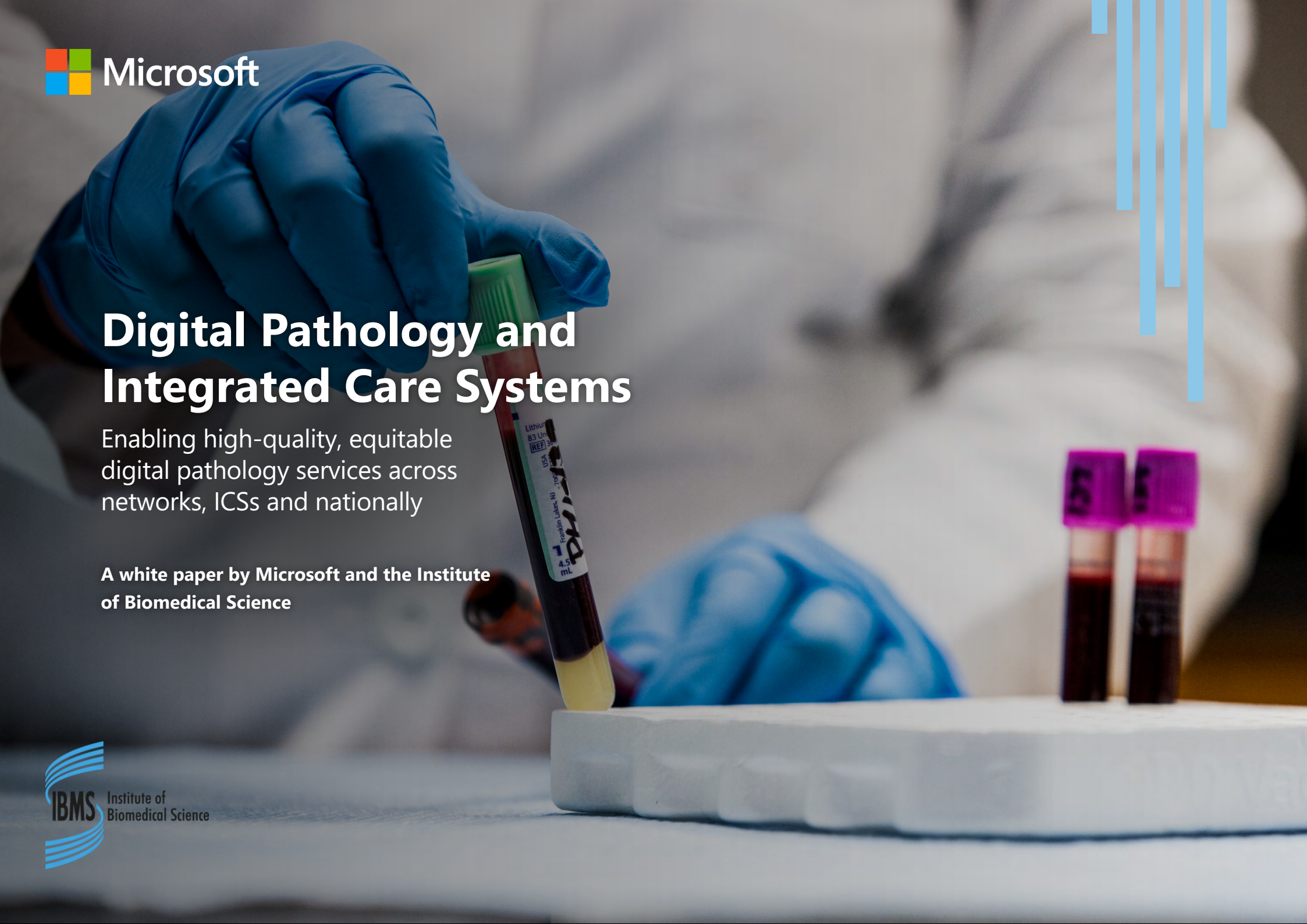

Microsoft

Digital Pathology and Integrated Care Systems

Enabling high-quality, equitable digital pathology services across networks, ICSs and nationally

A white paper by Microsoft and the Institute of Biomedical Science

IBMS Institute of Biomedical Science

A note on workforce terminology

The essential services of a pathology laboratory are delivered by professionals with various titles and roles, particularly pathologists and biomedical scientists. In this paper, we refer interchangeably to these titles and roles or refer to them as the ‘diagnostic workforce’.

