



LIMS and workflow integration as impulse to establish Virtual Microscopy to daily clinical use

K. Saeger¹, S. Wienert¹, K. Polus², D. Emmel³, P. Hufnagl⁴

¹VMscope GmbH, Berlin

²Nexus/Dis GmbH, Frankfurt a.M.

³Loescap Technology GmbH, Berlin

⁴Charite Universitätsmedizin Berlin



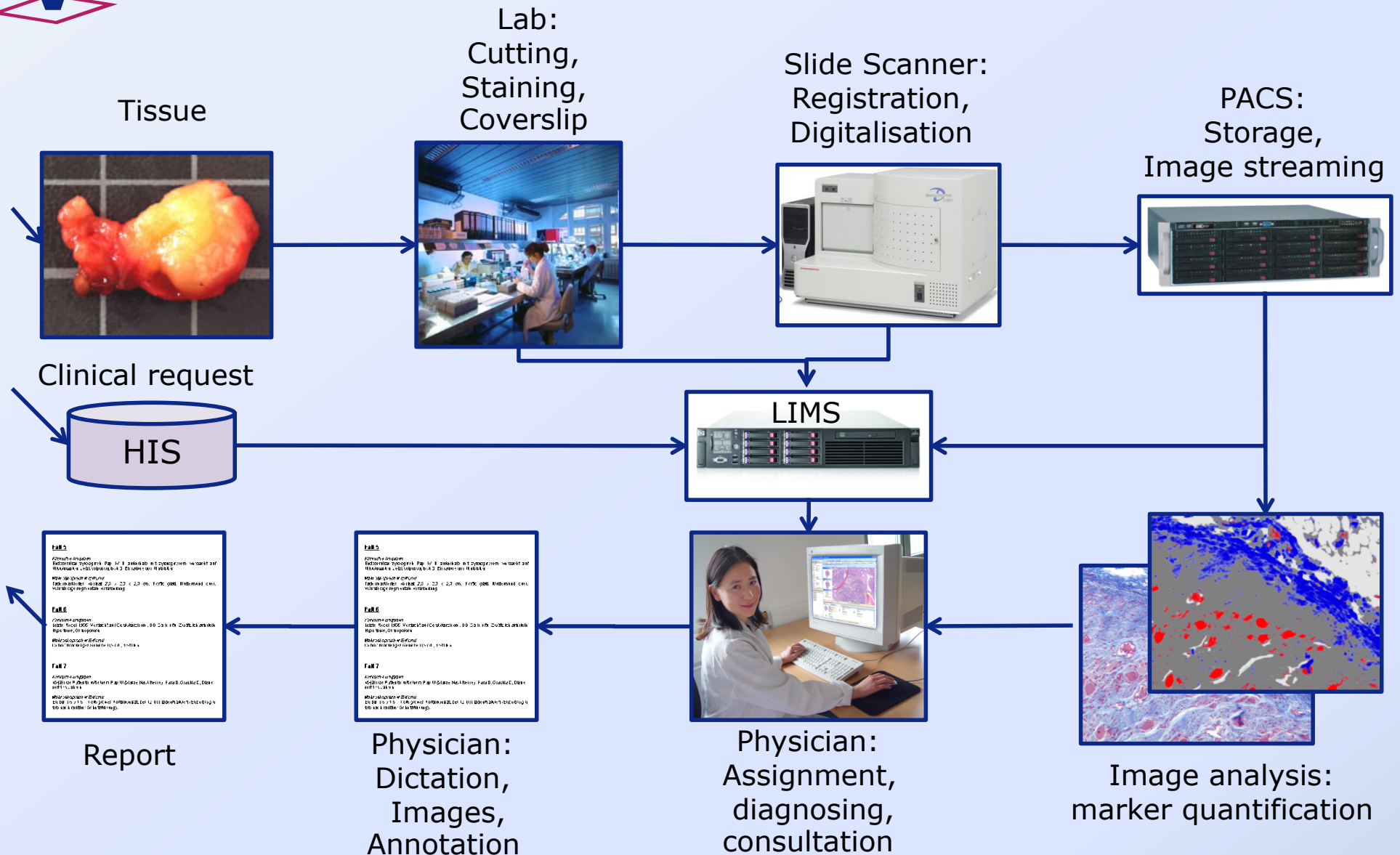
Current situation of VM in clinical use

In Clinical applications, Virtual Microscopy is used for:

- Tele-consultation: Second opinion, supervision of remote pathologies
- Frozen-section telepathology (controversial)
- Case presentations: clinical conferences, continuing education
- Documentation and archiving of rare cases

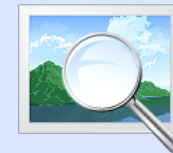
...but not for the daily clinical pathology.

