COLLEGE of AMERICAN PATHOLOGISTS

Digital Pathology, ROI, Research and Efficiency

Timothy Travis, MBA, MS, FACHE, CMPE, CHFP

June 10, 2025

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Timothy Travis, MBA, MS, FACHE, CMPE, CHFP

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- MGMA Indiana-Legislative Committee
- Medical Education Foundation: IU School of Medicine South Bend-Board of Directors
- President & CEO SBMF

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Derrick Forchetti, MD

- Pathologist with South Bend Medical Foundation (SBMF).
- Board-certified in Anatomic and Clinical Pathology as well as Clinical Informatics.
- Master of Science degree, specializing in data science, from the University of Wisconsin Extended Campus.
- Member of the CAP's Digital and Computational Pathology committee.

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Dibson Dibe Gondim, MD, FACP

- Member of the Artificial Intelligence Committee, CAP
- Director of Pathology Informatics and Associate Professor of Pathology at the University of Louisville
- Certified by the American Board of Pathology in:
  - Anatomic Pathology
  - Neuropathology
  - Clinical Informatics
- Lead on the large-scale digital pathology and AI Initiative at the University of Louisville

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EDITOR'S NOTE: FURTHER PICTURE SLIDES THAT WERE ONLY RELEVANT WITH NARRATION HAVE BEEN REMOVED TO REDUCE FILE SIZE AND FOR EASE OF REVIEW. PLEASE VISIT THE ONLINE RECORDING TO SEE THEM IN CONTEXT.

Photo courtesy Orange County Archives.

$$ROI = (Net\ Profit / Cost\ of\ Investment) \times 100$$

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$$\text{Estimated ROI} = (C + B - A) / (A) \times 100$$

A = Projected costs

B = Projected cost savings and cost avoidance

C = Projected revenue

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CPT Code	Long Descriptor
+0751T	Digitization of glass microscope slides for level II, surgical pathology, gross and microscopic examination (List separately in addition to code for primary procedure)
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+0753T	Digitization of glass microscope slides for level IV, surgical pathology, gross and microscopic examination (List separately in addition to code for primary procedure)
+0754T	Digitization of glass microscope slides for level V, surgical pathology, gross and microscopic examination (List separately in addition to code for primary procedure)
+0755T	Digitization of glass microscope slides for level VI, surgical pathology, gross and microscopic examination (List separately in addition to code for primary procedure)
+0756T	Digitization of glass microscope slides for special stain, including interpretation and report, group I, for microorganisms (eg, acid fast, methenamine silver) (List separately in addition to code for primary procedure)
+0757T	Digitization of glass microscope slides for special stain, including interpretation and report, group II, all other (eg, iron, trichrome), except stain for microorganisms, stains for enzyme constituents, or immunocytochemistry and immunohistochemistry (List separately in addition to code for primary procedure)
+0758T	Digitization of glass microscope slides for special stain, including interpretation and report, histochemical stain on frozen tissue block (List separately in addition to code for primary procedure)
+0759T	Digitization of glass microscope slides for special stain, including interpretation and report, group III, for enzyme constituents (List separately in addition to code for primary procedure)
+0760T	Digitization of glass microscope slides for immunohistochemistry or immunocytochemistry, per specimen, initial single antibody stain procedure (List separately in addition to code for primary procedure)
+0761T	Digitization of glass microscope slides for immunohistochemistry or immunocytochemistry, per specimen, each additional single antibody stain procedure (List separately in addition to code for primary procedure)
+0762T	Digitization of glass microscope slides for immunohistochemistry or immunocytochemistry, per specimen, each multiplex antibody stain procedure (List separately in addition to code for primary procedure)
+0763T	Digitization of glass microscope slides for morphometric analysis, tumor immunohistochemistry (eg, Her-2/neu, estrogen receptor/progesterone receptor), quantitative or semiquantitative, per specimen, each single antibody stain procedure, manual (List separately in addition to code for primary procedure)
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#+0828T	Digitization of glass microscope slides for cytopathology, fluids, washings, or brushings, except cervical or vaginal; simple filter method with interpretation (List separately in addition to code for primary procedure)
#+0829T	Digitization of glass microscope slides for cytopathology, concentration technique, smears, and interpretation (eg, Saccomanno technique) (List separately in addition to code for primary procedure)
#+0830T	Digitization of glass microscope slides for cytopathology, selective-cellular enhancement technique with interpretation (eg, liquid-based slide preparation method), except cervical or vaginal (List separately in addition to code for primary procedure)
#+0831T	Digitization of glass microscope slides for cytopathology, cervical or vaginal (any reporting system), requiring interpretation by physician (List separately in addition to code for primary procedure)
#+0832T	Digitization of glass microscope slides for cytopathology, smears, any other source; screening and interpretation (List separately in addition to code for primary procedure)
#+0833T	Digitization of glass microscope slides for cytopathology, smears, any other source; preparation, screening and interpretation (List separately in addition to code for primary procedure)
#+0834T	Digitization of glass microscope slides for cytopathology, smears, any other source; extended study involving over 5 slides and/or multiple stains (List separately in addition to code for primary procedure)
#+0835T	Digitization of glass microscope slides for cytopathology, evaluation of fine needle aspirate; immediate cytohistologic study to determine adequacy for diagnosis, first evaluation episode, each site (List separately in addition to code for primary procedure)
#+0836T	Digitization of glass microscope slides for cytopathology, evaluation of fine needle aspirate; immediate cytohistologic study to determine adequacy for diagnosis, each separate additional evaluation episode, same site (List separately in addition to code for primary procedure)
#+0837T	Digitization of glass microscope slides for cytopathology, evaluation of fine needle aspirate; interpretation and report (List separately in addition to code for primary procedure)
#+0838T	Digitization of glass microscope slides for consultation and report on referred slides prepared elsewhere (List separately in addition to code for primary procedure)
#+0839T	Digitization of glass microscope slides for consultation and report on referred material requiring preparation of slides (List separately in addition to code for primary procedure)
#+0840T	Digitization of glass microscope slides for consultation, comprehensive, with review of records and specimens, with report on referred material (List separately in addition to code for primary procedure)
#+0841T	Digitization of glass microscope slides for pathology consultation during surgery; first tissue block, with frozen section(s), single specimen (List separately in addition to code for primary procedure)
#+0842T	Digitization of glass microscope slides for pathology consultation during surgery; each additional tissue block with frozen section(s) (List separately in addition to code for primary procedure)
#+0843T	Digitization of glass microscope slides for pathology consultation during surgery; cytologic examination (eg, touch preparation, squash preparation), initial site (List separately in addition to code for primary procedure)
#+0844T	Digitization of glass microscope slides for pathology consultation during surgery; cytologic examination (eg, touch preparation, squash preparation), each additional site (List separately in addition to code for for primary procedure)
#+0845T	Digitization of glass microscope slides for immunofluorescence, per specimen; initial single antibody stain procedure (List separately in addition to code for primary procedure)
#+0846T	Digitization of glass microscope slides for immunofluorescence, per specimen; each additional single antibody stain procedure (List separately in addition to code for primary procedure)
#+0847T	Digitization of glass microscope slides for examination and selection of retrieved archival (ie, previously diagnosed) tissue(s) for molecular analysis (eg, KRAS mutational analysis) (List separately in addition to code for primary procedure)
#+0848T	Digitization of glass microscope slides for in situ hybridization (eg, FISH), per specimen; initial single probe stain procedure (List separately in addition to code for primary procedure)
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#+0854T	Digitization of glass microscope slides for blood smear, peripheral, interpretation by physician with written report (List separately in addition to code for primary procedure)
#+0855T	Digitization of glass microscope slides for bone marrow, smear interpretation (List separately in addition to code for primary procedure)
#+0856T	Digitization of glass microscope slides for electron microscopy, diagnostic (List separately in addition to code for primary procedure)

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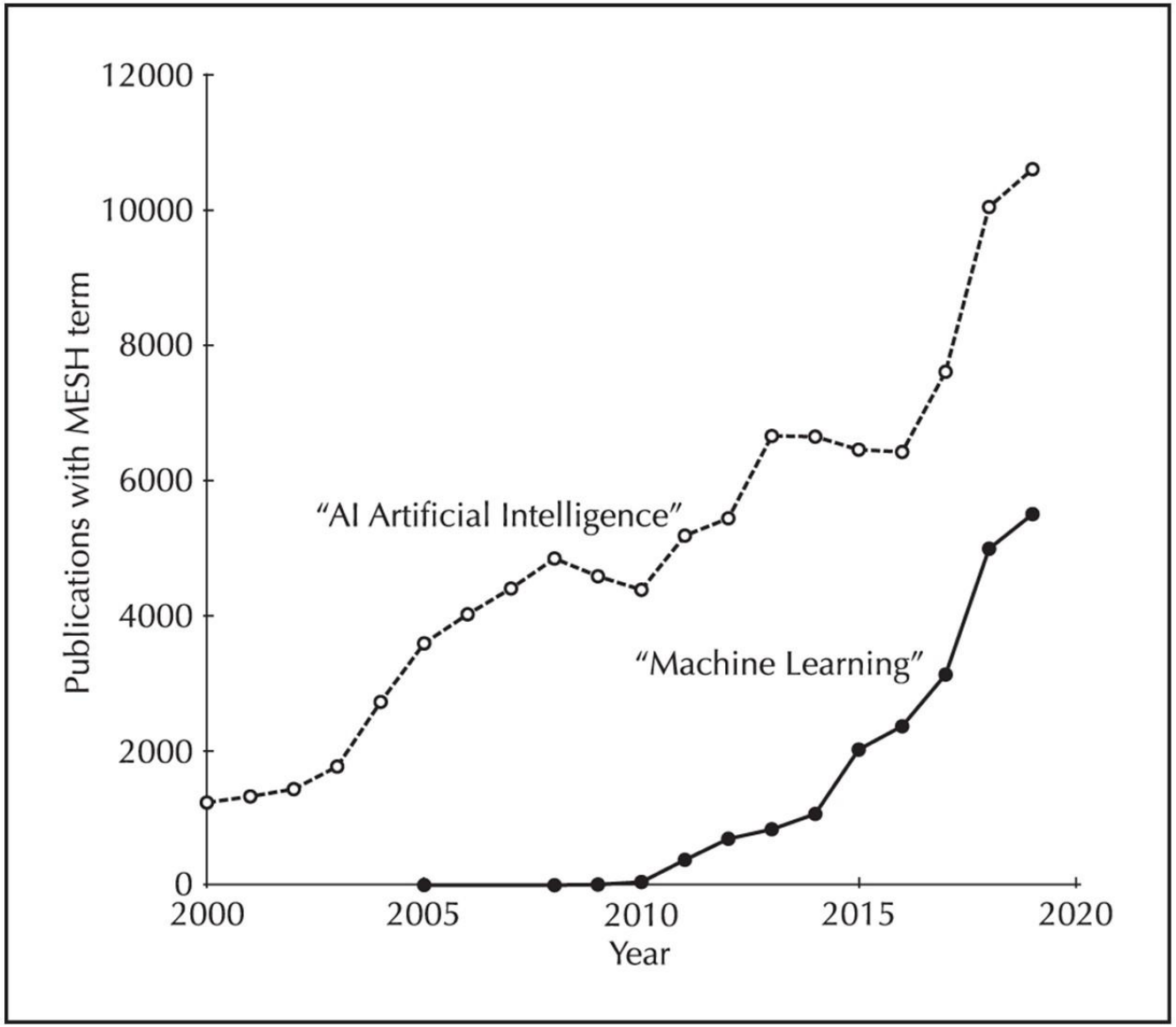
From: **Introduction to Artificial Intelligence and Machine Learning for Pathology**

Arch Pathol Lab Med. 2021;145(10):1228-1254. doi:10.5858/arpa.2020-0541-CP



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Studio scene
Image comparison tool

Lighting: Image size: FULL COMP PRINT

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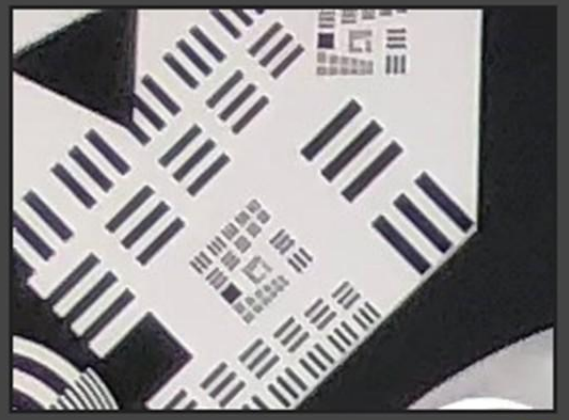

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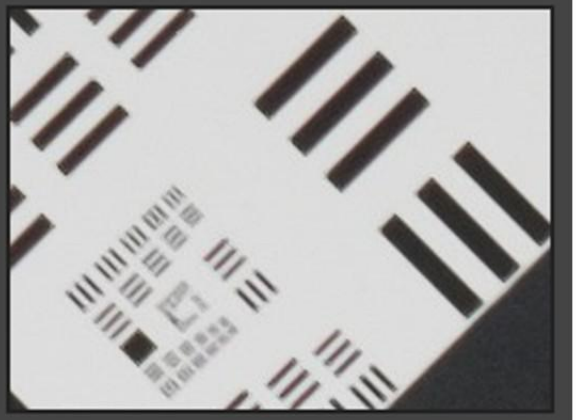

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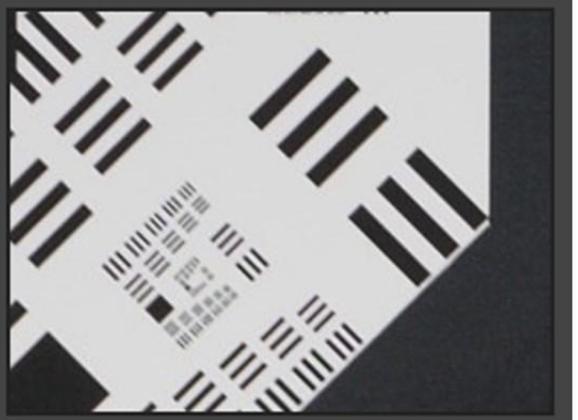

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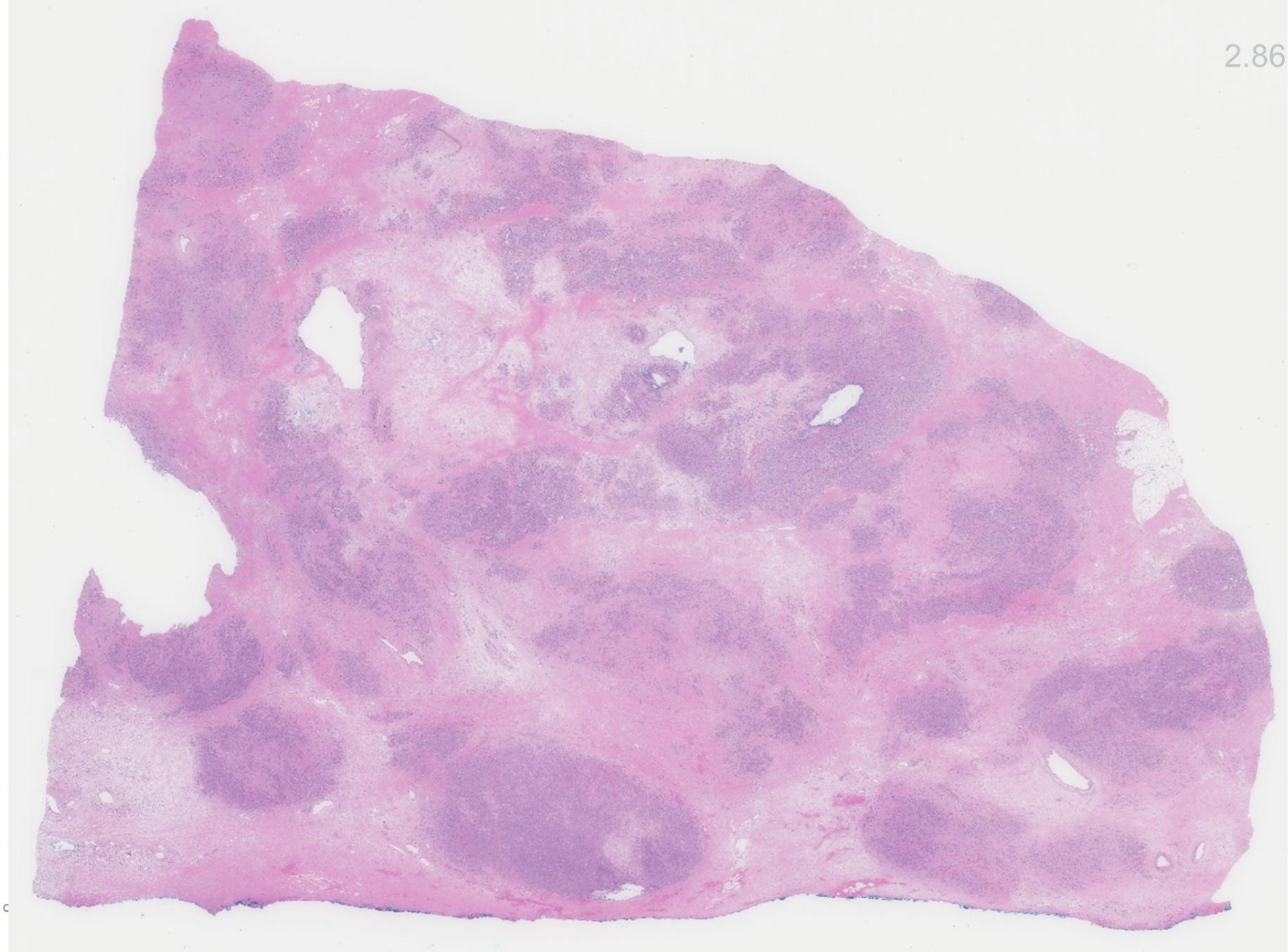

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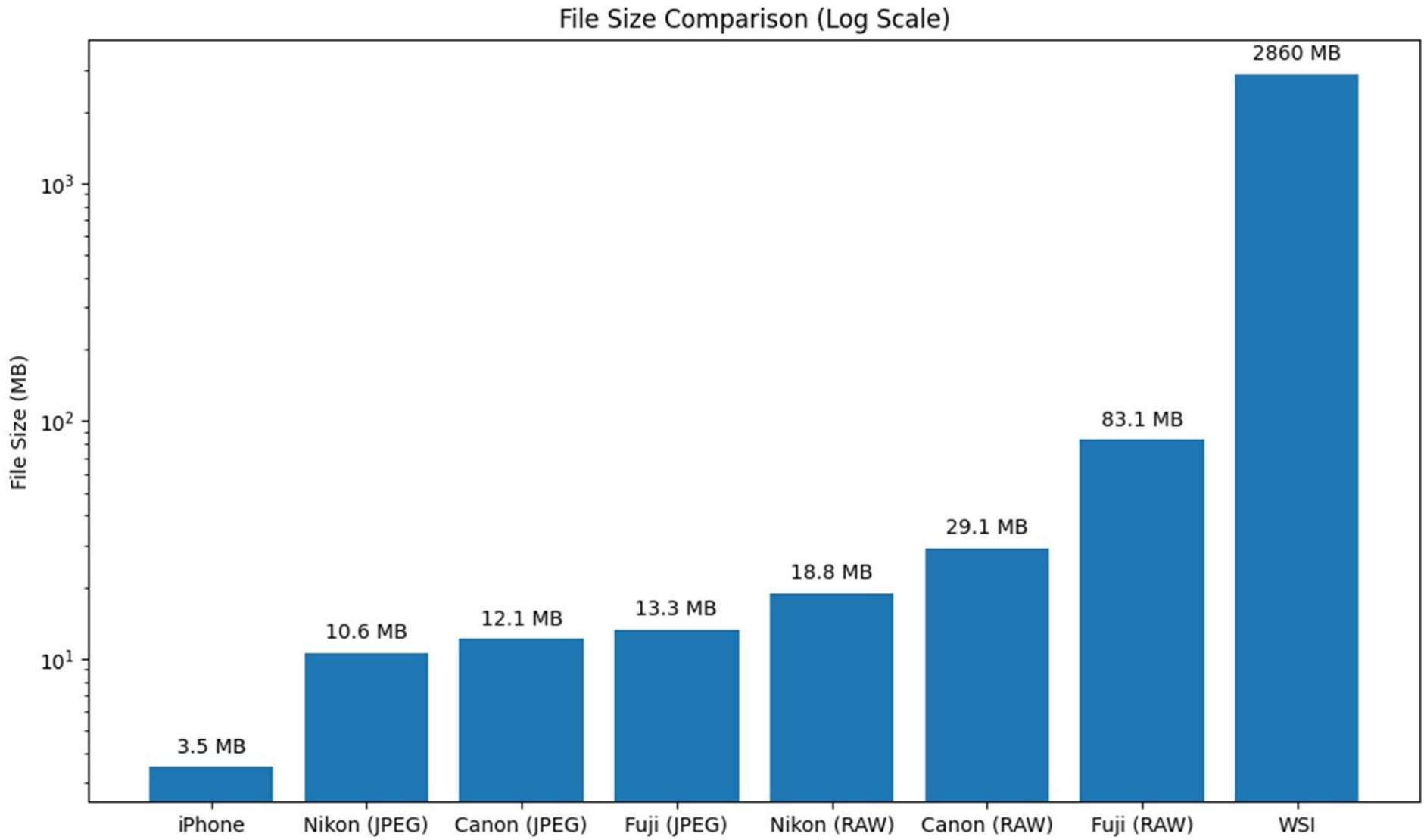

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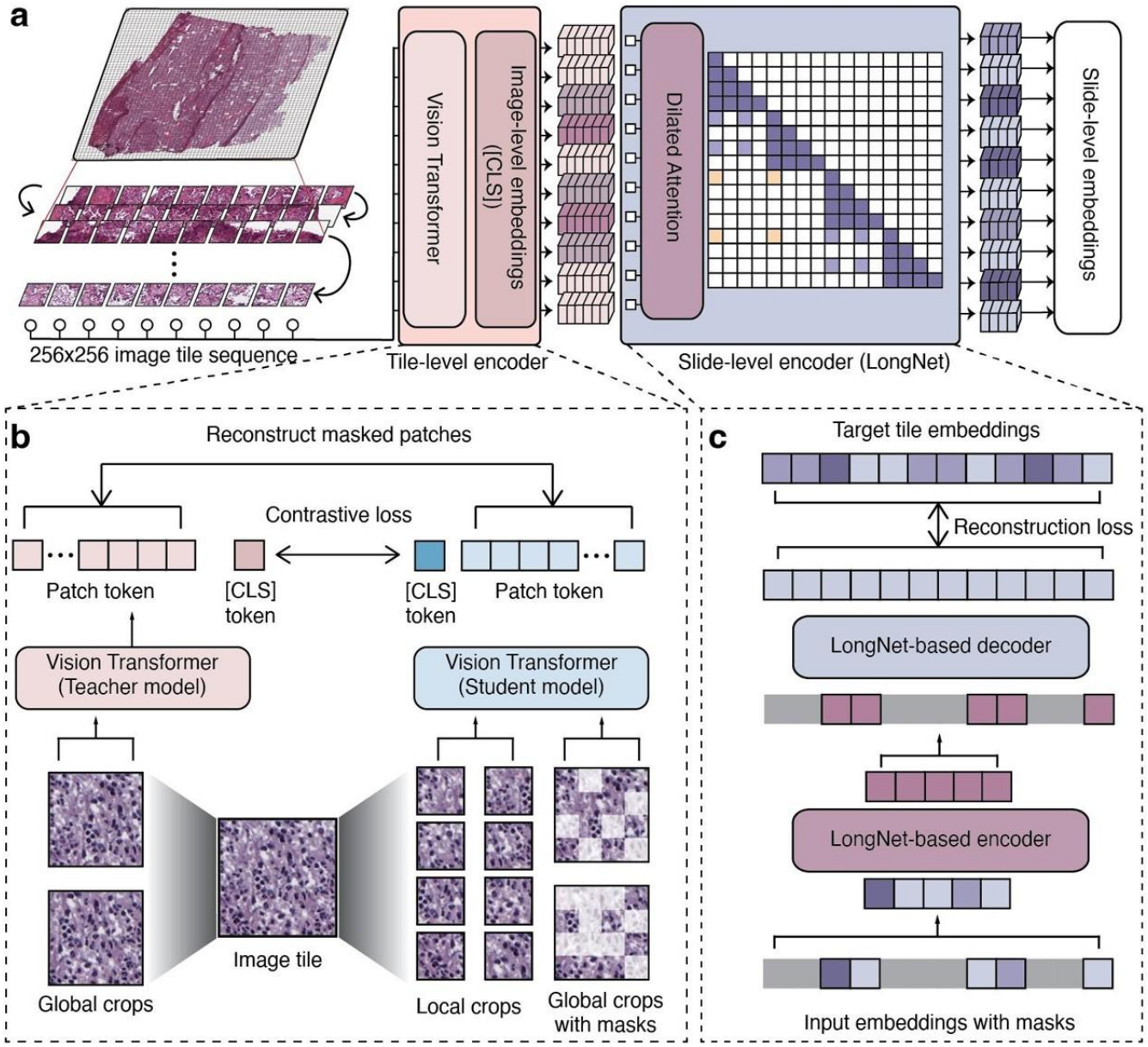

