




SYGEHUS LILLEBÆLT
PATIENTEN FØRST


De bästa tipsen för digital patologi

– perspectives on digital microscopy from Vejle Hospital

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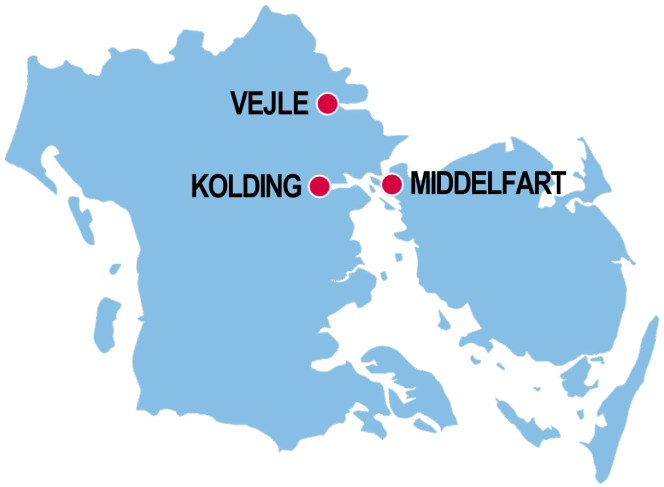
Lillebaelt Hospital



Vejle Hospital

Approx. 58.000 hospitalized patients per year
558 beds
2,7 days in hospital/patient
127 hospitalizations daily
59.800 surgeries

561.900 outpatients per year (plus x-ray)
2.200 patients daily

Approx. 5.500 employees - 4993 FTE
917 MDs
1990 nurses
294 biomedical laboratory scientists (BMS)
39 professors
Approx. 30 PhD students

Vejle Hospital: specialized cancer hospital

Background and choice of solutions

Scope and strategic considerations:

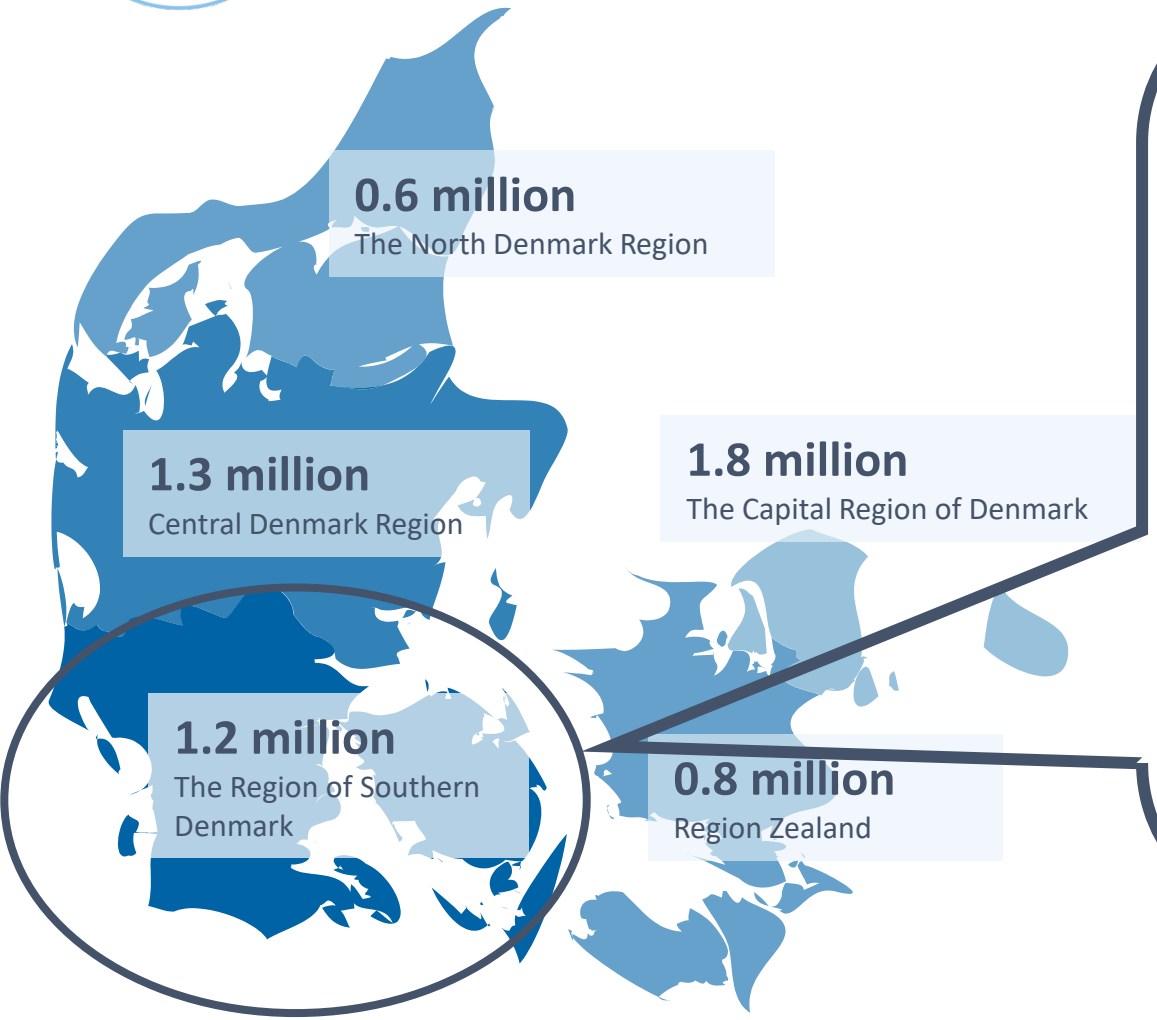
- four individual departments in the region (13 in all DK)
- shortage pathologists and qualified BMS
- 1.2 mio inhabitants
- 34% increase of cancer incidents over the next 20 years[1]
  → more samples
- more demanding expectations concerning turnaround time
- continuous workflow adaptations
  - Syddansk forbedringsmodel: leadership, lean management, quality improvements, Choosing Wisely etc.
- task shifting

