NHS Pathology Conference 2022

12th April 2022- 10:50am – 2:10pm – GoToWebinar

Webinar hosted by Convenzis Group Limited

Jane Mills,
Head of Pathology Transformation,
NHS England and Improvement

Pathology Transformation

Maturity of Pathology Networks

National Pathology Conference - April 2022

NHS England and NHS Improvement

Welcome!

Through this session I aim to cover:

- Explanation of the Maturity assessment
  - Seven Domains
  - Five stages of maturity
- An overview of the approach
- National analysis summary
- Regional analysis summary
- Summary position of 7 domains
- Next steps

Seven Pathology Network Maturity Domains

1. Governance	A single governance model signed off by all network member Trust and ICS Boards, with clear clinical and operational leadership arrangements where dissolution would require Trust Board approval
2. Leadership	A single accountable officer appointed at network level e.g., Network SRO, and other leadership roles defined and appointed to
3. Operational	Agreed clinical, operating and business models signed off by Trust Boards e.g., consolidation of services at agreed sites and integration into clinical pathways
4. Quality	A common quality management process and methodology for oversight of performance, quality and clinical governance including working with local, regional and national systems such as PQAD and single UKAS accreditation process.
5. IT and Digital	A digital roadmap setting out how the network will achieve digital interoperability across the whole local healthcare system and digitization of cellular pathology services with shared digital pathology reporting.
6. Workforce	Agreed workforce strategy for passporting/mobility, Skill mix (including the role of clinical scientists), training and CPD and recruitment and retention, managed via a Network workforce lead
7. Shared Supply Chain	A shared joint procurement strategy with robust supply chain and joint purchasing at scale for example shared Managed Service Contract across the network, or a clear process and timeline to achieve one.

Five Stages of Pathology Network Maturity

In order to define a level of maturity categorisation for each matrix within this pack. The five maturity categories highlighted below have been used, in line with common maturity terminology, to cover the breadth of progressive maturity within a network.

Developing

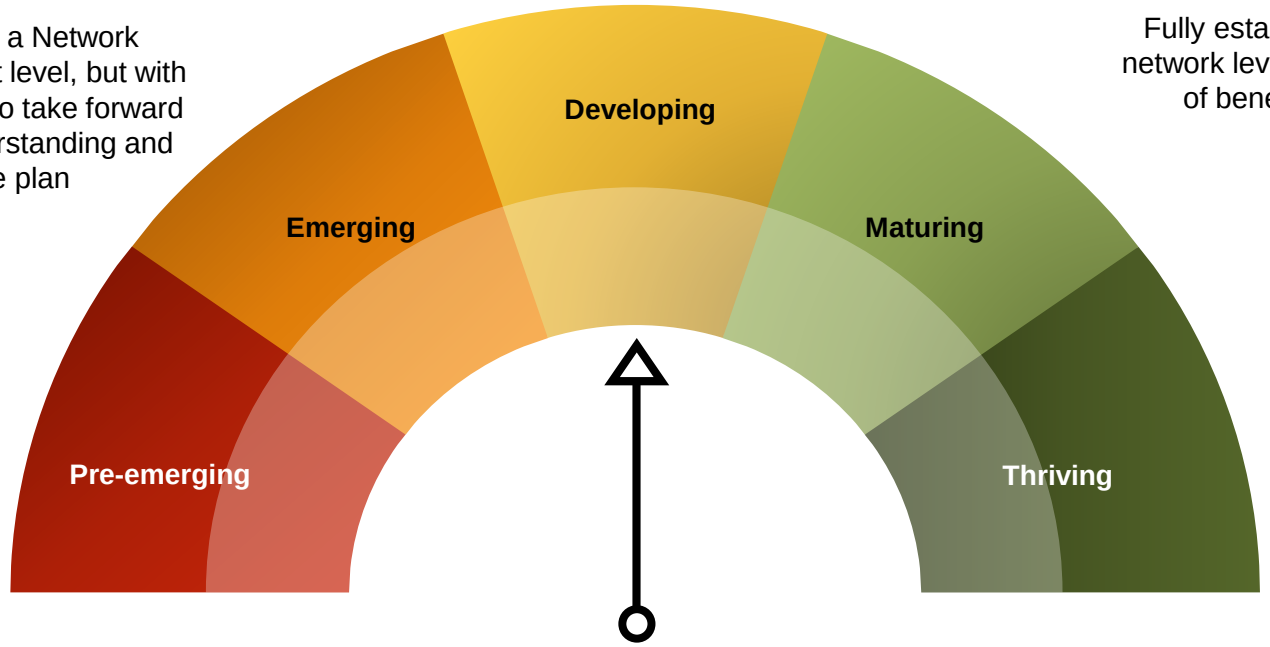
Joint-working across Network with implementation of network-level plan underway

Emerging

Constituent pathology service within a Network currently operate independently at Trust level, but with a Network programme board engaged to take forward Trust board signed network-wide understanding and development of a network-wide plan

Maturing

Fully established and implemented plans at network level, and where applicable realization of benefits and further innovation and improvement underway



Pre-emerging

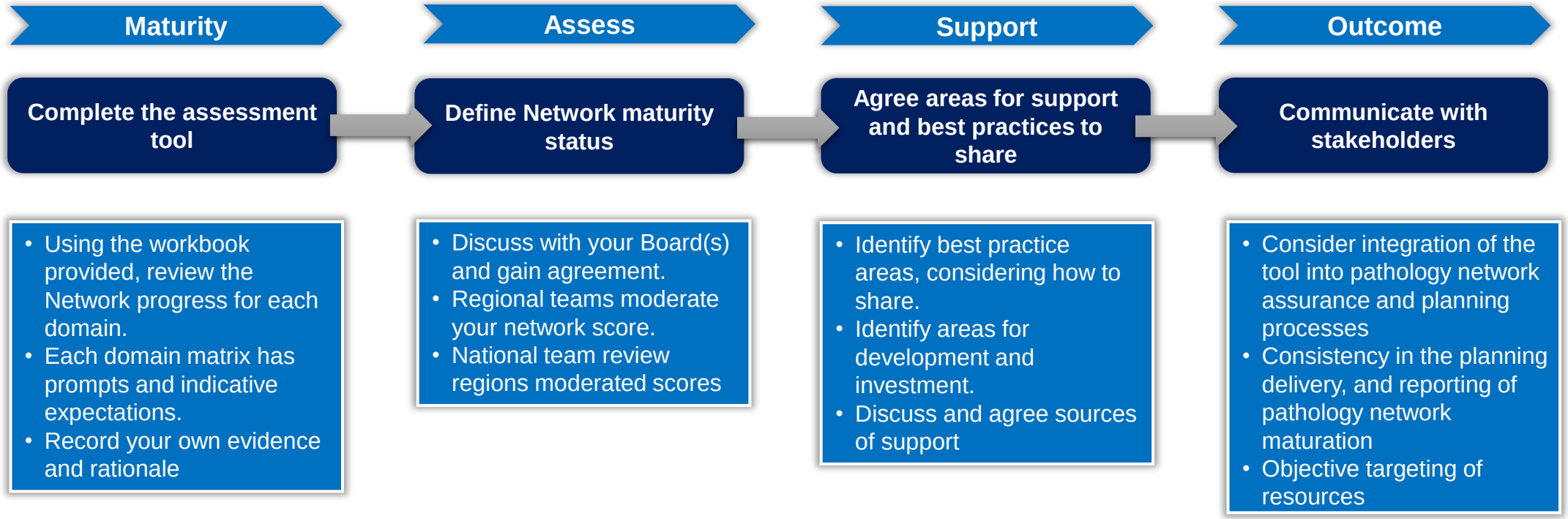
Constituent pathology service providers within a Network operate independently at Trust level

Thriving

Fully integrated network operation, and collaboration with other networks within the region for regional academies, best practice evidence and standardization across region.

