

A Whole-slide Imaging Based Workflow Reduces the Reading Time of Pathologists

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Research

Keywords: Digital pathology, whole slide imaging, workflow efficiency, business case, time savings

Posted Date: May 18th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-520449/v1>

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Abstract

Aims: Even though entirely digitized microscopic tissue sections (whole slide images) are increasingly being used in histopathology diagnostics, little data is still available on the effect of this technique on pathologists' reading time. This study aimed to compare the time required to perform microscopic assessment by pathologists between a conventional workflow (using an optical microscope and glass slides) and digitized whole slide images (WSI).

Methods: The study was performed in the Laboratory for Pathology Eastern Netherlands (LabPON, Hengelo, The Netherlands), which has been using WSI in primary diagnostics for several years. Cases were either read in a conventional workflow, while the pathologist recorded the time required for diagnostics and reporting or were read using a fully digitized workflow. The digitized workflow was fully integrated with the laboratory information system, and reading times were extracted from the log files of the image management system.

Results: Analysis of over 3800 cases showed a time gain in favour of the digital workflow for most case categories, with the highest gain (68% time gain) for prostate biopsies (prostate care program). On average, a gain of 12.3% was found for the digital workflow, taking the case distribution into account.

Conclusions: It was concluded that transitioning from conventional microscopy to use of WSI significantly reduces the pathologists' reading times. A fully integrated pathologist working environment is required to fully benefit from the benefits of a digital workflow.

Full-text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Figures

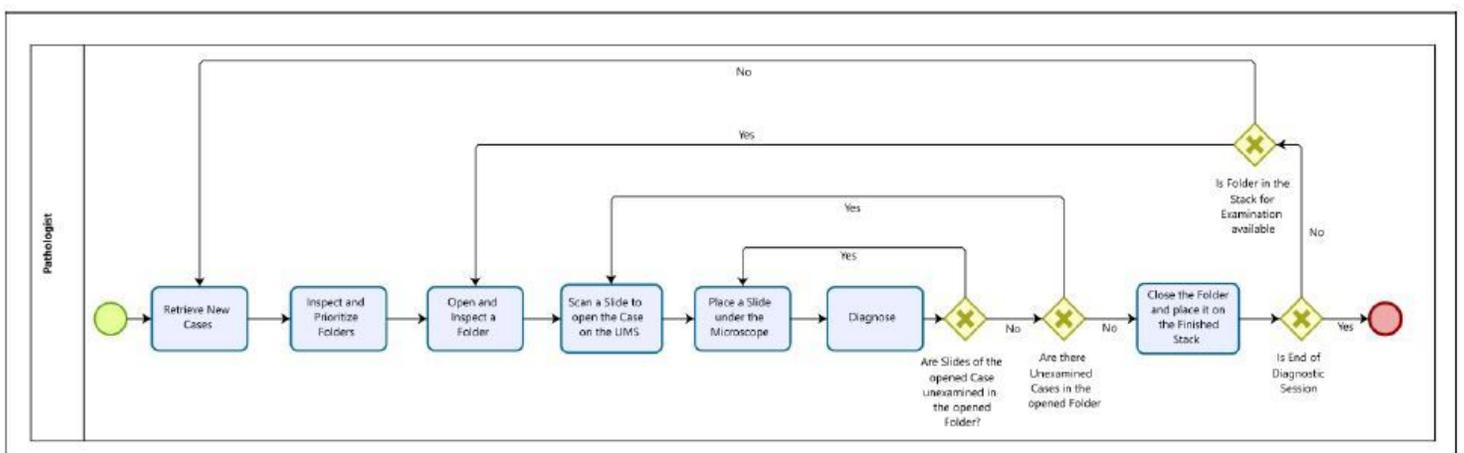


Figure 1

Overview of the diagnostic workflow using a conventional light microscope by the pathologist. The red box indicates the part of the workflow that was analyzed in this study.

