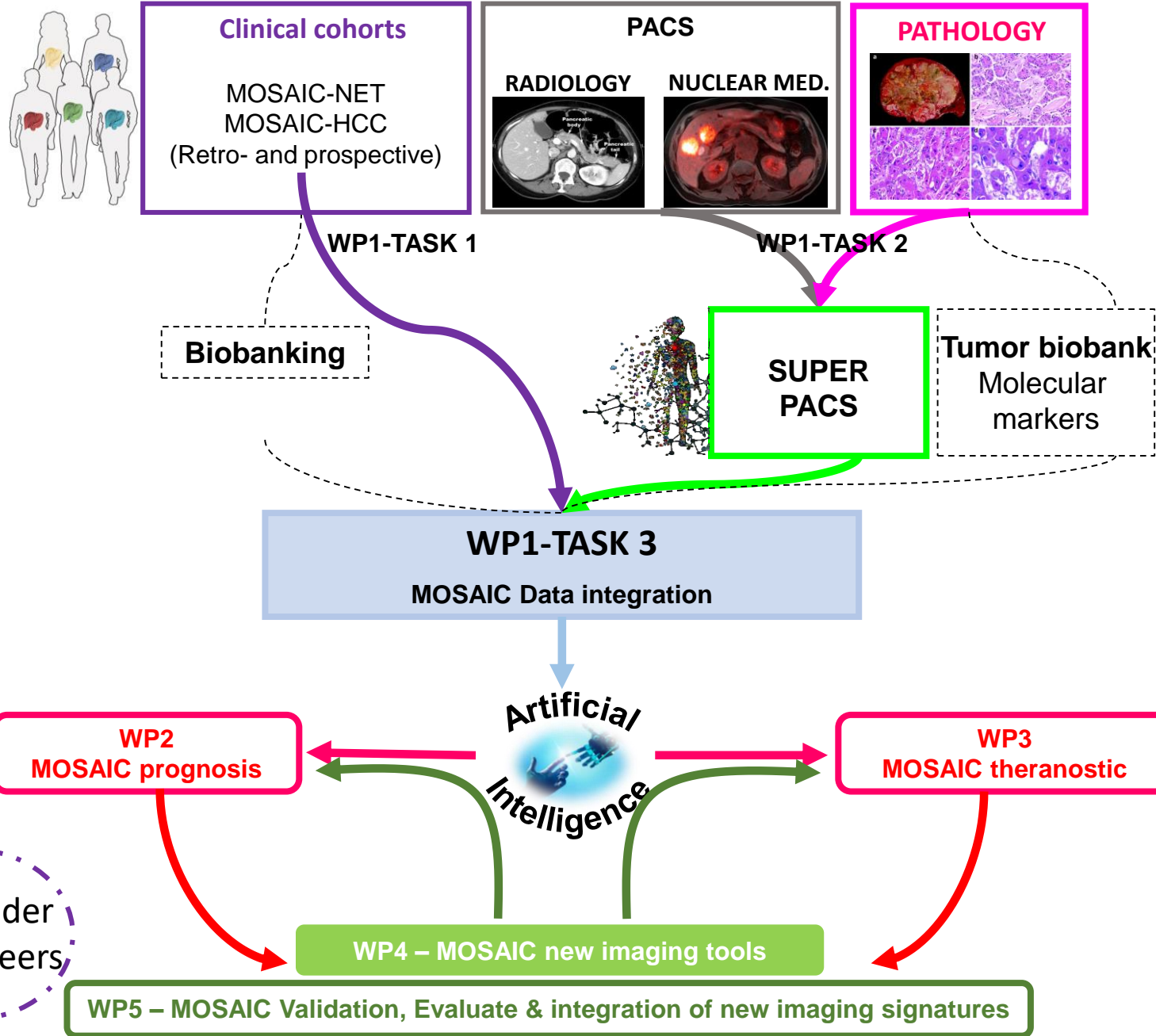
➤ In situ proteomic approach

- Combines a proteomic approach (MS) with morphological analysis
- Provides an **exhaustive molecular picture** without the need for target-specific reagents