How This Tool Helps

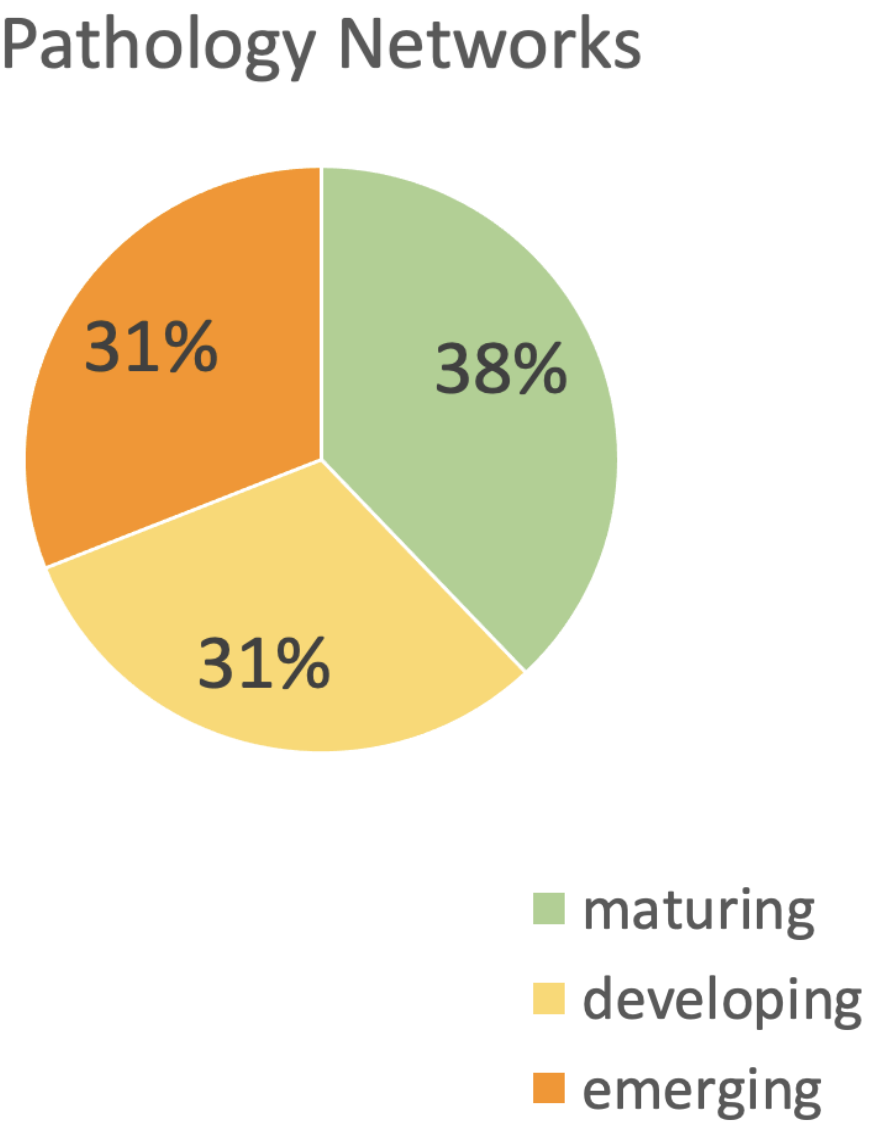
The pathology network maturity matrix is designed to help with consistent, objective assessments of network progression. It is intended to support network leadership, regions and ICS understand their current status against the key implementation components of a network and assist with identifying areas in need of further support and input. ***An overview of the approach:***



National Analysis

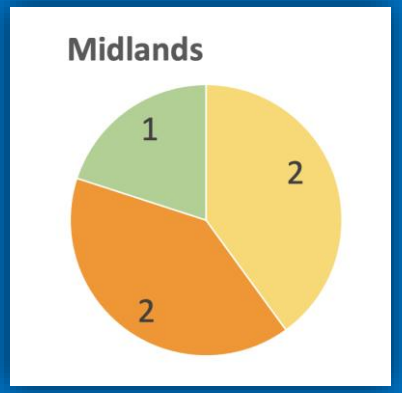
Summary:

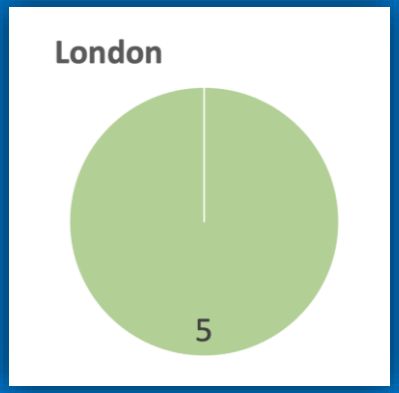
- 29 Networks identify as networks
- Two of the 29 Networks are now in strategic discussions to merge, creating 27 Networks
- 100% engagement with creation of Pathology Networks
- Taking a national average of the regional position, the **NHS has achieved a rating of “developing” for establishment of pathology Networks**
- Networks classified as emerging are tasked with identifying a plan and delivering on being classed as Developing by 22/23

