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# TOWARDS DIGITAL PATHOLOGY: EXPERIENCES FROM THE GENEVA UNIVERSITY HOSPITALS

Mario KREUTZFELDT

# WHY GO DIGITAL?

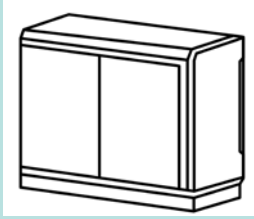
- Manage increasing case numbers with same number of pathologists
- Faster diagnostics
  - Streamlined diagnostic process (productivity)
  - „Instant“ second opinion via telepathology
  - Computational pathology and image analysis (reproducibility)
- Facilitated (slide) logistics (e.g. slide distribution and archive retrieval)

# KEY COMPONENTS OF A DIGITAL PATHOLOGY INSTALLATION IN ROUTINE AND DIAGNOSTICS

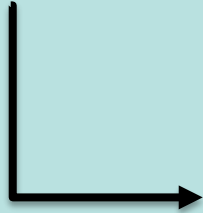


Laboratory Information System (LIS)

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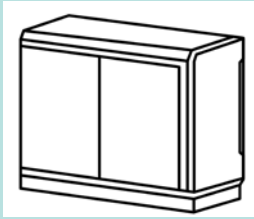


High Performance Slide Scanner

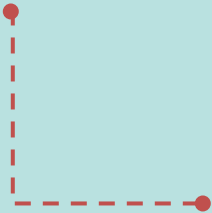


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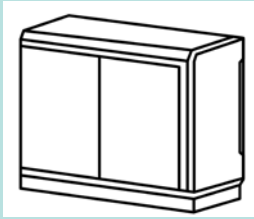


High Performance Slide Scanner



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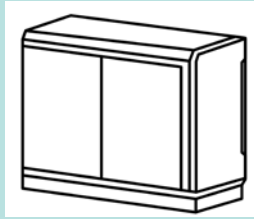


Image Management System (IMS)



Laboratory Information System (LIS)

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High Performance Slide Scanner



Image Management System (IMS)

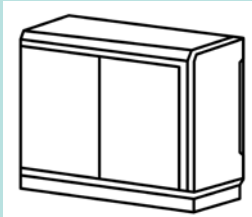


Laboratory Information System (LIS)



„Digital Pathology“ Workstation

# KEY COMPONENTS OF A DIGITAL PATHOLOGY INSTALLATION IN ROUTINE AND DIAGNOSTICS



High Performance Slide Scanner

- Optimized lab workflow
- Strong IT infrastructure: Network / Storage



Image Management System (IMS)



Laboratory Information System (LIS)

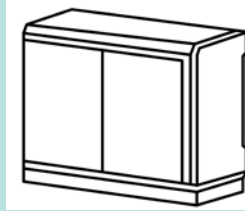


„Digital Pathology“ Workstation



# KEY COMPONENTS: DETAILS

# WHOLE SLIDE SCANNER



## Preferences:

- Open format (DICOM or supported by OpenSlide)
- Priority Scanning of urgent slides
- Easy slide loading and start of scan (push-and-go)
- Flexible use cases (double slides)
- Rapid scanning (slide loading + autofocus + scan)
- Barcode compatible

## Considerations:

- Calculate necessary scanning throughput at peak times
- Define acceptable time delay for slide distribution

Adapt scanner capacity to lab workflow (and vice versa)

# IMAGE MANAGEMENT SYSTEM



## Preferences:

- Broad WSI image file format support (Interoperability)
- Bidirectional communication with Lab Information System
- Ability to integrate other sources (e.g. grossing images, PDF)

## Considerations:

- Sleek intuitive User Interface
- Efficient Collaboration tools
- File Handling: Tagging / Search / Deletion
- Easy case switching / resuming reporting open cases

# DP WORKSTATIONS + SLIDE VIEWER



## Preferences:

- Fast slide loading
- Low latency and smooth slide navigation
- Auto alignment and stacking of consecutive slides
- Intuitive annotation and commenting tools
- Case report based on selected ROIs and comments

## Considerations:

- Preparation of tumor boards (calendar, attach ROIs)
- Integration of (custom) image analysis tools

# IT INFRASTRUCTURE

## Prerequisites

- Network transfer speeds:
  - Scanner <> IMS : 10Gbit/s
  - IMS <> DP-workstations : 1 Gbit/s
- Deployment of IMS on virtual machines
- Data storage capacities for at least 3-month worth of WSIs