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01

Why digital pathology?

The promise of digital pathology is one of precision and productivity

Digital pathology uses digital imaging, image analysis and data management technology to provide quantitative data and visual information about tissue and cell samples. It is a revolutionary advance in the field of pathology that provides a more efficient, accurate and cost-effective way to diagnose, treat and monitor diseases.

Digital pathology is currently transforming the way tissue samples are diagnosed, allowing for a more comprehensive analysis which leads to more precise and targeted treatments.

A digitised slide can also be accessed by a network of pathologists across the country, so complex results can be shared for second opinions instantaneously.

This is a huge advantage over the current process of mailing slides across the country to be reviewed under a microscope by colleagues.

"I want to be able to see my patients' results from anywhere. I want to be able to look at those results, and ideally report from where I need, with all the ancillary information I require to be able to make a diagnosis."

Professor Jo Martin, Professor of Pathology at Queen Mary University of London

When the diagnostic workforce embeds digital pathology into its systems, the collaboration it enables will support continued professional development, progress equity of service delivery and improve the quality of diagnostic output – increasing precision. Subspecialists will be able to collaborate across the country, enabling the right individual to review the right specimen, regardless of the location of the patient, doctor or medical student, across the nation.

Digital pathology will make it easier for the diagnostic workforce to share workloads, operate as a network and gain efficiencies from remote working – enhancing productivity.

It's estimated that digital pathology results in a 15% improvement in workforce-related efficiencies[1,2].

The many benefits of digital pathology are further outlined in The **Leeds Guide to Digital Pathology**, a publication by the National Pathology Imaging Collaborative (NPIC), which pioneers efforts in this area.

1 Ho et al. Can digital pathology result in cost savings? A financial projection for digital pathology implementation at a large integrated health care organization. J Path Inform, 2014. Available at: Can digital pathology result in cost savings? A financial projection for digital pathology implementation at a large integrated health care organization - PubMed (nih.gov)

2 Retamero et al. Complete Digital Pathology for Routine Histopathology Diagnosis in a Multicenter Hospital Network. Arch Pathol Lab Med, 2020. Available at: Complete Digital Pathology for Routine Histopathology Diagnosis in a Multicenter Hospital Network - PubMed (nih.gov)

02

Trends impacting digital pathology

1. Networked pathology services.

Across the UK, pathology organisations have been restructuring into regional pathology networks. These networks enable regions to use their staff and resources more effectively, by sharing and balancing workloads and enabling the sustainability and growth of specialist pathology services. Digital pathology creates an opportunity for these networks to standardise workflows and collaborate with greater ease.

2. Precision medicine and the rise of biomarkers.

Precision medicine (therapies which are designed to benefit specific cohorts of patients – often based on their molecular or genomic profile) is on the rise, and the biomarkers (biological molecules which signal how the body responds to a given treatment) associated with these therapies are growing exponentially.

At the cutting-edge of pathology, there is a need to identify and characterise growing numbers of biomarkers to help improve the delivery of therapies for patients. Digital pathology tools, including artificial intelligence will enable pathologists across the UK to identify new biomarkers and understand their links to precision medicine.

3. Artificial Intelligence (AI).

For all the reasons that radiology has embraced artificial intelligence, pathology is likely to show a mirror benefit. Machine learning (ML) algorithms are particularly proficient when it comes to quantification problems and are best deployed in standardised workflows where the rules of analysis are consistent. Digital pathology benefits from both of these: scanned images are (generally) consistent; the interpretation needed is well-defined; and a number of pathology questions are based on quantification (e.g. counting a number of types of cells).

AI shows significant promise in supporting pathologists to become more productive by taking a "first pass" at a digital slide – enabling pathologists to focus on reviewing and refining the interpretation rather than starting from scratch.