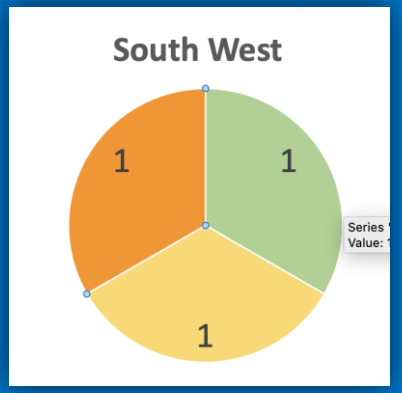


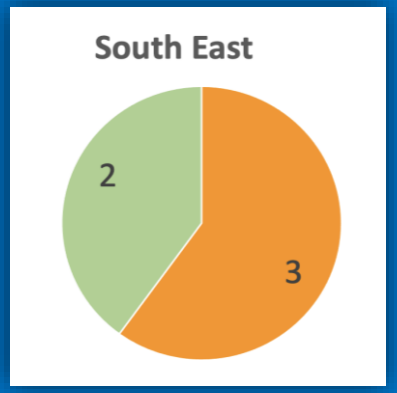
Position at 01/02/2022

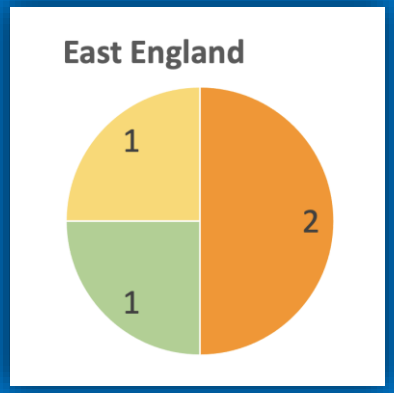
Regional Analysis

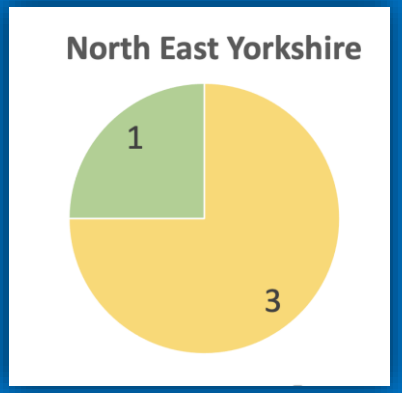


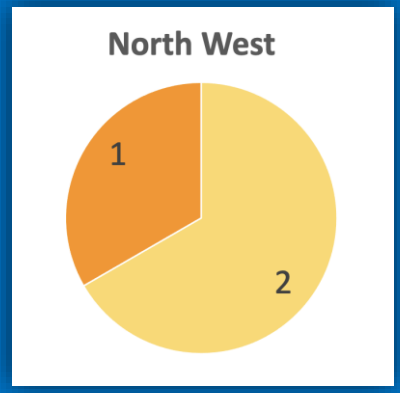






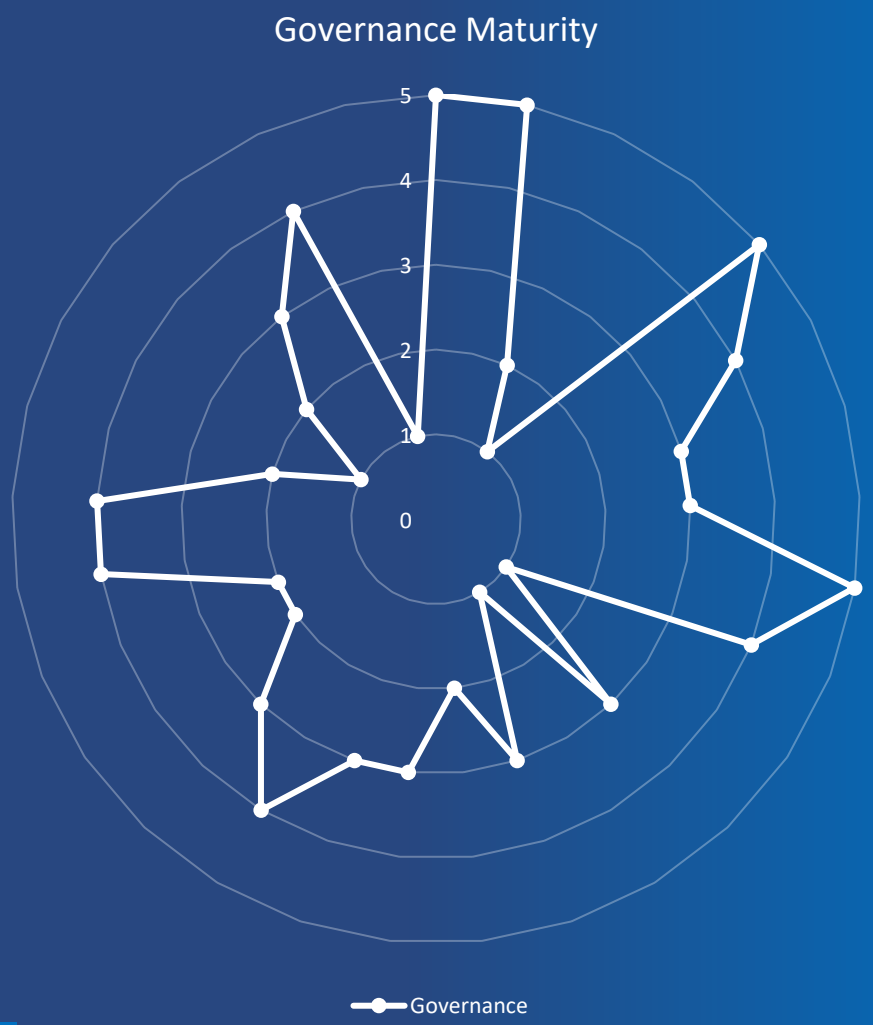






1. Progress Update **Governance** Domain

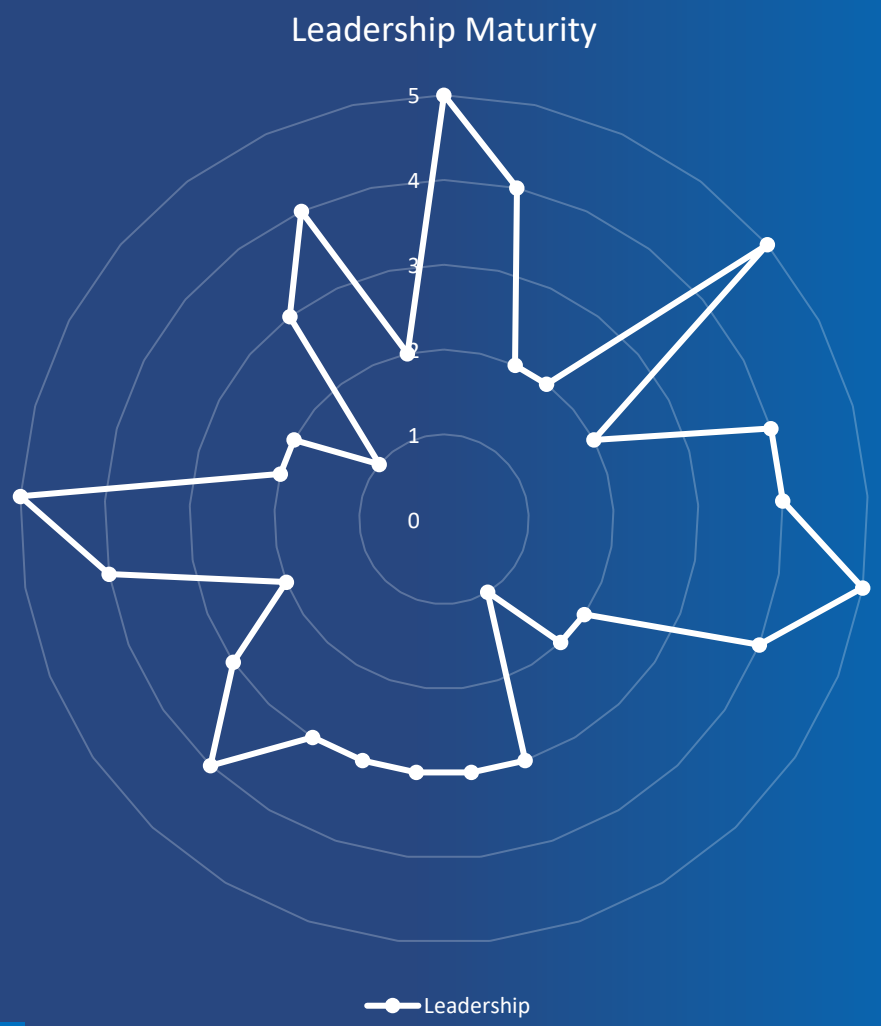
- **Analysis**
  - 5 Networks classify as pre-emerging on this domain, although 2 of the 5 are in process of combining with existing developed networks.
  - The remaining 3 will be tasked with documenting governance arrangements as a priority.
- **National Guidance**
  - Pathology Business Case Template
  - Due diligence guide
  - Commercial structure and operational guide
  - Structural, commercial and regulatory issues to address in business case
  - Clinical governance guide
- **Case Studies (draft)**
  - Driving consistency through clinical collaboration – formation of Pathology Effectiveness Group – Peninsula Pathology Network (South 1)
  - Clinical Governance /Commercial Structure – Mid and South Essex Foundation Trust (ME8)



Key:	
Pre-emergent	1
Emerging	2
Developing	3
Maturing	4
Thriving	5

2. Progress Update
Leadership Domain

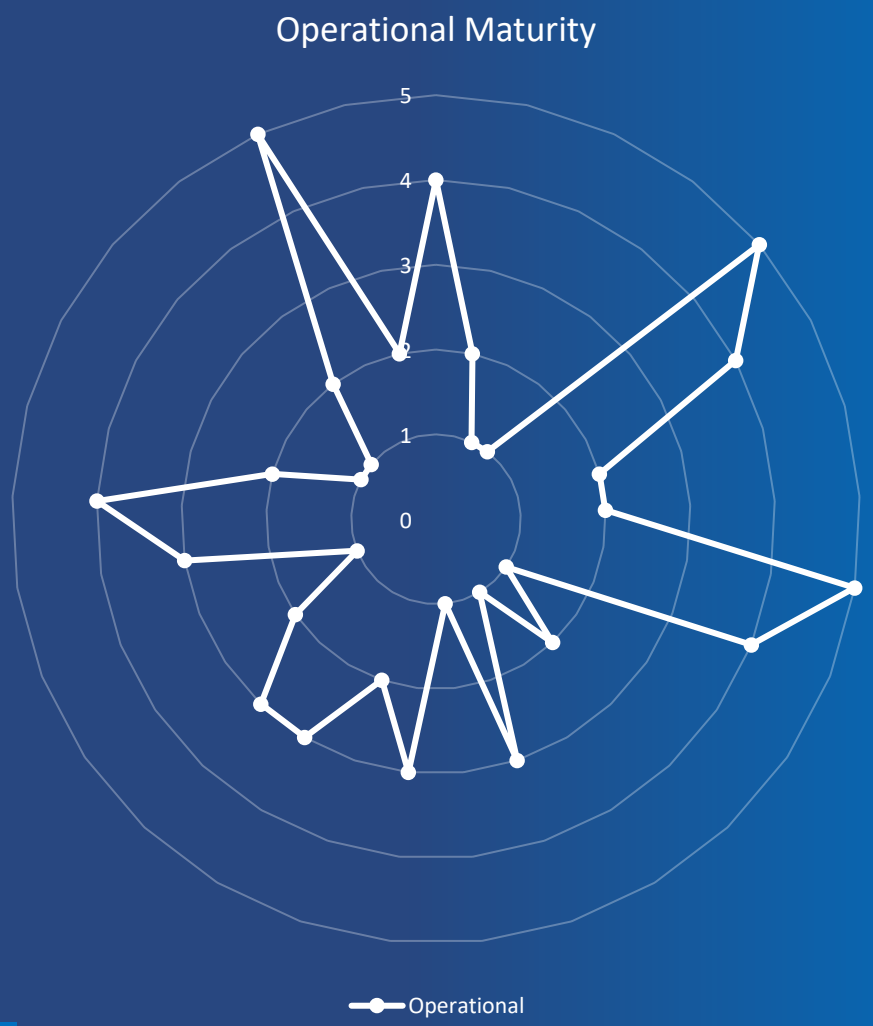
- **Analysis**
  - 2 Networks are at pre-emergent classification with no confirmed leadership team. Both networks are required to move to emerging with support from regions.
  - This domain is key to undertaking the programme of work associated with delivering a network and the transformation programme.
  - All networks will be asked to confirm leadership in line with request made by NHSEI in 2019 state of the nation report.
- **National Guidance**
  - *No published guidance on leadership models, roles and job descriptions - should this be considered for the 22/23 work programme?*
- **Case Studies (draft)**
  - NWL Pathology Leadership Model (London 1)