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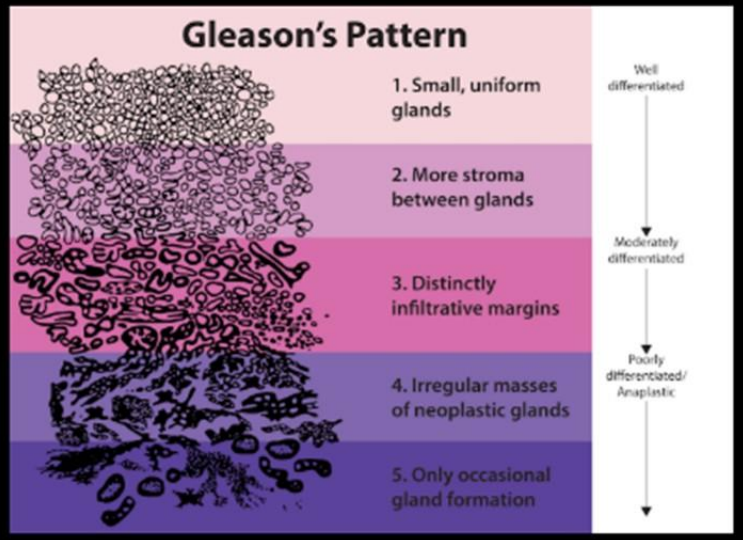
Improved Grading of Prostate Cancer Using Deep Learning

November 16, 2018 ·

Posted by Martin Stumpe, Technical Lead and Craig Mermel, Product Manager, Healthcare, Google AI



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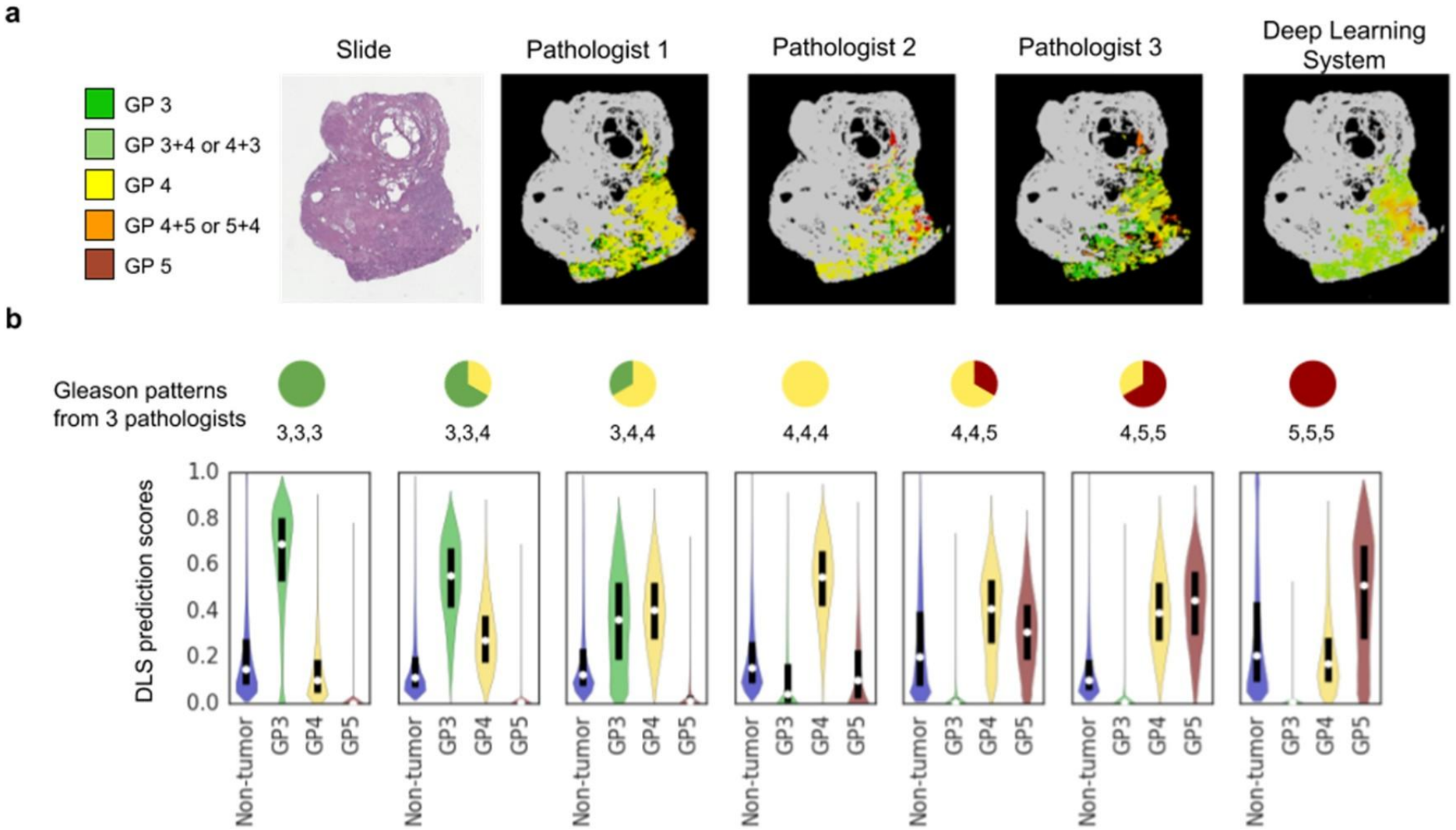

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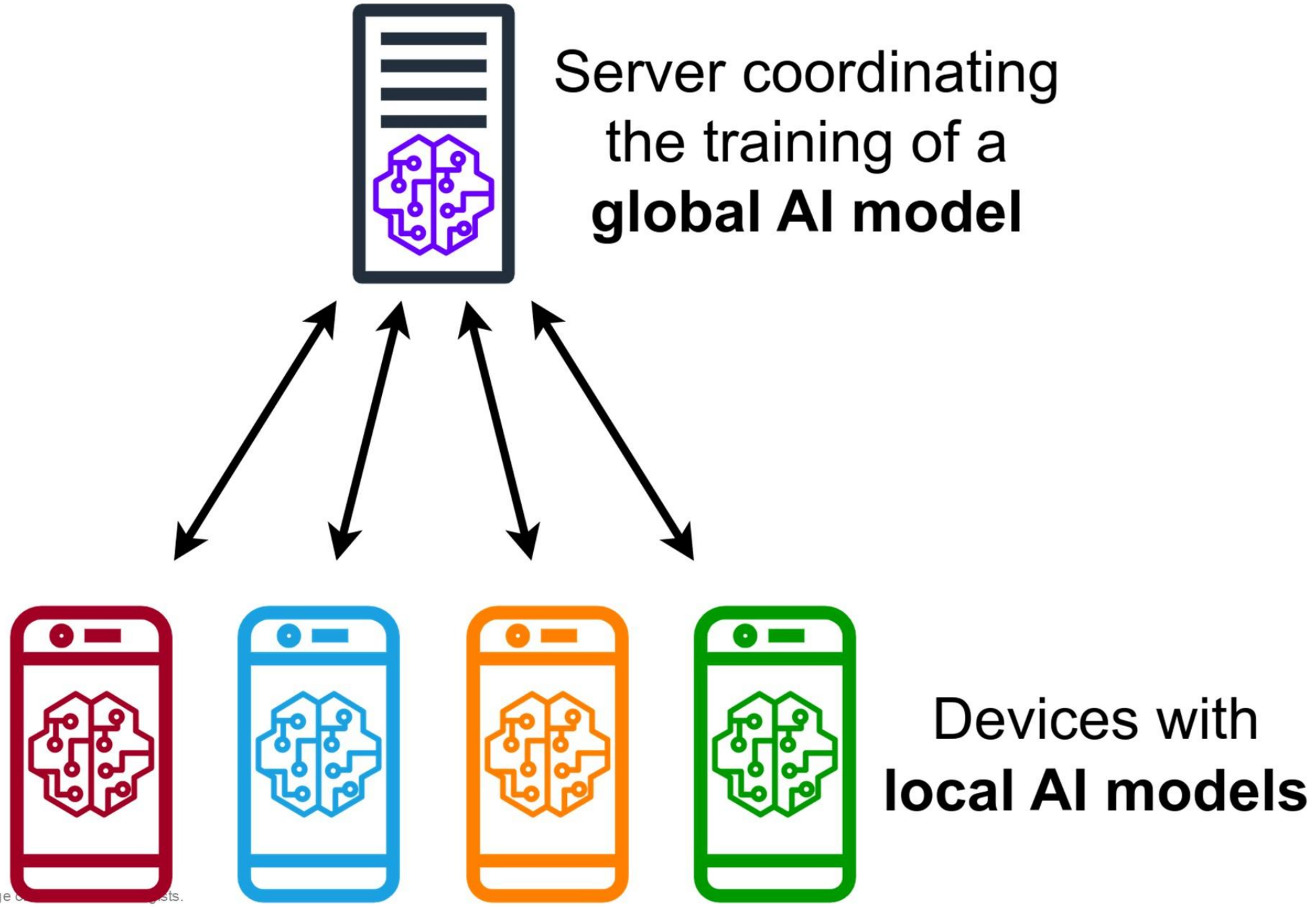

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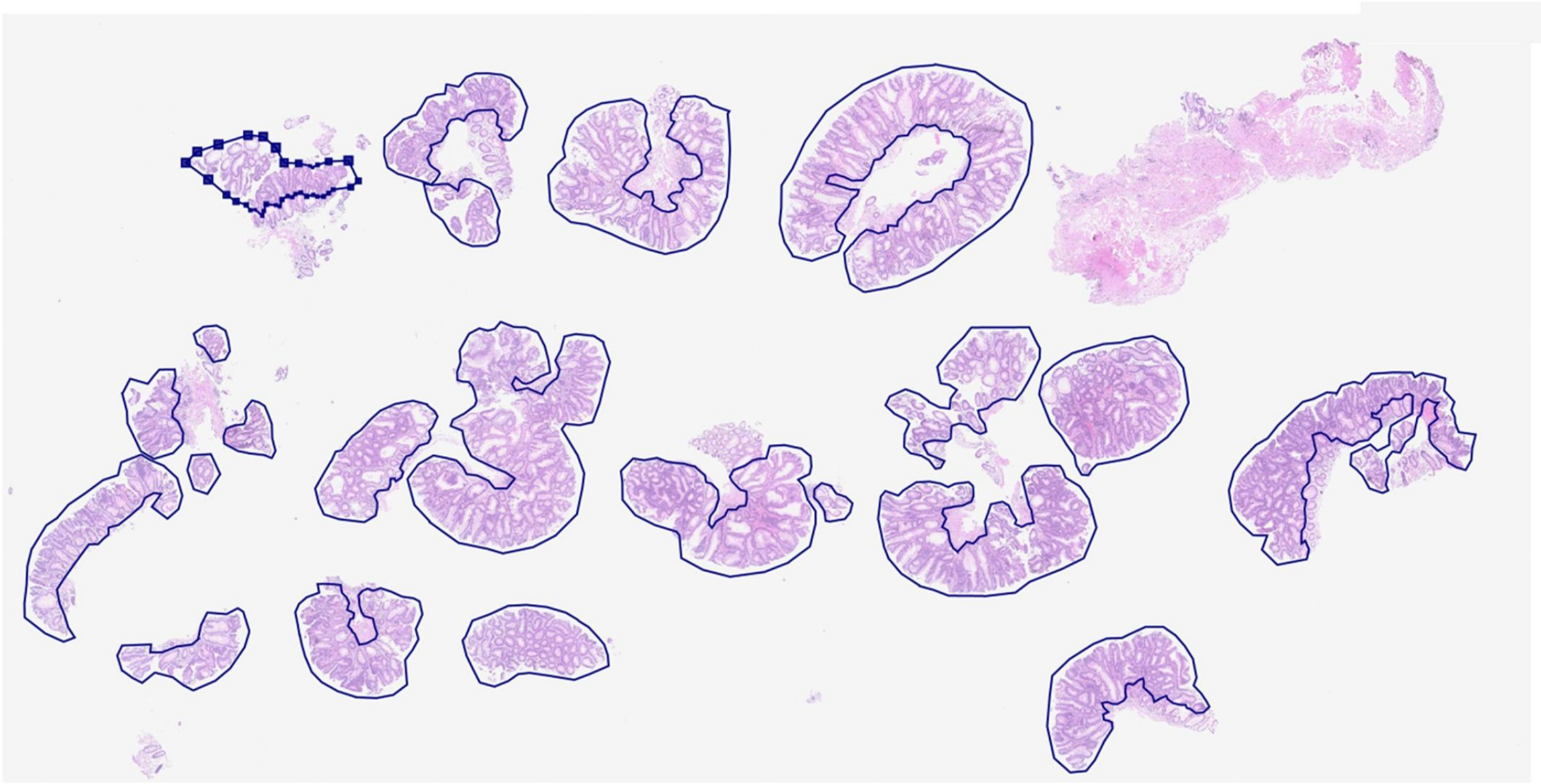

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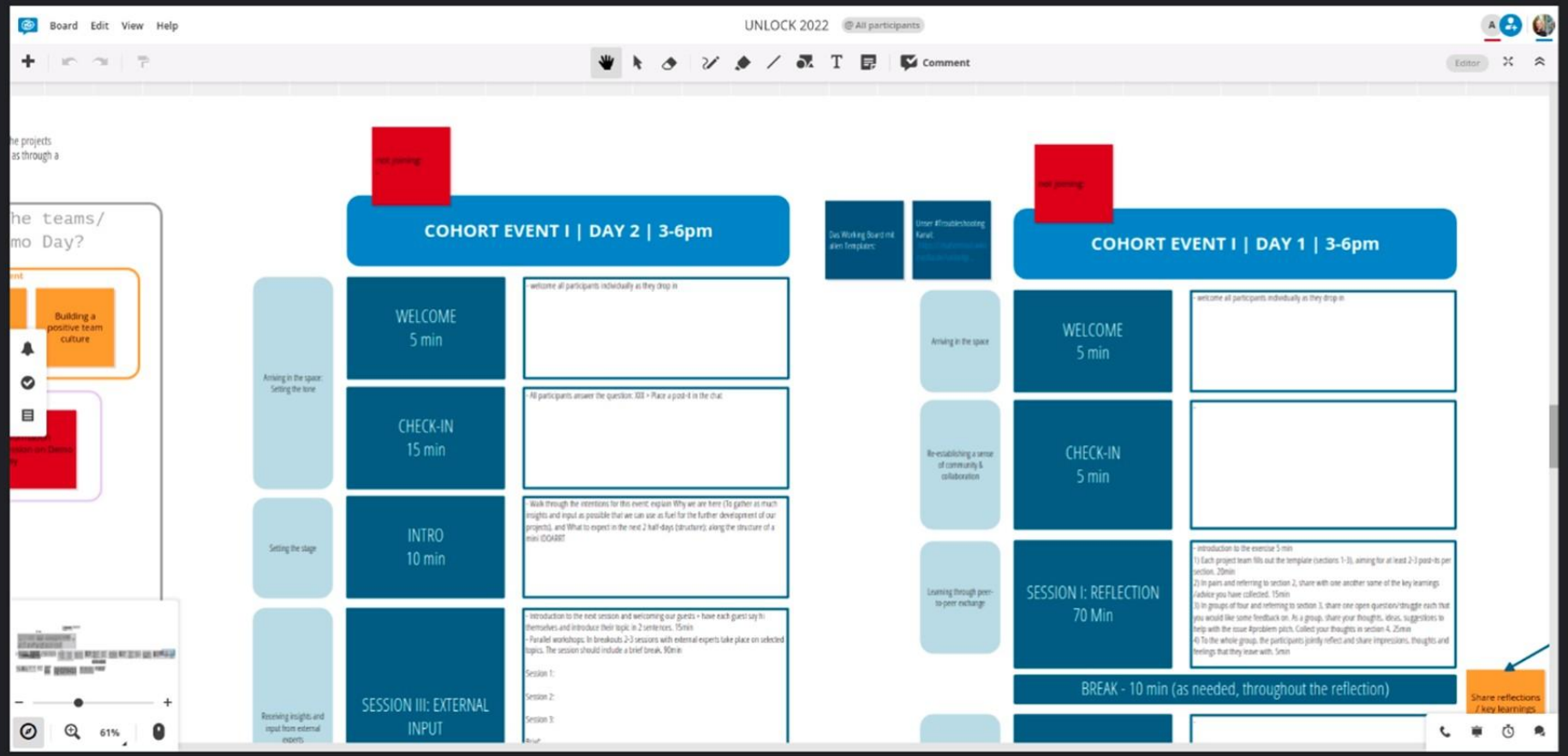

[BLOCK] UNLOCK program shadowing

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Original research

Faster than light (microscopy): superiority of digital pathology over microscopy for assessment of immunohistochemistry

Emily Clarke [1, 2], Daniel Doherty [1, 2], Rebecca Randell [3, 4], Jonathan Grek [5], Rhys Thomas [1], Roy A Ruddle [6], Darren Treanor [1, 2]

Correspondence to Dr Emily Clarke, Division of Pathology and Data Analytics, University of Leeds, Leeds LS9 7TF, UK; e.l.clarke@leeds.ac.uk

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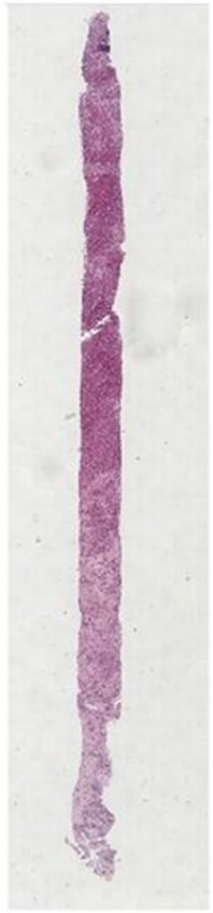
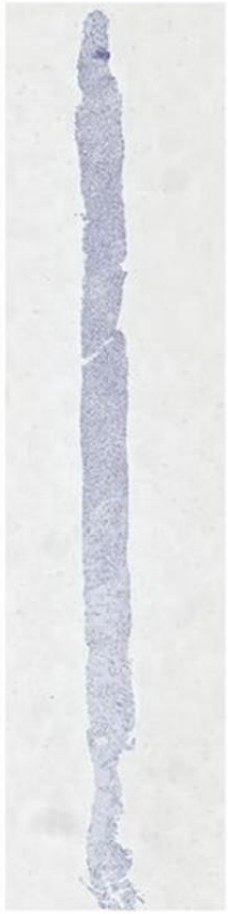
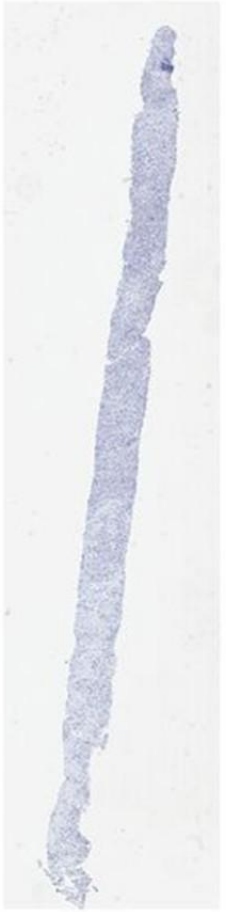
H&E	CK7	CK20	CDX-2	TTF-1	ER	PR
						

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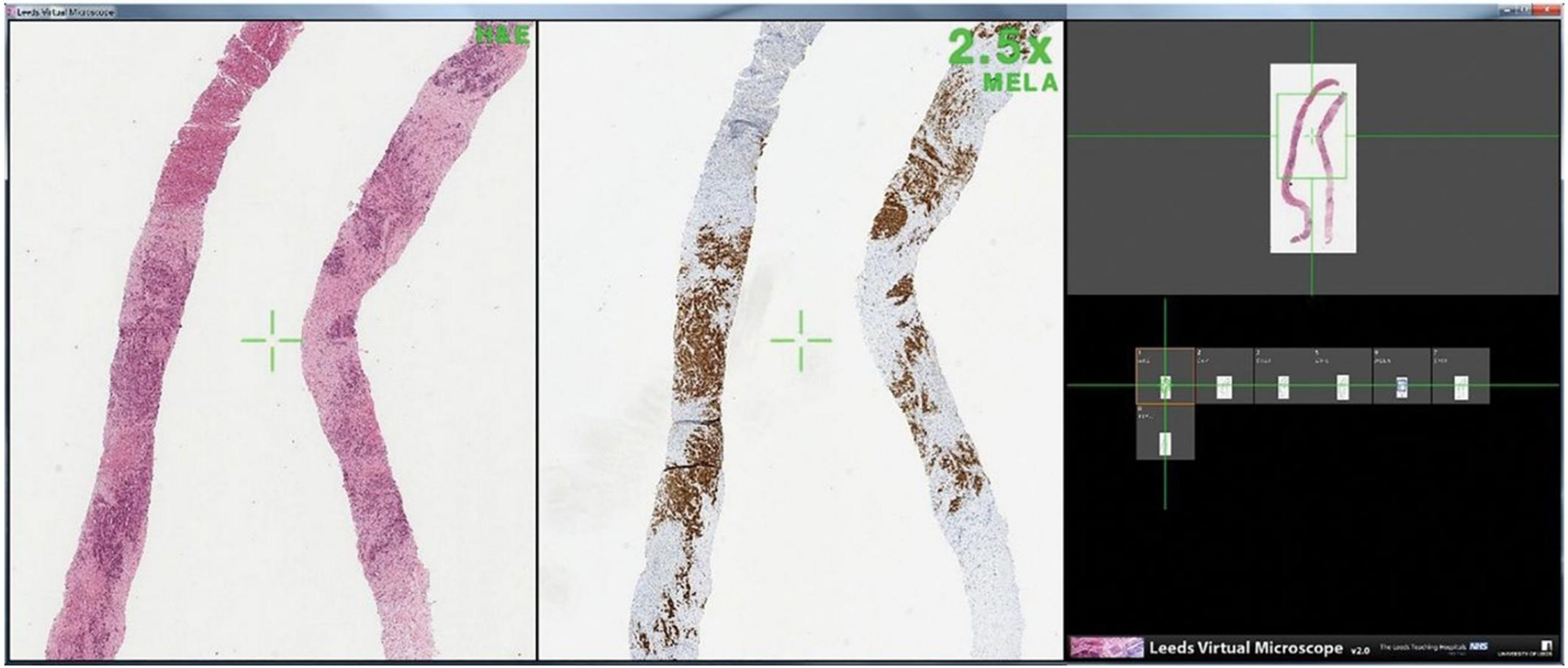

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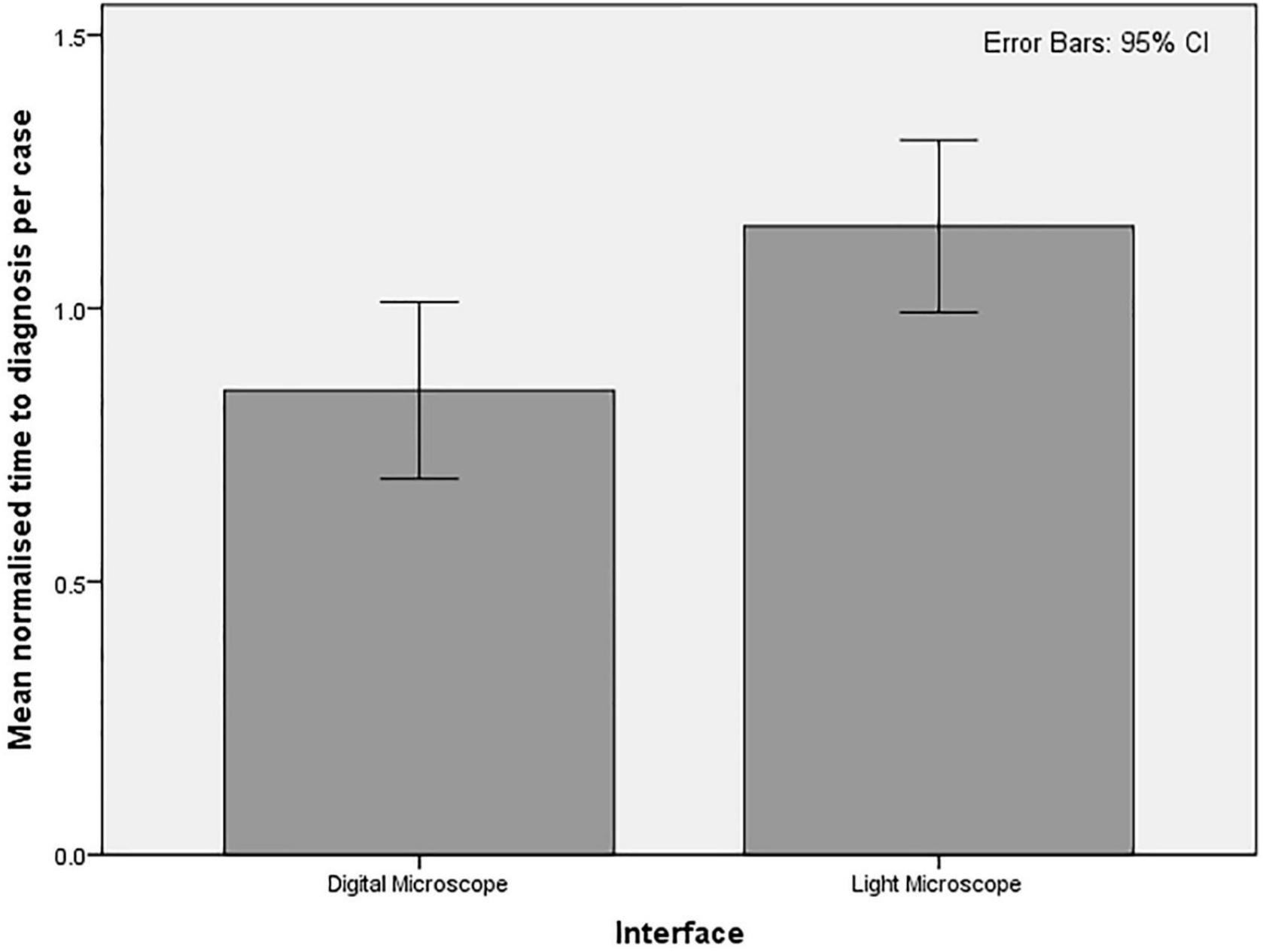