The possible digital workflow



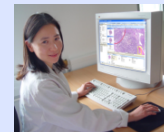
Advantages

- High degree on automation: Saves costs
- Digital archive: Saves space and time
- Remote work: Faster diagnosis for rare cases
- Support through image analysis:
Faster diagnosis and more reproducibility
- More diagnostic functionality:
Staining overlay, tele-consultation, ...



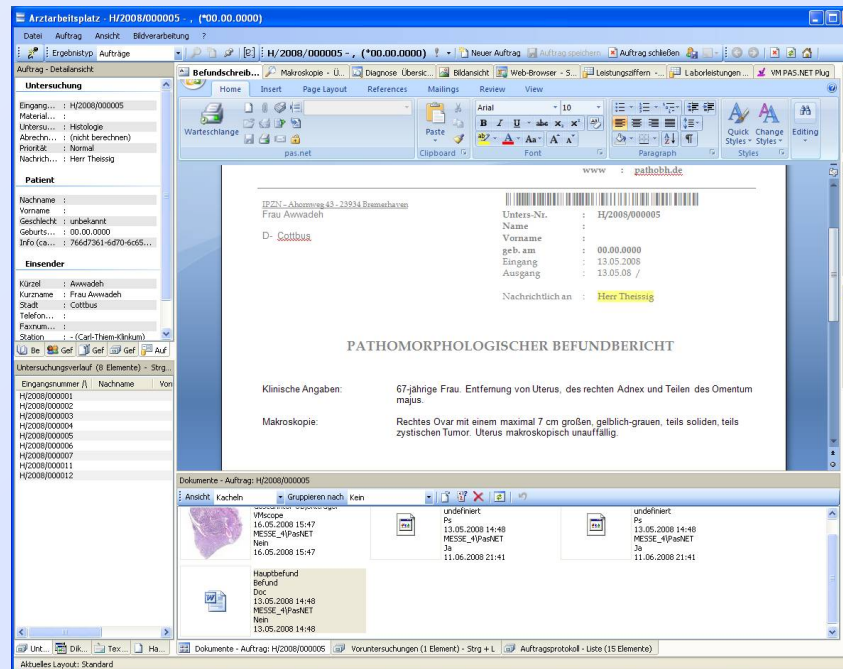
Disadvantages

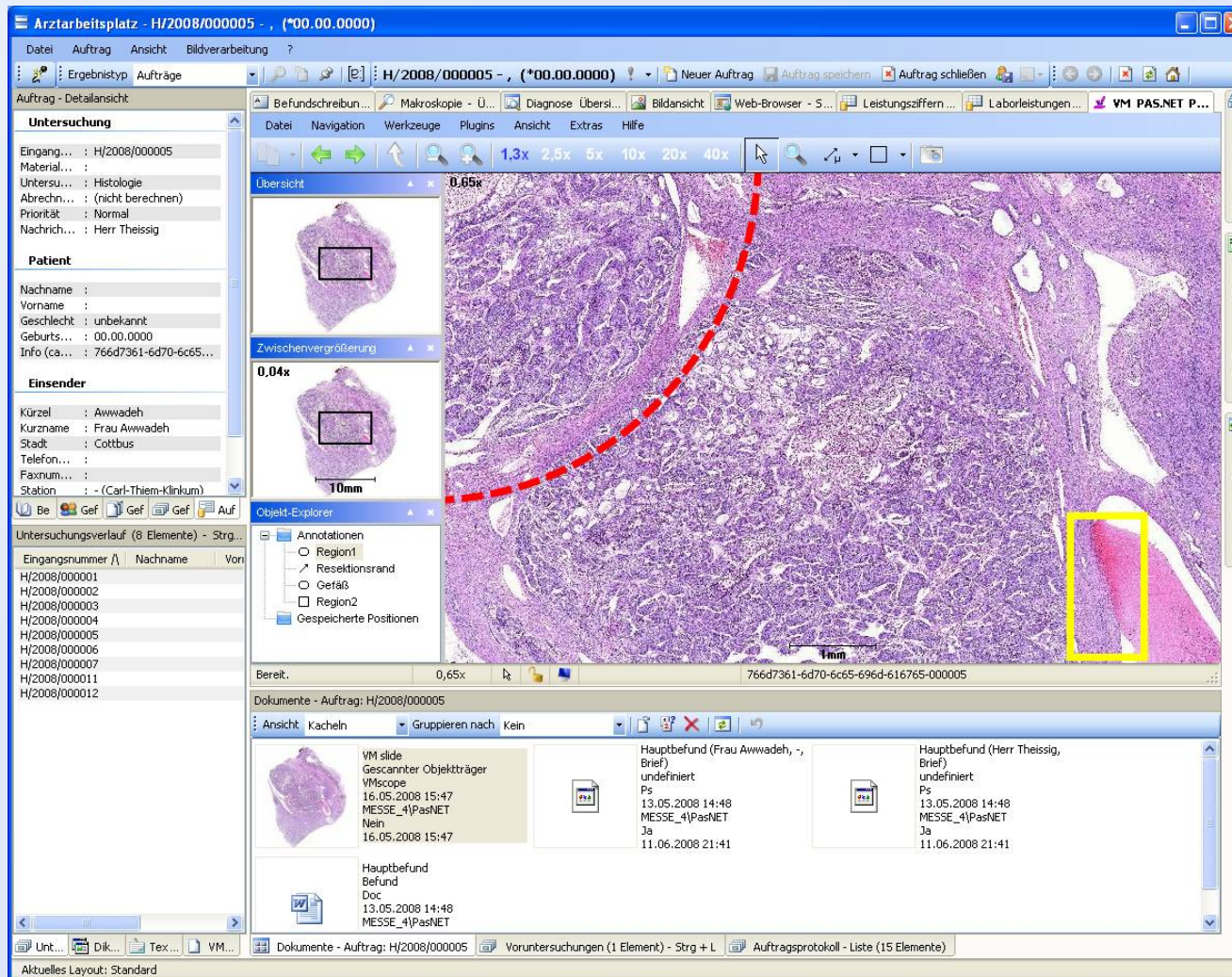
- Additional process step: Digitalisation
- Huge hardware investments
- Training of personnel
- Diagnosis on the monitor is unfamiliar and legally indistinct



Already technically realised

- Unsupervised, automatic mass scanning