Digital Pathology (DIPA) → Digital Microscopy of Histology (and cytology in the near future)

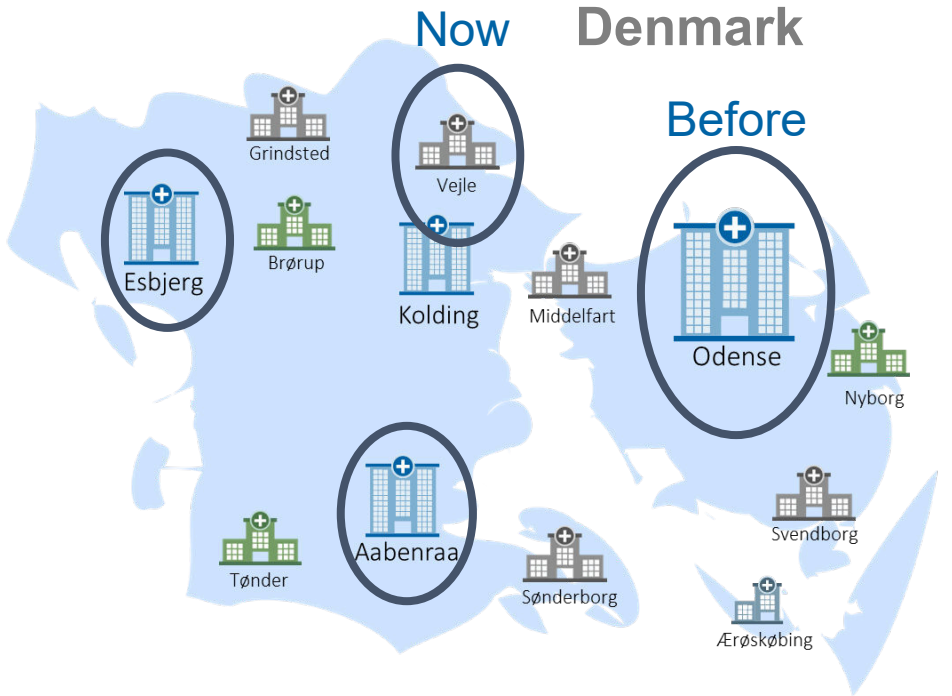
Overall increase in digitization and automation of healthcare in the years to come

1. Danish Health Authority

Demography



Pathology departments in the Region of Southern Denmark



In addition, psychiatric hospitals at 25 different locations in the region

Region of Southern Denmark

Lillebaelt Hospital

Timeline DIPA project

2017:	Initial discussions
2018-19:	Specifications and procurement procedures on software and hardware (Regional Governance approval)
2019 SW:	Sectra → preliminary analysis of workflows, configuration, education (teach the teacher) etc.
2020 HW:	Visiopharm (Hamamatsu scanners) → delayed (pandemic and global supply shortage)
Nov 2020:	Sectra Go Live – full implementation Oct 2021 in all four departments
2021-2022:	Initial projects and evaluation (QA, storage, AI etc.)
2023…:	Implementation of digital microscopy in the other four regions of Denmark

FTE 2023

Data 2023	Odense	Vejle	Aabenraa	Esbjerg	Total
No of employees (FTE)					
Pathologists	38	20	8	6	72
Biomedical Laboratory Scientists	90	38	15	13	156
Secretaries	10	3	3	3	19
Total	138	61	26	22	247