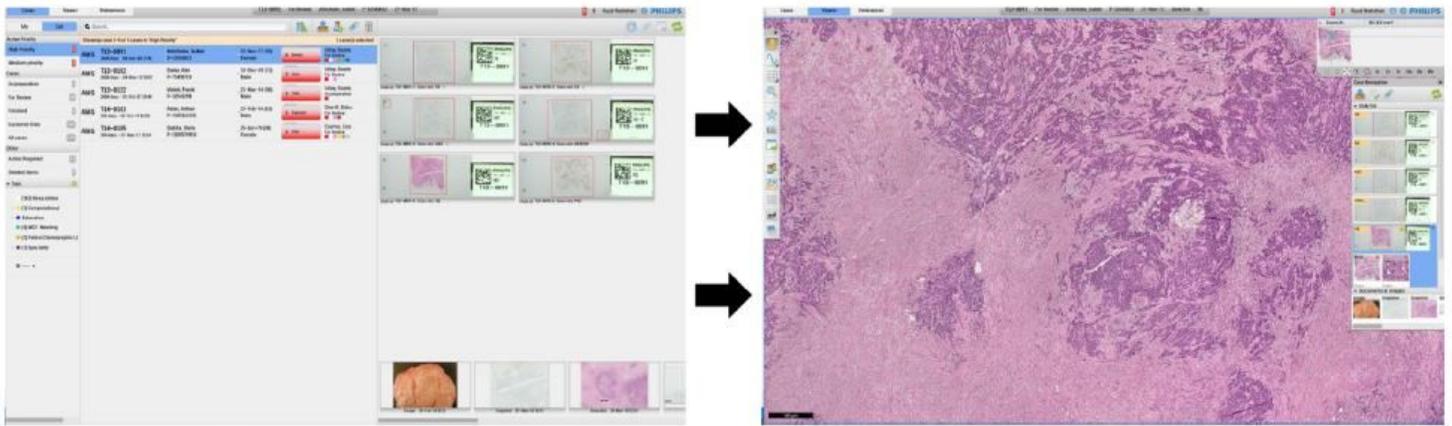


Figure 2

Example of the user interface of the workflow system used in this study. Left panel shows an overview of the cases assigned to a specific pathologist. Right panel shows the viewing window, allowing inspection of a scanned tissue section.