- Automatic slide registration through barcodes
- Visualisation of slides on the monitor
- Annotating virtual slides and creating snapshots





“VM Slide Explorer 2010” by VMscope GmbH



Remaining barriers for digital clinical pathology

Hardware automation

- Integrated autostainers with interface to LIMS/Pathology system
- Durability of glass slide barcodes during the laboratory processes
- Autostainers/coverslippers with hardware interface to slide scanners

Software integration

- LIMS integration
- PACS integration

Software automation and user support

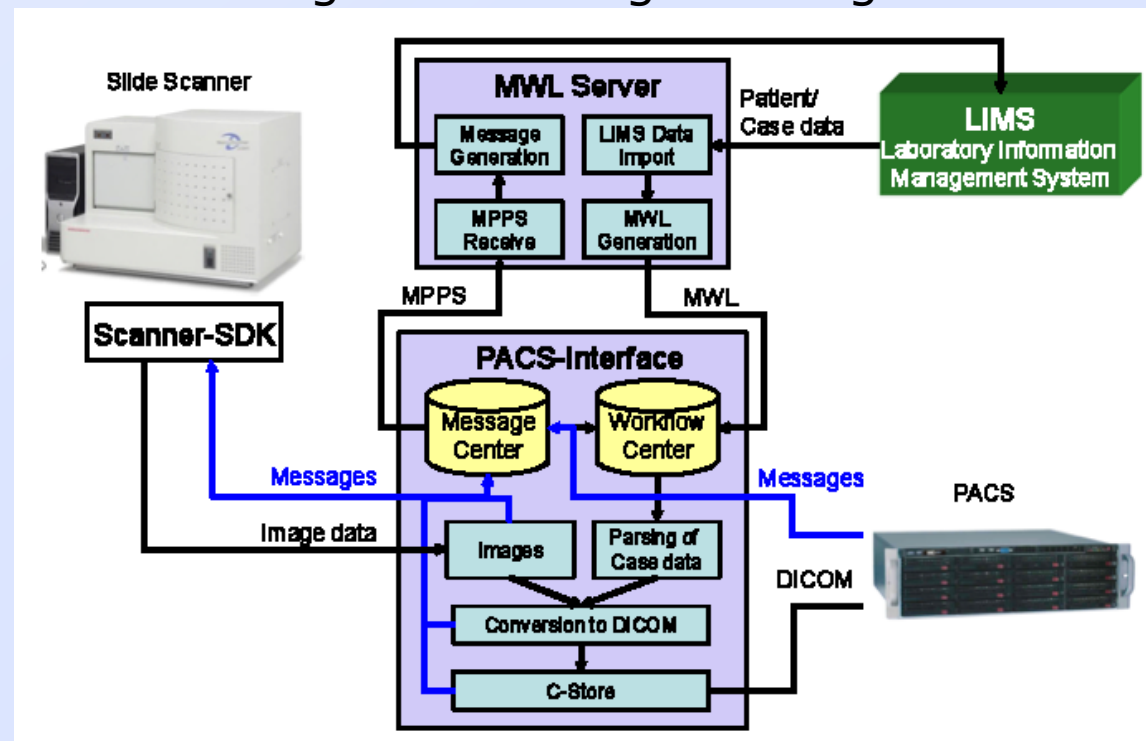
- Workflow integration
- Specialised Applications (Tumour marker quantification)