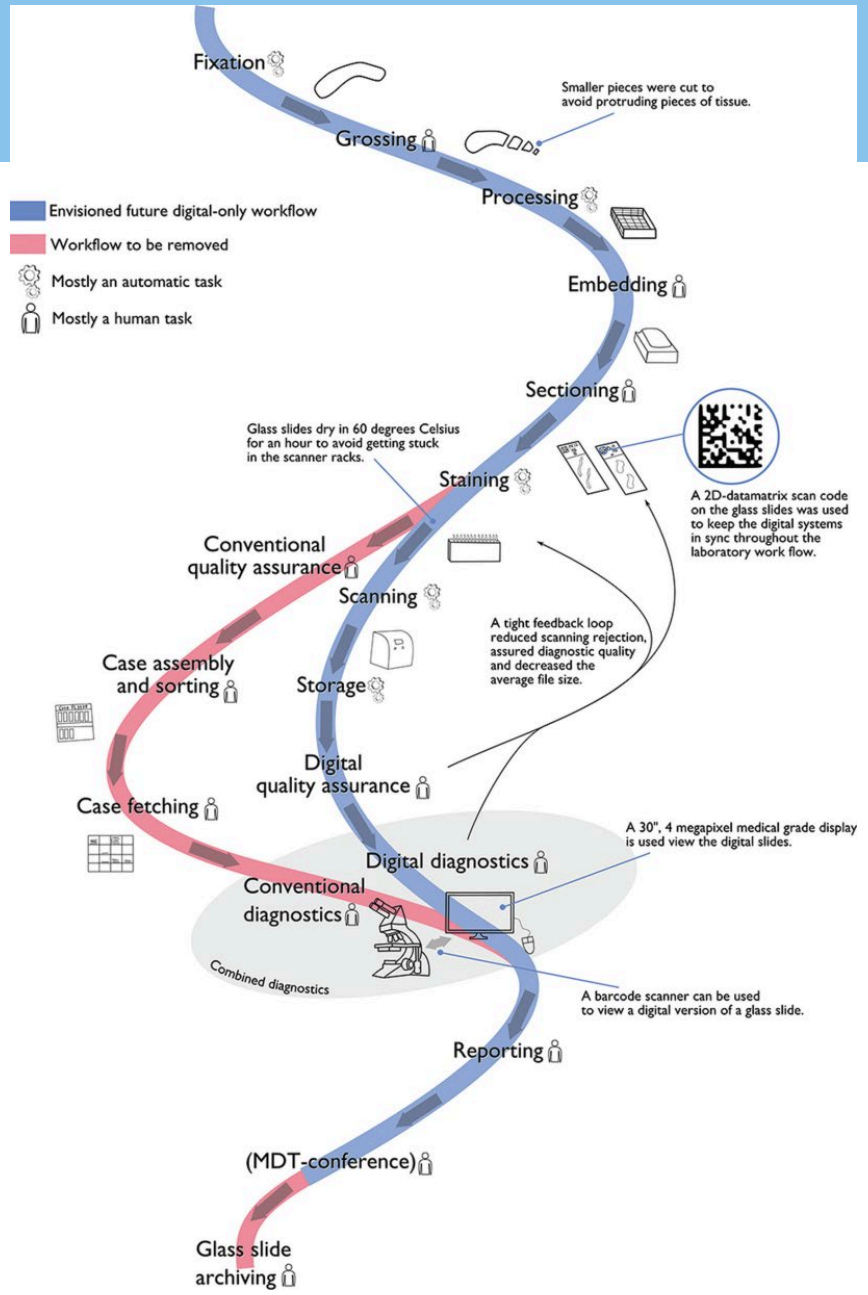
Production - scanning

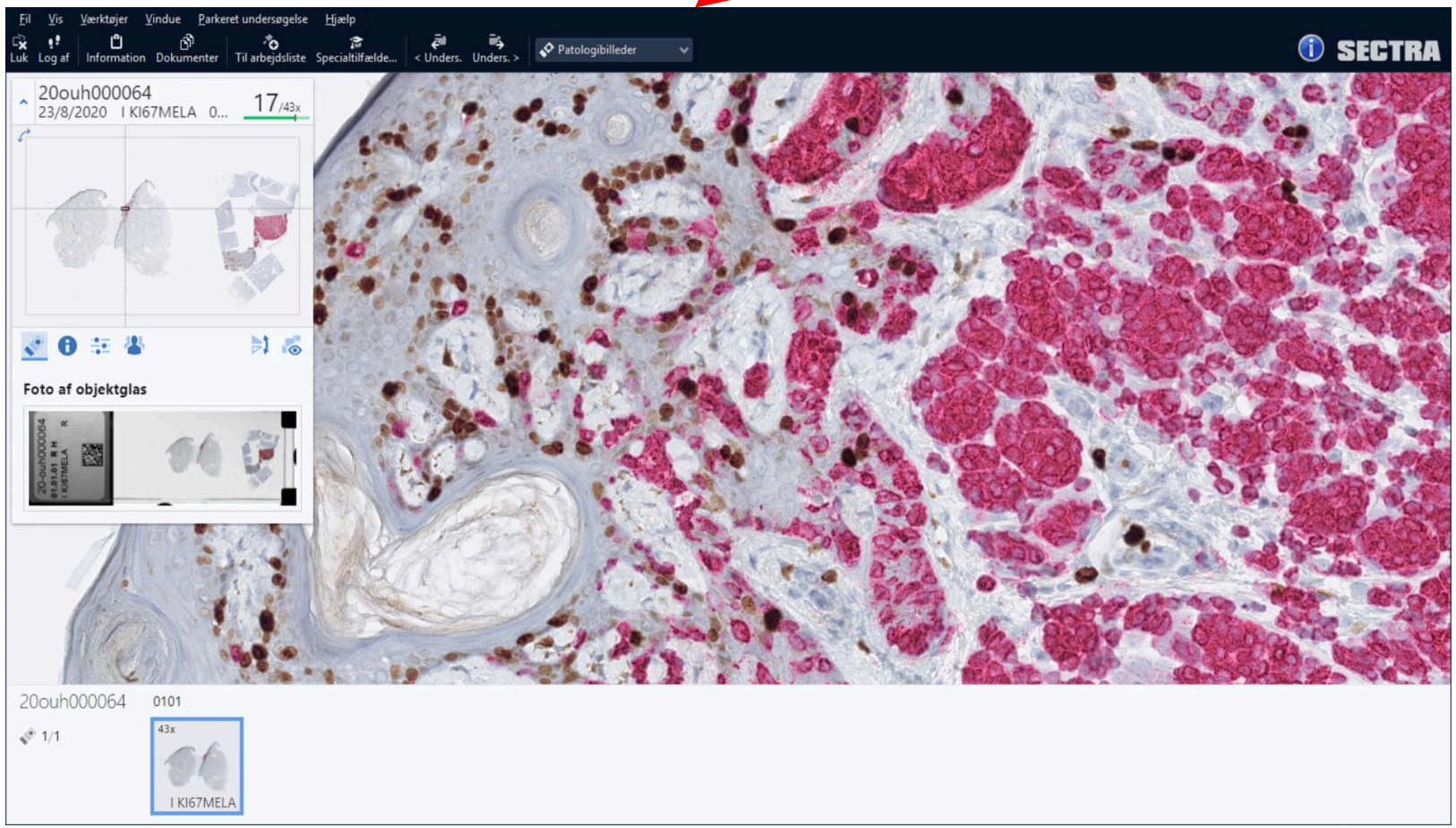
Slides per year (H&E, special and IHC)	~800.000
Odense/day	~1.600
Vejle/day	~700
Aabenraa+Esbjerg/day	~800
Total/day	**3.100**

0,5-2,5 min/slide
0,5-2 GB/slide

RSYD ~ 2-4 TB /day

The proces – how hard could it be?