# LABORATORY WORKFLOW

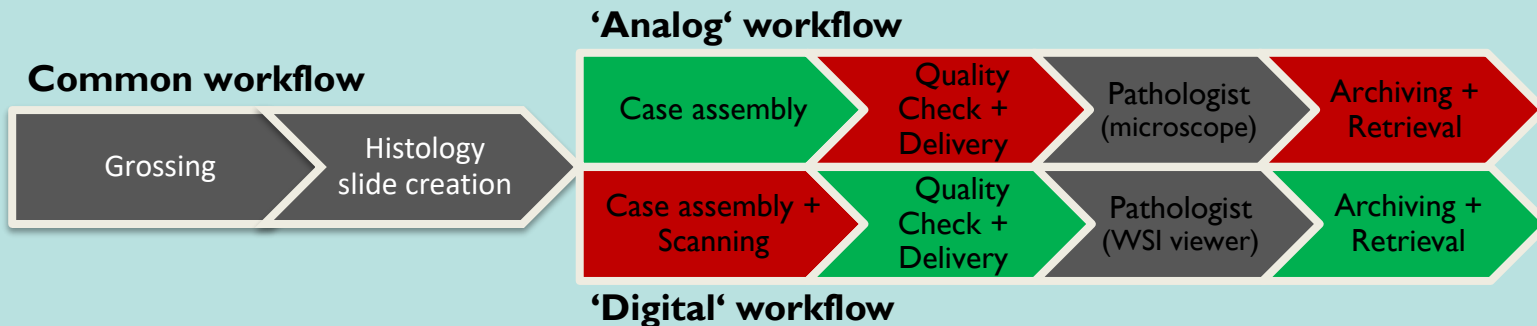


## Preferences:

- Standardize / automate as much as possible
- Sample tracking essential (barcoding, slide printer)

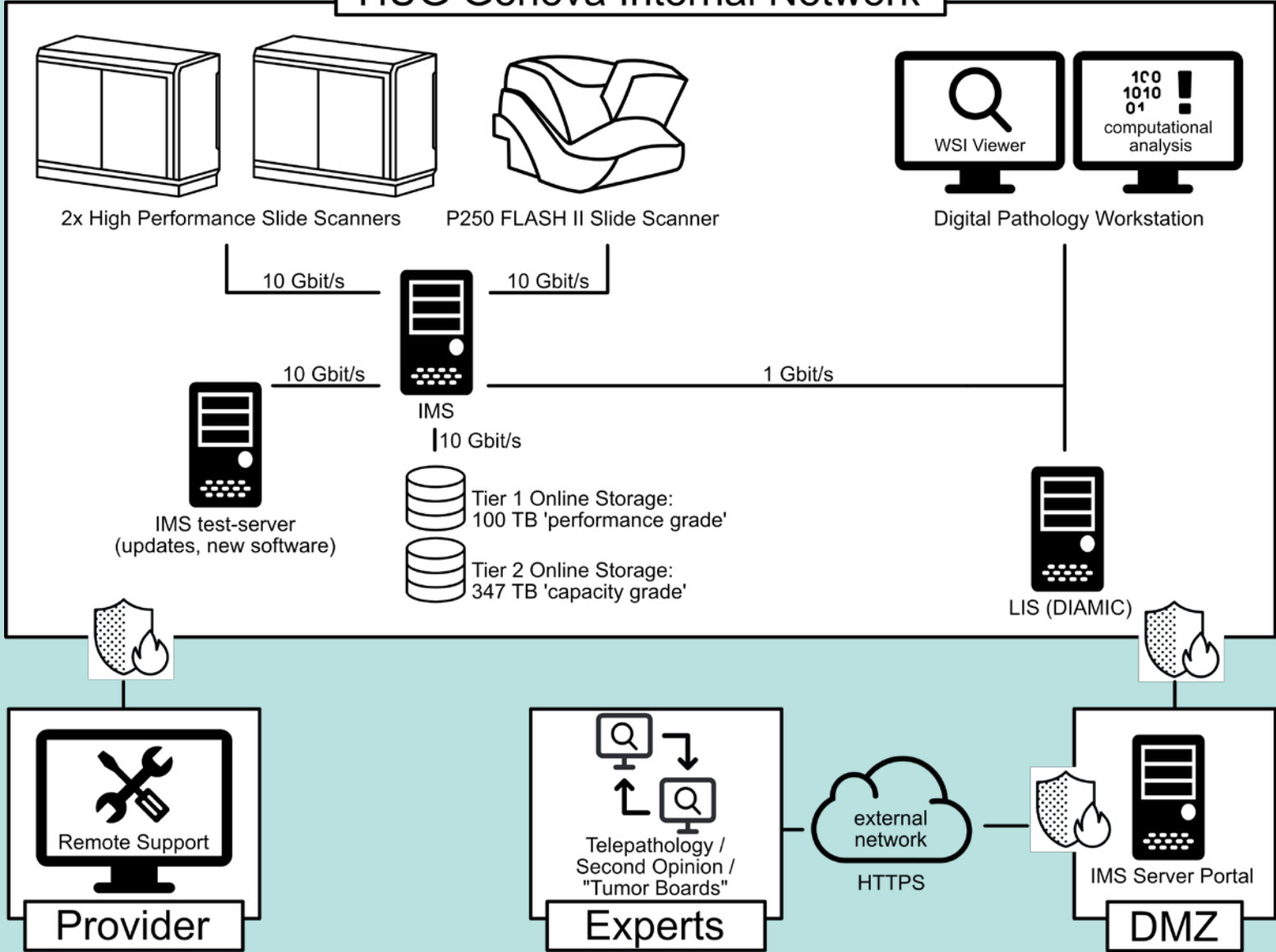
## Considerations:

- Integrate technical lab staff into the change
- Designate DP-specific “pioneers”
- Remove workflow bottlenecks (e.g. continuous workflow)



Handling time: **Slower**, **Faster**, **Similar**

# HUG Geneva Internal Network



# ACKNOWLEDGEMENTS



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