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26%

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Artificial intelligence–assisted cancer diagnosis improves the efficiency of pathologists in prostatic biopsies

Catarina Eloy[1,2,3] · Ana Marques[1,4] · João Pinto[1,5] · Jorge Pinheiro[1,4] · Sofia Campelos[1] · Mónica Curado[1] · João Vale[1] · António Polónia[1,2]

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20%

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Main Topics

- Large Scale Digital Pathology Implementation
- Digitally-Native Pathology Workflows

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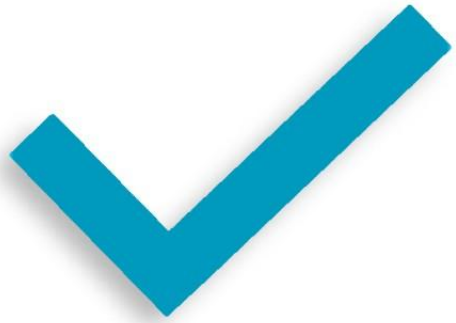
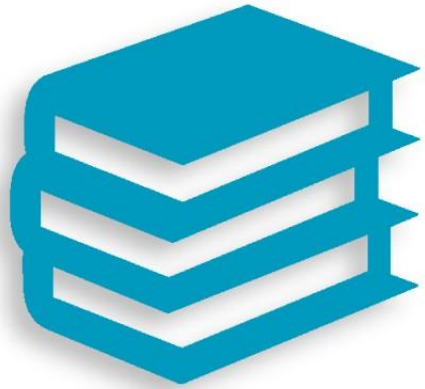
Objectives

Outline the core components of a digital pathology system



Summarize the challenges and advantages of large-scale DP deployment



Review the University of Louisville's DP implementation case study and key lessons learned

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Implementation and adoption of digital pathology

Digital pathology remains uncommon at scale in the US

Only ~15% of laboratories have DP

Yet…

- Large-scale DP deployments are expanding
- DP is increasingly used as a strategic differentiator
- AI-driven DP applications continue to proliferate

DP has highest value at large scale

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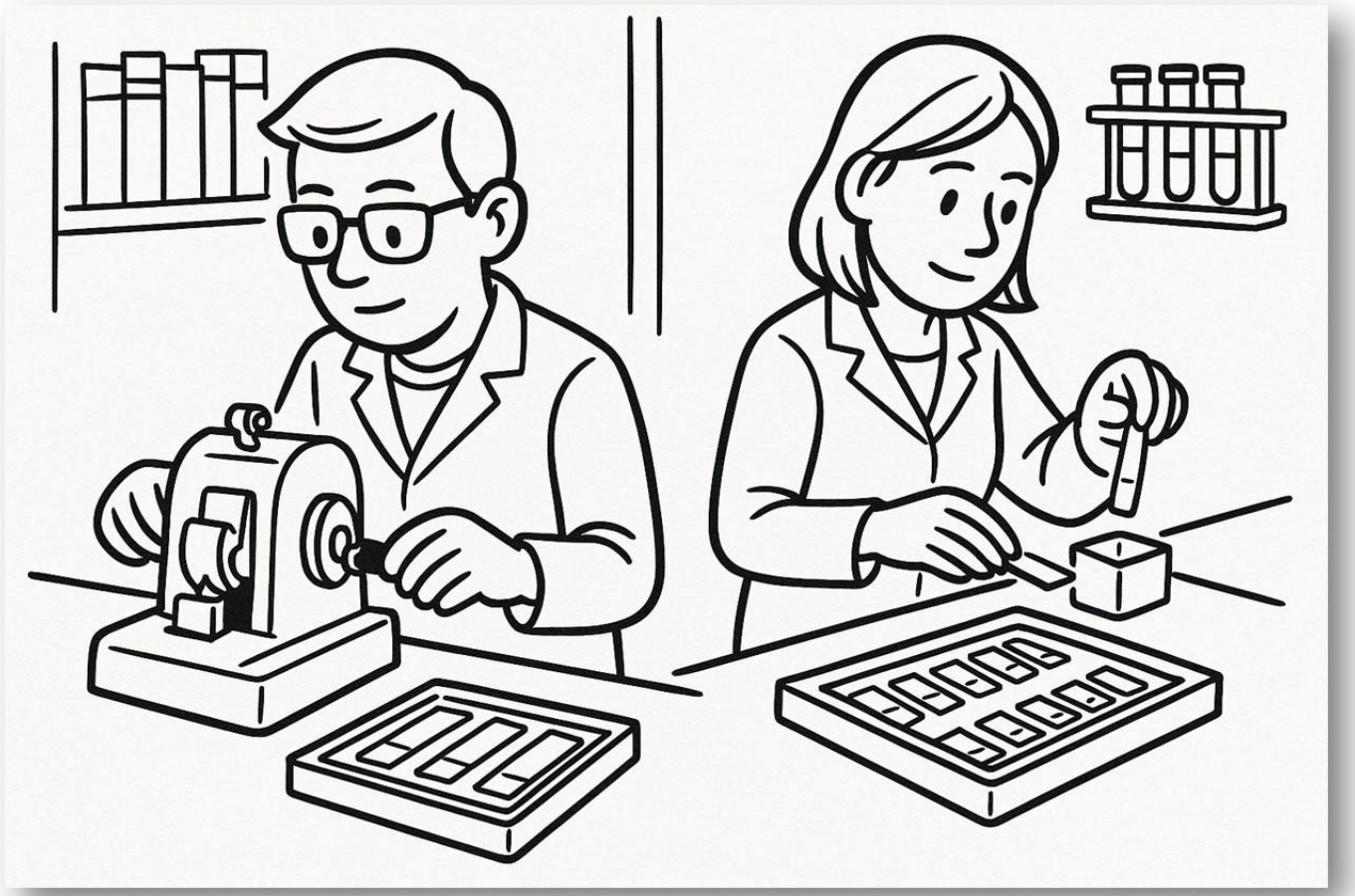
Single site – histology + pathology reading



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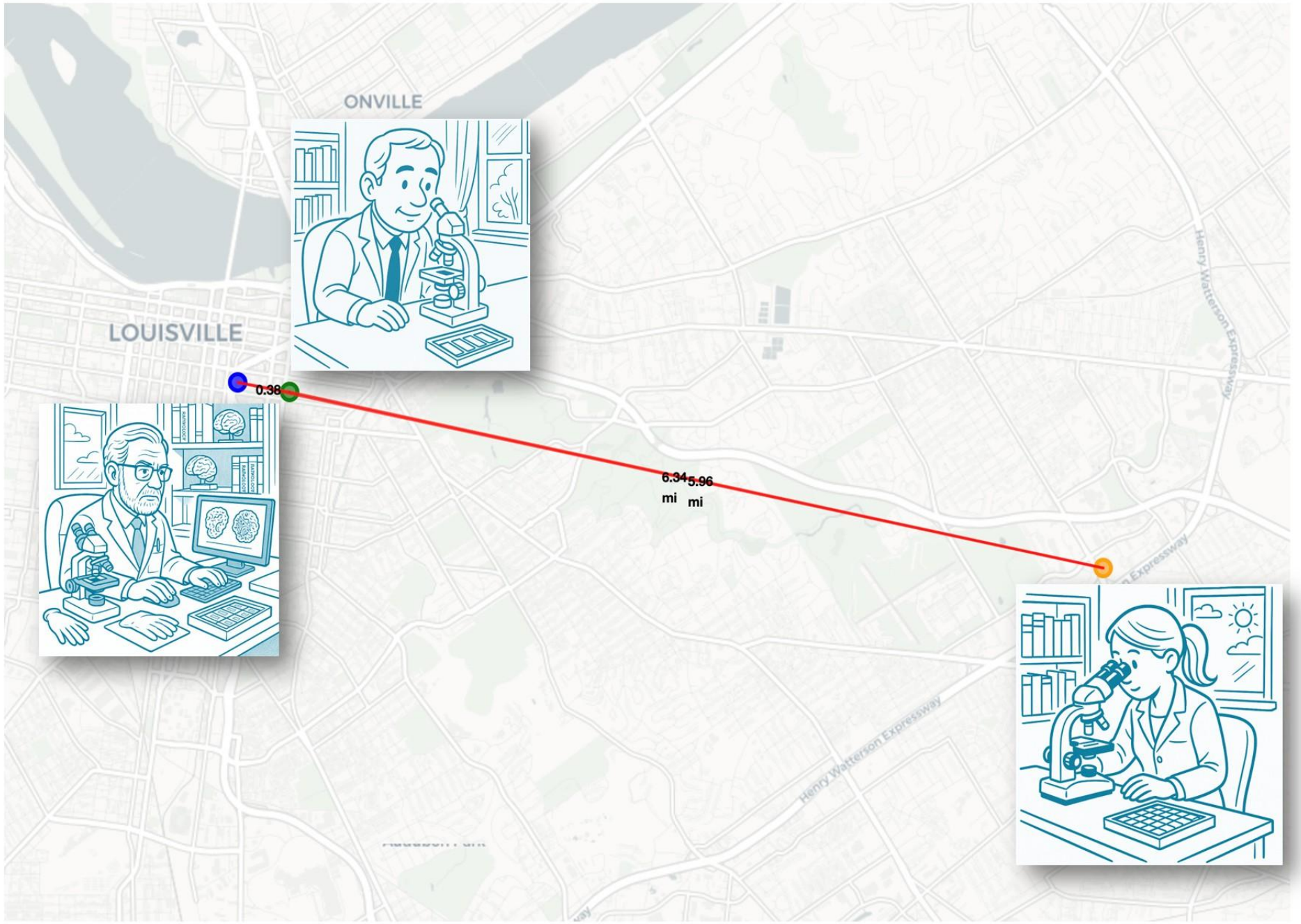
Multisite



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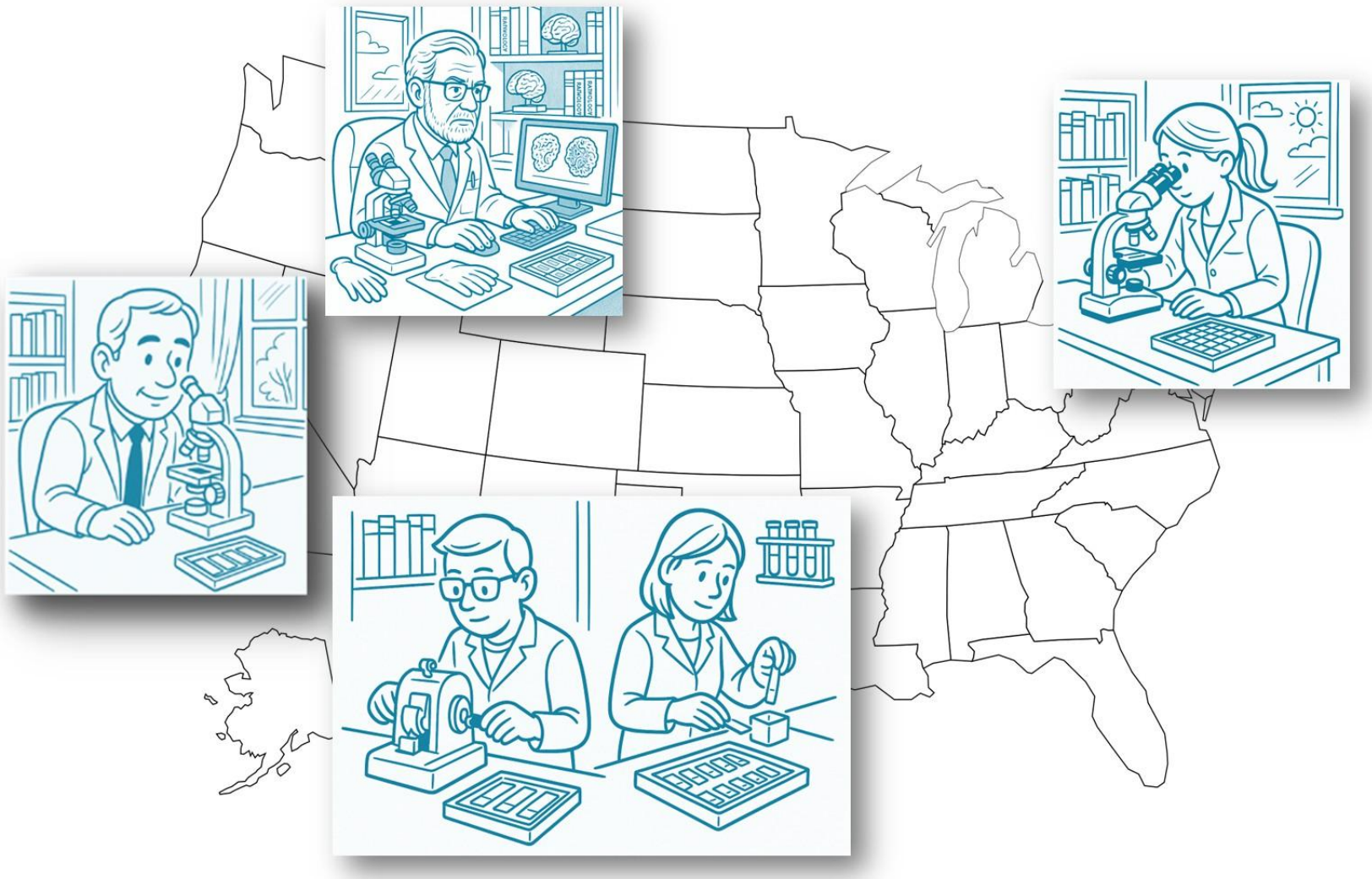
Scalable digital pathology: A competitive advantage



Leverage scalability through a centralized national laboratory or by establishing a regional network of connected labs.

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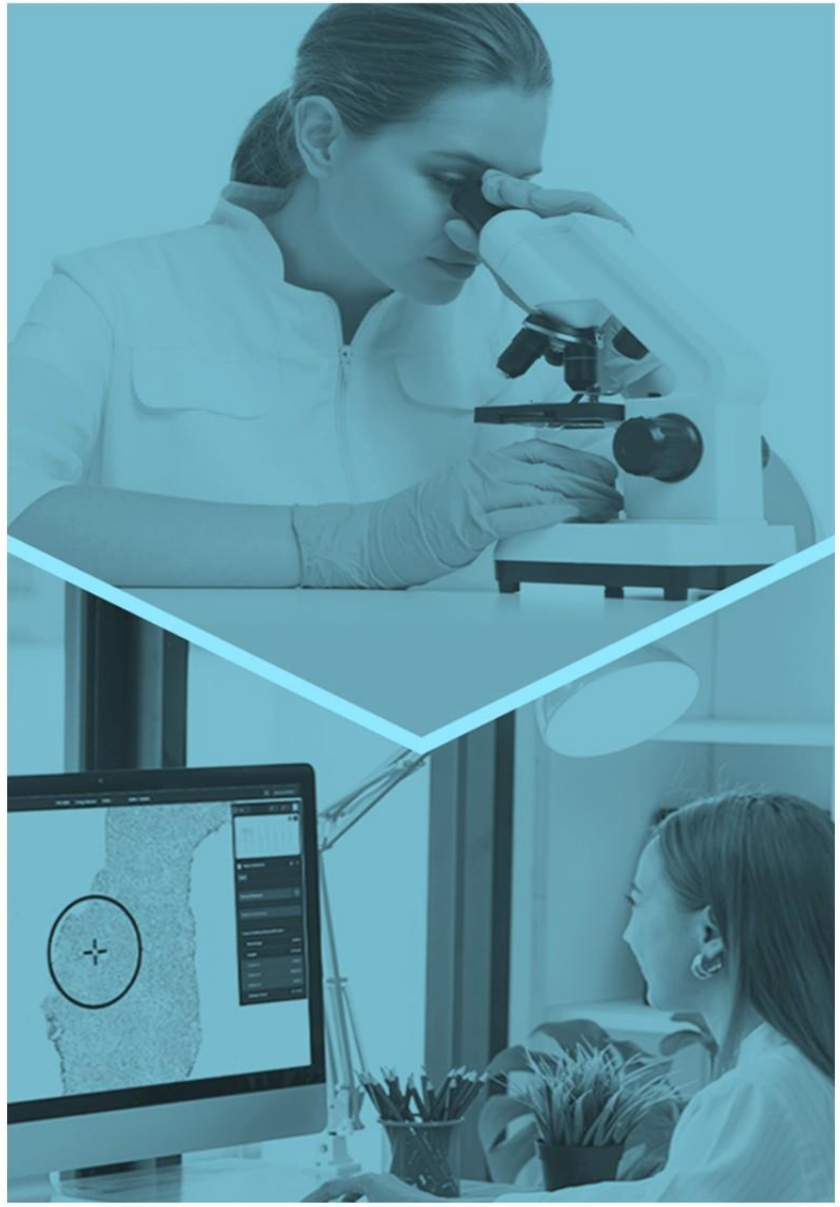
Digital pathology is an incredible and useful tool!

Why is it not widely deployed in the USA?

- **Cost**
  - No specific reimbursement
  - Lack of well-established ROI model
- **Implementation complexity**
  - No widespread adoption of DICOM standard by vendors
  - Custom interoperability challenges



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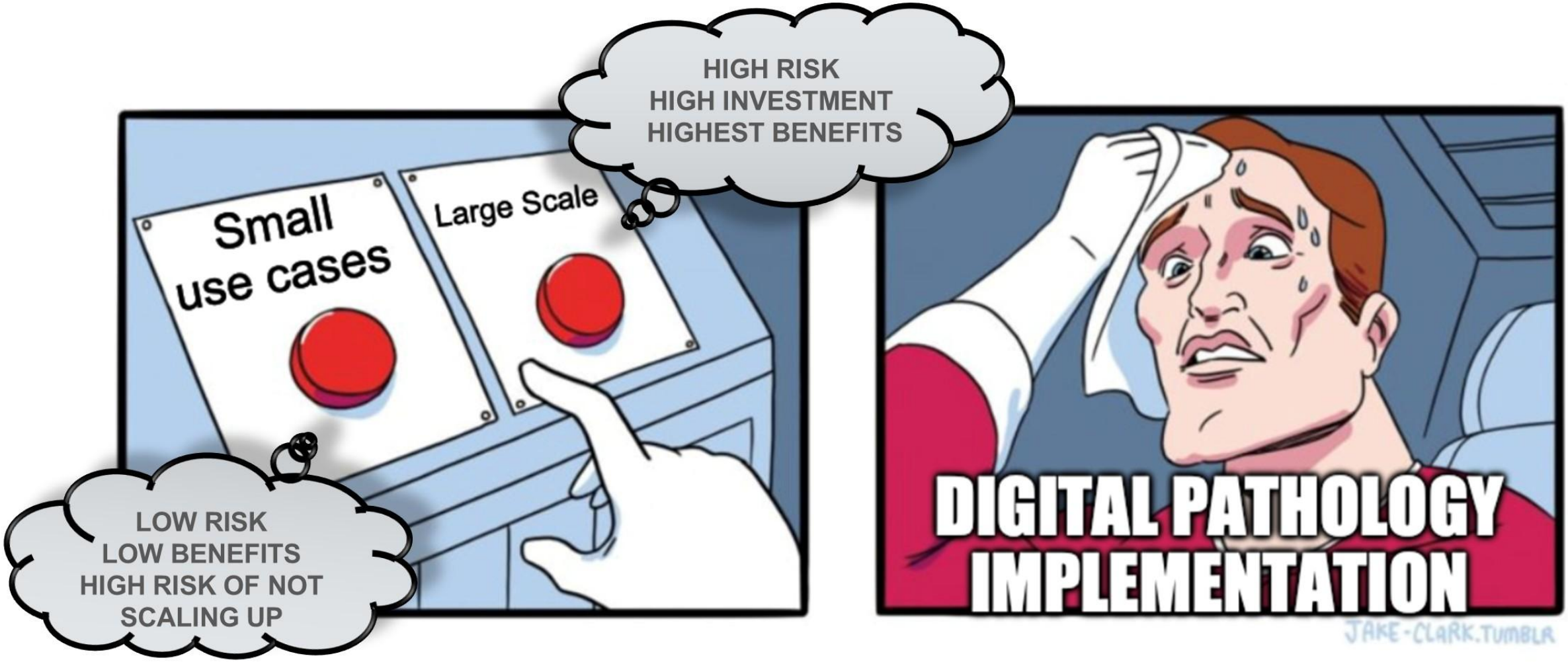
Implementation dilemma



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Small-use case approach

- **Buy a scanner**
- **Use case-specific scanner, e.g., tumor board**
- **LIS interoperability is not a must**
  - It may be too expensive to justify
  - Techs may need to associate metadata manually
- **Then, work on second use case, e.g. medical liver service**

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Small-use case WITHOUT INTEROPERABILITY

Not scalable

A lot of manual work

Difficult to retrieve scanned cases

Lack of consistency, only some cases are available

High-risk of failure due to low adoption, proceed with caution

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Large-scale digital pathology

- Aim for 100% prospective scanning
- Requires efficient integration in the histology laboratory
- Interoperability with LIS is a must
- Labels with barcode are need (LIS or asset tracking system)
- Essential to consider AI interoperability from the beginning
- Enables primary diagnosis and remote work

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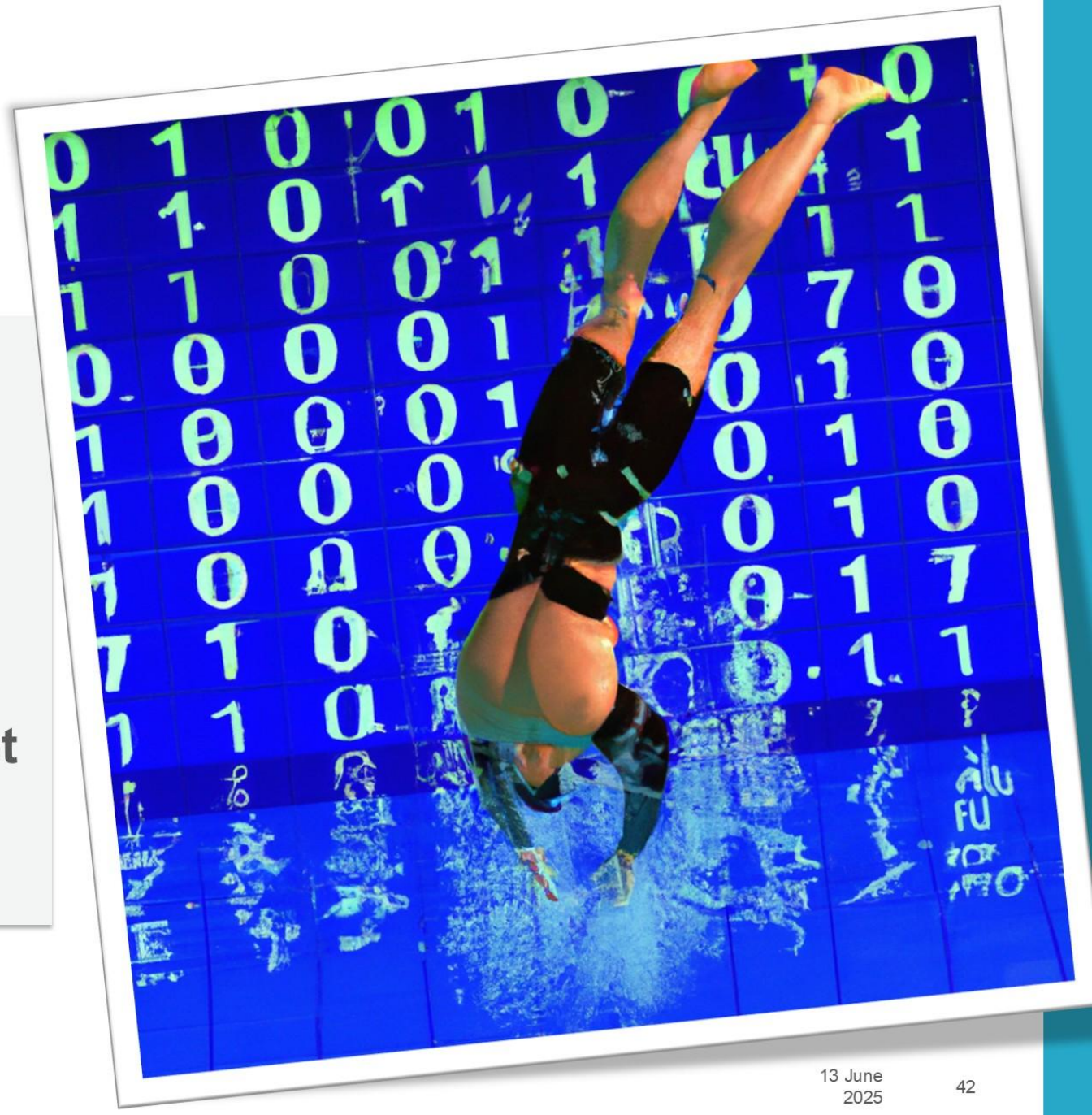
University of Louisville DP/AI journey

