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Digital Pathology

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Yves Sucaet · Wim Waelput

Digital Pathology

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To Lilly and Lucas

Preface

Dr. Sucaet holds a Ph.D. in Bioinformatics from Iowa State University. His research background is in systems and network biology. He is a co-founder of Pathomation and currently fulfills the role of Chief Technology Officer. Before that, he was at HistoGeneX in the function of Section Head, Data Management and Bioinformatics, where he met Dr. Waelput. They decided to combine their expertise and have been promoting the use of digital pathology ever since.

Dr. Waelput is an M.D. and certified pathologist, currently employed as a senior staff member at the University Hospital of Brussels (UZ-Brussels). He is also a consulting (pharma-)pathologist at HistoGeneX and a co-founder of Pathomation. Dr. Waelput has been involved in research on protein–protein interactions and signal transduction within the Department of Medical Protein Research at the Flemish Institute for Biotechnology (VIB—Vlaams Instituut voor Biotechnologie). He obtained his Ph.D. from the University of Ghent.

Pathomation is a young innovative company founded in 2012. The company was created by two pathologists and a bioinformatician. Located in Berchem, Belgium, the company strives to offer the most comprehensive software platform for digital pathology possible. The focus is on integration, scalability, and user-friendliness. Pathomation implements digital pathology in a variety of use cases and scenarios. Truly vendor-independent digital pathology solutions are hard to come by. Platforms that claim to be vendor-independent are difficult to adapt to specific circumstances. Interoperability, which is taken for granted in wet lab conditions (e.g., a sample is sectioned on a Leica microtome, stained on a Dako autostainer, and studied under an Olympus microscope), is often lacking when moving to digital pathology. Therefore, Pathomation develops software for pathologists, designed by pathologists. Its PathoCore software can read most proprietary vendor formats, so the company is not tied to any technology and can offer objective guidance. PathoCore is central to a complete software platform. In addition, other applications are available, including viewers and host application plug-ins. Because of this component-based architecture, Pathomation is ideally placed to take digital pathology information (including augmented datasets like on-slide annotations and captured form-data) and deliver it to any target environment or device.

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Chapter 1
Digital Pathology's Past to Present

Abstract Digital pathology is a rapidly growing field that did not even exist 20 years ago. However, in some ways, its origins date back to the earliest attempts at telepathology back in the 1960s. This chapter provides a brief historical perspective on how digital pathology came to be. It answers questions like why does it exist and what need does it fulfill? It also provides a brief summary of current applications and the challenges ahead; explains why we believe digital pathology is rapidly coming of age; and describes the converging factors that lead us to this conclusion.

Keywords Digital pathology · Digital pathology history · Telepathology · Informatics · Whole slide imaging · Pathology cockpit · Pathology dashboard · WSI · DP

1.1 Introduction

One of the world's most renowned and successful inventors, the late Charles Franklin Kettering (1876–1958), also was a very gifted man of words. Among his most famous lines are: "Our imagination is the only limit to what we can hope to have in the future" and "People are very open-minded about new things—as long as they're exactly like the old ones." These two statements encapsulate the struggles that exist with any novel idea, and certainly with any new field, whether that field is in engineering, science, art, or medicine.

Among the very newest of fields in medicine is the field of digital pathology which, as a distinct entity, only started to be mentioned in published, peer-reviewed scientific journals in the year 2000 [1–3], though its roots reach at least into the 1990s [4] and perhaps even further. Initially, relatively little was written about digital pathology; but this has changed dramatically, especially over the

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