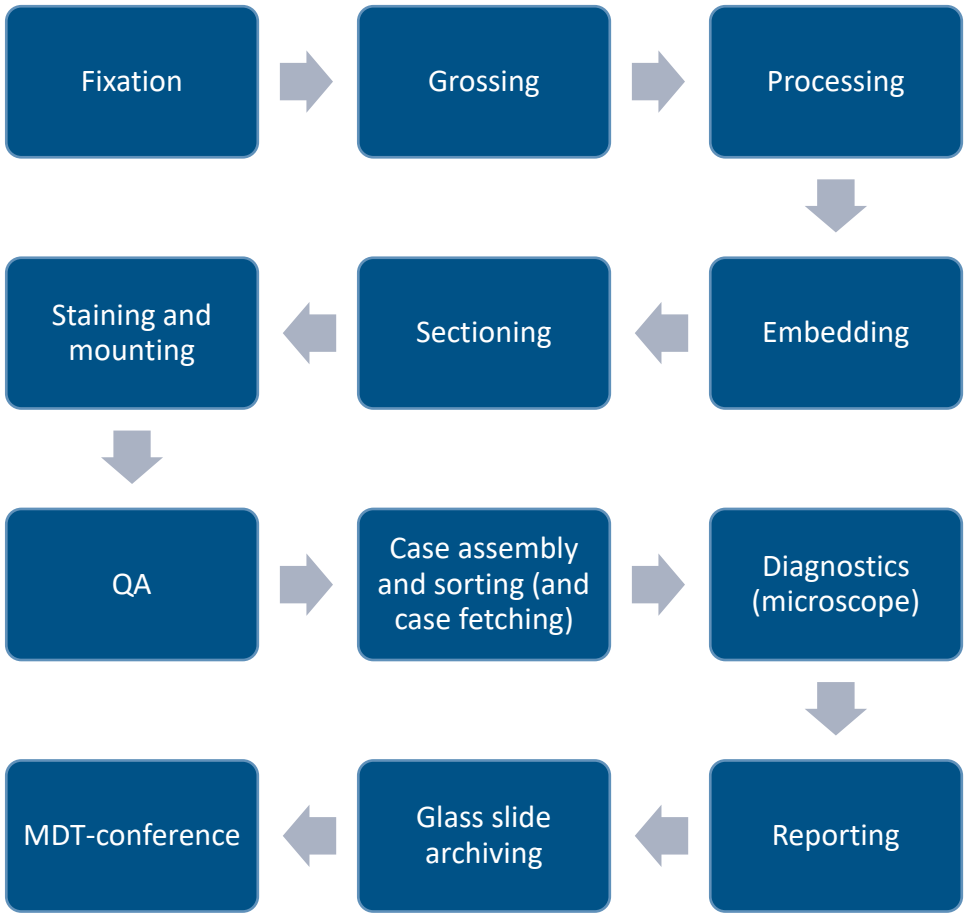


Region of Southern Denmark

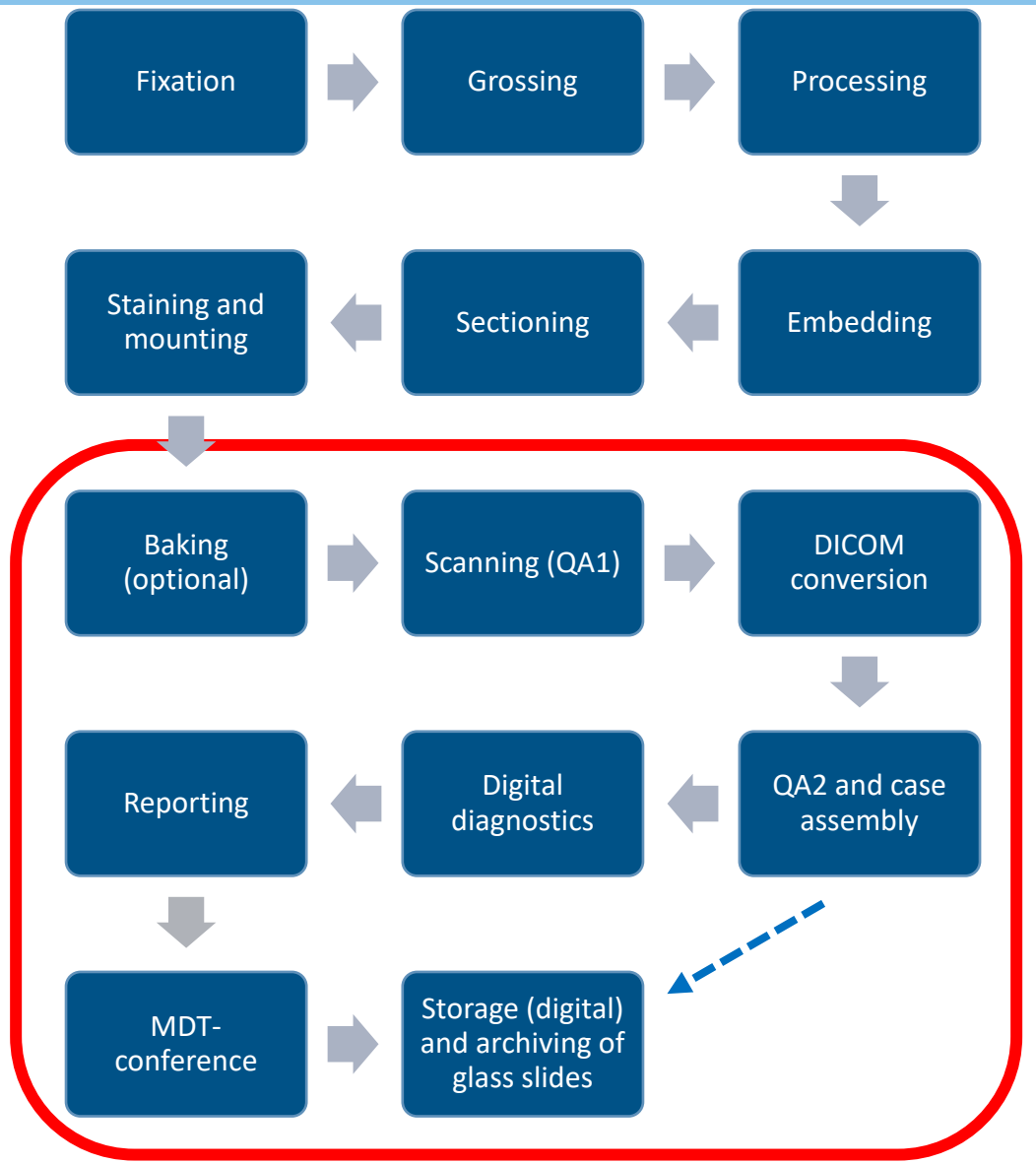
Thorstenson, J Pathol Inform 2014.