- Deep dive approach to efficiently deploy large scale DP/AI
- From minimal to 100% slides scanning in 9 months
- Deployment and validation of first AI system in 6 months



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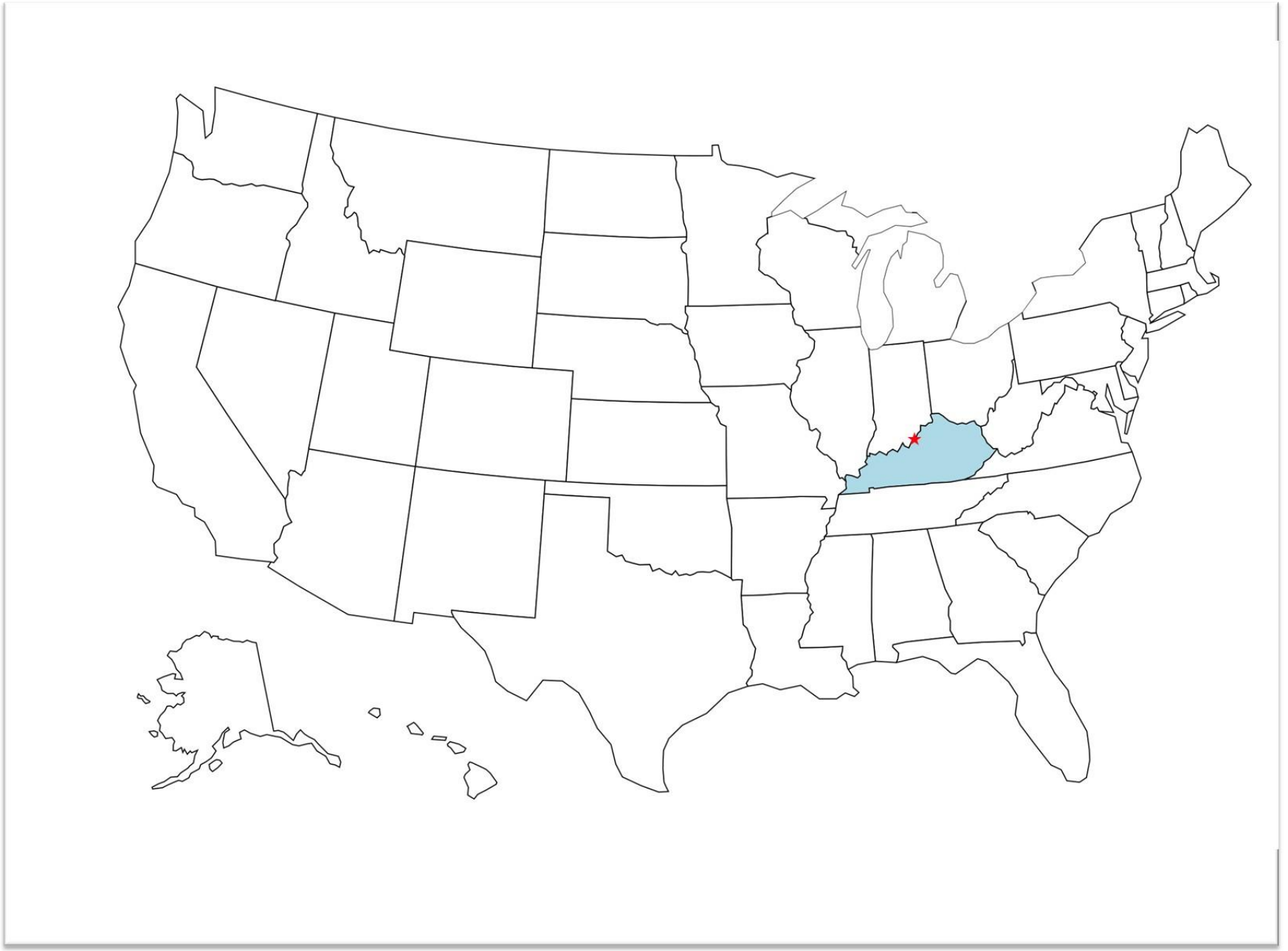
Health system

UofL Health



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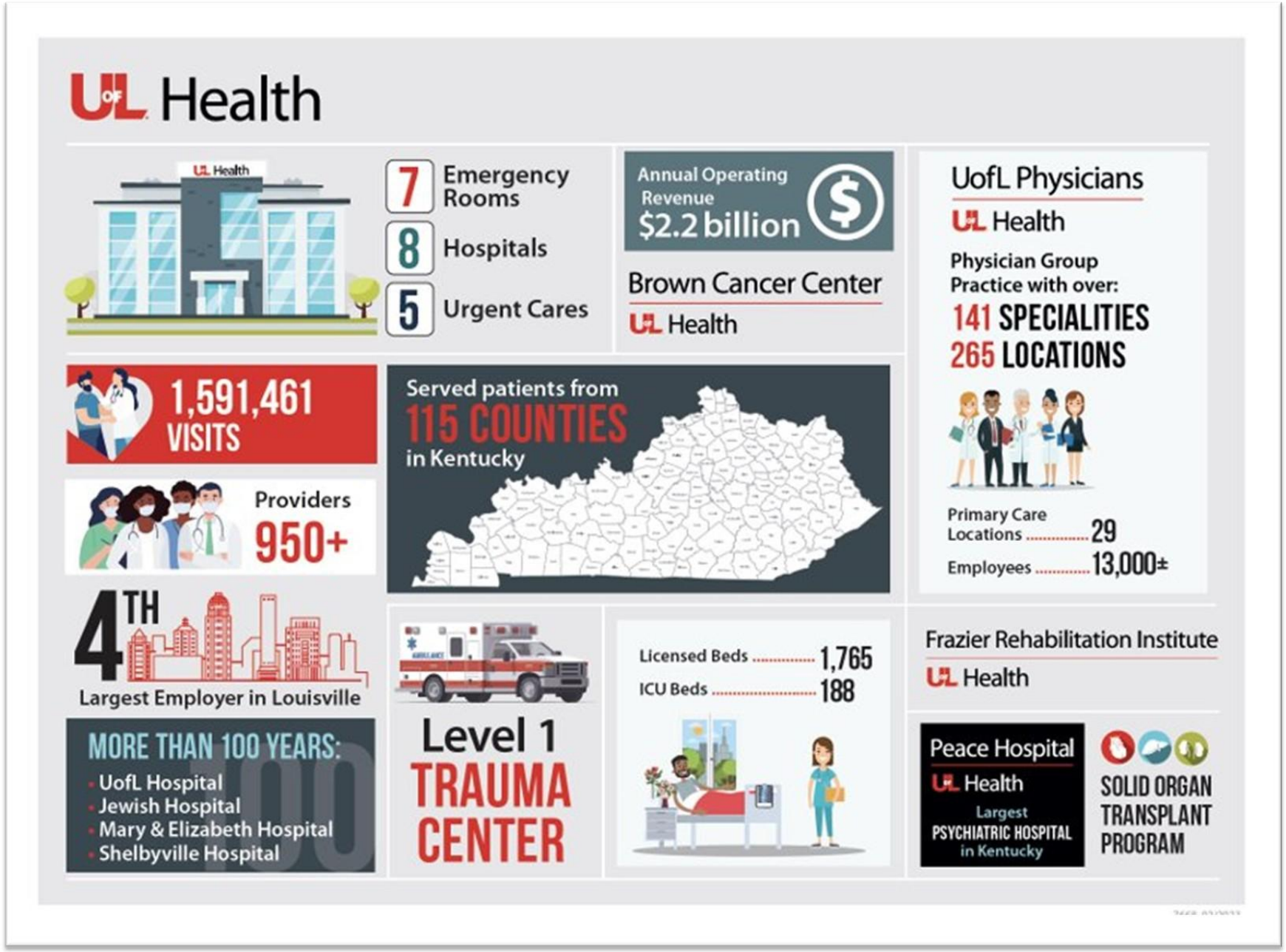
Health system

UofL Health



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UofL Department of Pathology

- Provide coverage to multiple clinics and 5 Hospitals of the Health System
- Anatomic Pathology division: 9 faculty members
- Pathologist are on-site in 3 different locations
- General/subspecialty sign-out

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Daily AP coverage

4 Surgical pathologists

1 Cytopathologist

1 Neuropathologist

1 Hematopathologist

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Centralized AP lab at Jewish Hospital

- Specimen processing
- Grossing
- Histology
- Ancillary studies (e.g., immunohistochemistry)

Annual Volume

- Surgical Pathology: 30,000
- Cytopathology: 3,300
- Hematopathology: 2,500

COMPUTATIONAL PATHOLOGY
(AI-BASED APPROACHES)

DIGITAL PATHOLOGY

HIGH-QUALITY HISTOLOGY

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Review of concepts

STEP 1

Implementation

- Putting a plan into action
- Spectrum
  - Limited
  - Large scale

STEP 2

Adoption

- Embracing of new practice by groups, or individual
- Spectrum
  - Limited
  - Digital pathology-only workflow (successful digital transformation)

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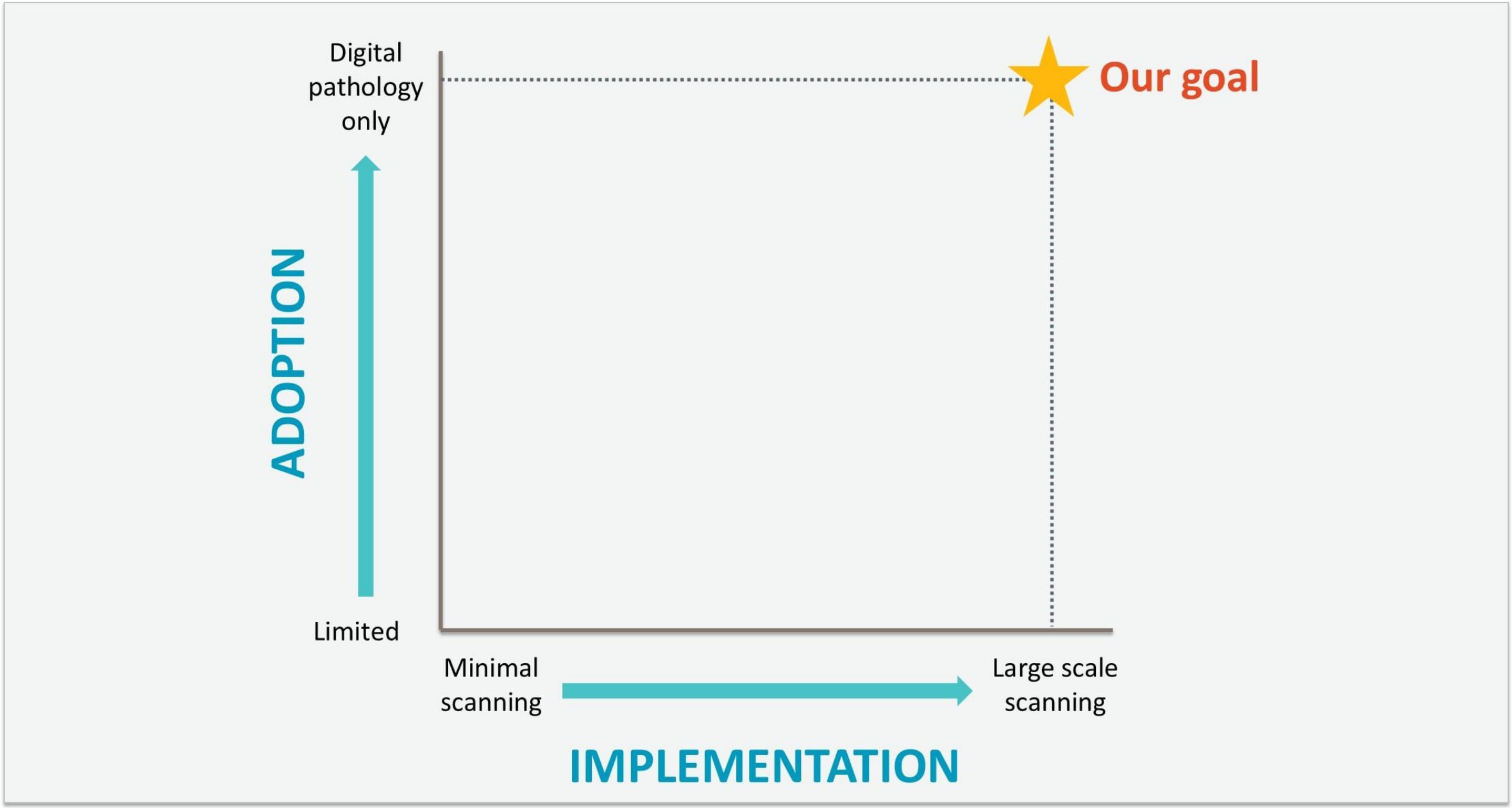

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Planning - Minimal requirements

- 100% Slide scanning of all FFPE cases
  - Scaling from minimal scanning to 125,000 slides/ year
- Scanning incorporated in the histology laboratory
- Storage: ~188.25 terabytes
- Viewer: Web-based, accessible outside hospital
- AI: FDA approved, clinical grade
- AI development: Easy deployment of in-house developed AI algorithms
- LIS/DP/AI Interoperability

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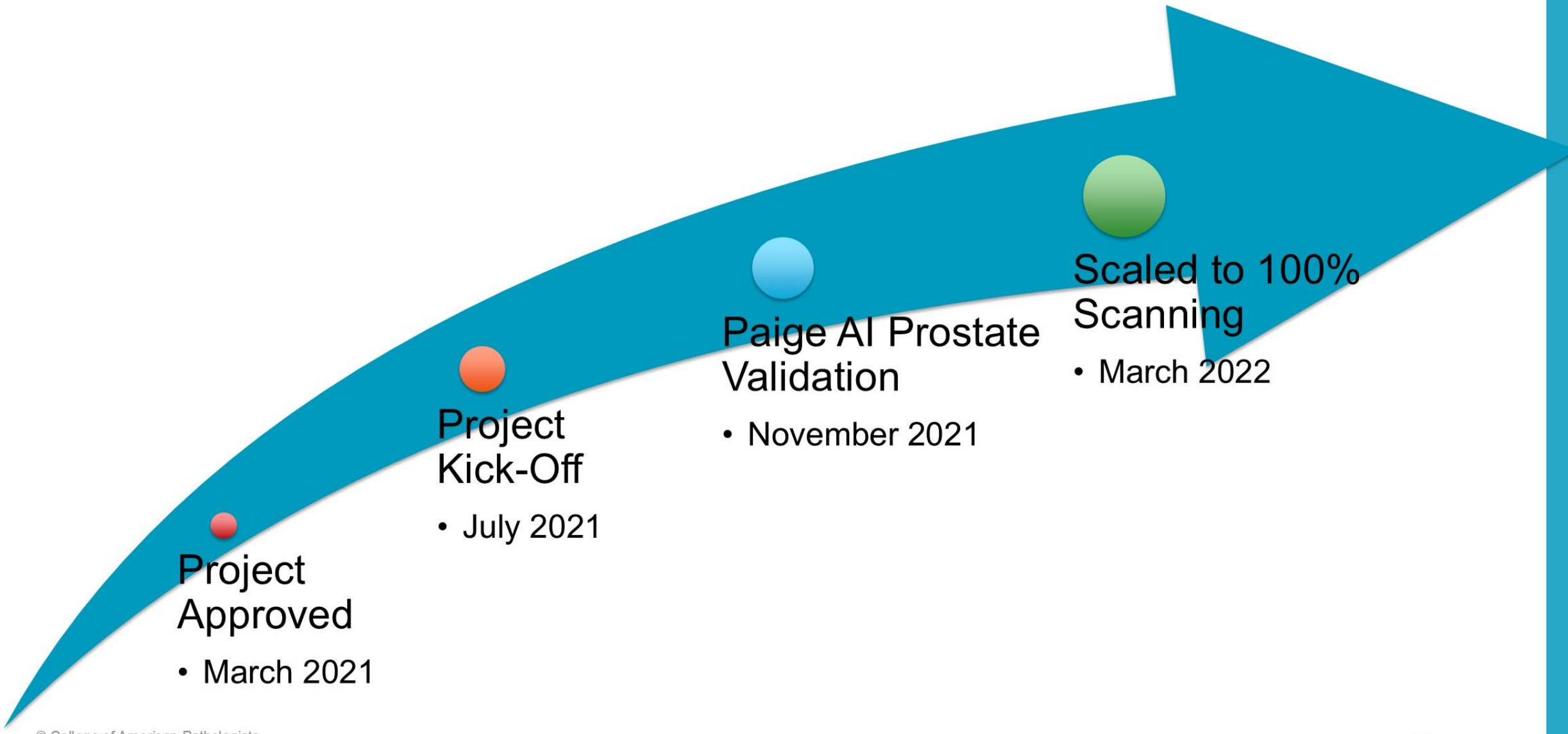
Timeline & milestones



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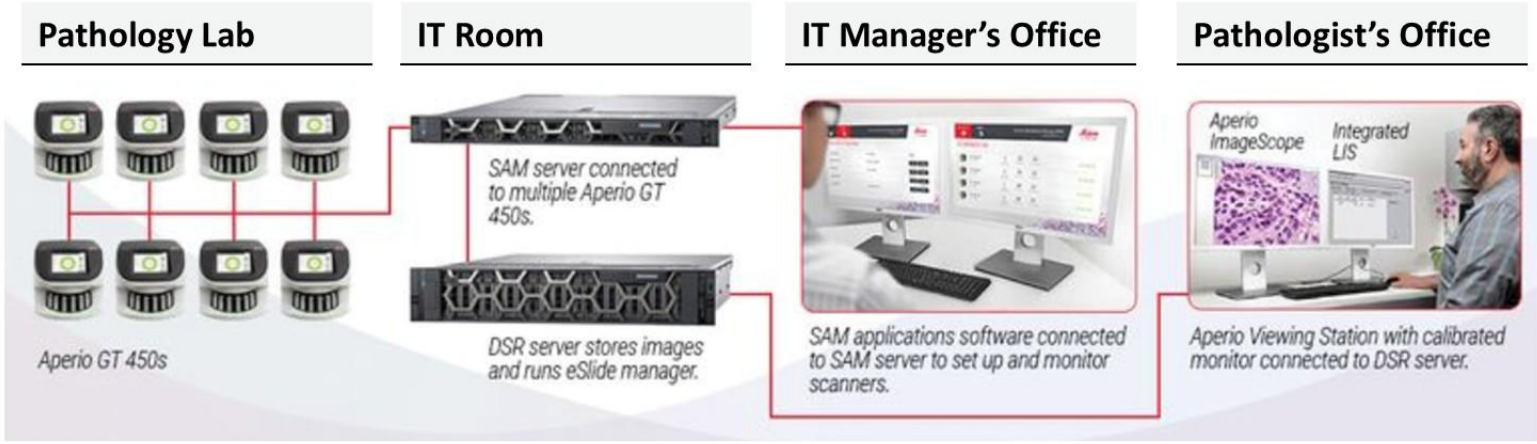
Paige

Scanning

LEICA GT450 High-throughput digital scanner

- Scan Speed: 32 sec/slide (@ 40x for 15mm x 15mm area)
- Scan Throughput: 81 slides/hr (@40x for 15mm x 15mm area)*
- Scan Output: DICOM compatible and SVS
- Scanning Region: ≤ 23.6 mm x 58 mm
- Slide Capacity: 450 slides (15 racks of 30)
- Slide Loading: Automatic Continuous Load up to 450 slides



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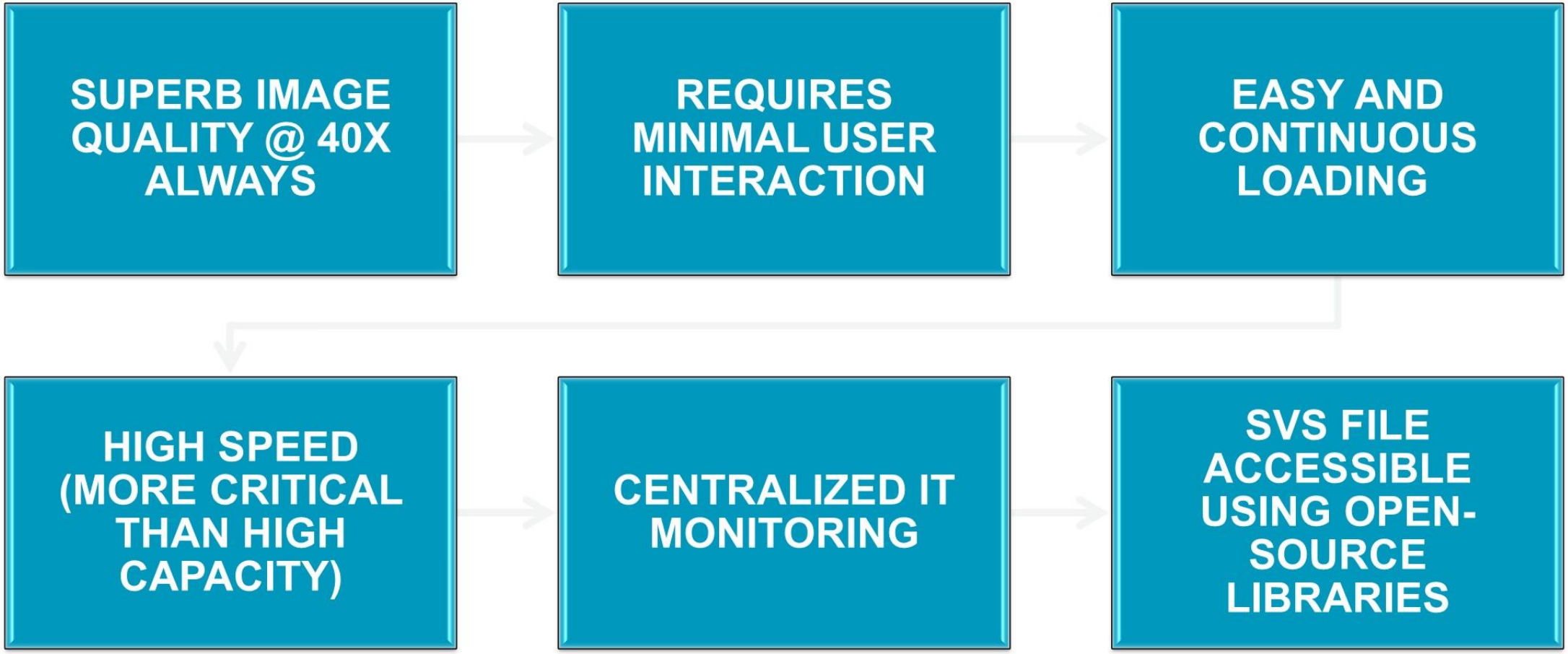

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Requirement: IMS + AI integrated

Image management systems (IMS):

- Many available in the market
- Very few had integrated AI
- Expertise required to build image management systems (abundant)
- Expertise required to build clinical grade AI systems for pathology (rare)

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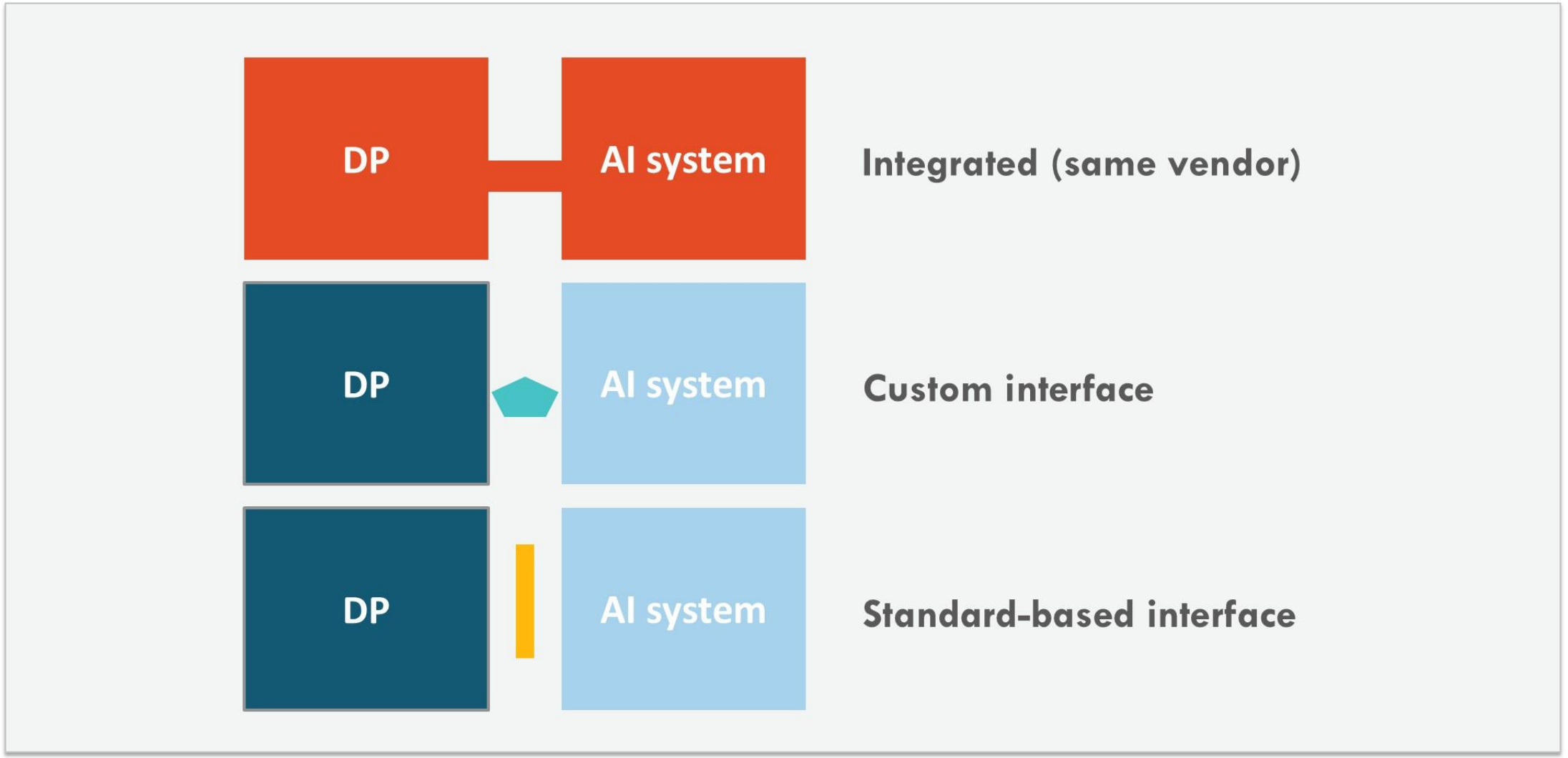
DP + AI Interoperability