A target LIMS/WSI solution would need:

- Digital laboratory order communication
- Slide scanner communication (preference of cito cases)
- System supervised auto-stainers and other laboratory machines
- Direct automated transfer of images to the storage in a DICOM-PACS
- Diagnosis on the virtual slide within the system
- Interfaces to the Virtual Microscope for:
 - Clinical reporting
 - Image analysis and
 - Tele-consultation systems

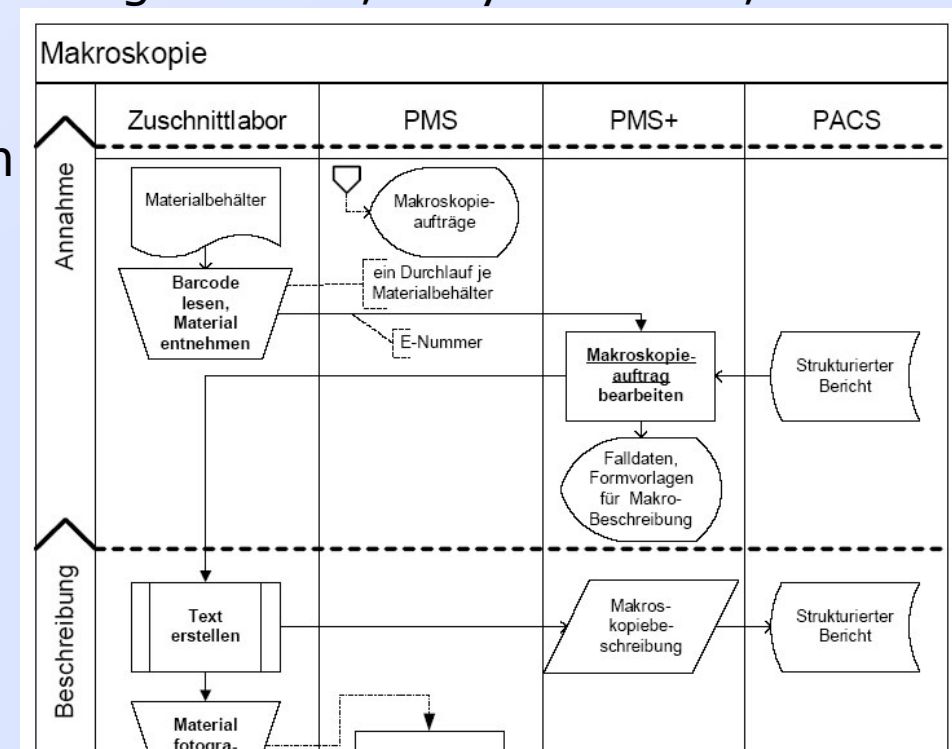
DICOM WG26/Supp.145 compatible interface to the clinic PACS with:

- Archiving of virtual slides of different slide scanners as WSI IOD
- Sharing of clinical short-term and long-term storage strategies
- WSI image streaming from the PACS
- Secured intra-clinic image communication
- Anonymous internet/tele-consultation image provision