Key:	
Pre-emergent	1
Emerging	2
Developing	3
Maturing	4
Thriving	5

3. Progress Update
Operational Domain

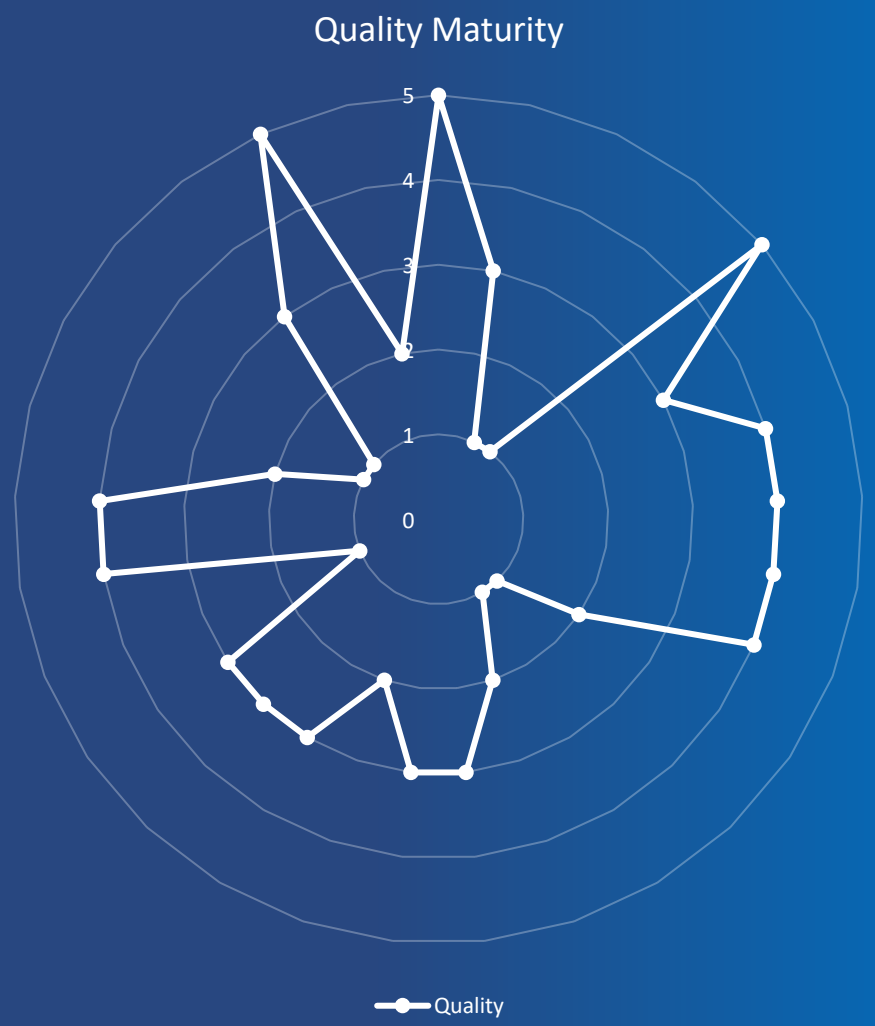
- **Analysis**
  - This domain has the most pre-emergent classifications with 8 networks not having a documented operating model.
  - Defining a target operating model for clinical services and documenting current state should be a priority for a network. Offering the best opportunity to support high quality services
  - Through Covid response most networks have operated in some form of collaborative working, particularly in managing POCT. Documenting this could offer opportunity to move to emerging.
- **National Guidance available**
  - Pathology Business Case Template
  - Clinical governance guide
  - Consolidation Framework planning
  - Template structure for essential services laboratory – Blood sciences provision
- **Case Studies (draft)**
  - Viapath Test Harmonisation (London 4)



Key:	
Pre-emergent	1
Emerging	2
Developing	3
Maturing	4
Thriving	5

4. Progress Update
Quality Domain

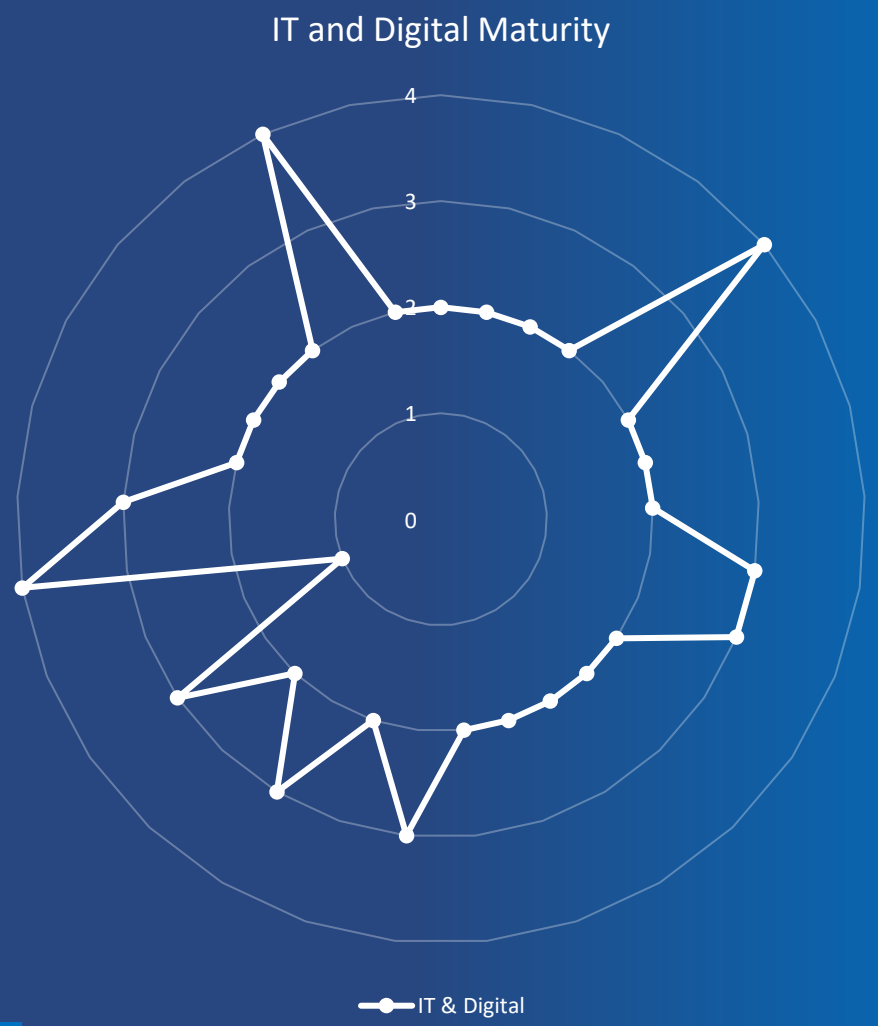
- **Analysis**
  - 7 networks have pre-emergent classifications in this domain
  - With regional support for appointment of key roles it is essential that networks plan to reaching developing standard
- **National Guidance available**
  - PQAD
  - Clinical governance guide
- **Case Studies (draft)**
  - *No case studies have been submitted yet to illustrate and support this domain*



Key:	
Pre-emergent	1
Emerging	2
Developing	3
Maturing	4
Thriving	5

5. Progress Update
IT and Digital Domain

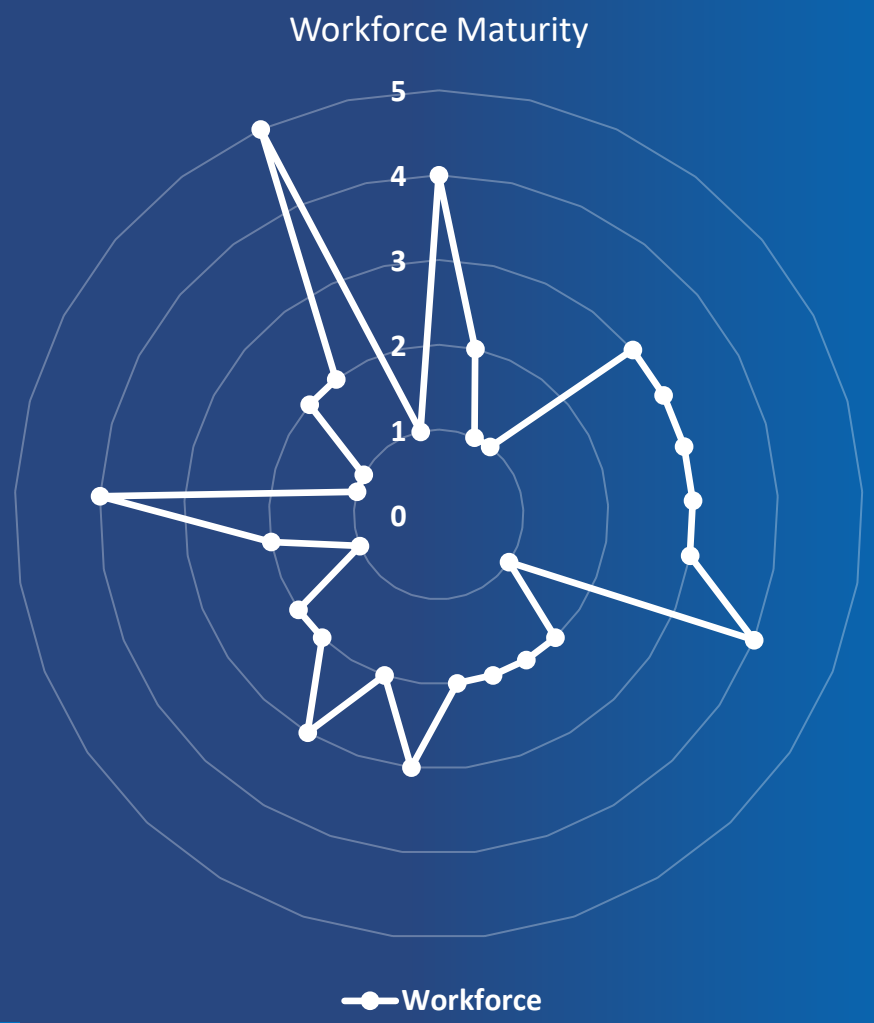
- **Analysis**
  - This domain has the least number of pre-emergent ratings of all domains.
  - With the investment in LIMS, IT systems and digital pathology, it is expected that networks will have robust plans with benefits realisation mapped to reach maturing status by 24/25
- **National Guidance available**
  - Pathology Business Case Template
  - Clinical governance guide
- **Case Studies (draft)**
  - IT NWLP (London1)
  - The Portal (London 2)
  - WYAAT LIMS (North 2)