03

Challenges facing digital pathology

1. Staff availability, capability and interest.

Workforce tops the list of any challenge facing the NHS. The number of trainees coming into the diagnostic workforce (and the number of available trainers) are currently insufficient to meet demand. Supporting the existing and future workforce with learning and development is one of the biggest priorities to enable the profession to progress and change.

The transformation to digital pathology requires staff time, a severely limited resource. The diagnostic workforce currently investing in this change are doing so on the premise that their return on investment will be significant – enabling gains in productivity and the work/life balance enhancements offered by remote working.

Staff knowledgeable in both digital technology and pathology/ biomedical sciences are extremely rare. Career development and training will be needed to find individuals to engineer the transformation towards digital pathology.

"I agree with the importance of getting more data-savvy individuals into our workforce. However, we are currently operating with a significant vacancy factor and are struggling to recruit any new staff, leaving little leeway for building digital skills."

Ashley Ballard,
Senior Biomedical Scientist

2. Funding for digitisation.

Business cases are a challenge given the fiscal climate. Where funding is available, it is frequently focused on capital, enabling the purchasing of equipment but limited by the requirement for revenue funding for licence costs, storage, and the types of innovation outlined below. Business cases to enable revenue funding from stretched budgets represent a significant hurdle in moving to a digital workflow, despite the productivity gains that can be expected. **NPIC has produced guidance on building business cases** to help communicate the quality and financial benefits of digital pathology.

3. Digital and analogue interpretations have yet to be considered equivalent.

Is a pathologist "seeing" the same thing when they view a slide through a microscope and on a screen? Although the move to digital pathology is well under way, this question is still deliberated and depends on the quality of scanners, software and even the screens used to view slides. Implementations of digital pathology typically include a Clinical Validation component, whereby participating pathologists perform a review before shifting their workloads into a digital environment.

4. Maintaining a ‘single source of truth’.

If data is transferred (a copy created), there is a risk of multiple copies of an image being stored in several databases. For this reason, there is an increasing focus on “streaming” – accessing the image at its source – rather than copying and sharing images.

This requires the relevant organisations to come together and agree shared standards for information governance to enable effective data-sharing. Technology providers have both the capability and expertise to support these agreements but there are already a plethora of agreements in place in different regions.

Radiology reporting has set standards such as Digital Imaging and Communications in Medicine (DICOM) for reporting. However, many pathology laboratories use different templates for pathology information-reporting.

Standards specific to pathology are being created and reviewed by national and international bodies.

NHS England has published pathology test and results standards, and WSI (whole slide imaging) is being incorporated into DICOM.

Importantly, **IHE has published technical frameworks to enable cross-border sharing of pathology**.

The Royal College of Pathologists provides templates for pathology reporting which are being widely adopted.

“From a data and governance perspective, we can implement the information sharing agreement as required by the ICS – the policy is their responsibility. There are some guidelines which we implement in Azure or even in a data centre, but there’s an opportunity to create some national standards in this space – right now, each trust does a separate DPIA (Data Protection Impact Assessment).”

Lee Webb, Clinisys

"We're currently finalising the configuration of our digital pathology system in Dorset. As part of this, we have had to work with our LIMS (Laboratory Information Management System) and digital pathology suppliers to match specimen type codes and procedure codes across all systems, so that when slides are scanned the bar code label allows PID and slide information to be correctly updated. When sharing cases across different laboratories with different systems, this could create issues – these codes need to be standardised."

Ashley Ballard, Senior Biomedical Scientist

5. Digitisation requires additional effort.

In radiology, films have been replaced by digital images (similar to the move from film cameras to digital cameras). However, digital pathology still requires the 'analogue' preparation of a slide – after which the additional step is required to scan the slide to create the digital image(s). Moreover, the slides must currently be stored in line with the Human Tissue Act 2004 (warehouses full of slides exist across the country) and this replicates the storage of cloud-based images.

6. Latency.

To annotate and interpret an image effectively, the pathologist must be able to quickly access, zoom and manipulate it. This cannot involve any 'lag' or download delays. For this, strong network connectivity and well-established cloud systems must be in place. Generally speaking, this issue can be navigated and there are trusts that have successfully moved pathology archives to the cloud with low-latency access.