Digital vs Analog Case Diagnose time per case type

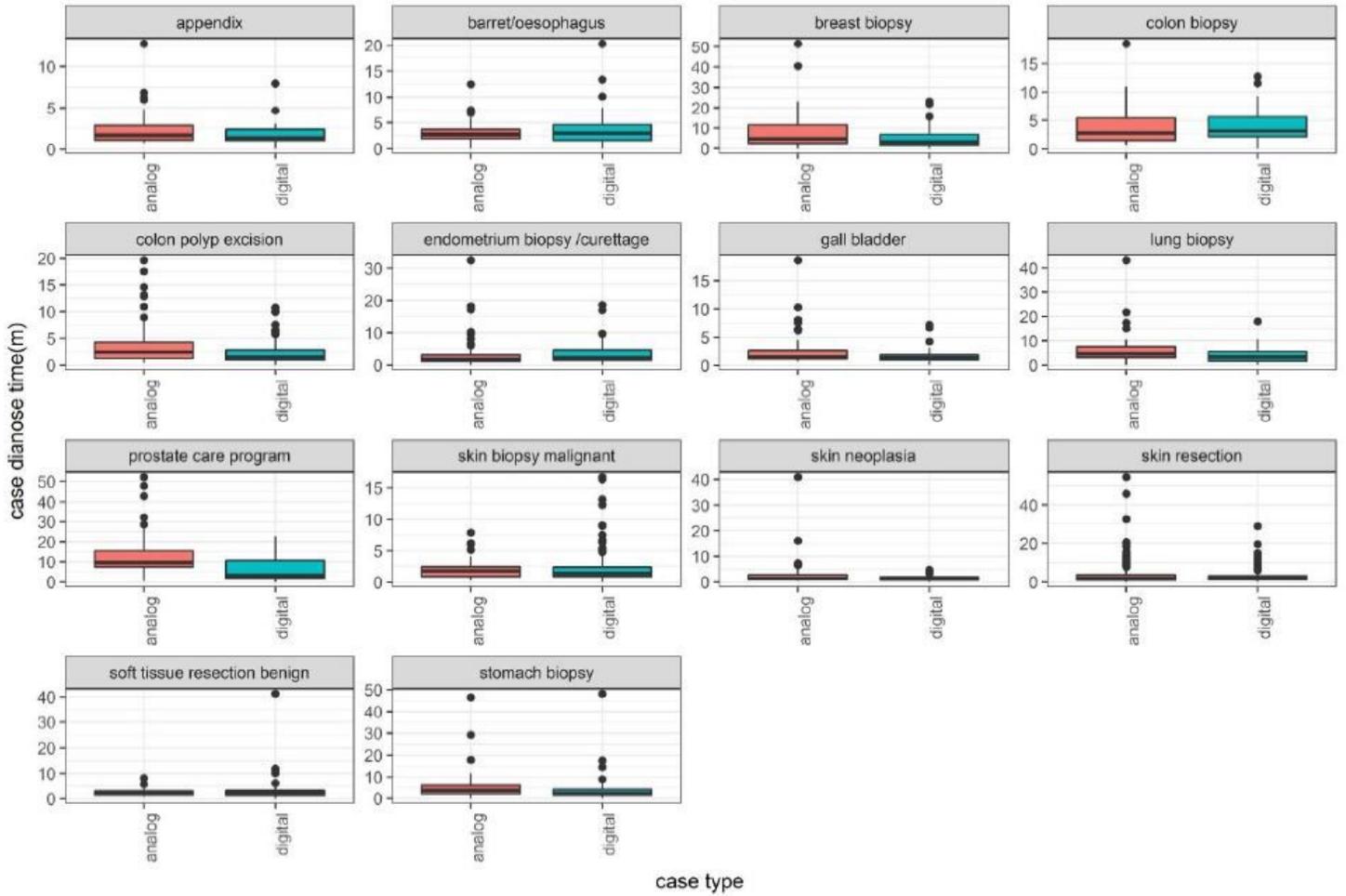


Figure 3

Boxplots of the distribution of time needed for diagnoses, per case category for the conventional (left) and digital (right) workflow. Data from the digital workflow are corrected for gaps, as indicated in the text.

Gap distribution density plot(zoom in 1h)

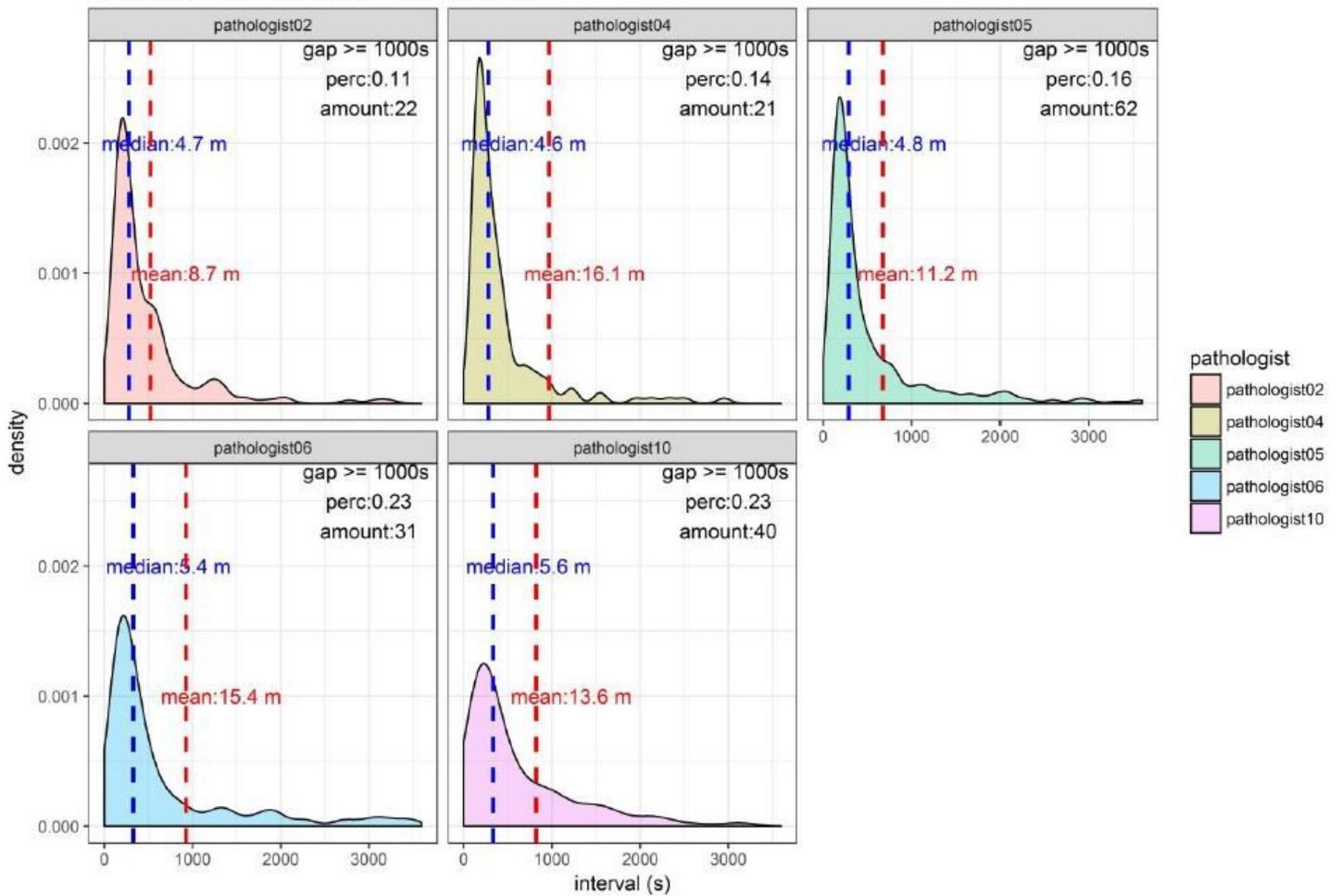


Figure 4

The distribution of gaps in the log files, for each pathologist individually.