Key:	
Pre-emergent	1
Emerging	2
Developing	3
Maturing	4
Thriving	5

6. Progress Update
Workforce

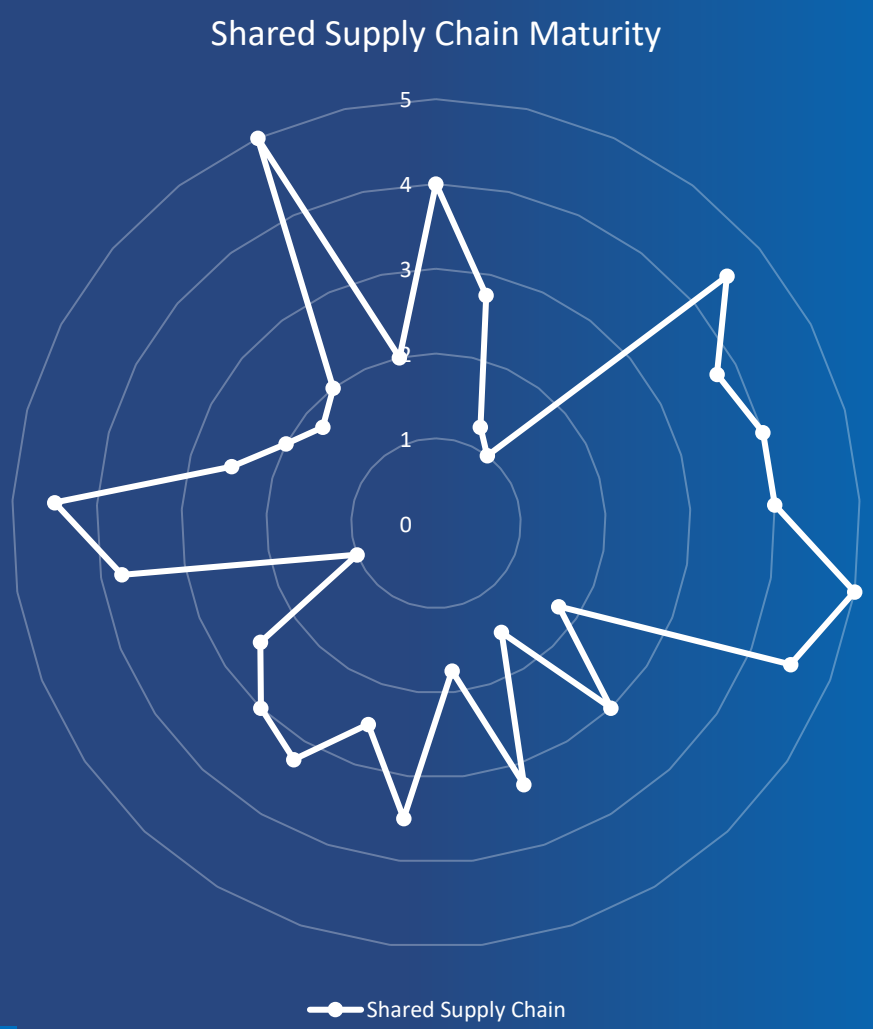
- **Analysis**
  - 11 networks are at developing or higher in this domain
  - Our workforce remain our most valuable asset
  - This is a domain with increased investment, and will therefore need to share the benefits being realised
- **National Guidance available**
  - PQAD
  - Clinical governance guide
  - *A toolkit or guidance on developing a pathology workforce strategy - should this be in the work programme for 22/23?*
  - *Commissioning a standardised workforce planning and data capture model should be in 22/23 work plan for the national team?*
- **Case Studies (draft)**
  - *None yet submitted to support network development and illustrate this domain*



Key:	
Pre-emergent	1
Emerging	2
Developing	3
Maturing	4
Thriving	5

7. Progress Update **Shared Supply** Chain Domain

- **Analysis**
  - Most networks are evidencing making progress in this area, with half still below the developing standard.
  - Response to covid and handling of supplier incidence may have contributed to more collaborative working
- **National Guidance available**
  - Pathology Business Case Template
  - Commercial structure and operational guide
  - Structural, commercial and regulatory issues to address in business case
  - Work programme for 22/23 to produce procurement toolkit/guidance
- **Case Studies (draft)**
  - Network purchasing of pathology managed services contract – West of England Pathology Network (South 3) **Published on NHSE website**



Key:	
Pre-emergent	1
Emerging	2
Developing	3
Maturing	4
Thriving	5

Next Steps

- **Regional Implementation**
  - Networks are submitting plans to be re-assessed as developing by 22/23 or as early as practically possible in 22/23
  - Networks are developing plans to assure a programme of work to be assessed as mature by 24/25
  - Develop case studies from Networks to illustrate the domains

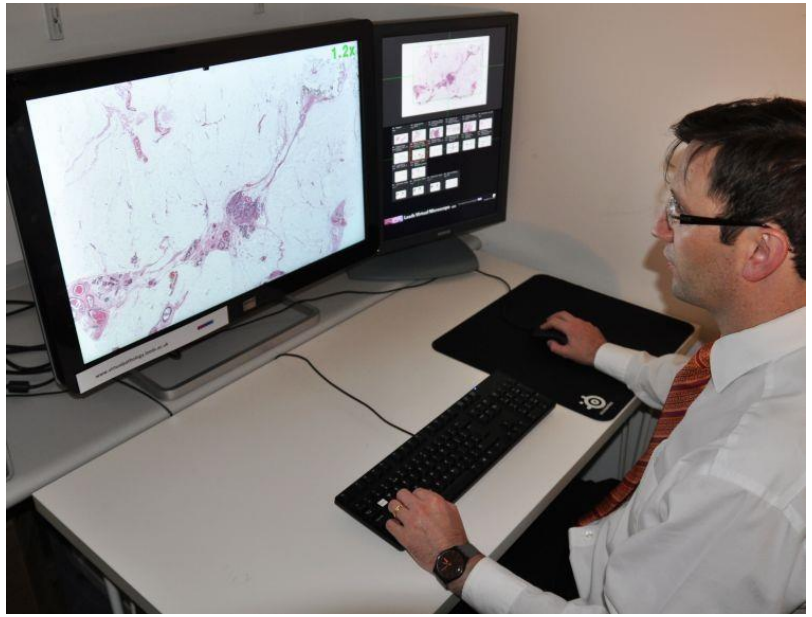
- **National Transformation**
  - Complete the summary findings and the Report to advise key stakeholders of the work programme
  - Refresh and further develop Guidance and toolkits with particular attention to domains where no present product offer exists
  - Review and optimize opportunity to share guidance and toolkits across other diagnostic programmes
  - Establish and publicise the larger library of case studies
  - Workshop and reference groups to advise on the evolution of the assessment toolkit with consideration and how to illustrate benefits realized following the investment programme

Bash Hussain,
Deployment Director at National Pathology Imaging Co-operative (NPIC) and
Jonathan Bridges, CIO, Exponential-e