Imaging Mass Spectrometry Reveals Modified Forms of Histone H4 as New Biomarkers of Microvascular Invasion in Hepatocellular Carcinomas

Poté N, Hepatology 2013

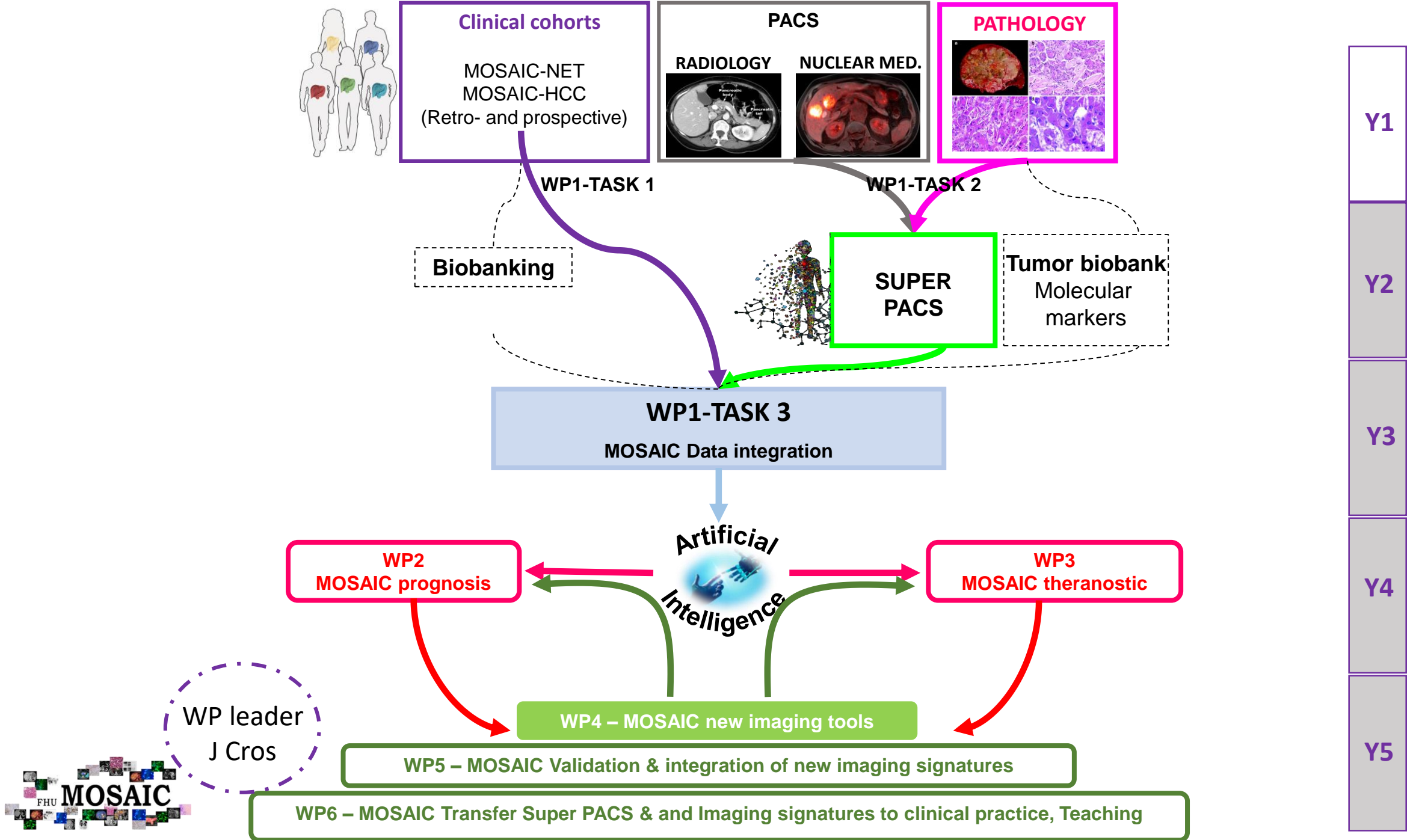




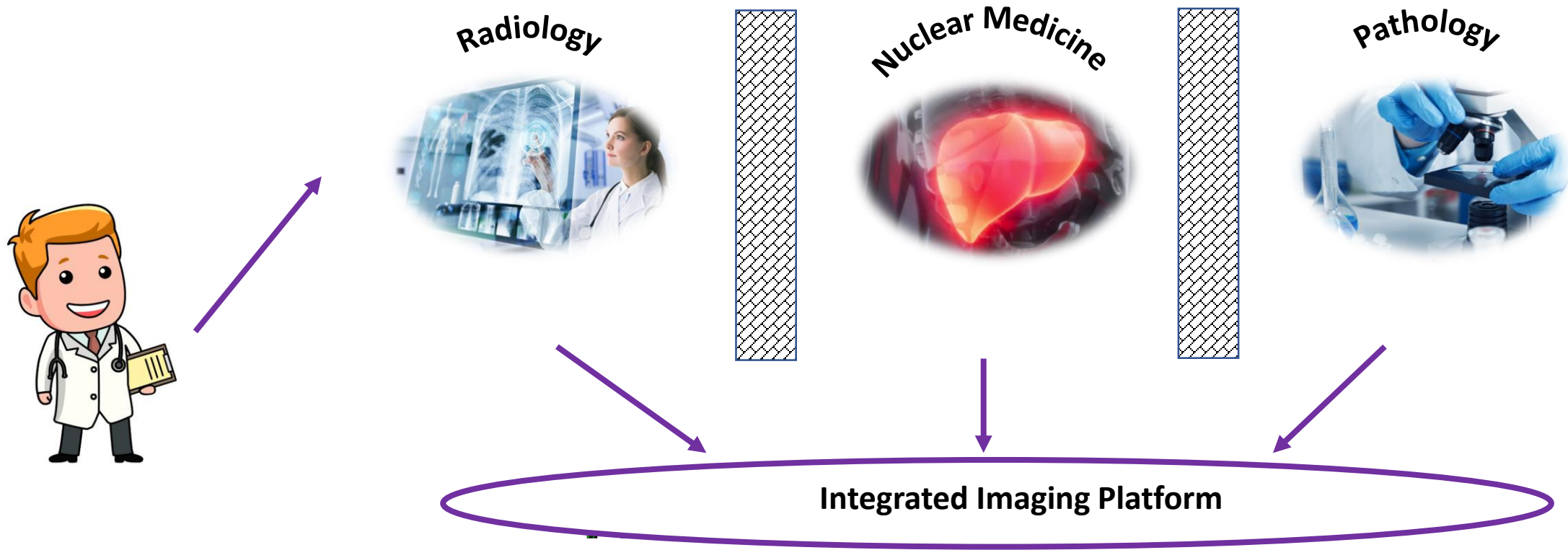
WP leader
B van Beers



- Y1
- Y2
- Y3
- Y4
- Y5

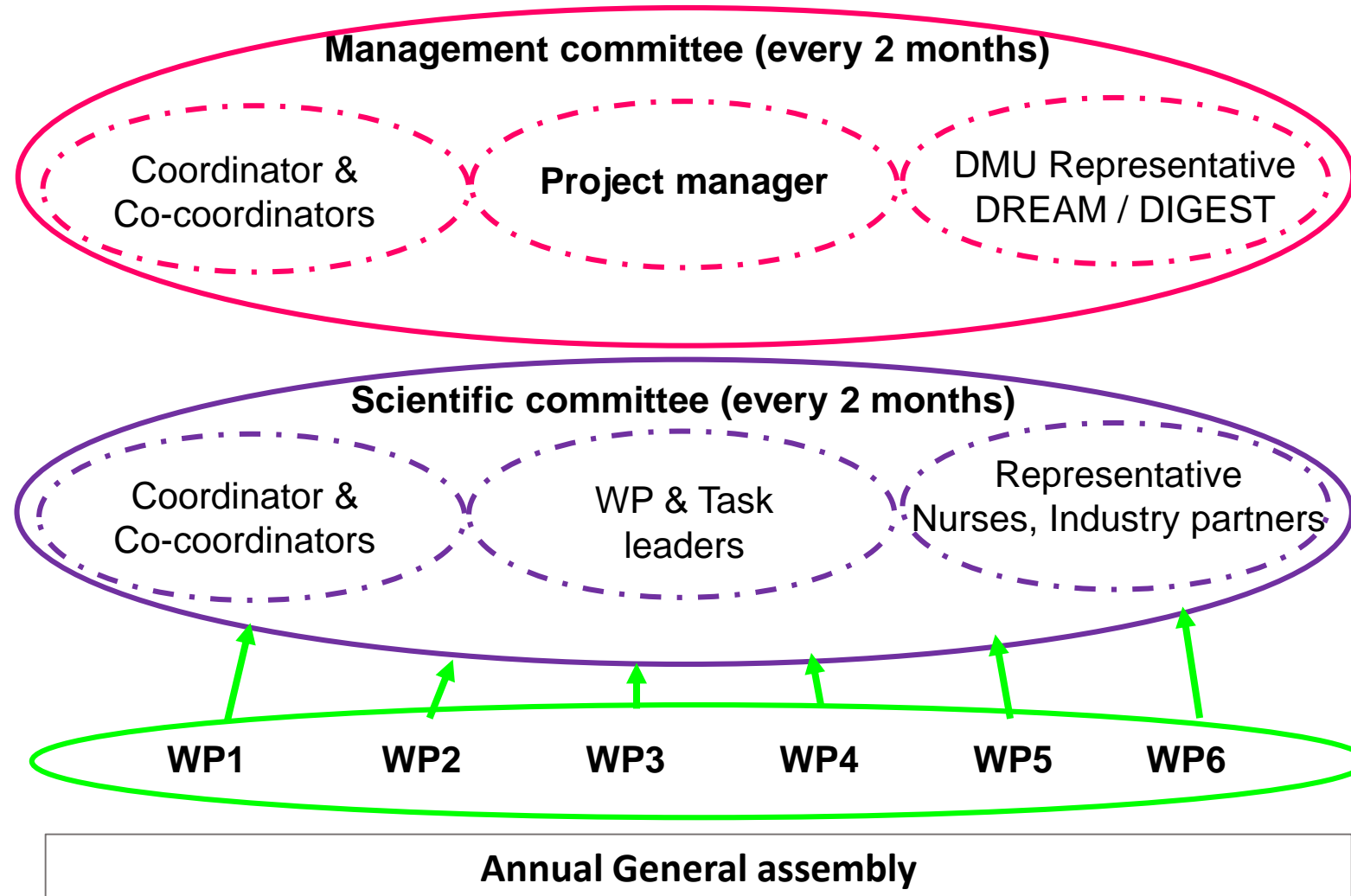


MOSAIC: A Teaching Platform



- A computer-based education (integrated to Ilumens Simulation Centre)
 - Interactive learning, Personalized education
 - Medical students & training for practionners

MOSAIC : The Gouvernance



MOSAIC

Our strengths

- Project of IMAGING « at large », **Multiscale**
 - Multidisciplinarity merging experienced teams
 - Existing imaging approaches
- Topic : HCC & NET
 - **Centres of Excellence** for HCC and NET (ENETS)
 - Patient recruitment & access to tumor biobanks
 - Running fundings (H2020, RHU QUID-NASH, FUI)
- Long standing collaborations between partners
 - **Shared publications, fundings and students**
 - Academic and industry partnership already active

Why we need FHU ?

- Creation of integrated imaging database (**SUPER PACS**)
 - Structure Radiopathomic cohorts
 - Facilitate access to AI approaches
 - Compliance with ethical standards
- From Proof Of Concept to **clinical practice**
 - SUPER PACS implementation (Radio-Patho imaging)
 - Transfer to other diseases and other centres
- Increase our **visibility**
 - APHP “Data integration : A strategic priority “
 - Industry partnership strengthening
 - Competitive grants application
- Dissemination & **Education**
 - Reshape medical teaching in Radio and Pathology