04

Digital pathology: systems and processes

Here is a simple but typical digital workflow for histopathology or cytopathology:

- A pathology request is initiated for a patient, and a sample is sent to the laboratory.
- A new record is created for this patient in the LIMS (Laboratory Information Management System).
- The sample is received, processed and accessioned into a scanner, which converts it into a Whole Slide Image (WSI).
- The pathologist logs into image management system, where they can view and interpret the image alongside relevant information in the LIMS or EHR. This can be done in a remote location in a secure manner via virtual machines or in the cloud.
- Annotations are performed and any important outputs are reported in the LIMS or the PACS (Picture Archiving and Communications System). This image management system and the LIMS are tightly coupled and interact in a workflow which allows the pathologist to access both simultaneously and easily.
- Further iterations of analysis, validation and reporting may take place. For instance, by another pathologist, on the same sample.
- A final report is created containing all relevant information and linked back to the sample. This is connected to the patient's Electronic Health Record, where it can be accessed by other clinicians to support decision-making.

Several types of systems are referenced in such workflows: the scanner, the image management software and the LIMS system.

Scanners provide the hardware and software to convert the sample into a digital format. For slides, this results in a digital image. Images are stored in an archive for retrieval (which may be cloud-based) and these manufacturers also frequently provide bundled PACS capabilities (see below).

Image Management (IM) or Picture Archiving and Communications Systems (PACS) provide storage, retrieval and distribution capabilities for medical images from various locations. They usually include image-manipulation capabilities and are usually integrated into EHRs. Most use standardised formats like DICOM. PACS can also support diagnostic reporting.

A Vendor Neutral Archive (VNA) (such as that provided by Sectra) can store and archive images from different vendors into a single interoperable digital storehouse. These systems frequently support more than one 'ology' – in particular, crossing pathology and radiology – enabling further cross-specialty collaboration and improving care for patients whose diagnostic needs include scans and laboratory work (a frequent occurrence). They often include data-protection mechanisms (such as disaster recovery) and can be provided on-premise, cloud-based, or hybrid. Storage requirements for digital pathology imaging are significant: estimates from Leeds and Dorset suggest a fully digital lab workload requires anywhere from 100-800TB of storage per year.

Laboratory Information Management Systems (LIMS, sometimes LIS) (such as those provided by Clinisys and Magentus) are software systems which enable laboratories to manage their workflow. These systems support sample management, inventory management, barcode labels and printing, and most importantly diagnostic reporting via integration into multiple clinical systems, particularly Electronic Health Records (EHRs). Different workflows are often facilitated by different LIMS systems, even in a given trust. Most trusts and networks are working to converge around a single LIMS system to enable interoperability for reporting. Some EPR providers (such as Epic and Cerner) provide LIMS functionality which is integrated into their solution – although this may not cover all types of pathology laboratory workflow.

Specimen Tracking systems (such as those provided by Vantage) produce block/slide labels with 2D barcodes to track the specimen through the laboratory from the time of collection to the time of analysis, providing real-time visibility into the sample's status and location. These capabilities are sometimes also provided within a LIMS system.

AI solutions analyse virtual slides and provide clinical decision support – helping pathologists to prioritise their workload by highlighting slides of particular concern or improving the efficiency of clinicians to conduct their work faster and more accurately. AI algorithms can be provided in a marketplace as part of reporting solutions (for instance, Sectra has a marketplace) or separately integrated into the pathology workflow. The ability to deliver AI at scale is linked to the systems above. A PACS system which covers a large patient population enables simpler at-scale delivery of algorithms (and can also enable algorithm development for research purposes).

05

Roadmap towards regional digital pathology networks

Currently, many acute trusts have a plethora of IT systems and hardware from a number of different manufacturers. This creates challenges for physicians attempting to access information about a patient, particularly one who has had multiple diagnostics performed (e.g. radiology and pathology).

As seen above, the benefits of digital pathology come from the ability to easily collaborate and share workload. In the absence of interoperability between systems, this benefit ceases to exist. Pathologists cannot collaborate and request second opinions. Workloads cannot be easily shared. Clinicians cannot receive a single view of the patient across diagnostic services. Standards, such as those from IHE, are therefore critical to enabling interoperability.