With a LIMS/PACS integration the workflow can be integrated and automated:

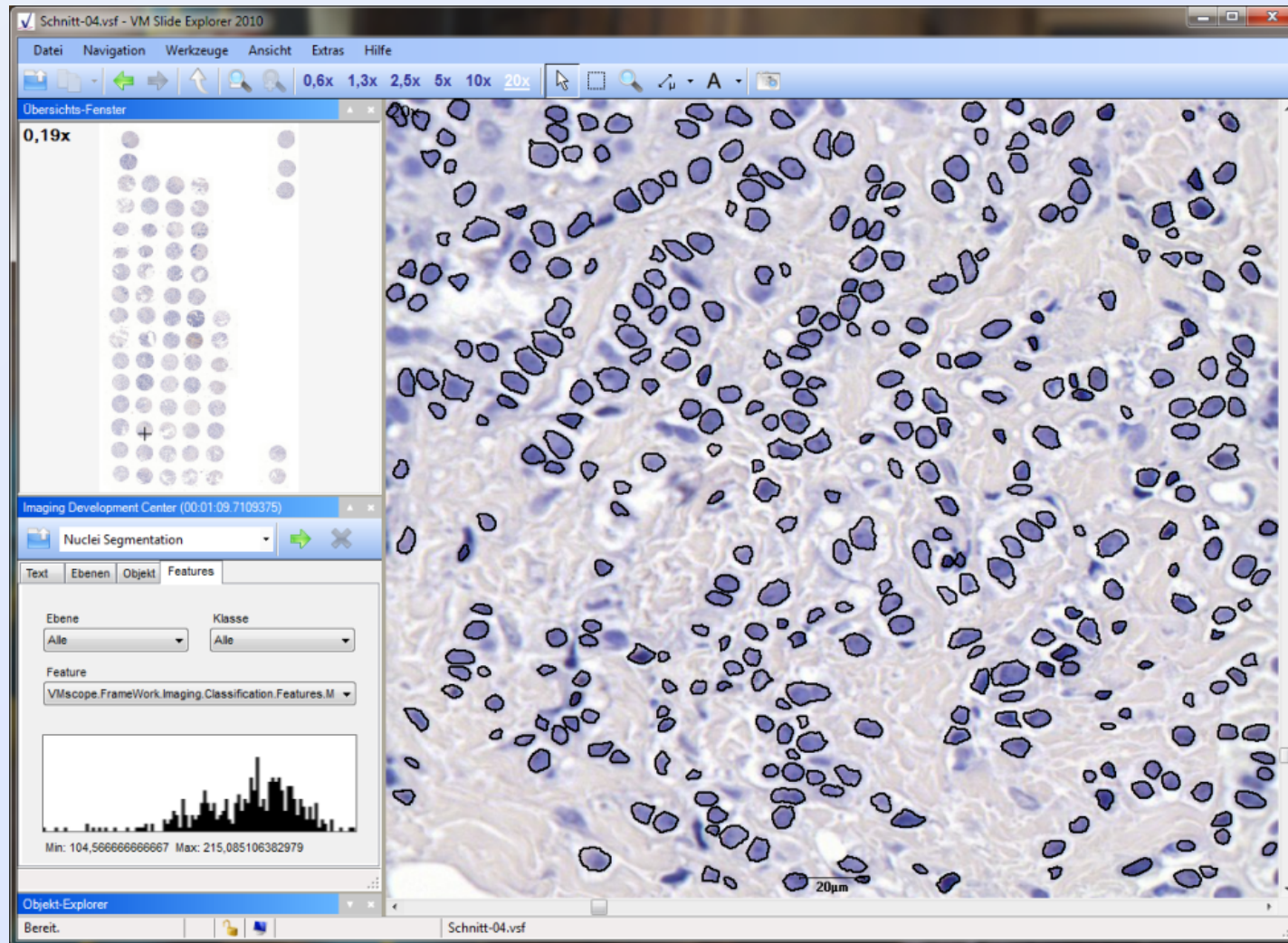
- Clinical pathways for decision for stainings, amount of slides, etc.
- Assignment to pathologists depending on case, duty schedule, and even personal workload.
- Organization of tele-consultation or remote case review by the LIMS





The user benefit increases with more specialised Applications:

- Tumour marker quantification
- Nucleus detection and evaluation



Automatic Nucleus Detection by VMscope GmbH

Thank you for your attention.

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