Conventional vs digital workflow

Conventional



Digital



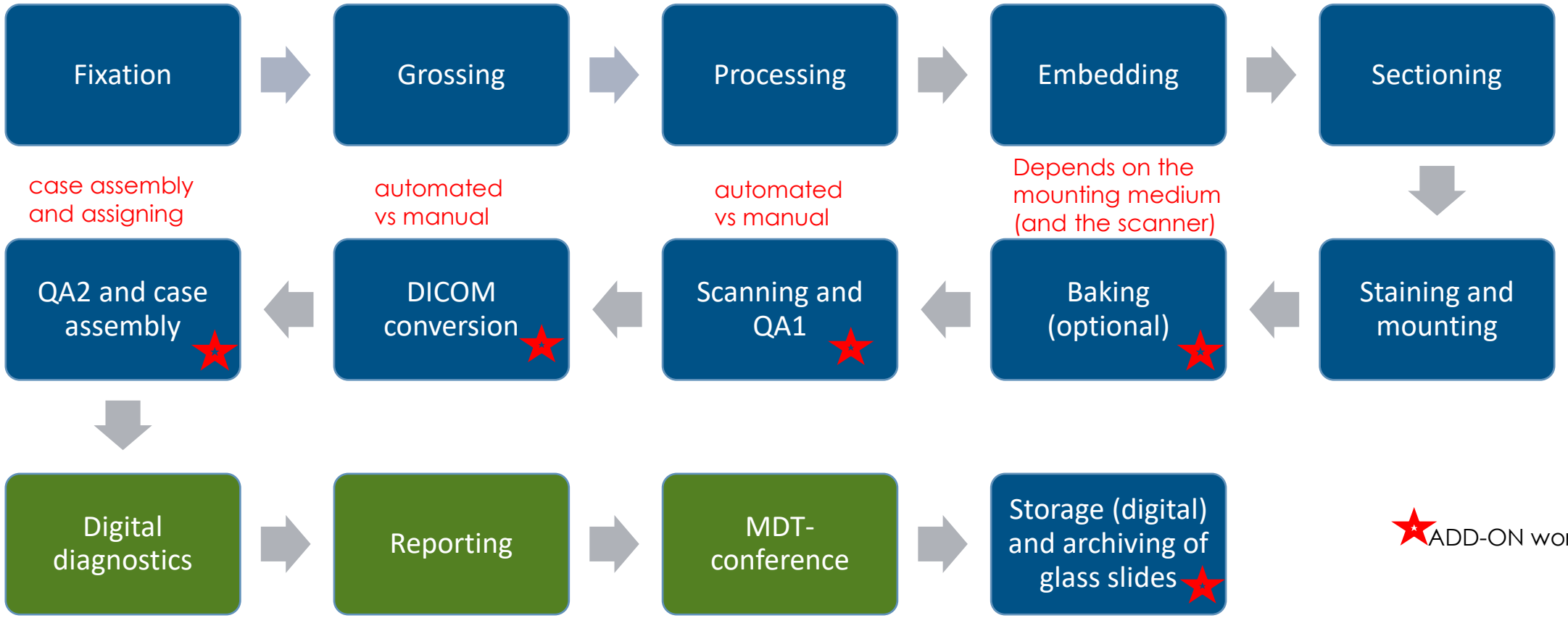
Considerations – lab flow (non-exhaustive list)

Pre-lab considerations and optimization

Lab optimization: no. of cassettes, tissue size, reducing no. etc.

High-throughput vs. fast-track considerations:
- New tech
- Recommend workflow analysis with the vendors
- Accreditation and standardization

scanning area, no. steps in sectioning, placement, Automated vs. manual etc.