A commitment to digital pathology and wider collaboration must be formed and adhered to. In this sense, a digital roadmap must be drawn up which enables interoperability, through convergence (aligning on single systems) and agreed standards.

"Part of the challenge we've got is we have so many different types of networks which have different geographical boundaries that don't align – cancer alliances, pathology networks, radiology networks, ICSs – so there's always going to be complexity and why end-to-end integration will always be important… We're now starting to have discussions across much larger areas – multiple ICSs – who want to be able to access one another's data."

Lee Webb, Clinisys

Single LIMS

A number of areas across the UK have begun to standardise onto a single LIMS for one or more types of pathology services.

In Scotland, Magentus have been appointed as the supplier for the national LIMS framework across all major pathology services. The ambition is to standardise workflows across the core disciplines (e.g. blood transfusion, cellular pathology, microbiology) as well as genetics. To do so, a national programme of work has begun – with workstreams to enable pathology laboratories across the region to come together and make joint decisions which enable networked delivery of services.

In other areas, there has been significant acceleration of regions announcing plans to consolidate around a single LIMS, with many already having successfully implemented:

- In Northern Ireland, Clinisys has been selected across all major pathology services;
- In England, a number of pathology networks and even ICSs have consolidated around a single LIMS: Clinisys in Black Country; Clinisys in Berkshire & Surrey Lab Services; Magentus in Lancashire & South Cumbria; Clinisys in Oxford's "South 4" Network; Clinisys across Dorset ICS; Clinisys in West Yorkshire & Harrowgate; Magentus across Birmingham and Solihull.

Since the underlying laboratory workflows are consistent, this type of model enables patients to receive equitable services which are consistent across the region. It enables networked service delivery, as samples can be shared and transported, and reports accessed, across the various systems.

Switching a laboratory from one LIMS to another is not easy, carries significant cost and risk, and can take over 18 months. It requires the pathology community to agree to work in collaboration and invest time and effort to share a vision for the future.

If the image archiving system is not also interconnected, a shared LIMS system is not the full journey. Until there is a centralised repository (or PACS system) with appropriate permissions, or seamless integration capability between PACS systems in the region, this prevents pathologists from jointly viewing and analysing the same image.

Centralised PACS and Vendor-Neutral Archive (VNA)

A centralised PACS is an advanced medical imaging system that enables healthcare professionals to securely store, retrieve, manipulate and share medical images and related patient data. It is a single, integrated system that is accessible from multiple locations, allowing for a unified view of medical images and data. The system also helps to reduce duplication of imaging exams, improve image quality and facilitate accurate diagnosis.

Where pathologists across a region can share access to imaging archive(s) across that system, powerful clinical benefits are unlocked including the ability for pathologists to collaborate on complex cases and learning and development opportunities. Many PACS systems also enable reporting, which means pathologists can jointly review and report on a case across the region.

A shared VNA can provide the 'single pane of glass' linking with the relevant LIMS systems of that local region. This also helps mitigate the risk of 'multiple sources of truth'.

"Sectra are enabling pathologists to work at their dining room tables – harmonising information from regional LIMS and connected EHRs directly into their reporting workspaces, thereby providing a single platform with which the users interact. The clinician doesn't have to jump from system to system – it's there, in context, brought together with common standards such as FHIR (Faster Health Interoperability Resources)".

Chris Scarisbrick, Sectra

Centralised systems with joined imaging archives can bring together images across multiple institutions to be accessed by the clinicians at all those sites. Those images are not sent to the accessing clinicians but streamed.

One of the earliest examples of a shared VNA for pathology imaging was demonstrated by the North East Cancer Alliance. A number of other trusts (including Homerton Healthcare) have since moved towards a fully managed cloud service for enterprise imaging based on Microsoft Azure. In Northern Ireland, a single PACS from Sectra combines pathology and radiology imaging.

An NHS site taking an international lead in digital pathology is Leeds Teaching Hospitals NHS Trust, which hosts the National Pathology Imaging Co-operative (NPIC). NPIC is one of the largest consortia in the NHS enabling digital pathology and AI.