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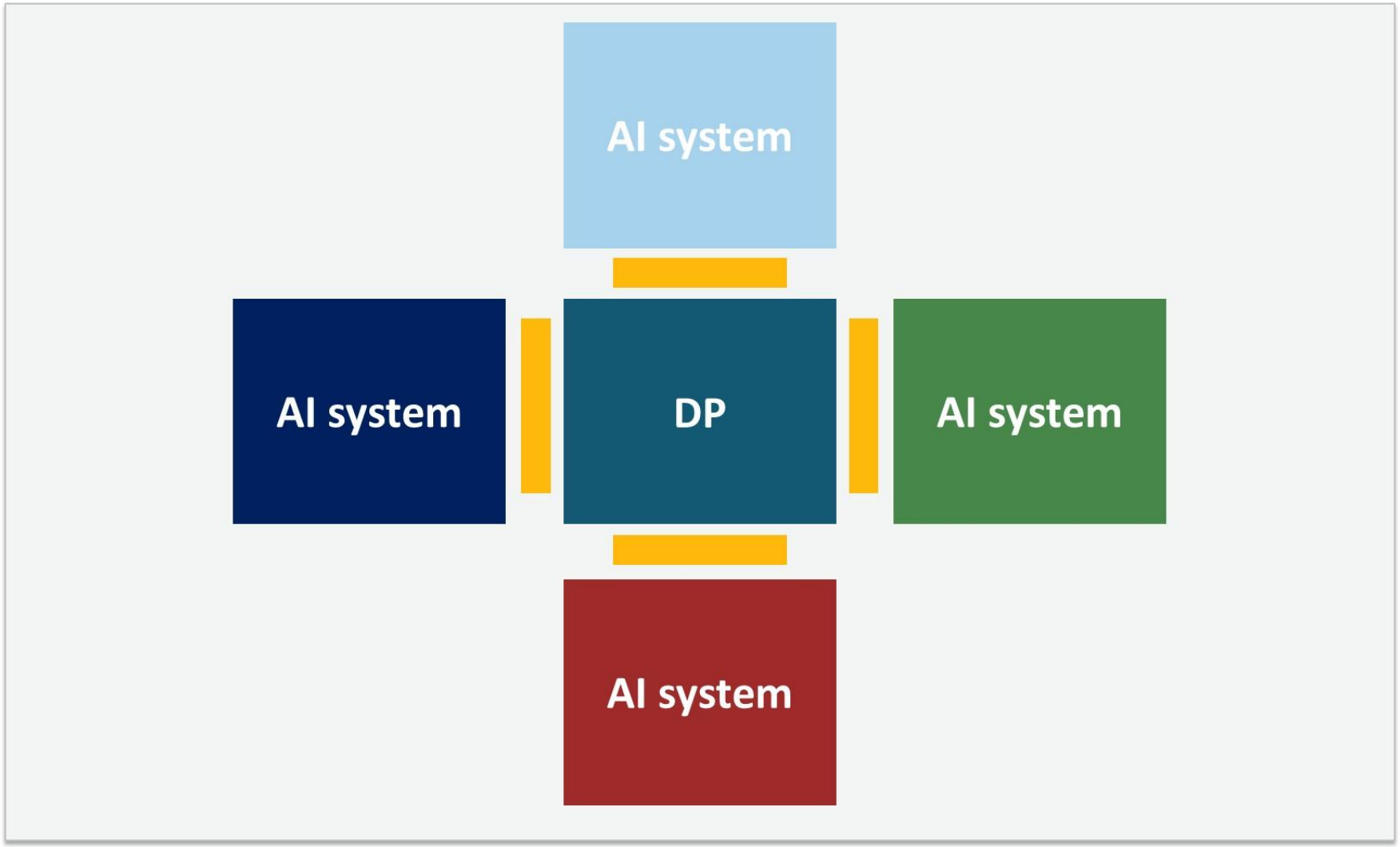
Standard-based interfaces

Potential to plug and play

(NOT A REALITY IN THE MARKET)



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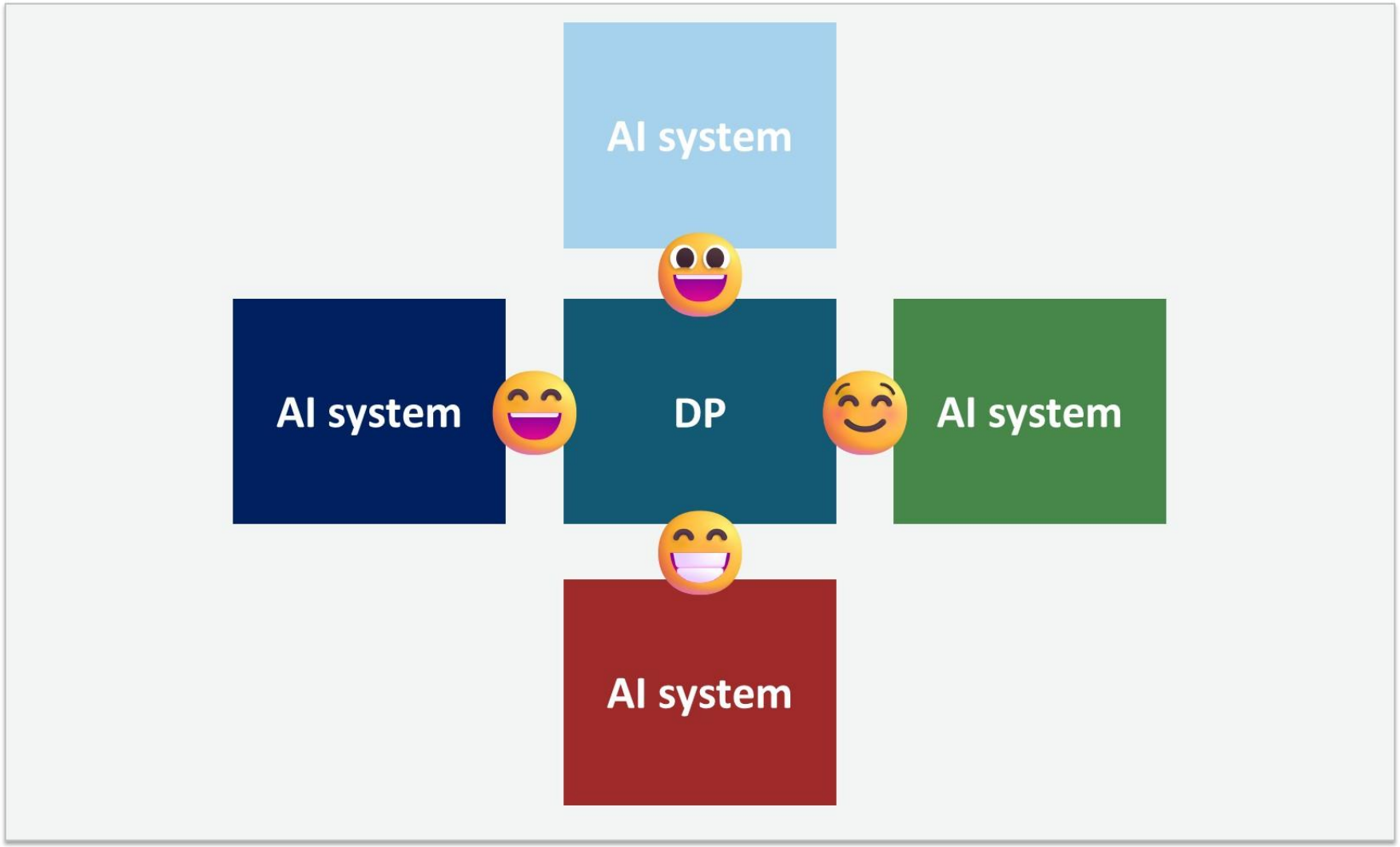
Custom interfaces

(Not scalable – Not sustainable)



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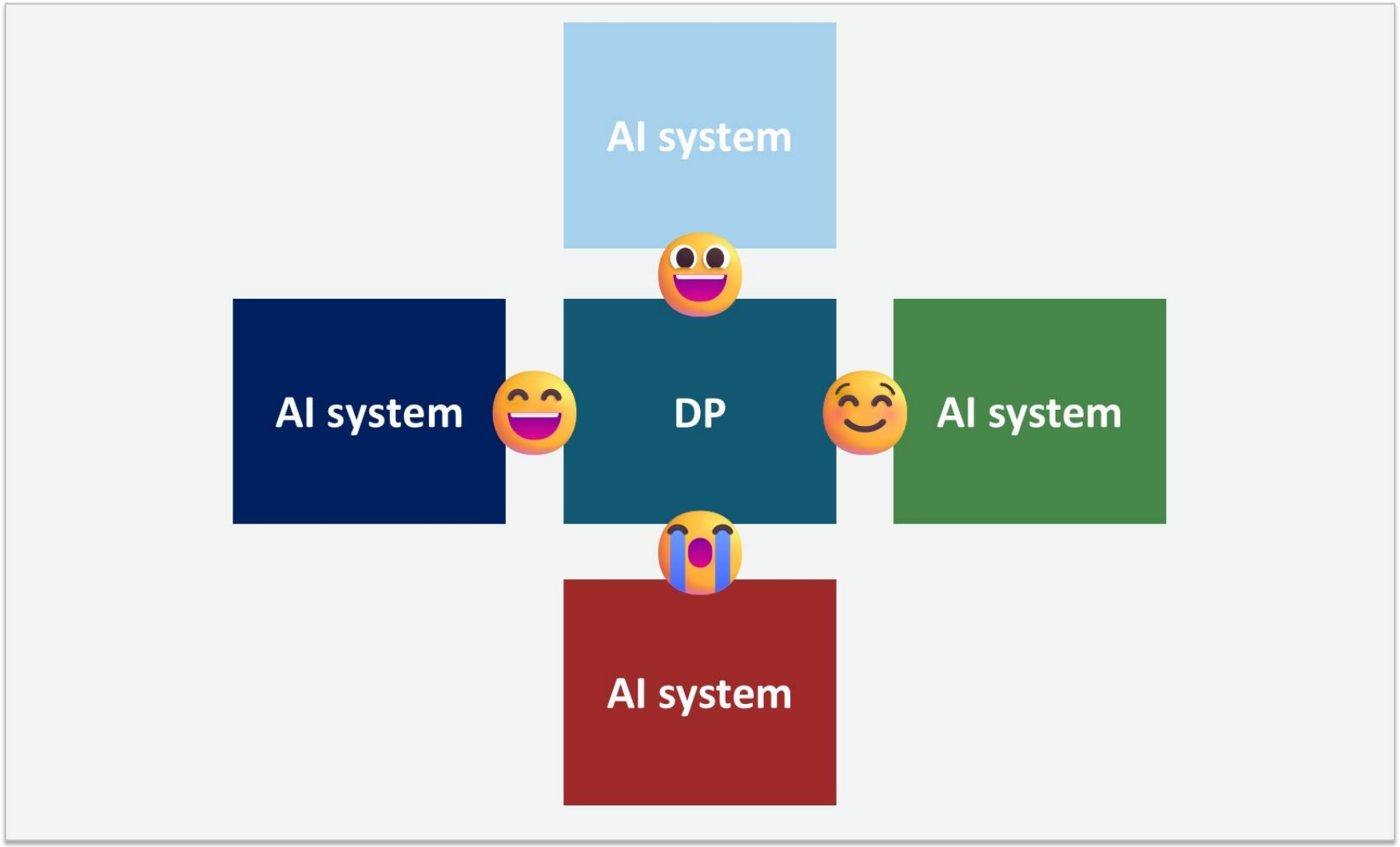
Custom interfaces

(Not scalable – Not sustainable)



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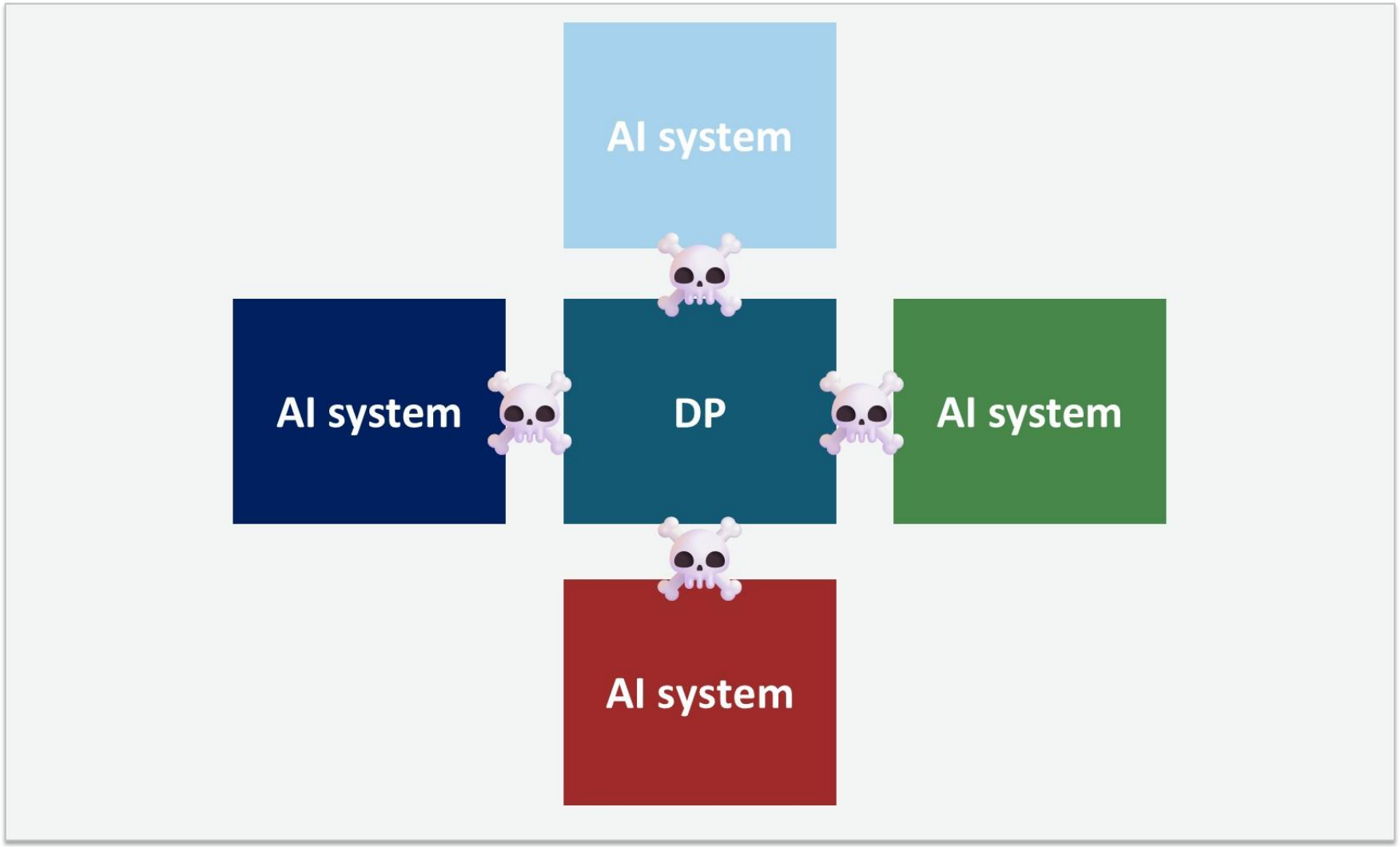
Custom interfaces

(Not scalable – Not sustainable)



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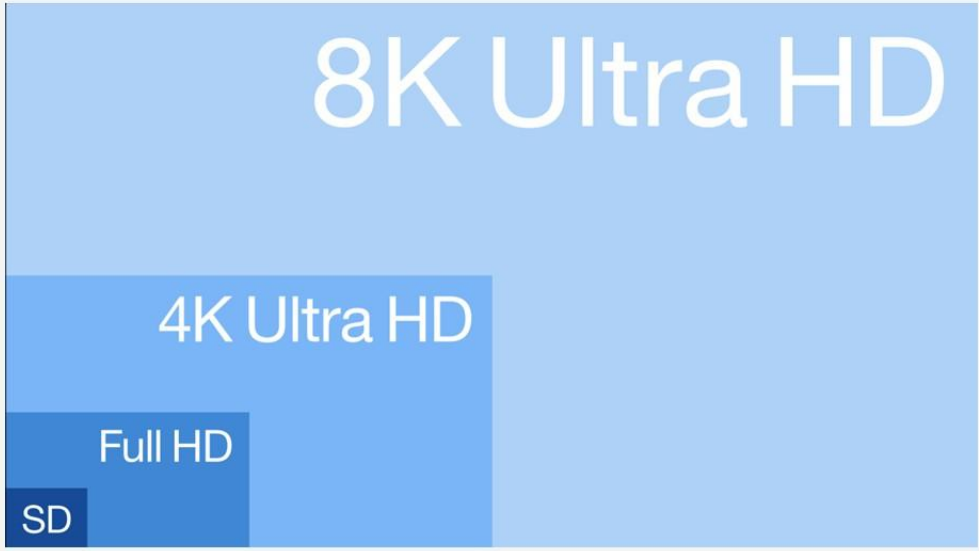
Monitors



8K monitors

7680 x 4320

E.G. WSI 40,000 x 40,000

8K: 45x larger than monitor

4K: 180x larger than monitor

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Phase 1 – Foundation and Validation

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Validating Whole Slide Imaging for Diagnostic Purposes in Pathology

https://www.cap.org/protocols-and-guidelines/cap-guidelines/current-cap-guidelines/validating-whole-slide-imaging-for-diagnostic-purposes-in-pathology

SCAN ME

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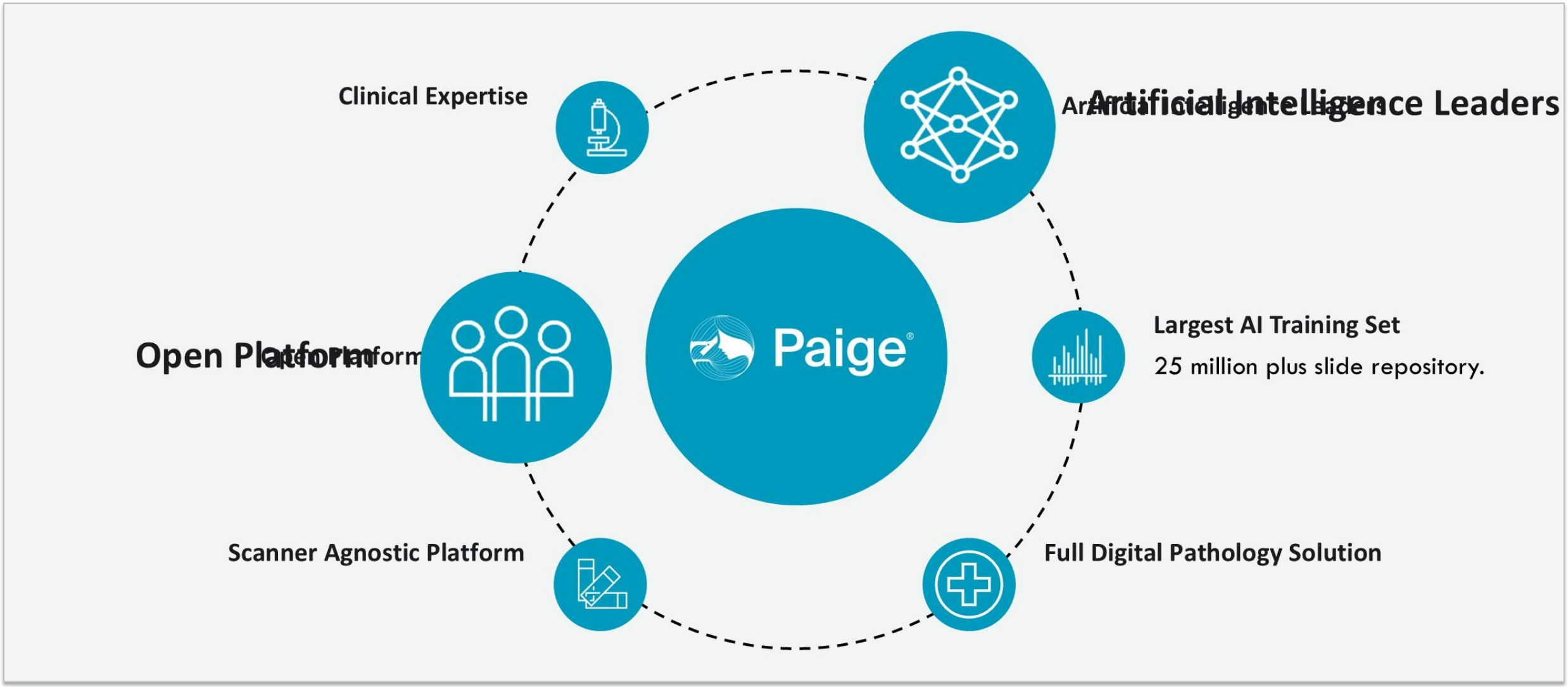
Image management system and AI



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Paige prostate AI validation

Validation study: 1141 images

Only images containing cancer or benign tissues

Results

- **Sensitivity**: 0.97 (97%)
- **Specificity**: 0.98 (98%)
- **Positive predictive value (PPV)**: 0.93 (93%)
- **Negative predictive value (NPV)**: 0.9943 (99%)
- **Accuracy**: 0.9807 (98.07%)

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Paige prostate AI validation (*continued*)

AI contributions

- **6/1141 slides = diagnostic correction 0.5%**
  - **2 slides**: Corrections from **BENIGN** to **CANCER**
  - **4 slides**: Corrections from **CANCER** to **BENIGN**

AI distractions

- **17 slides**: AI incorrectly called **CANCER**
- **4 slides**: AI incorrectly called **BENIGN**

Importance of pathologist oversight

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University of Louisville Health Adopts Paige AI-enabled Cancer Detection Software for Enhanced Cancer Detection

University of Louisville Health is one of the first U.S. health systems to implement FDA-approved Paige Prostate

December 15, 2021 10:05 AM Eastern Standard Time

NEW YORK--(BUSINESS WIRE)--**Paige,** the global leader in AI-based diagnostic software in pathology, today announced that University of Louisville (UofL) Health, a leading academic health system based in Louisville, Kentucky, has deployed a full suite of Paige AI-enabled digital pathology software to improve diagnostic confidence, efficiency, and patient care during routine cancer diagnosis.