National Pathology Imaging Co-operative

Bash Hussain – Deployment Director
Leeds Teaching Hospitals

Digital pathology: What it is and what it does

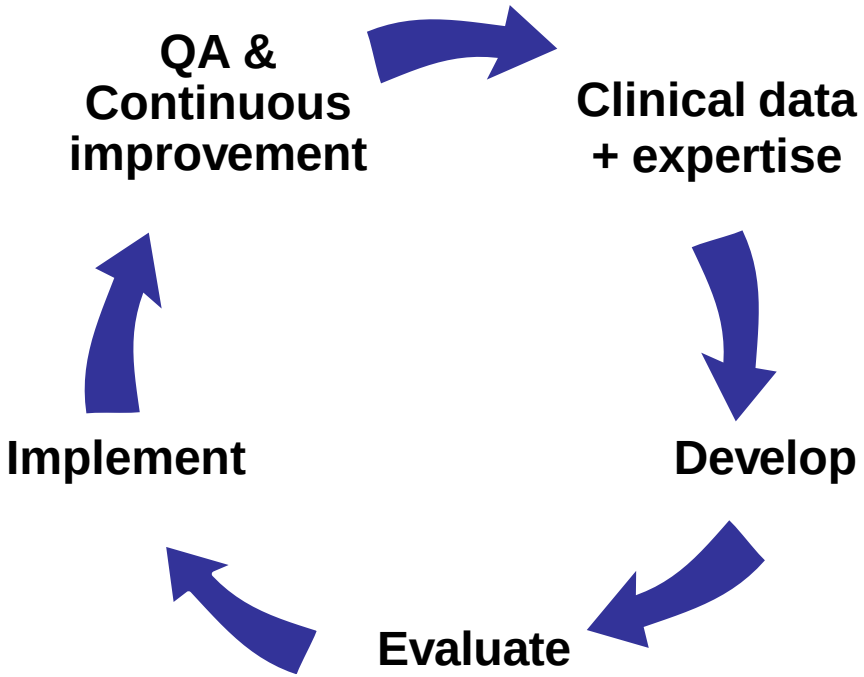


NPIC: Aims

1. Drive clinical use of digital pathology

2. Place for AI development and evaluation over the whole AI lifecycle

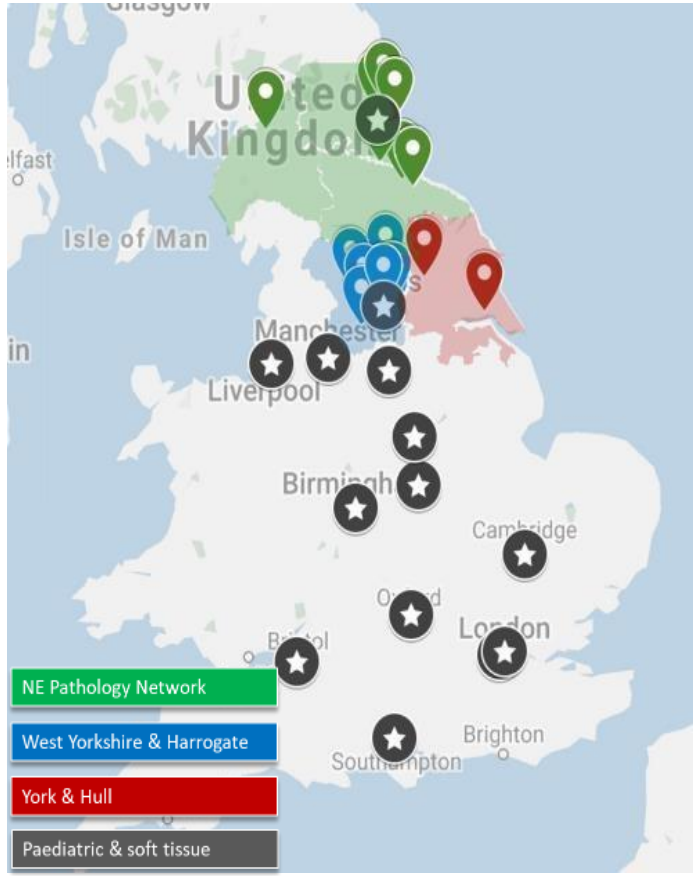
3. Support further research and innovation in cancer & diagnostics



Supporting the entire AI lifecycle

National Pathology Imaging Co-operative: Summary

- One of 5 UKRI Centres of Excellence in digital imaging and AI
- 2019-2023
- £33.0m public funding, £11.4m industry funding
- Build a national digital pathology system as a *platform for the NHS*
- World leading scale
- > 30 hospitals to start, 3 Petabytes image data per year



NPIC partners: “Co-operative”

Underpinning NPIC to drive Human Progress

Jon Bridges – CIO
Exponential-e

Expo-e In Health

HSCN Stage 3 Compliant

9 ISO
Accreditations

+65%
of London's NHS Organisations

70+
Health Organisations

of all HSCN Circuits

Trusts, ICS, CCGs, GPs, Community, STPs

Picture Archiving and Communication System (PACS) Ready Stacked Solutions

A.I & ML Solutions

Managed and Professio

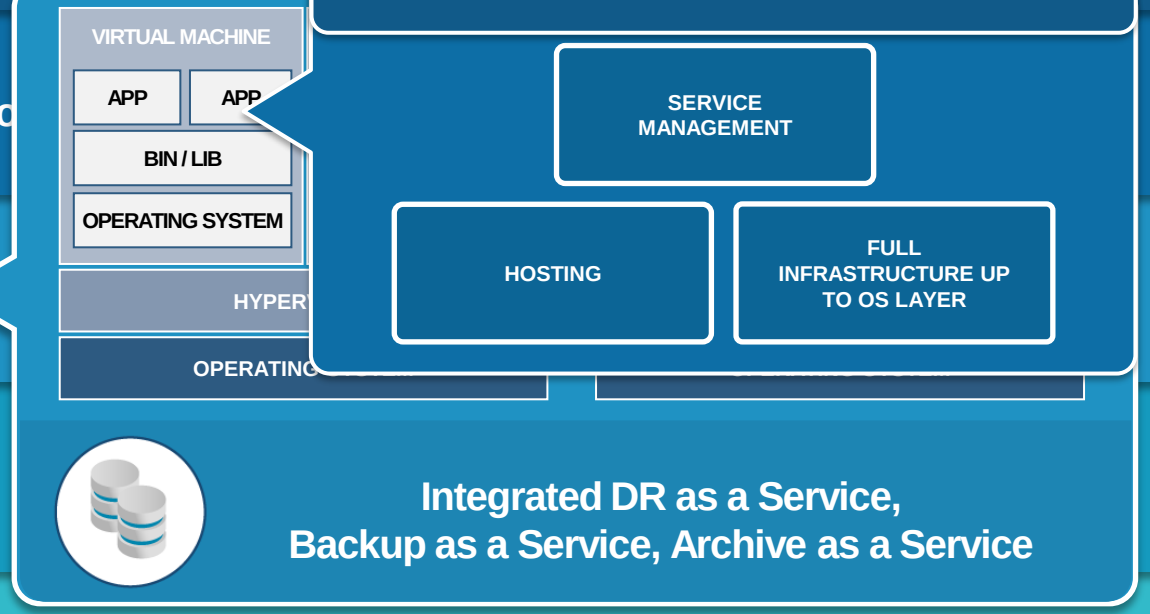
DRaaS and BUaaS

Long Term Archive Tier

Fast Tier 1 & Medium Tier 2 Storage

Green Datacentres, HSCN Connectivity and Private Cloud for PACS

Rapid time to Value for NPIC Consumers



Integrated DR as a Service, Backup as a Service, Archive as a Service

Growing Cyber Threat on Unstructured Data

54%

Of cyber claims based on ransomware up from

13%

between 2014 and 2020

$13m

average cost to organizations resulting from

cyber crime

Cyber Recovery Vault

67%

of IT decision makers are

not very confident

that all business-critical data can be recovered in the event of a destructive cyber attack

Ransomware Defender

Service Provider

Vaults for Unstructured Data

Process of Vault

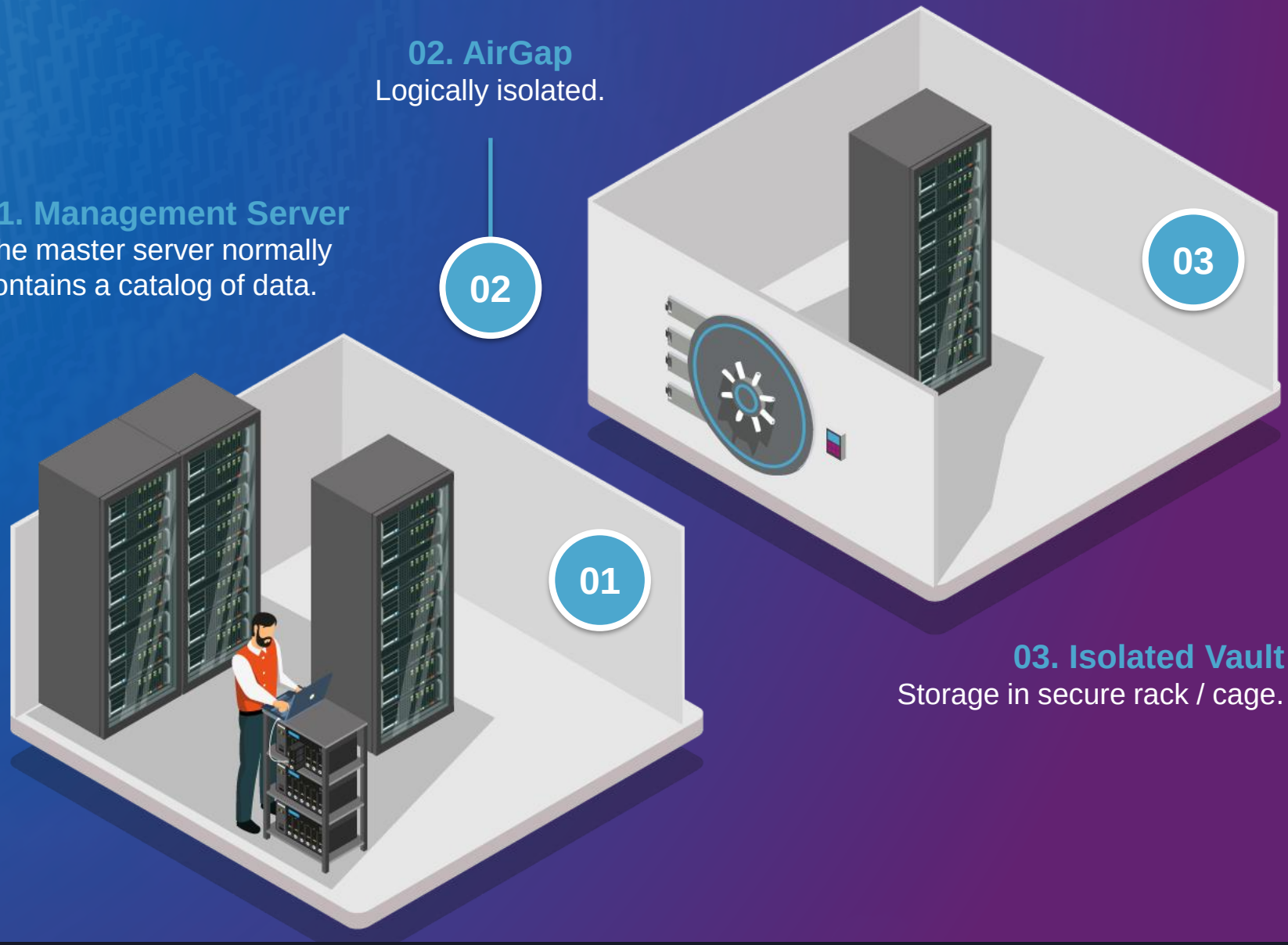
Protecting the most critical data in an isolated vault environment.