Leeds was one of the first hospitals in the UK to be become fully digitalised in pathology and has continued to scale its ambition. The NPIC solution is underpinned by a number of partners including Sectra, Exponential-e, mTuitive, Leica and others.

Initially, NPIC will enable over 200 pathologists across the country, generating 10,000 whole-slide images daily and 2 to 3 petabytes of data per year. By deploying a centralised VNA, NPIC offer a scalable solution to other hospitals to join and store images, removing the need for duplicate servers at each site for storage and reducing the burden on local IT staff to maintain infrastructure.

"As part of our planning, we have designed NPIC to be agnostic to any vendor for scanning and software. We support the journey end-to-end, working with trusts on digitisation, their DICOM journey, helping with interoperability and connectivity, helping with research, including with public engagement."

– Dr Daljeet Bansal,
NPIC Operations Director

NPIC is also enabling national specialist networks for pathology – one for soft tissue and bone, and another for paediatric tumour pathology. This unlocks some of the benefits associated with specialist second opinions, and enables better collaboration and training across the country. With NPIC, a pre-eminent, specialised pathologist could be available, not just to their network, but to every patient in the country.

Bringing together a sub-regional or national system also enables reporting at a wider scale and greater demand/capacity balancing. If pathologists can report remotely, and we can get the right specimen to the most appropriate pathologist in the country, turnaround times can be increased and there will be a benefit in both quality and efficiency.

Interoperability

Regardless of how much consolidation takes place with LIMS and PACS systems, interoperability and standards will be key to enabling collaboration in digital pathology. In the absence of a single national system, it is essential to agree and implement standards for reporting, and a common language for doing so, to enable pathologists to co-ordinate nationally.

The most widely used standard for image exchange and communication is DICOM, which now includes Whole Slide Imaging. **In addition, IHE has published technical frameworks to enable cross-border sharing of pathology**.

The Royal College of Pathologists provides templates for pathology reporting which are being widely adopted. The use of these standards by the diagnostic workforce and vendors can enable pathologists to collaborate, regardless of system and network.

06

Public cloud and its role

Public cloud is a type of cloud computing in which cloud services are provided over the public internet. It is a model of delivering services where computing resources – such as storage, servers and databases – are hosted externally and accessed by users over the internet.

These cloud services offer customers the benefit of scalability and cost savings, as the provider is responsible for managing and maintaining the infrastructure. They enable organisations to build and deploy applications faster, with less upfront investment.

Public cloud infrastructure is of particular benefit to the future of digital pathology when it comes to helping regions scale infrastructure flexibly. This will be required as regions come together incrementally onto the same system.

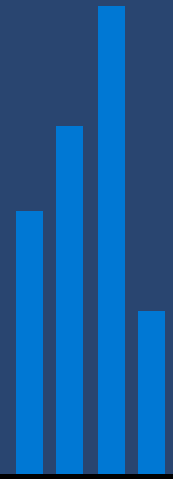
Public cloud infrastructure can also help to federate different imaging repositories. Increasingly large regional systems can be linked together to enable safe, role-based access, using integration engine capabilities. Services such as Microsoft's Azure Health Data Services, part of the Microsoft Cloud for Healthcare Suite, supports FHIR and DICOM, and its cloud-based storage and messaging capabilities can help bring together these systems to enable national interoperability.

Such a centralised platform could also incorporate elements of federated analytics, enabling each network to house their own archive of images, but allow research to be accomplished across the entire image base. Tools to enable Secure Data Environments (SDEs), with airlocks to prevent egress of data, can safeguard patient data for research purposes.

This would create possibly the largest single database of pathology images in the world, at a time when incredible strides are being made in artificial intelligence and biomarker identification.

"Public cloud is really crucial. When organisations have staggered contracts in place – as most ICSs do – organisations can come on-board when their contracts come to an end. The first organisation can be the progenitor, and when the next site is ready, you can dynamically scale the infrastructure. It's much more difficult to do this with static infrastructure which needs to be expanded over time, dealing with lead times for planning, hardware refreshes, and all the complexity of managing a monolithic infrastructure. With the cloud, you hand over all these problems to the experts, and focus on managing the contracts."

