Transforming workflow in the pathology domain

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A novel project, known as the Pathology Operating System, is being tested and implemented in Sweden for the digitalization of pathology services.

Pathology—the study of the causes and effects of disease—has a long history as part of medicine, being one of the earliest scientific methods used by the ancient Greeks. By the 18th century, the field had evolved and microscopic pathology methods were used to observe disease at the cellular level. At present, diagnostic analyses are made with the use of conventional light microscopy, and in the past decade, technical developments have made it possible to digitize glass slides. Indeed, scanners that can automatically scan glass slides and create digital image files have recently been produced. The use of fully digital processes, however, puts pressure on organizations from many perspectives (e.g., staffing and quality of service). Furthermore, it is uncertain whether the digitalization of pathology can be successfully achieved with just a change of technical platform, or whether a new paradigm for informatics and workflow is also required.

A Health Technology Assessment was conducted in 2012 to evaluate whether scanned digital images are of sufficient quality for diagnostic purposes compared with conventional light microscopy techniques. In this report it was found that there was good diagnostic agreement between intra-observer and inter-observer results when digital image slides were used. Further validation (e.g., in terms of clinical patient outcomes) of these findings, however, was required.

On the basis of earlier findings and observations, the Region Västra Götaland (VGR) in Sweden financed and implemented the Pathology Operating System (PATHOS) project, which is run within three public pathology departments (and one private department): see Figure 1. A total of 480,000 histopathology slides per year can be digitized and shared through the PATHOS network. The objectives of our project are not just to implement new technologies but also to change the workflow of the pathology departments and to support the sharing of information within an agreed model. PATHOS can thus serve as the basis for the digital pathology process, and can be summarized as having three focus areas (see Figure 2: service, value, and trust. Our findings indicate that the use of well-defined standards, codes, and Integrated Healthcare Enterprise (IHE) profiles4 are required to achieve interoperability at the technical, semantic, and organizational levels. The overall aim of our work is therefore to increase the value for both patients and the organizations/companies involved in pathology, by gradually implementing new services that are required to improve the diagnostic process. We make these improvements without the need for troublesome new procurements, and we can thus continue to build trust between all stakeholders.

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The procurement process we have developed as part of PATHOS is based on that of a public private partnership (PPP), which is a novel approach for obtaining government contracts in Sweden. Our focus was to define a managed service for pathology that includes innovation as well as a digital process, and that lasts for a substantial period (i.e., at least 10 years, plus up to another 10 years). In our case, there were five consortia that qualified for the dialog part of the PPP. We then combined these five consortia with companies that provide products and services important for the digitalization of pathology. More than 130 individual companies thus became involved in the procurement process. Our whole process, which involved more than 100 dialog meetings during the procurement phase, took more than a year to complete.

With the ultimate outcome of our PPP, the region’s government continues to have overall medical responsibility, as well as responsibility for staffing and for the physical spaces needed to provide a pathology service to the area. With PATHOS, the PPP is led by the consortium leader, but the consortium can change their members over time to meet the needs of both the pathology domain and the managed service. In our business model we use key performance indicators—determined during the PPP process—to act as a measure of the creative value and the economic transactions between the provider and users of the managed service. We can thus determine the value of the pathology service in economic terms at any time. This provides the pathology domain with a stronger impetus to change their responsibilities (if necessary) and indicates how the consortium can be more effective and deliver higher-quality products in the digital process. Moreover, the consortium can work within a larger infrastructure that provides opportunities to benefit from the reuse of hardware wherever possible (i.e., an example of circular economy in healthcare).

Another focus of our work has been the change management that was agreed upon for the transformation to a fully digital pathology process in VGR. To achieve the full potential of value creation, in terms of cost savings and improvements in efficiency and capacity, we have found that it is important to make sure the staff involved have a complete understanding of the paradigm shift that occurs when the whole workflow becomes digital. These new approaches must also be implemented in a trustworthy manner. Of course, this takes time, but it must be considered as a success factor when the managed service is deployed. The value–trust–service relationship (see Figure 1) involves the three main focus areas that were discussed from different perspectives during the PPP.

In summary, we have started the implementation of PATHOS in the Region Västra Götaland of Sweden. The aim of this project is to serve as a successful and efficient basis for the transformation to a fully digital process in the pathology domain of healthcare services. In our work we have found that the scale and scope of emerging phenomena (e.g., connectivity, platforms, algorithmic data, and big data) for the transformation of pathology is greater than from other technologies in the past. This leads to many new opportunities, but also to several challenges. Our solution, of creating a partnership between industry and the pathology domain, can therefore lower the risk of failure during digitalization. In our future work we will research how the process of digitalization in the pathology domain can be applied to other parts of the healthcare system.

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