"We are proud to be one of the first health systems in the U.S. to adopt an AI-enabled digital pathology software

UofL Health is one of the first health systems in the U.S. to implement Paige Prostate, the first and only AI-based pathology product to receive FDA approval for *in vitro* diagnostic (IVD) use in detecting cancer in prostate biopsies. UofL Health will also deploy Paige's FullFocus® as their

Phase 2 – Digitization integration and scaling

- Histology lab renovation to accommodate scanners
- Added GT450 x 2
- Accomplished 100% FFPE digitization with minimal delays

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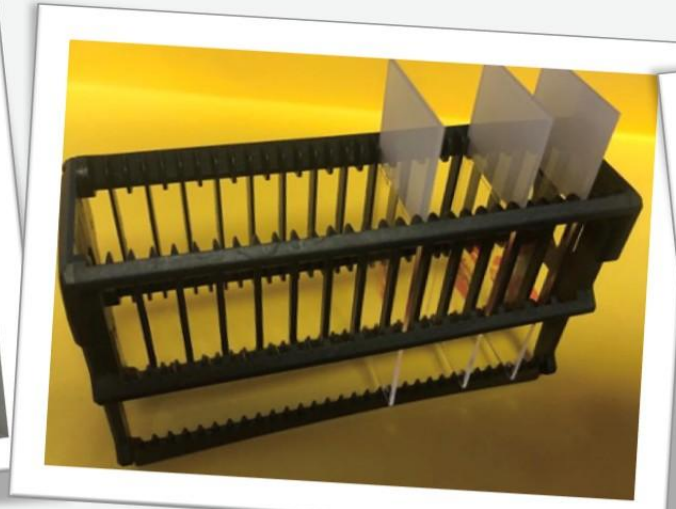
Digitization optimally integrated in histology laboratory



Staining → Cover-slipping → Drying → Same rack → Digitization

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Scale of digitization operation

Digitization

- 600-800/day
- 200k /year
- Avg file: 1.6 GB
- 1.2 TB/day
- 300TB/year

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Large scale = Efficiency is a must

Digitization

- 200,000 slides scanned yearly
- Stacked slides = 270m
- Eiffel tower = 330m

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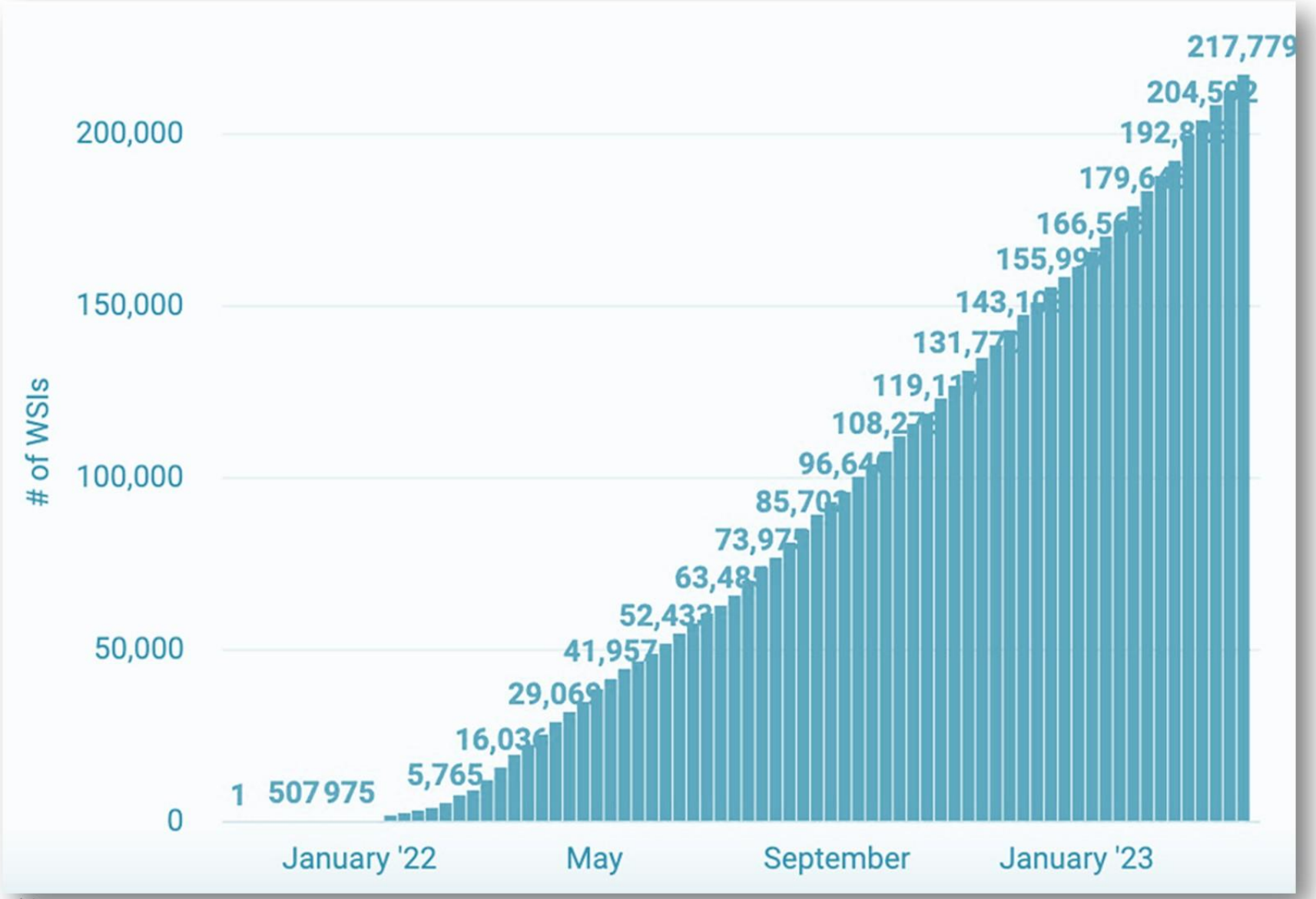
Cumulative number of WSIs ingested over time



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Scanning functionality and histology operation impact on digitization

OPTIMAL HISTOLOGY OPERATION → NO DELAY

HISTOLOGY DISRUPTION → DELAY

→ PROSPECTIVE SCANNING WITH DELAYS

→ NO PROSPECTIVE SCANNING

→ NO PROSPECTIVE SCANNING

→ NO PROSPECTIVE SCANNING

Phase 3 – Advanced interface

Functionalities

- **Updates**
- **Slide counts (pathology workflow visibility)**
- **Button to launch WSI from LIS**

Project milestones

- Engaged with LIS vendor since 2021
- Original completion goal: Q4 2022
- **Revised timeline:** April 25

Key considerations

- First client to request a digital pathology interface
- Low vendor priority initially, causing delays
- Transitioned from an alpha driver to a fully mature solution

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LIS-IMS Interoperability

LIS: Cerner PathNet (Oracle)

Tracking system: Vantage (Roche)

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Digital pathology transformation

Implementation of AI-Enabled Digital Infrastructure

- Scan 100% of glass slides in a timely fashion 🚧
- Digital slide viewer ✔
- Image management system ✔
- Interface Paige/Cerner unidirectional ✔
- Interface Paige/Cerner bidirectional 🚧
  Completion Q3 2023
- Integrated AI ✔

Adoption by pathologists

- Intradepartmental consultation ✔
- Research ✔
- Education ✔
- Tumor board ✔
- Quality assurance ✔
- Primary diagnosis ✔
- Remote work ✔

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Digital pathology and AI infrastructure

Scanning
GT450 x3

Optimized physical integration

WSI Storage, cloud-based, Paige
1.5 GB Direct Link between UofL Health Datacenter/AWS

8K monitors

Web-based viewer and image management System, **Paige**

Clinical grade AI, **Paige**
First system deployed and validated: Paige Prostate AI

LIS integration *(build by in-house team in collaboration with Paige team)*

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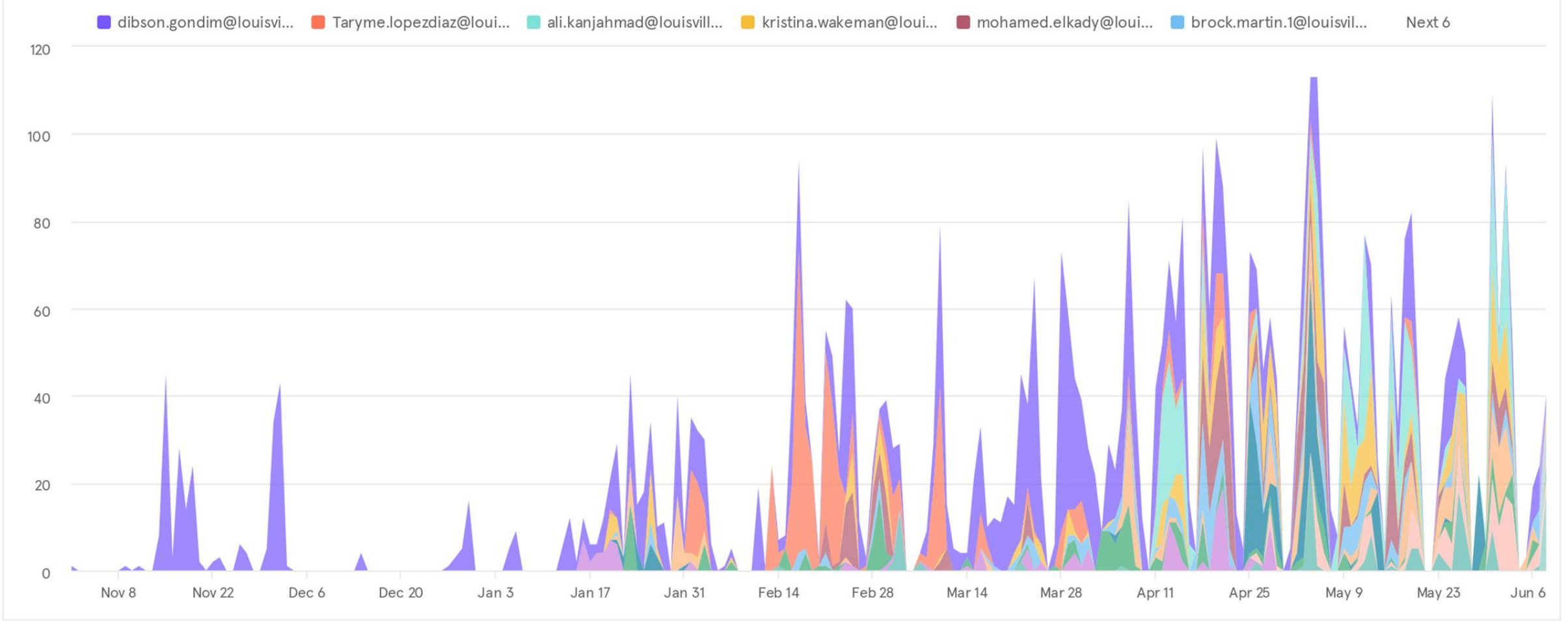
UofL Health

Cases Viewed Daily per User

Nov 1, 2021 → Jun 8, 2022

Insights, Linear



Source: Mixpanel

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Challenges

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Challenge – Workforce development

- DP is a new field, multidisciplinary in nature
- Retain workforce for knowledge retention
- Advanced IT/data science skills to apply to pathology
- Pathology technical staff with IT skills
- Histotech with pathology informatics training
- Team to develop custom solutions and provide maintenance
  - Software engineers /data scientists

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Challenges – Digitization

- Frequent scanner malfunction during a period of 2 months
- Leica leadership was fully engaged
- Support by having technicians on short notice
- One scanner was replaced, implemented maintenance protocols
- Crises was solved
- For the last 6 months we had rare/sporadic downtimes

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Challenge - Digitization

	Scanner1 errors	Scanner2 errors	Scanner3 errors	Totals
May	2	40	14	**56**
June	13	162	31	**206**
July	2	6	2	**10**
Total Errors Logged from May to July, 2022	**17**	**208**	**47**	**272**
Engineers onsite to fix mechanical issues	**2**	**5**	**1**	**8**

Credit: CJ Thomas

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Challenge – LIS integration

- Preliminary plan targeted to have interface between Cerner-Paige completed by June 2022
- Our DP/AI requirements was not in the roadmap
- Contingence plan: In-house build interface to send data to Paige
- Advanced interface with Cerner schedule for 2025 Q2/Q3

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Implementation challenges

High cost (manageable)

Interoperability

- Vendor dependent
- Lack of widespread adoption of standards by vendor
  - DICOM standard for digital pathology available
- Limited number of LIS provide out-of-box APIs
- Coordination between multiple vendors and your institution
  - Challenging when parties are not fully cooperative
  - A design interface from one vendor may not be interesting for another vendor
- State-of-the-Art digital pathology with AI implementation may not be in the LIS roadmap (may need to change LIS)

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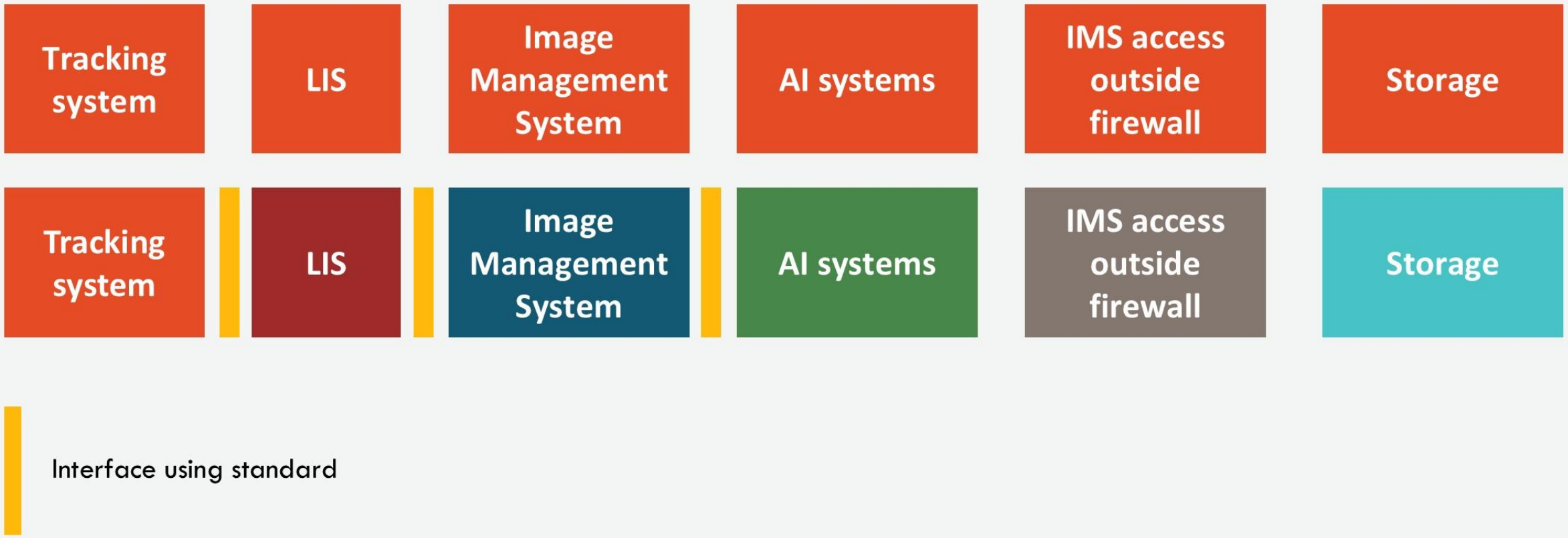
Interoperability and complexity



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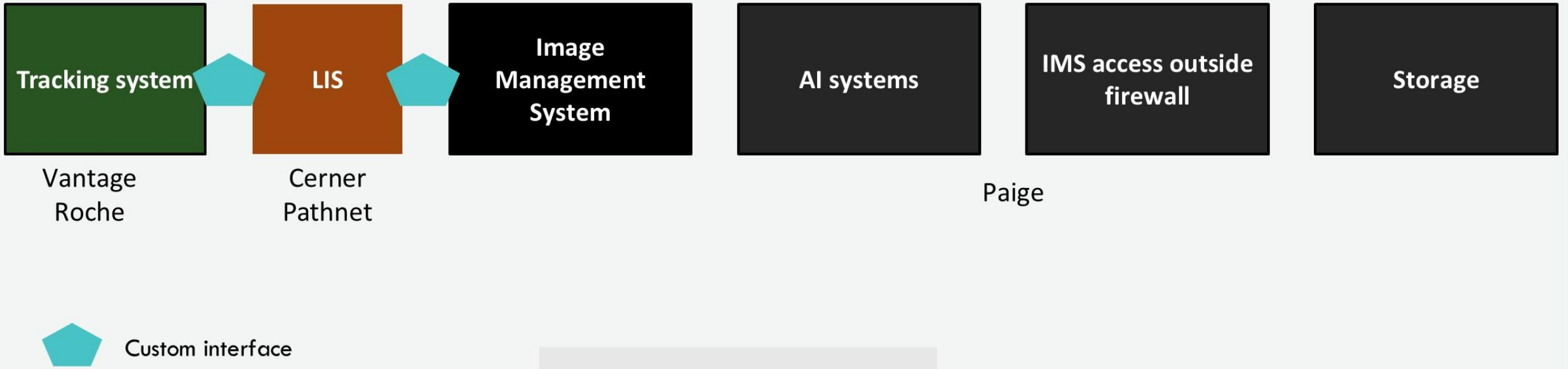
Interoperability and complexity



UofL Health

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Interoperability versus adoption

No interoperability

- Impossible to scale adoption
- Low volume scanning
- Mainly education and research

Limited interoperability

- It is easier to use glass slides than digital pathology
- Bulldozer-style adoption

Optimal interoperability

- Organic adoption
- Digital pathology is easier and faster to use than glass slides

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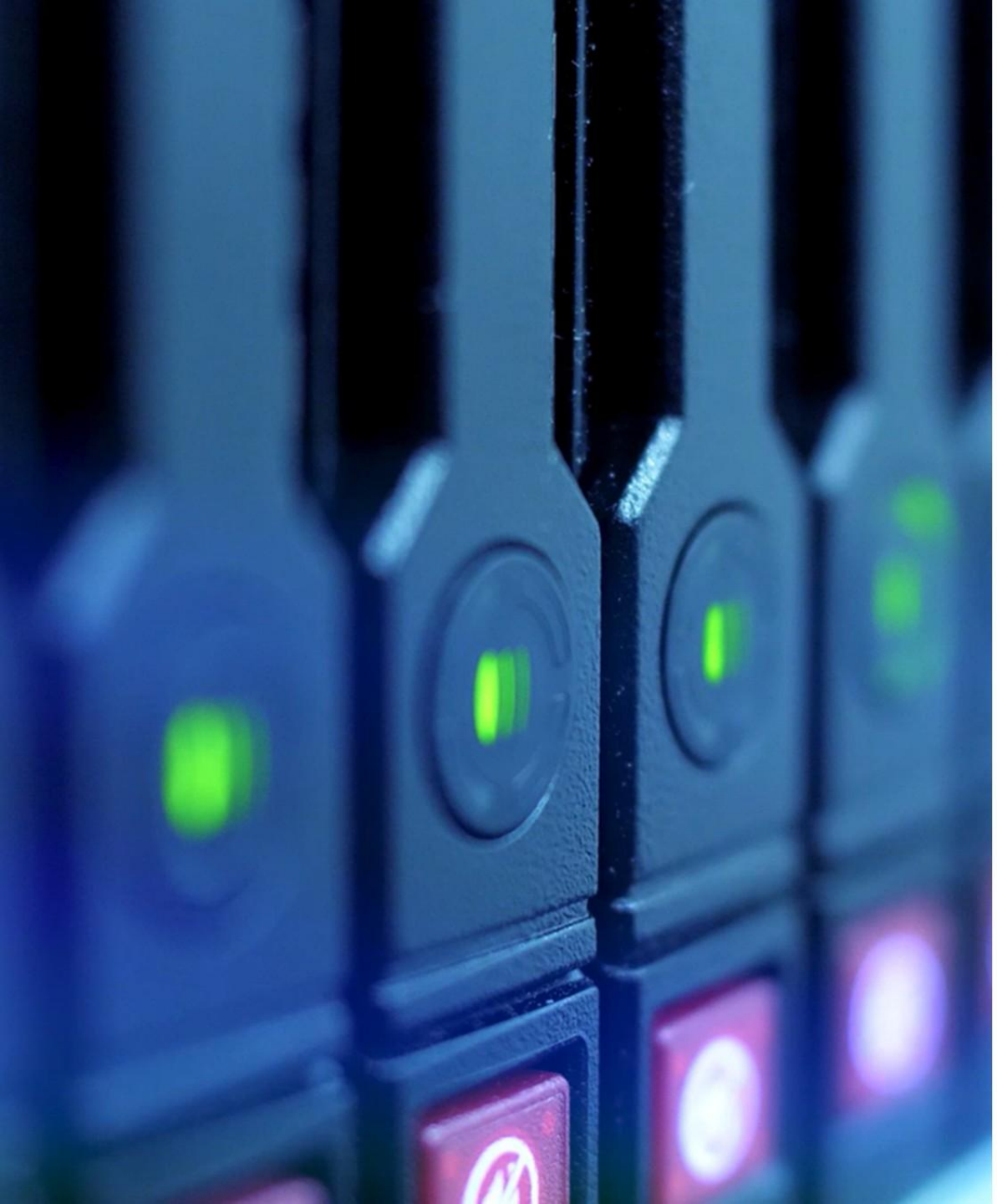
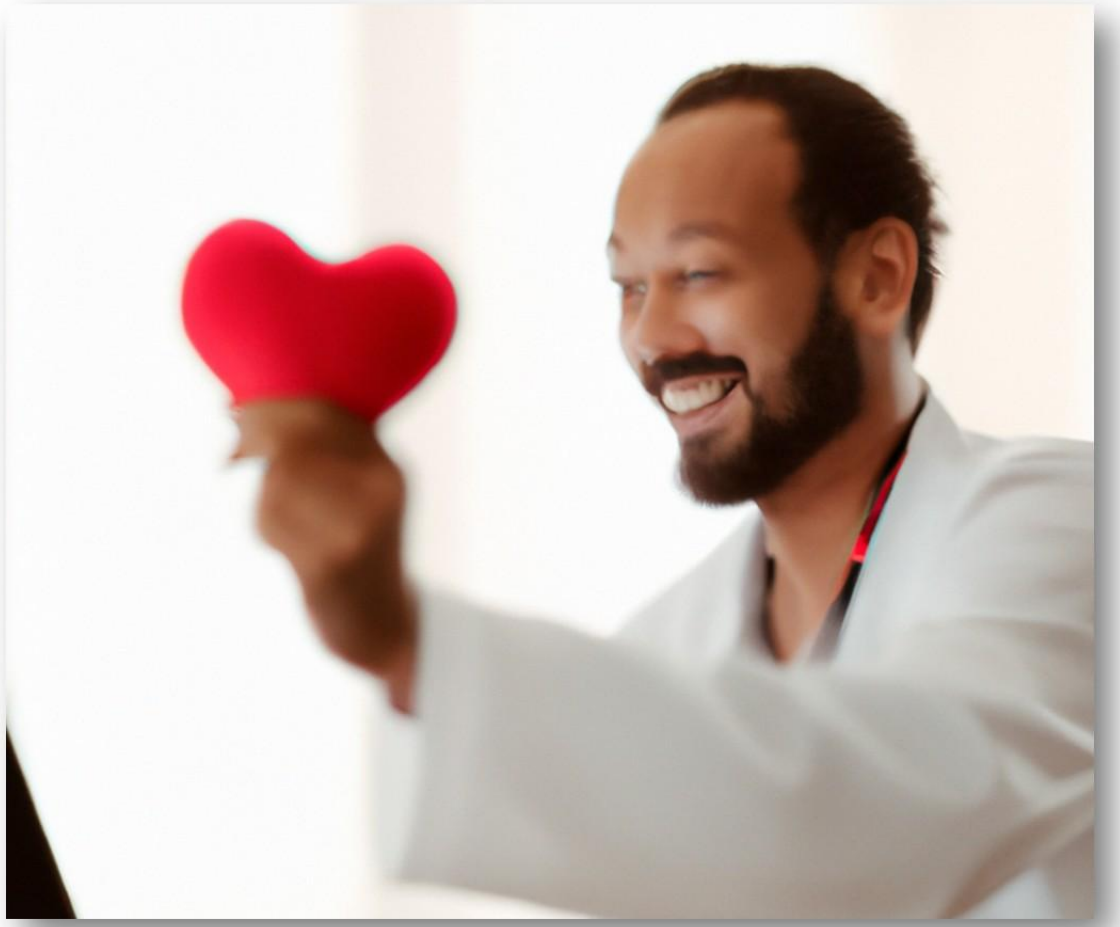


Extent of interoperability

- One time data exchange (no updates)
  - Ex. Pathologist change on LIS does not update on IMS
- Live data exchange
- Bidirectional
- Ex. Updates on IMS, updates on LIS
- Data exchange
  - Metadata only
  - Pathology Reports
  - Images
  - Orders

Optimal interoperability

- EHR + LIS + DP + AI
  - Synchronized
- No need to manually retrieve cases in multiple application
- Place orders from IMS system
- Export images from IMS to LIS
- Easy to determine status of assets



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Mandating DP primary diagnosis with limited interoperability

BULLDOZER-STYLE

DIGITAL PATHOLOGY ADOPTION

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Digital pathology superpowers
Digitally-native pathology workflows

Innovative functions and workflows not possible with glass slides

Large-scale photomontages

- Digital pathology pipeline to automate large-scale photomontage creation

Smart dashboards and automations

- Tumor board dashboards
- Cancer dashboards
- Consensus conference dashboard
- Slide-levels quality assurance workflow