– Chris Scarisbrick, Sectra



"One of the benefits for UK PLC of having the data in one place is that you can drive Machine Learning algorithms from that data, but do it safely and within the remits of appropriate governance."

– David Wells, CEO, IBMS

"I know some people are scared of the data sitting on someone else's servers. But is a physical server safer than a cloud solution? If you think about it logically, an on-prem server is more difficult to manage, and there's a greater risk of losing that data. From a safety perspective, the cloud has it [wins the argument]."

– Ashley Ballard, Senior Biomedical Scientist

Public cloud can also provide security and role-based access controls to help manage the plethora of access across different networks into patient information.

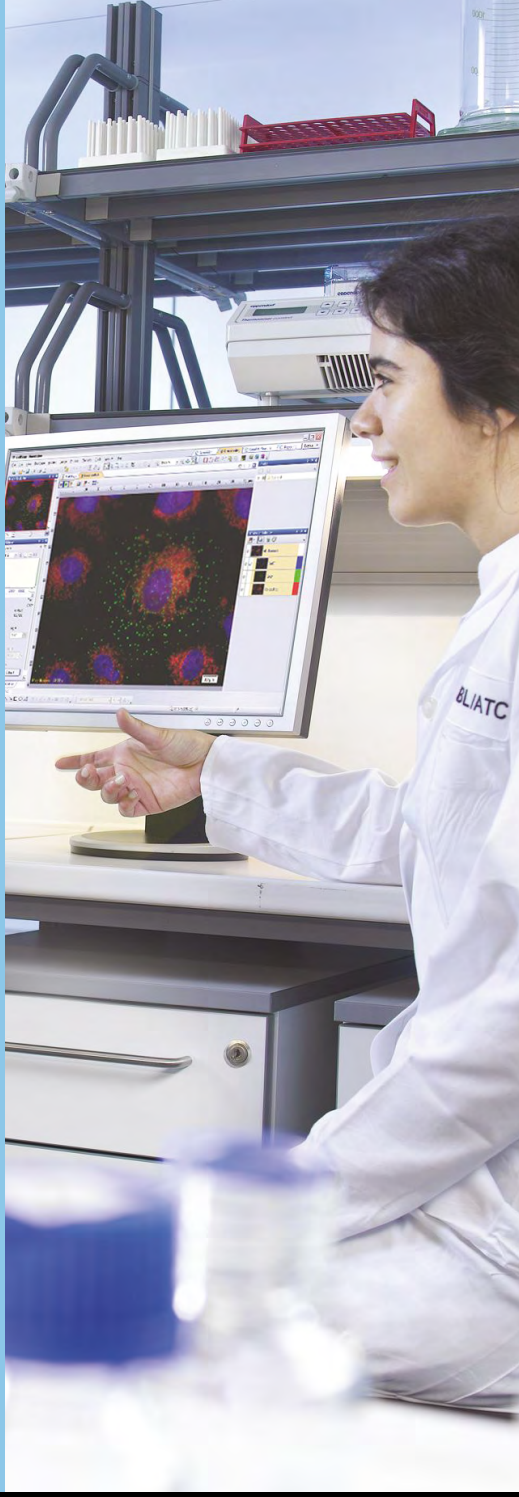
Public cloud vendors also have a range of tools to enable ingestion of additional data from a range of sources: for instance, IOT (internet of things) connectors which could connect to the hardware across a laboratory, enabling the creation of digital laboratory twins. This would enable biomedical scientists to proactively manage their hardware, simulate new working patterns, balance demand and capacity, and identify risks.

Such analytical dashboards and simulation models would allow network managers to see and track samples, turnaround times and delays in real-time. Capabilities such as robotic process automation (RPI) and the Microsoft Power Platform could then help send automated messages to necessary individuals relating to those samples, integrated into modern work environments such as Microsoft Teams or Outlook.

Finally, public cloud takes away some of the challenge around managing complex infrastructure at a time when workforce is a limiting factor.