The vault is ideally physically isolated meaning stored in a locked rack, cage or room. And is always logically isolated via an operational air gap.

The components of the vault aren't accessible from production and to access the vault target- when the air gap is unlocked - Is extremely limited.

01. Management Server
The master server normally contains a catalog of data.

02. AirGap
Logically isolated.



03. Isolated Vault
Storage in secure rack / cage.

Vaults for Unstructured Data

Synchronisation

Data representing critical applications is synced through the air gap.

Which is controlled by the management server in the vault, and replicated to the vault storage.

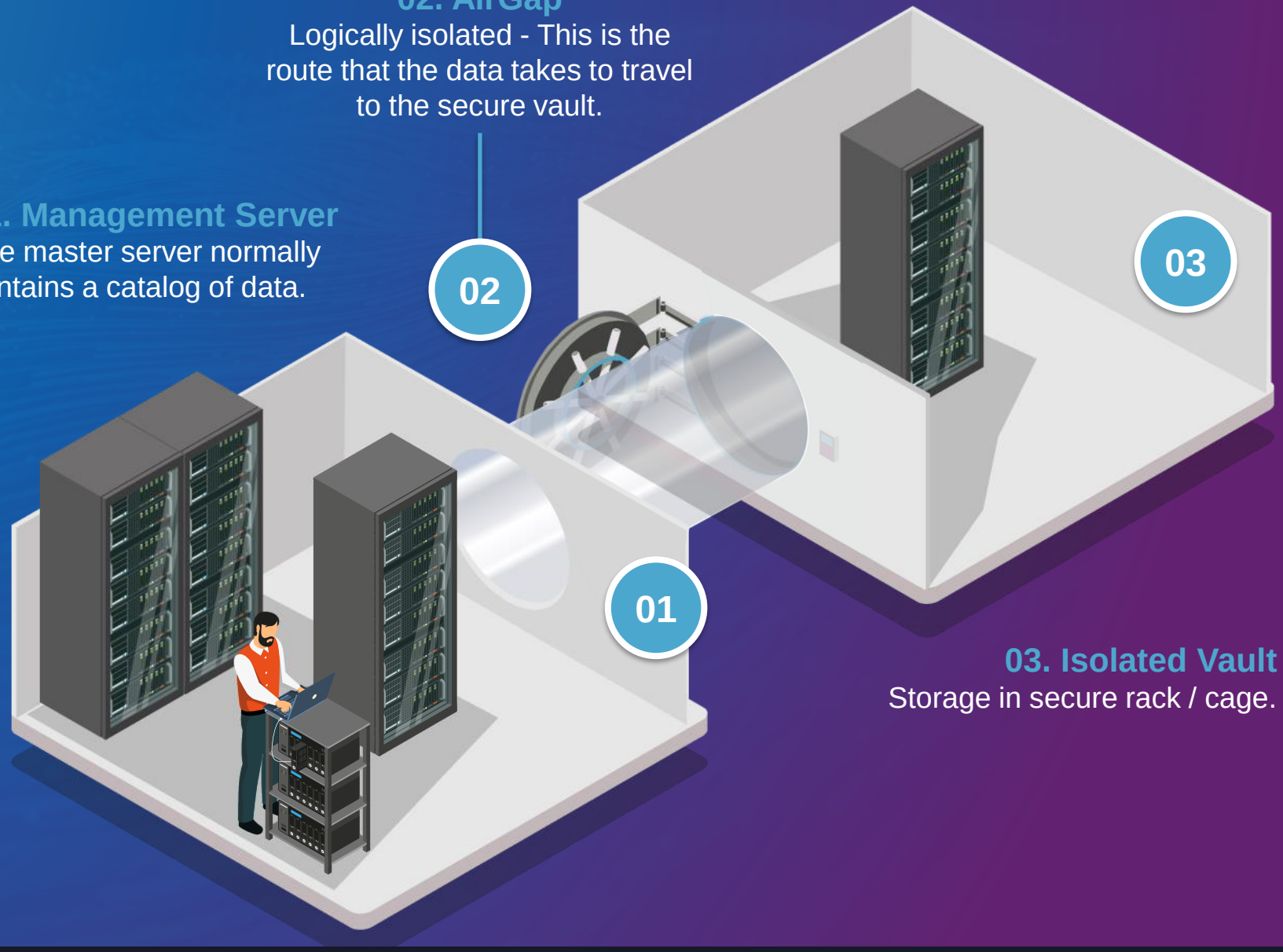
The air gap is then re-established so no logical access to the vault is possible.

02. AirGap

Logically isolated - This is the route that the data takes to travel to the secure vault.

01. Management Server

The master server normally contains a catalog of data.



03. Isolated Vault

Storage in secure rack / cage.

Vaults for Unstructured Data

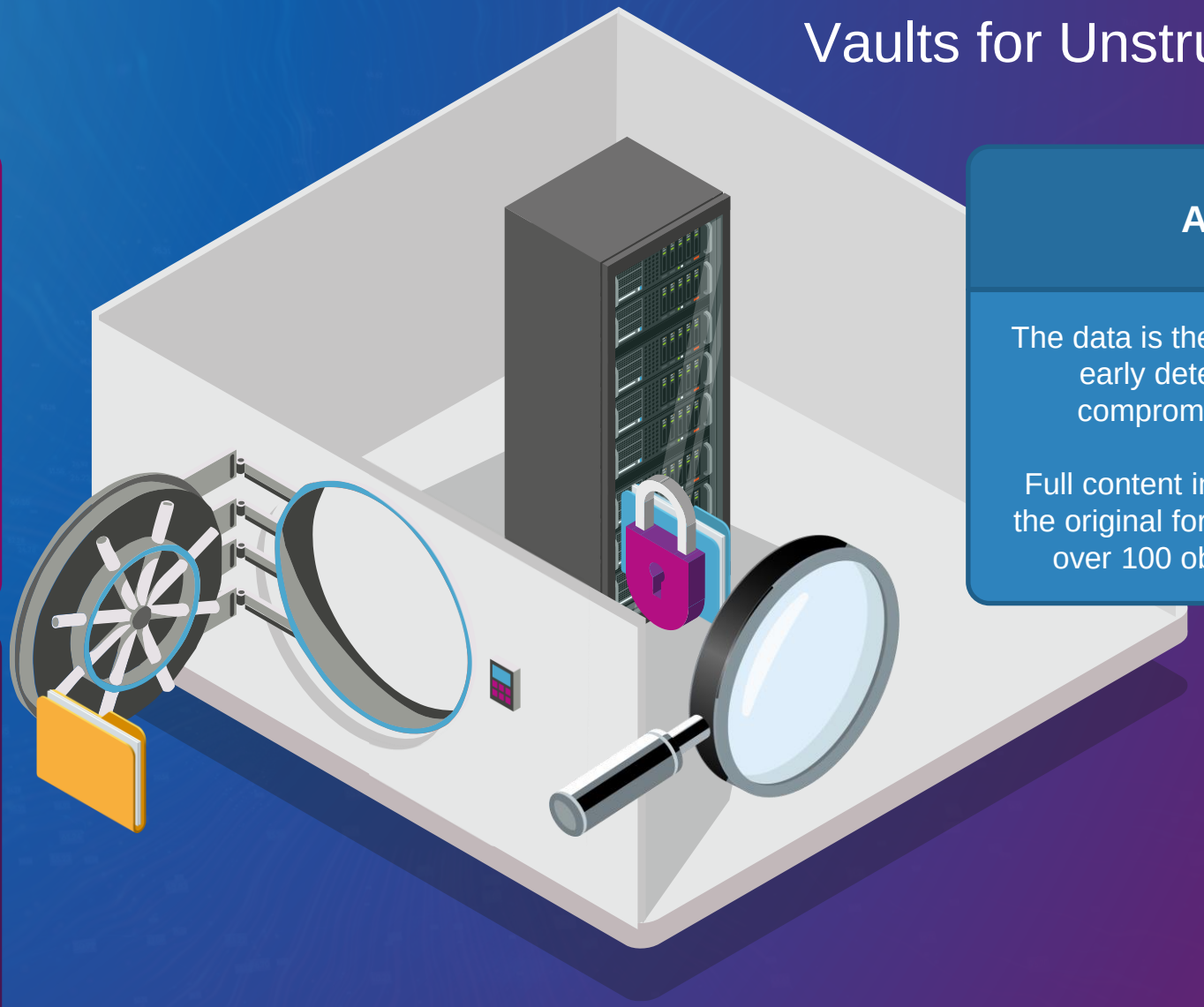
Copy

Once the critical data is in the vault, a copy of that data is made.

Vault retention is configurable, but most keep about a month's worth of copies.