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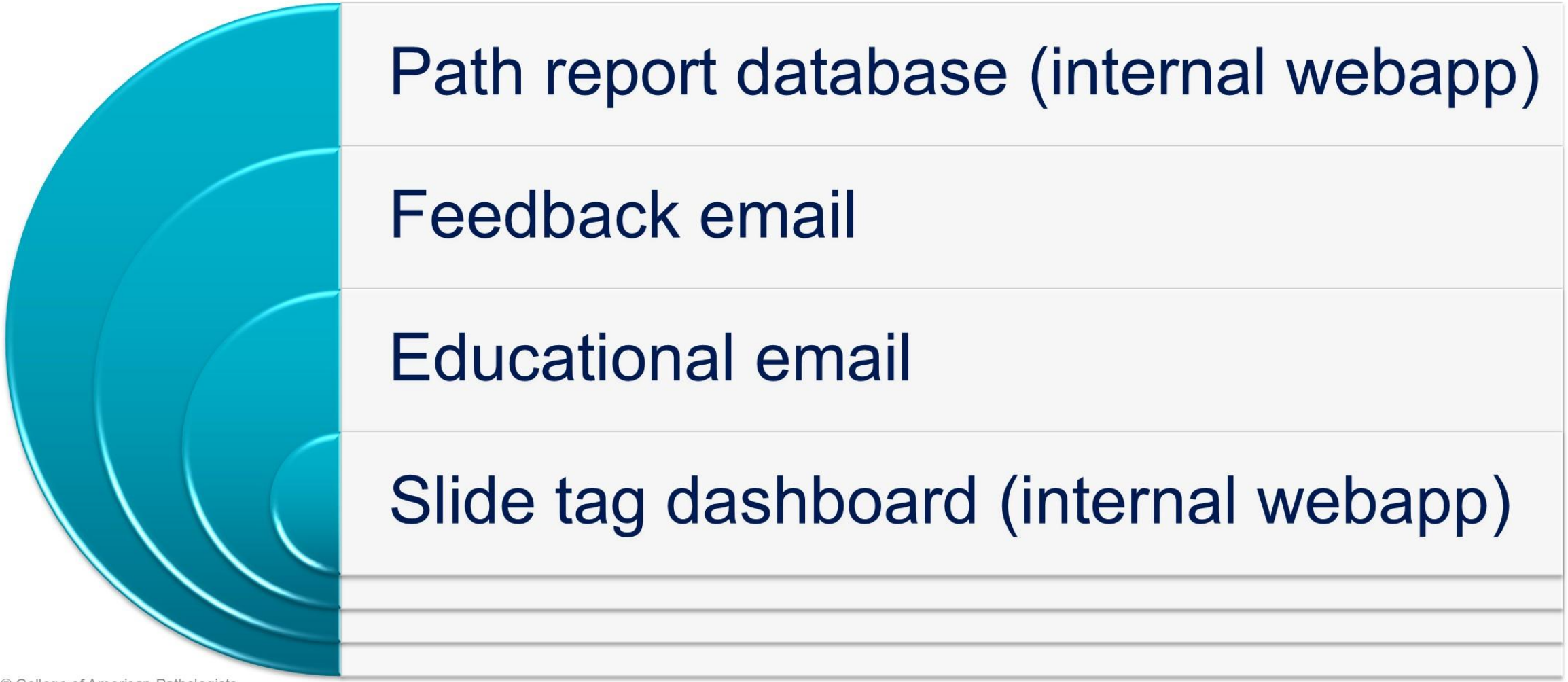
Secondary integrations
Digitally-native pathology workflows



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UofL HEALTH

Scanner GT450

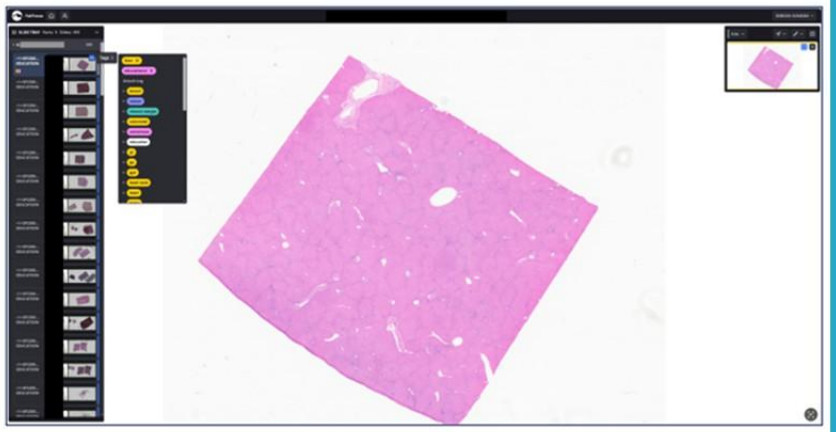
WSI

Storage on premises

Deidentification

CLINICAL

The Paige Platform cloud-based storage



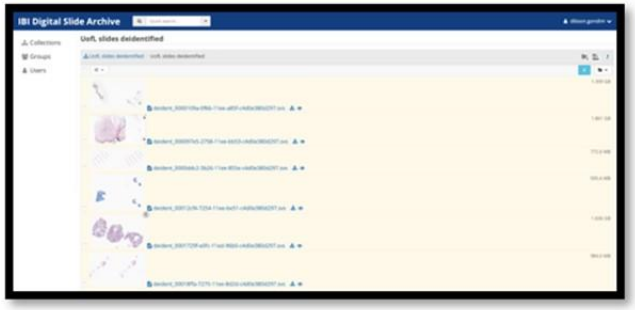
Viewer

University of Kentucky

WSI

Deidentification

Storage



DSA Viewer

RESEARCH

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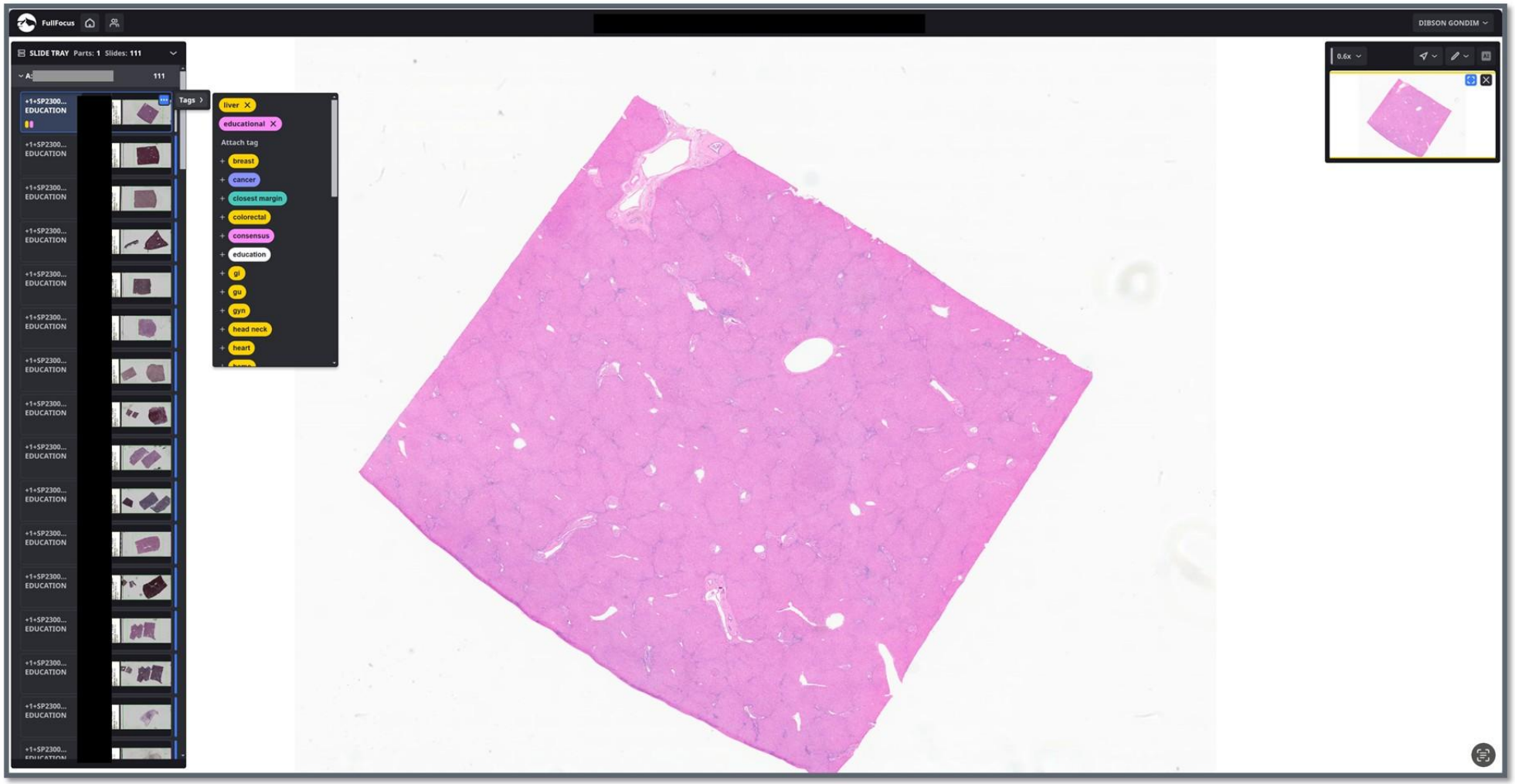
Paige Full Focus viewer – Clinical



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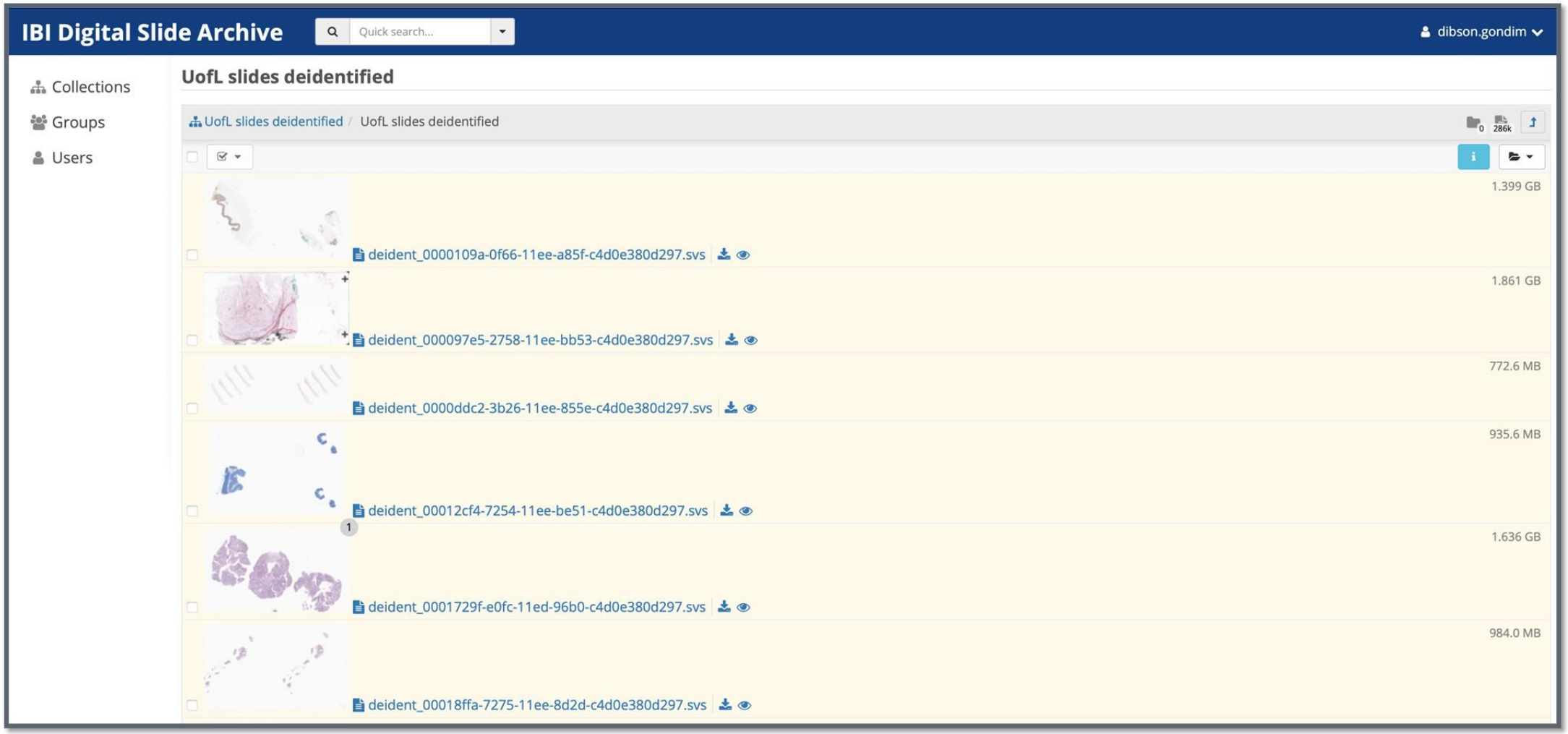
DSA – Research



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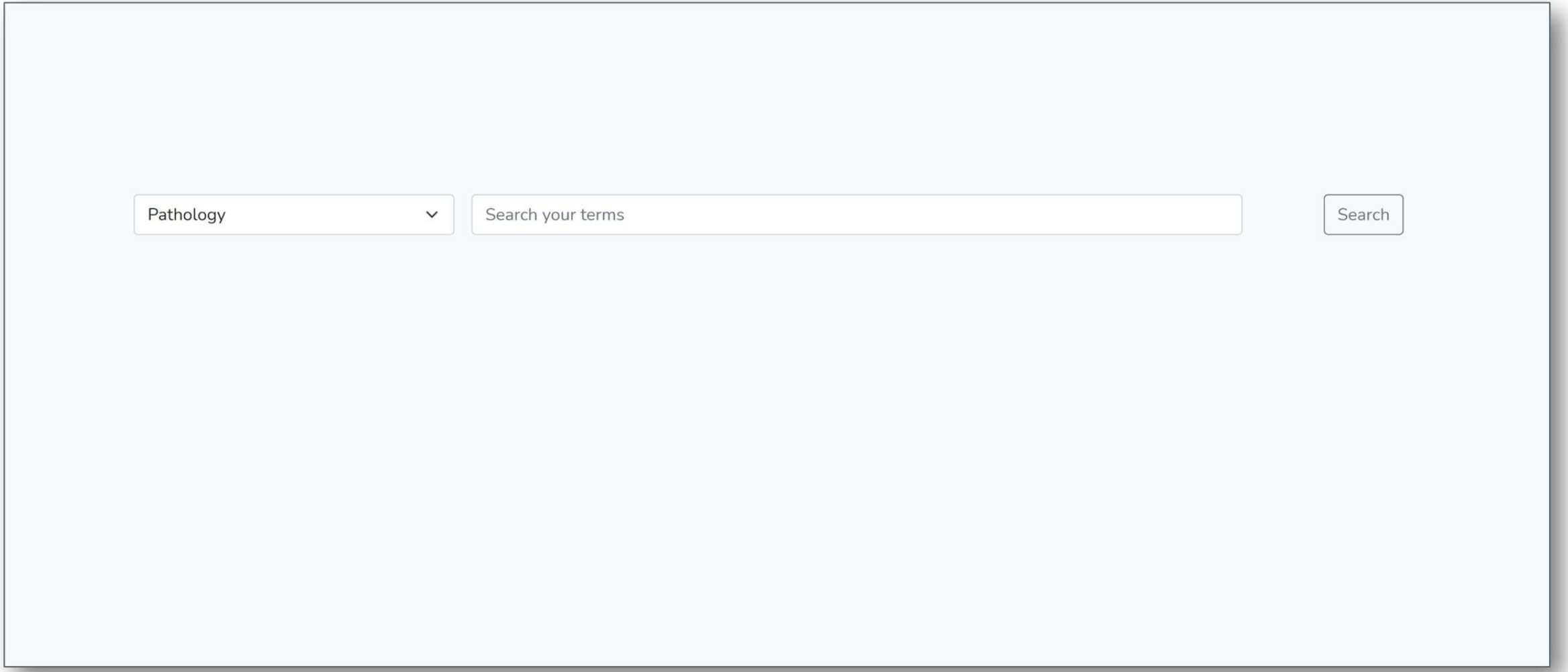
Path report database



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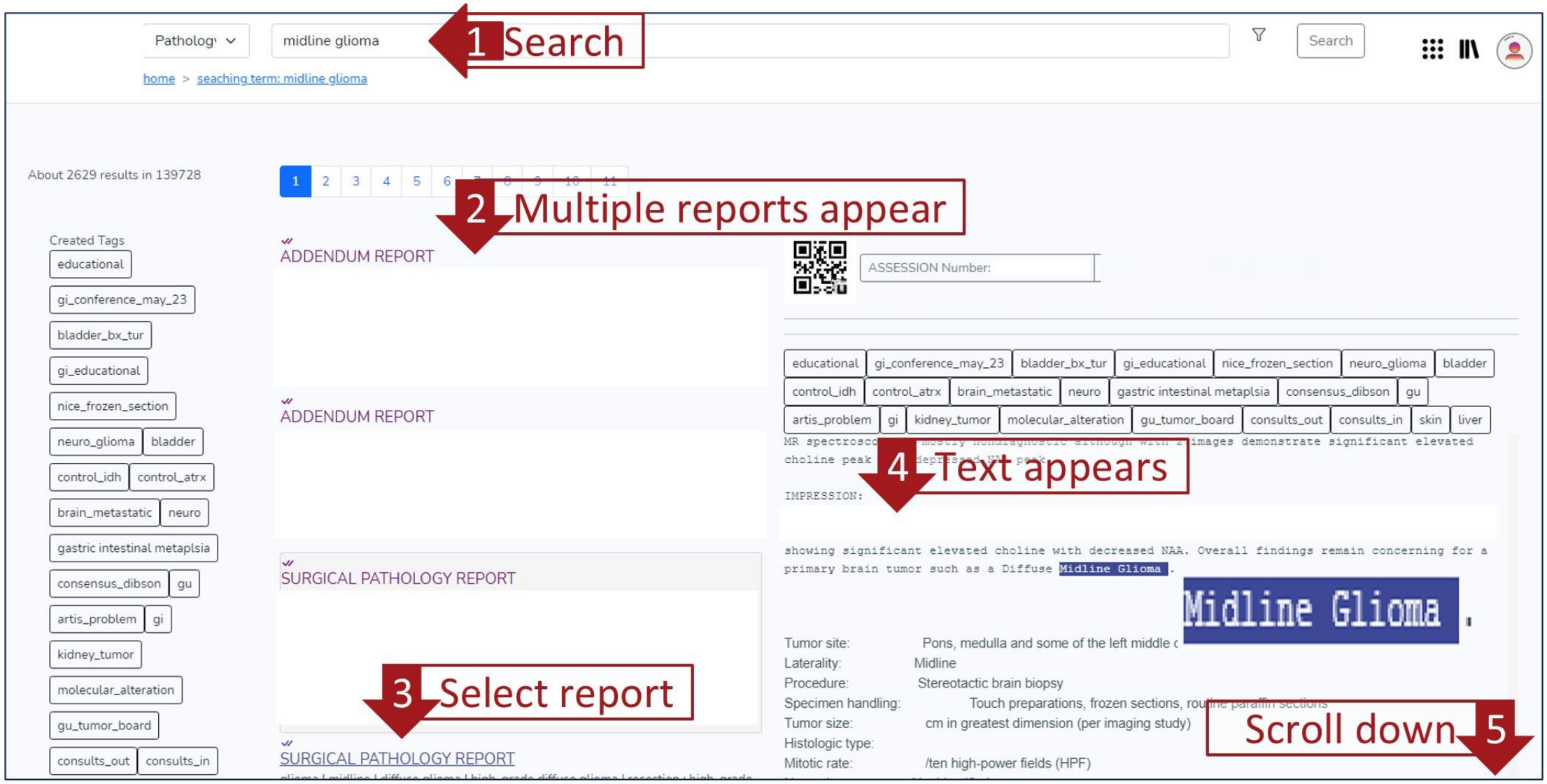
Path report database



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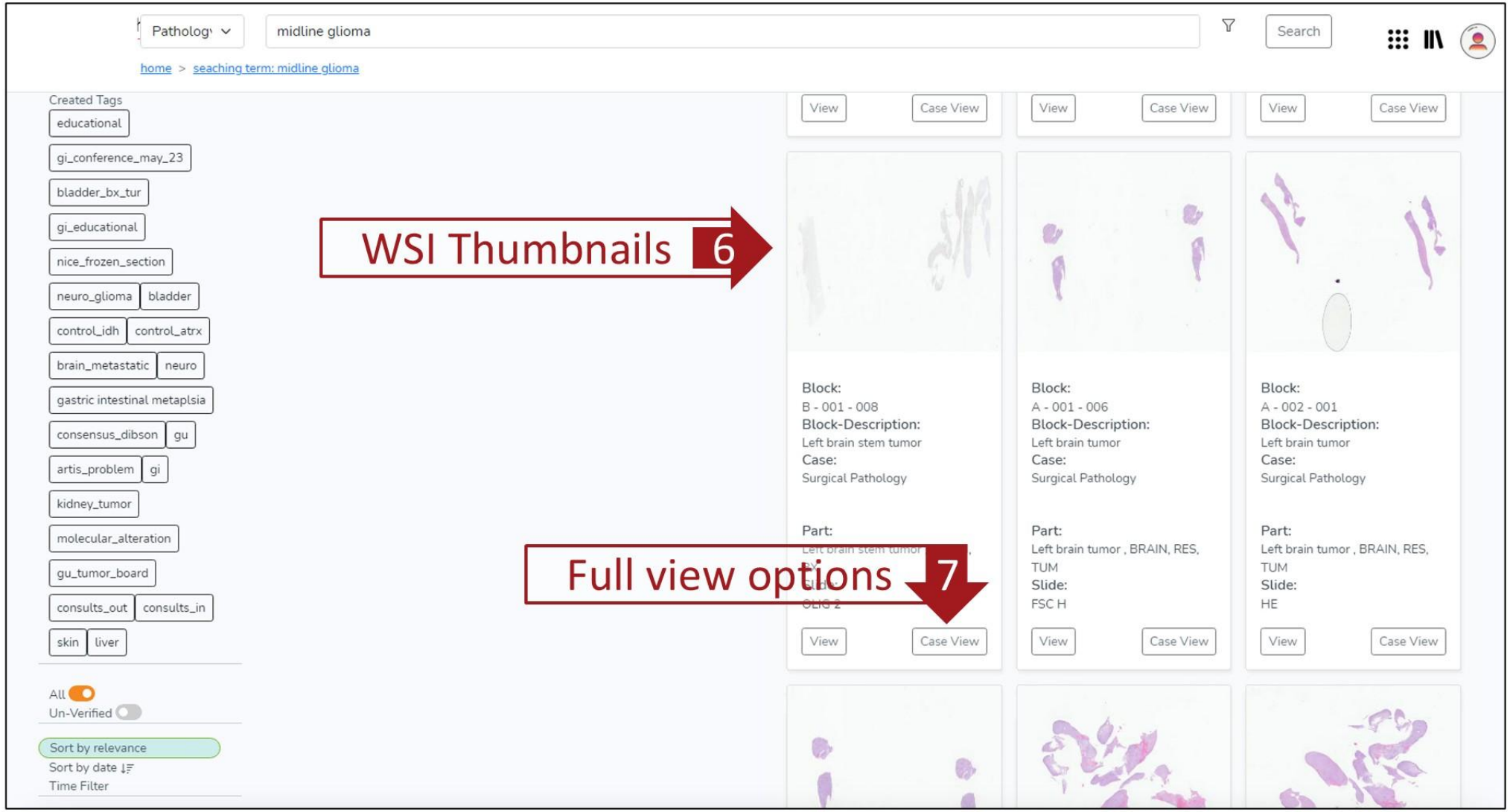
Path report database



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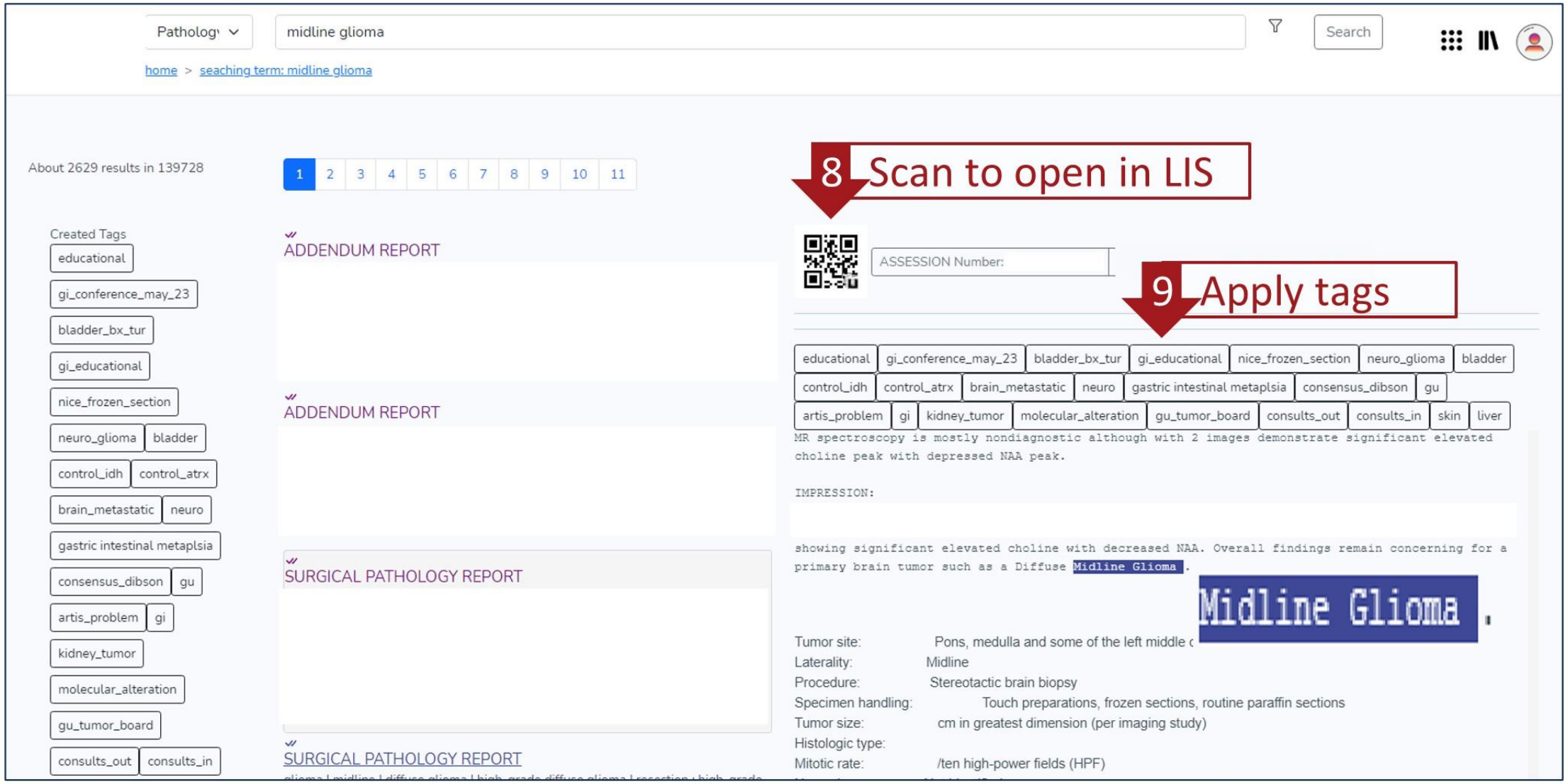
Path report database