“By going to the public cloud and leveraging managed platforms or software-as-a-service offerings, you are enabling staff who are already stretched thin, to concentrate on their most critical work. They don’t need to waste time debugging service resiliency or availability issues, or worry about how to fund higher specification GPUs to run their models. Horizontal and vertical scaling of compute and improved service availability can be rapidly accommodated.”

David Montgomery, Cirdan



Moving to public cloud can also simplify the commercial arrangements for digital pathology. At the moment, it is challenging to determine the total cost implications of a move to digital pathology, as this involves understanding the average size of a case produced in a given laboratory, number of slides and so forth, then working out the implications for licensing and storage.

Public cloud environments also offer the opportunity to take advantage of emerging technologies such as additional storage tiers. This development significantly reduces the cost-per-terabyte (TB) related to the long term storage of vast quantities of data.

"By moving to a straight Software-as-a-Service (SaaS) model end-to-end, Sectra can provision infrastructure as it is required, providing transparency of costs for an estimated annual caseload. If the estimates exceed or fall short of estimates then the infrastructure can be dynamically scaled (up or down) to meet the updated demands of the service."

– Chris Scarisbrick, Sectra

When moving to public cloud, bandwidth is a consideration in an area with limited fibre connectivity: the cloud relies on a stable and reliable internet connection, and disruptions or outages can cause delays. Data privacy and compliance are critical considerations. The cloud service provider must have robust security measures in place to protect patient data and meet key standards and regulations.

Microsoft's cloud platform, Azure, meets current standards and regulations including GDPR, HIPAA and HITRUST, with comprehensive security features and controls including encryption, identity and access management, and network security. Finally, simplification and standardisation of the information governance arrangements for sharing images and associated metadata is also a key enabler.

07

Our commitment to digital pathology

The Institute of Biomedical Science (IBMS), Microsoft and organisations represented by the authors of this paper believe that digital pathology has the potential to revolutionise the way pathology is practised. We commit to:

- **Engage the public and the system.** We will continue to communicate the benefits of digital pathology – in terms of quality, finance and staffing (particularly for the public and ICSs) – and promote and inform how it enables better, more efficient care.
- **Continued focus on interoperability and standards.** We will work to define standards, encourage conformance to standards and enable access to clinical data via those standards, including those defined by IHE (XDS, XCA, XCA-I).
- **Standardised information governance policies.** We will encourage the development of national standards for data governance relating to shared imaging services and appropriate access and permissions management, linked to clear technical specifications.
- **Patient access to results.** We will explore the value of providing access to pathology results directly with patients, helping empower the public while reducing the reporting burden on clinicians.
- **Digital training.** We will continue providing additional training to embed digital training for biomedical scientists and pathologists, to unlock the benefits of digitised laboratories and pathology services. We will also encourage and work with the royal colleges to develop learning and development opportunities.
- **Education for ICSs on the systems in place.** We will work together to help create a picture of the systems which are in place in different regions, and how those systems can better enable collaborative working for pathology and other clinical specialties.

Through these actions, we will help the diagnostic workforce to diagnose diseases faster and more accurately, facilitate better communication and co-ordination of care, and improve the accuracy of diagnoses – reducing costs, increasing efficiency, and improving patient care.

"We want to see more digital training, and embedding the workforce in the digital environment. From the point of view of the biomedical scientist role, the scientists are going to be spending less time with test tubes, and more time with user interfaces. It's a lot more data analytics, alerts – our scientists need a grounding in the data and technology which supports this. The IBMS is creating a Certificate of Expert Practice qualification to support this change, and there is much more to do to make our workforce more responsive to what the lab will look like in the future."

Jamie West, Biomedical Scientist

"As the NHS, we're here to help the public. If we can educate the public about the benefits of digital pathology, artificial intelligence, storing images on the cloud, and this can help mitigate concerns about data sharing, this will benefit us all."

– Ashley Ballard,
Senior Biomedical Scientist

"We need to educate the ICSs better on what systems are already in their network. Some areas are surprised to hear about systems which are in place, and importantly the capabilities some of those systems have."

Lee Webb, Clinisys

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