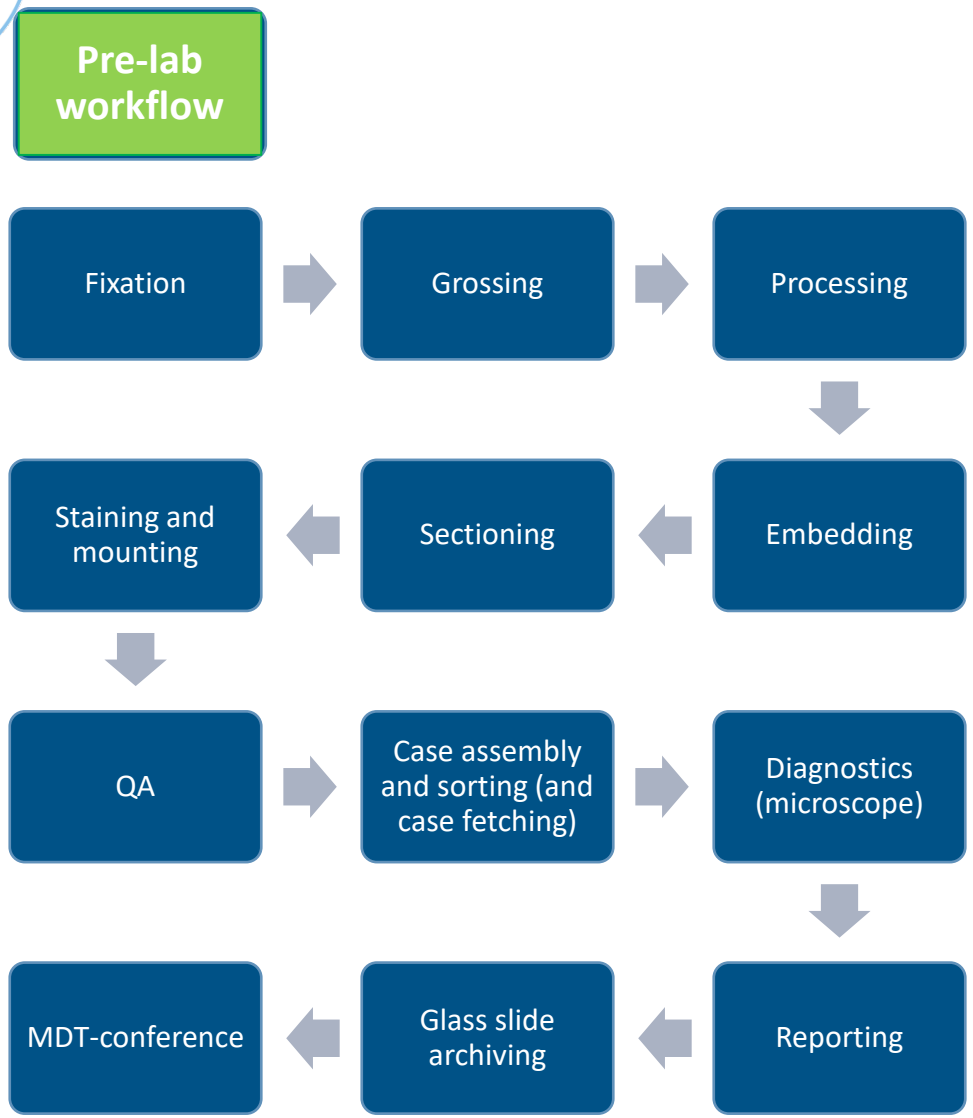


Digital: reduction + deletion of unnecessary WSI
Physical: cassation of more than 90% of the histology slides (storage options: short vs long term), FFPE-blocks archived

Region of Southern Denmark

Lillebaelt Hospital

Recap: if you're not digital yet



- Standardize procedures (accreditation)
- Train/ensure quality focus
- Broaden your scope – include the clinicians (choose wisely)
- Workflow analysis – including the diagnostic part!
- Invest in new tech
- Train scanning
- Organizational considerations (leadership, roles, responsibility etc.)
- Get help from colleagues, vendors, other dipa departments etc.
- And so on…

Concerns

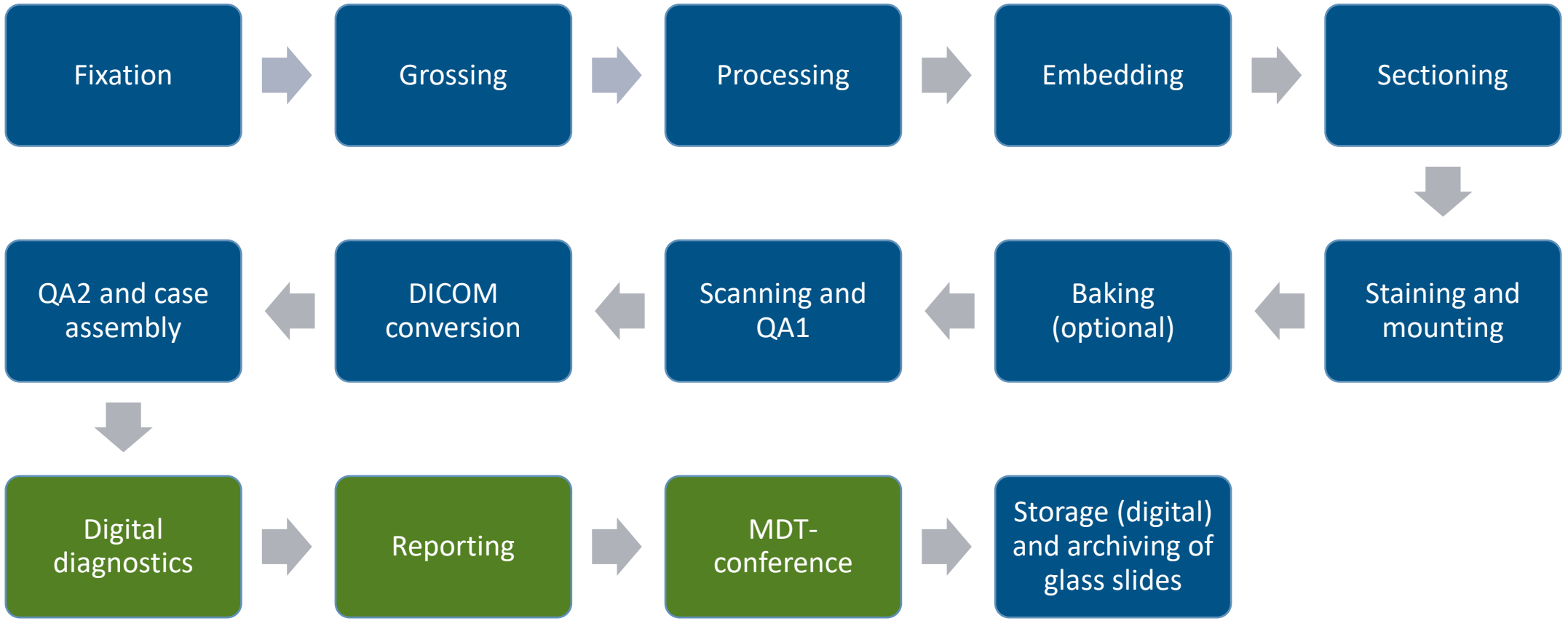
Pathologists

- Time
  - Lab add-on time → turnaround time
  - Load time at workstation
  - Digital microscopy
- Quality
  - Poor sectioning not as visible
- Habits LIS vs PACS
- Field of vision vs screen
- Ergonomics
- Referral cases between departments
- Nice-to or need-to
- More automation to come