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Pathology report search application

- Web app based on a vector database
- Script populate database pulling reports from Cerner
- Reports and slide thumbnails are available

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Resident feedback email

Report database

Retrieval

- Resident final report
- Attending final report
- Case URL is retrieved

Email report is sent to both residents and attendings with diagnoses and URL links

Annual retreat: The most helpful implementation for resident education in the year

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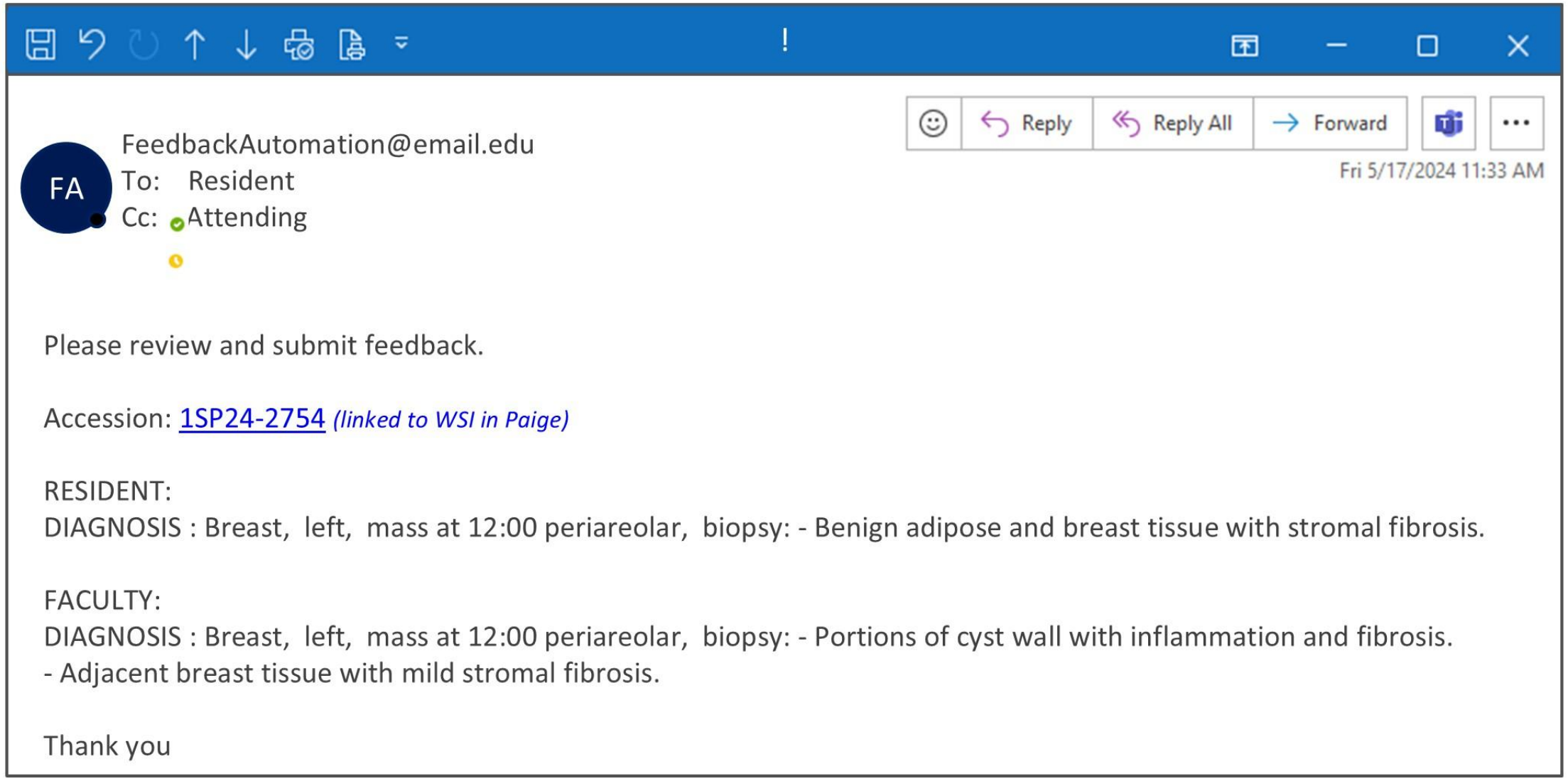
Email report data example



Reply | Reply All | Forward

Fri 5/17/2024 11:33 AM

FA

FeedbackAutomation@email.edu
To: Resident
Cc: Attending

Please review and submit feedback.

Accession: 1SP24-2754 *(linked to WSI in Paige)*

RESIDENT:
DIAGNOSIS : Breast, left, mass at 12:00 periareolar, biopsy: - Benign adipose and breast tissue with stromal fibrosis.

FACULTY:
DIAGNOSIS : Breast, left, mass at 12:00 periareolar, biopsy: - Portions of cyst wall with inflammation and fibrosis.
- Adjacent breast tissue with mild stromal fibrosis.

Thank you

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Educational e-mail table

bladder	histologic changes compatible with prior turbt site
colon	endometriosis as colon polyp
liver	biopsy extensive parenchymal loss and inflammation , unclear clinical setting
liver	hepatectomy extensive zone 3-based necrosis
adrenal	metastatic clear cell renal cell carcinoma
bladder	cystitis cystica and glandularis
bladder	invasive papillary urothelial carcinoma pt1
kidney	clear cell renal cell carcinoma differential with ccprct
stomach	ppi effect
lung	atypical adenomatous hyperplasia
anus	perianal nevus
brain	cerebellar arteriovenous malformation
bladder	low-grade papillary urothelial carcinoma with an inverted growth pattern
ileum	crohn's disease
liver	metastic colonic adenocarcinoma

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Slide-level tagging dashboard and workflows

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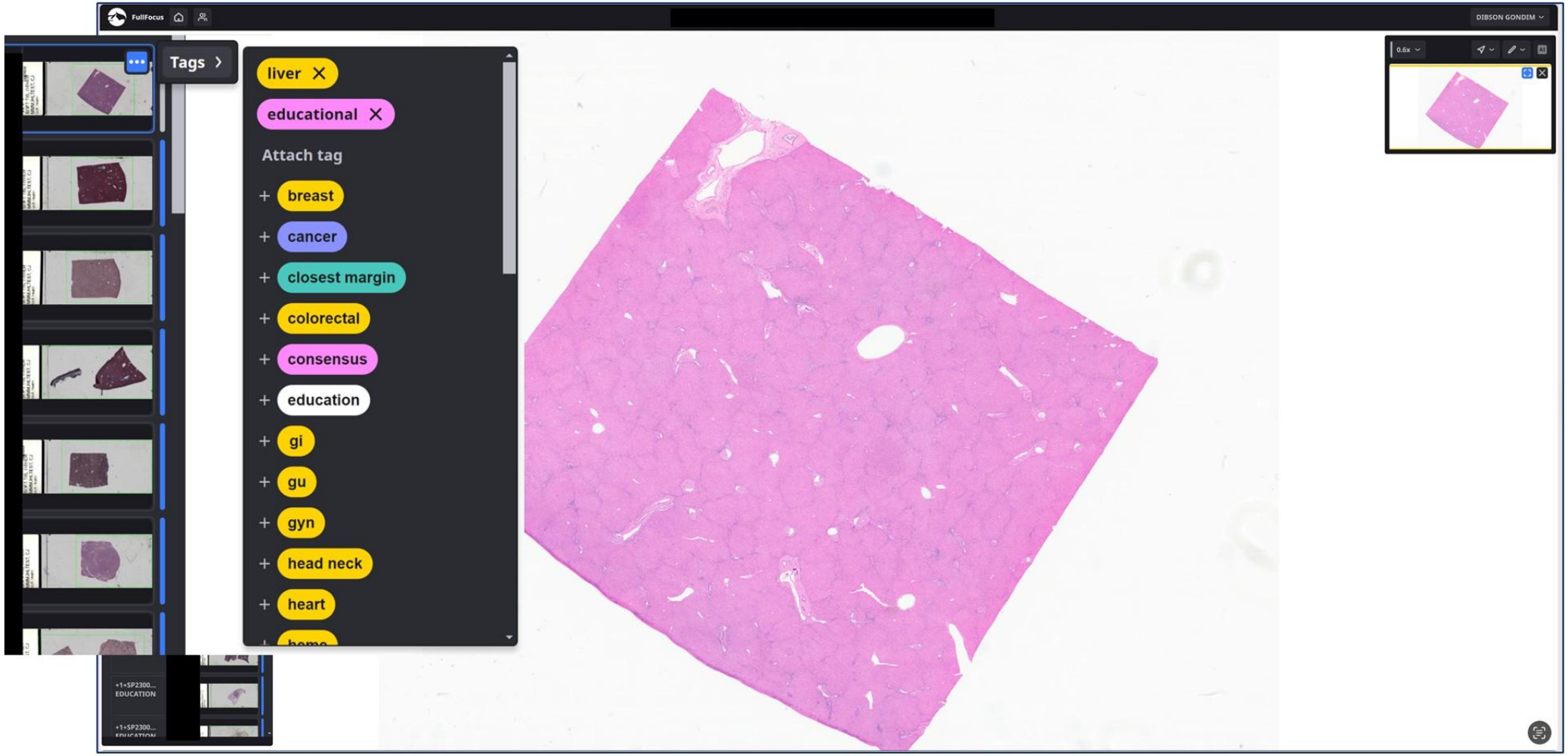
Slide level tags for workflows and dashboard



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Types of tags

Subspecialty

- breast
- colorectal
- gi
- gu
- gyn
- head neck
- heart
- heme
- liver
- melanoma
- neuro
- sarcoma
- thoracic
- transplant

Report Elements

- closest margin
- lvi
- m stage
- n stage
- pni
- positive lymph node
- positive margin
- representative
- highest grade
- t stage
- tumor necrosis

Workflow

- molecular
- outside consult
- pending
- question
- rescan
- suboptimal histology

Conferences

- consensus
- educational
- intradepartmental consult
- deid for talks
- tumorboard/conference

Misc

- no pathology
- cancer

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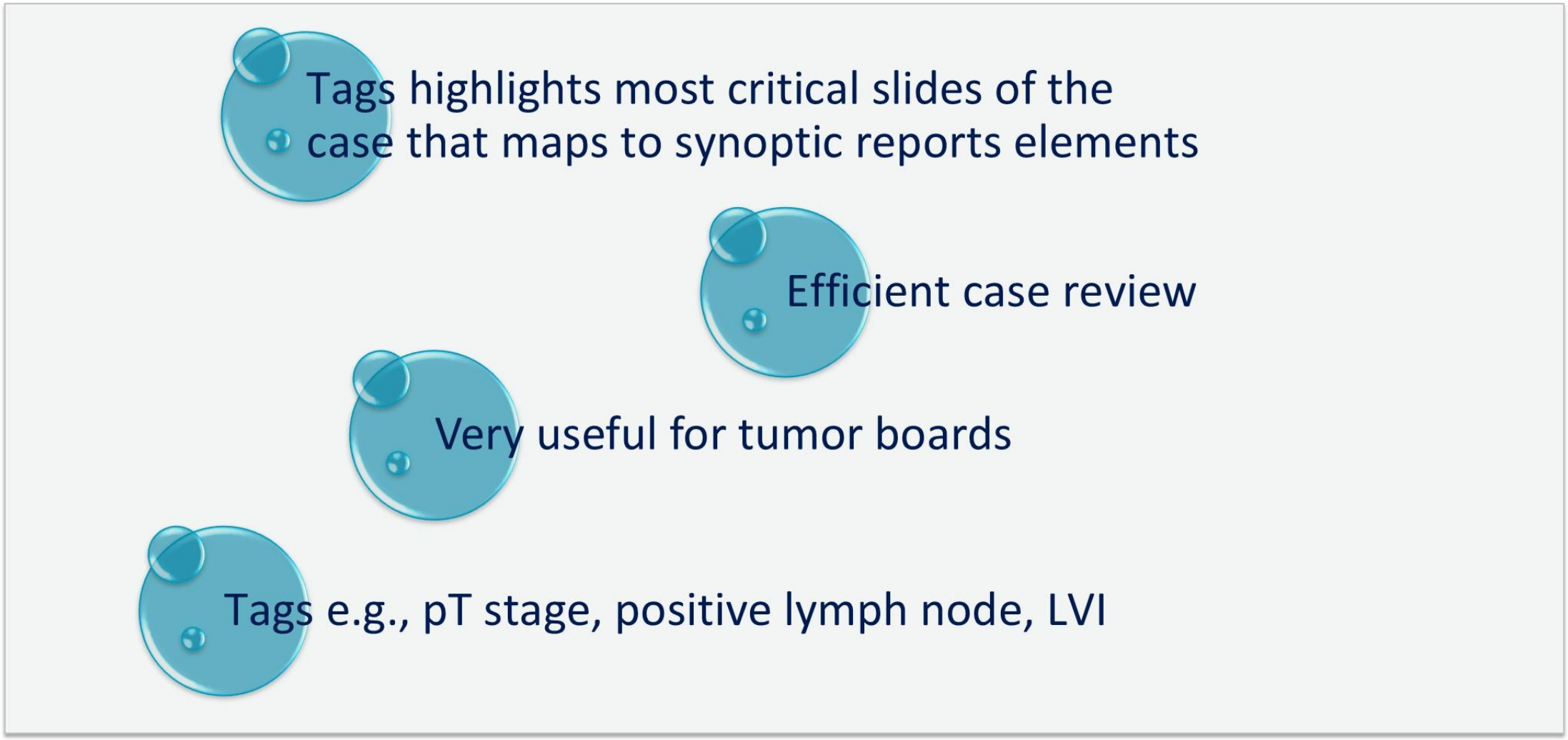
Synoptic report elements-based tags



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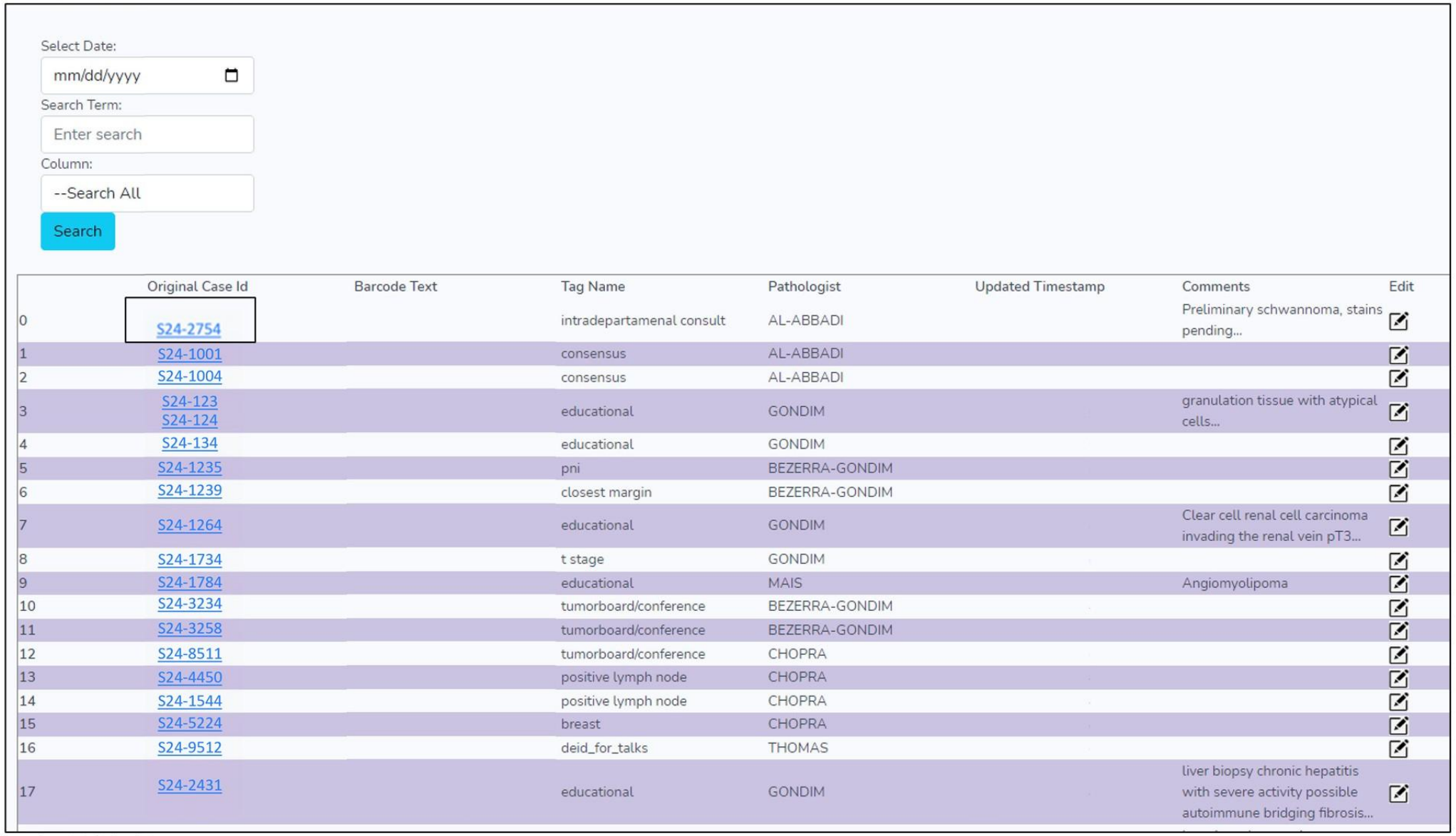
Dashboard



Select Date:

mm/dd/yyyy

Search Term:

Enter search

Column:

--Search All

Search

	Original Case Id	Barcode Text	Tag Name	Pathologist	Updated Timestamp	Comments	Edit
0	S24-2754		intradepartamenal consult	AL-ABBADI		Preliminary schwannoma, stains pending...	
1	S24-1001		consensus	AL-ABBADI			
2	S24-1004		consensus	AL-ABBADI			
3	S24-123 S24-124		educational	GONDIM		granulation tissue with atypical cells...	
4	S24-134		educational	GONDIM			
5	S24-1235		pni	BEZERRA-GONDIM			
6	S24-1239		closest margin	BEZERRA-GONDIM			
7	S24-1264		educational	GONDIM		Clear cell renal cell carcinoma invading the renal vein pT3...	
8	S24-1734		t stage	GONDIM			
9	S24-1784		educational	MAIS		Angiomyolipoma	
10	S24-3234		tumorboard/conference	BEZERRA-GONDIM			
11	S24-3258		tumorboard/conference	BEZERRA-GONDIM			
12	S24-8511		tumorboard/conference	CHOPRA			
13	S24-4450		positive lymph node	CHOPRA			
14	S24-1544		positive lymph node	CHOPRA			
15	S24-5224		breast	CHOPRA			
16	S24-9512		deid_for_talks	THOMAS			
17	S24-2431		educational	GONDIM		liver biopsy chronic hepatitis with severe activity possible autoimmune bridging fibrosis...	

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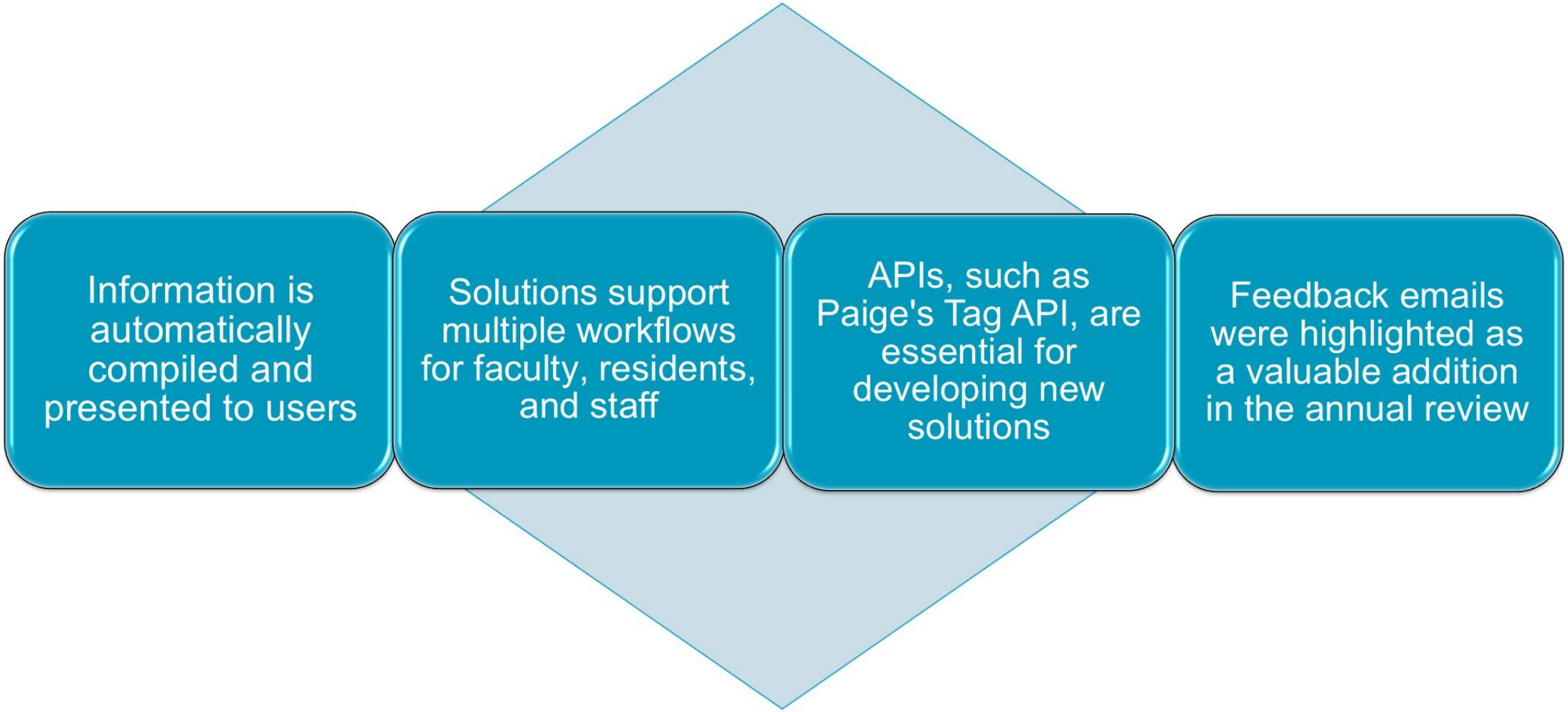
Experience



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Digitally-native pathology workflows

Use Case	Data Sources	Data Processing	Presentation
Resident feedback Educational cases Tumor board Cases for consensus	EMR Pathology Schedule Surgery schedule LIS DPS …	Merging data from one or more sources  Complex data processing pipeline	Dashboard Email Application*

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Conclusions

Digital workflows, free from physical limits, offer endless possibilities to discover effective solutions

Vendors face limitations and cannot explore every possible solution

Encouraging vendors to provide APIs is crucial for leveraging digital pathology native workflows

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References

- Hanna, Matthew G., et al. "Integrating digital pathology into clinical practice." Modern Pathology 35.2 (2022): 152-164.
- Montezuma, Diana, et al. "Digital pathology implementation in private practice: specific challenges and opportunities." Diagnostics 12.2 (2022): 529.
- Eloy, Catarina, et al. "Digital pathology workflow implementation at IPATIMUP." Diagnostics 11.11 (2021): 2111.
- Dawson, Heather. "Digital pathology–Rising to the challenge." Frontiers in medicine 9 (2022): 888896.

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Thank you!

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louisville.edu/medicine/departments/pathology

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Additional Resources

- **Practice Management Webpage**
  - https://www.cap.org/member-resources/practice-management
- **Previous and Upcoming Roundtables/Webinars**
  - https://www.cap.org/calendar/webinars/listing/practice-management-webinar
- **Articles Authored by Members of the CAP Practice Management Committee**
  - https://www.cap.org/member-resources/articles/category/practice-management
- **Practice Management Networking Community**
  - https://www.cap.org/member-resources/practice-management/practice-management-networking-community-application
- **Practice Management Frequently Asked Questions**
  - https://www.cap.org/member-resources/practice-management/frequently-asked-questions

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Watch for the session evaluation form. Your feedback is important!

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