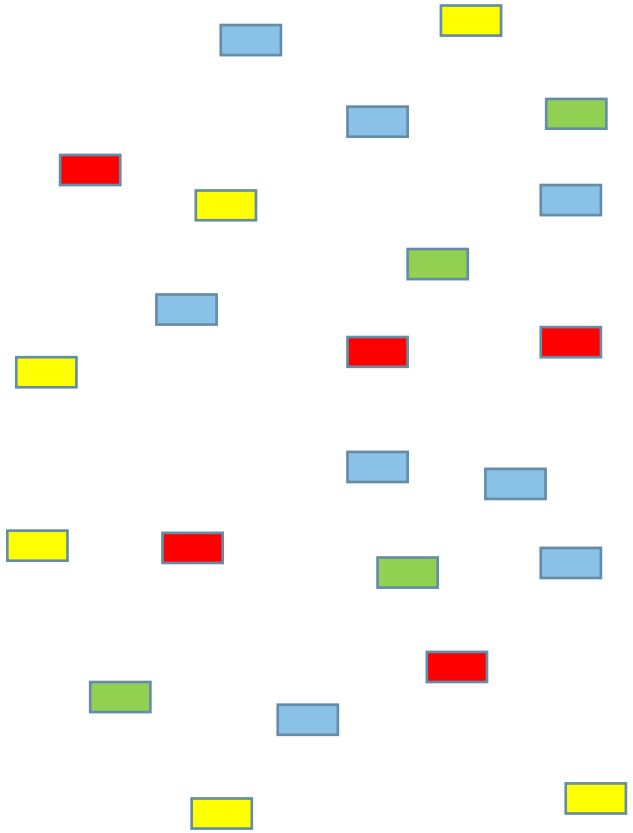
BMS

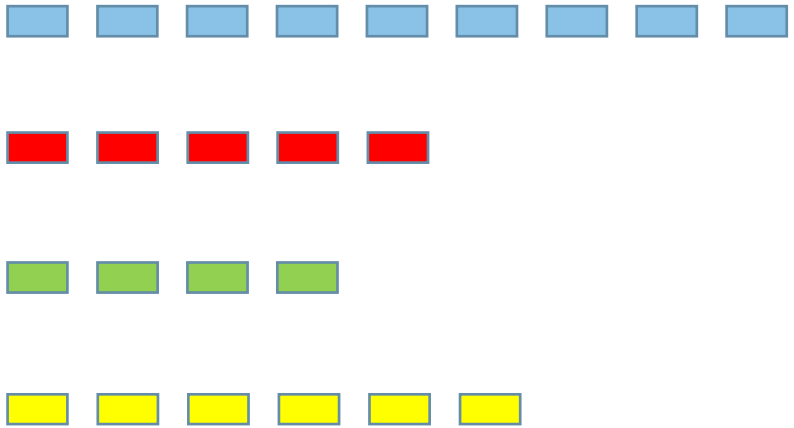
- Time
  - Lab add-on time → turnaround time
  - Skills
  - Simultaneous analogue and digital workflow
- Quality
  - Sectra case-centric
  - Poor sectioning not as visible
- Work plan (extended workday)
- Resources
- Skills
- Habits
- Ergonomics
- Nice-to or need-to
- More automation to come

Considerations – AI (for now)



Case-assembly





AI - pre-diagnostics

- Priority
- Physicians available (worklist assignment)
- Workload distribution (maybe between dep in the region)
- Normalization – staining and other
- Automated reordering
- Screening
- Automated reporting of negative cases
- Etc.

Obstacle:
Data accessibility
(esp. for cloud based solutions)

AI – digital diagnostics

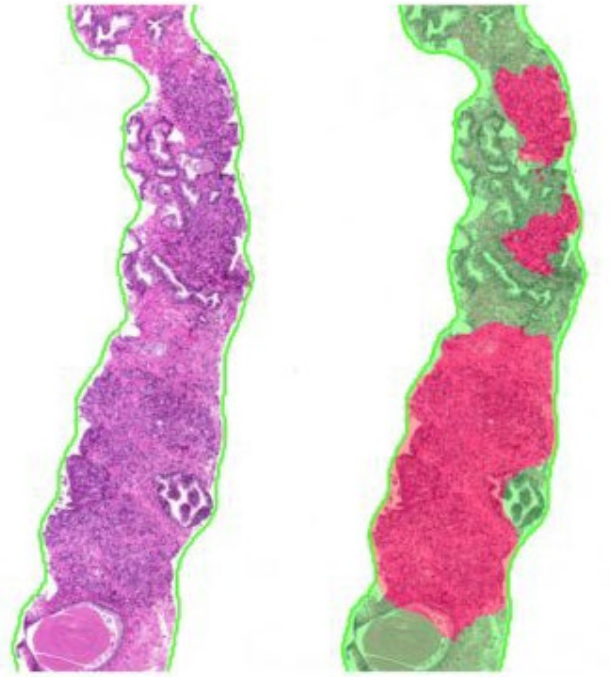
Multiple solutions available and many more in the pipeline

Assisting tools:

- Categorization
- Interpretation (e.g. IHC)
- Diagnosis

Research and development

Public-private innovation/cooperation



Next step: digital cytology

Task shifting

BMS perspectives

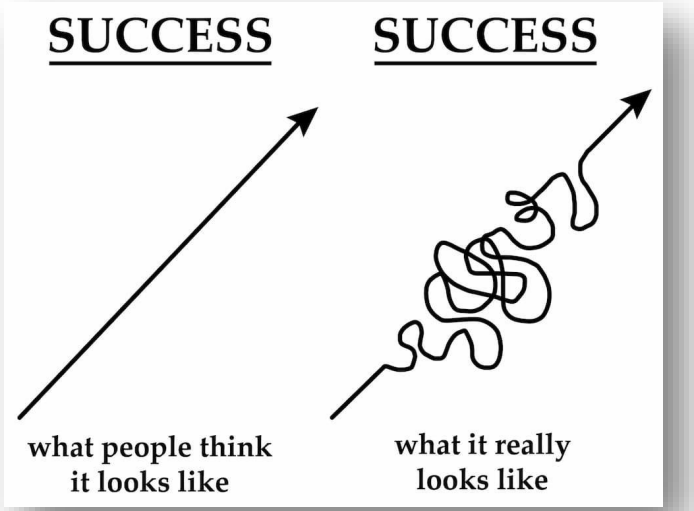
- Diagnostic BMS':
  - Trained (cyto-)BMS analyzing selected types of cases
  - Portio biopsies and colon polyps, ductus def. etc.
  - The pathology dep. in Hjørring DK was the first
  - Formal education at University College Copenhagen: "Histologisk mikroskopi og fortolkning" 10 ECTS.

- IT skills:
  - Testing of new releases/updates
  - Administrators maintain optimum system performance every day
  - AI

- Readiness for change – invest in the future!

- Innovation skills and mindset

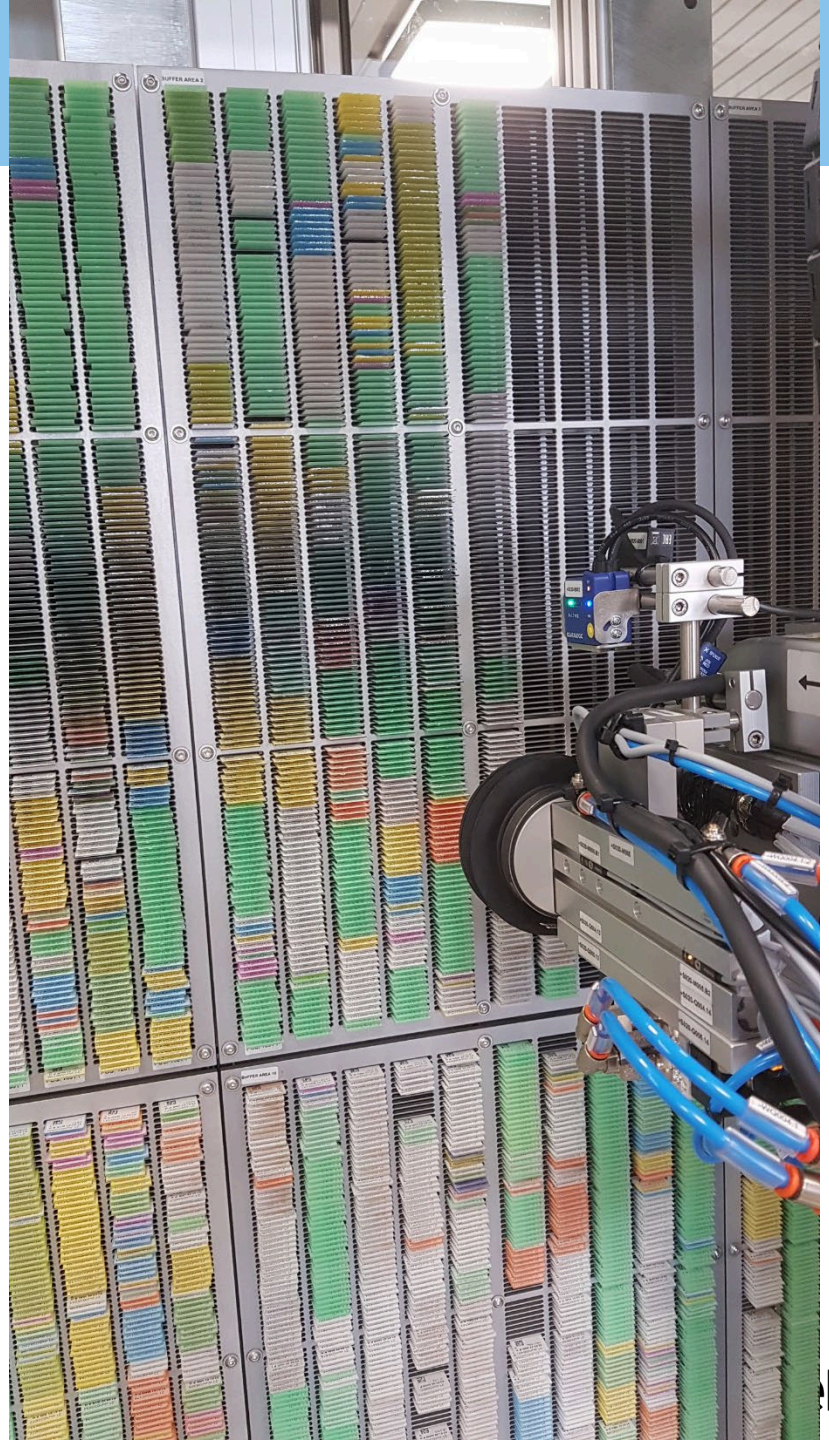
- Etc.



Glass slide archival robot

Robot for glass slide storage, short term.

Capacity 24.000 units (approx. 3 weeks production in Odense)



Storage of slides after scanning.

Rack-compatibility.

Glass slide → 2D barcode scanned and timestamp assigned → slide is loaded onto the storage-shelfs.

Automatic disposal after 21 days.

Example of an OPI process with KILDE A/S in DK.

In the process of acquiring 4 new half-sized robots to the dep. In the Region.

Questions?

Thank you for your attention