Lock

The copied data is made immutable, using our advanced retention lock capability, to further protect it from accidental or intentional deletion.



Isolated Vault

Storage in secure rack / cage.

Analysis

The data is then analysed to provide early detection of potential compromises to your data.

Full content indexing of the data in the original format is achieved using over 100 observations per file.

Vaults for Unstructured Data

Recovery

Recovering data from the Isolated vault in the event of a cyber attack or simply for recovery testing procedures is critical.

The data will be recovered and sent through the **AirGap** to the **Management Server** where it can be retrieved.

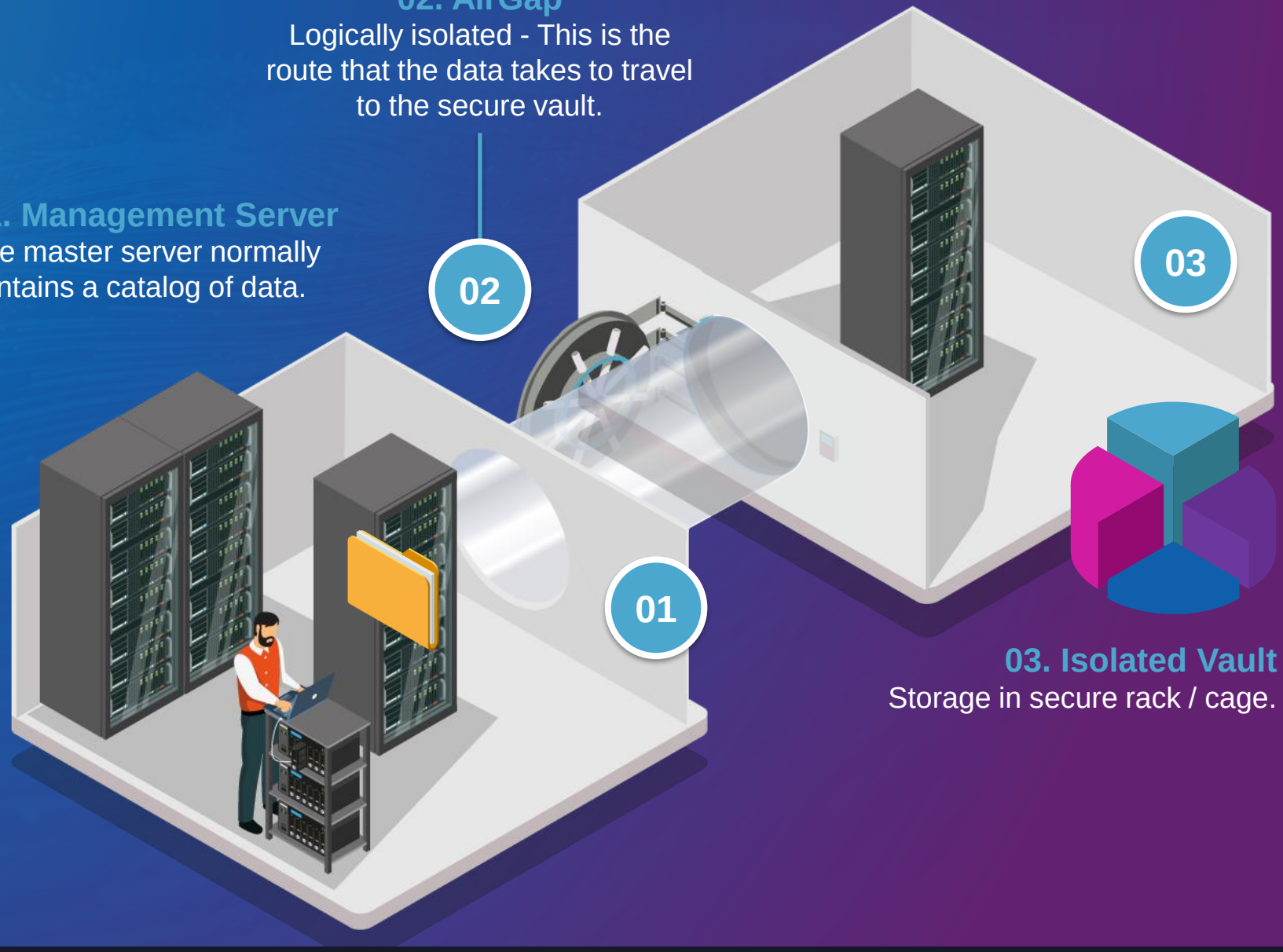
Monitoring and reporting is also provided from within the vault and can be shared outside of the vault environment in a variety of secure methods which will discuss in more detail.

02. AirGap

Logically isolated - This is the route that the data takes to travel to the secure vault.

01. Management Server

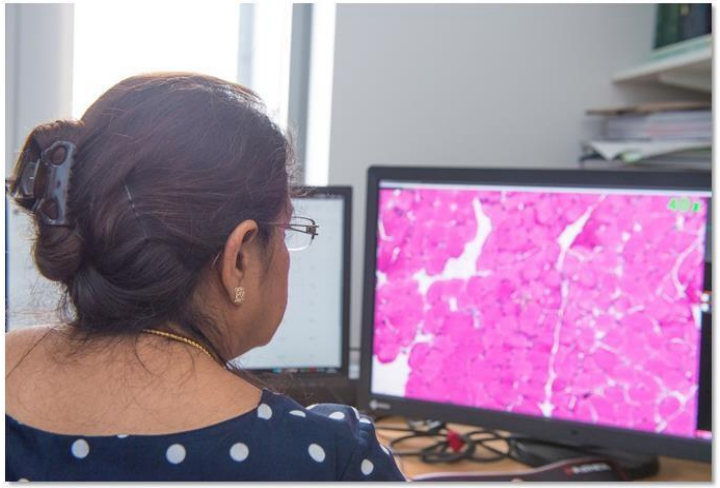
The master server normally contains a catalog of data.

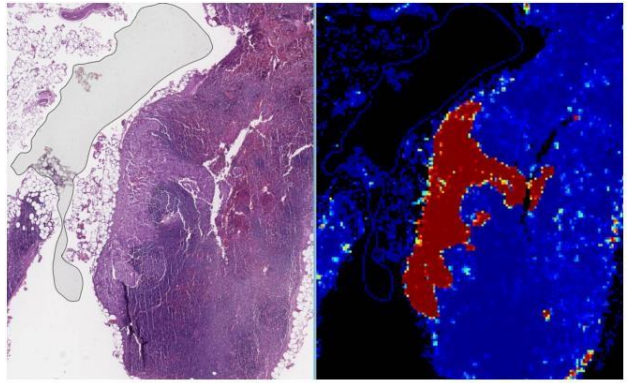


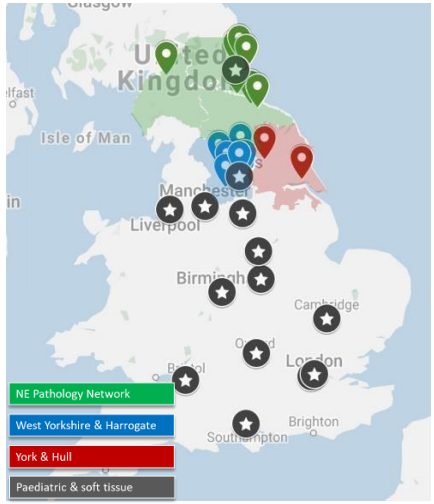
03. Isolated Vault

Storage in secure rack / cage.

A platform for many applications…







Clinical diagnosis

- Full digitisation of NHS hospitals
- 3 regional networks in North
- 2 national networks for rare tumours (to start)

Digital pathology & AI

- Gather data for AI development
- Evaluate AI across multiple hospitals

National research & innovation

- Pathology-Genome correlation in and 2x GeCIPs to start
- Support national clinical trials
- Support diagnostics innovation

Q&A

Mark Hindle,
Managing Director, Pathology Collaboration, Lancashire and South Cumbria Integrated Care Partnership

Lancashire and South Cumbria
Health and Care Partnership

NHS
Lancashire and South Cumbria
Pathology Service

Pathology Conference

Mr Mark Hindle
Managing Director

12 April 2022

Journey So Far – Progress & Achievements

Significant and effective collaborative working through Covid-19
Strategic Outline Case agreed
OBC drafted and at approval stage
Significant clinical engagement
Workforce models being identified
Governance arrangements in place
LIMs specification agreed, approved and contract award in progress
Commenced blood sciences equipment tender process

Economic case (CIAM) and delivery framework agreed – hub & spoke
Location for Hub identified
Hub designs progressed to RIBA stage 2
Host organisation agreed
Due diligence process completed
Development of Target Operating Model
Development of Annual Business Plan for 22/23

Medium Term: Establishing a Single Pathology Service

- The Department of Health has established 29 Pathology Collaboratives that are geographically distributed across England.
- **Benefits:**

  - Standardised offer for the ‘Lancashire & South Cumbria patient’
  - High quality, resilient diagnostic service
  - Increased patient experience and improved outcomes
  - Workforce resilience and equitable development opportunities for all
  - Investment in equipment and technology at scale
  - Opportunities to participate and develop research and innovation in practice
  - Consistent achievement of quality and performance standards

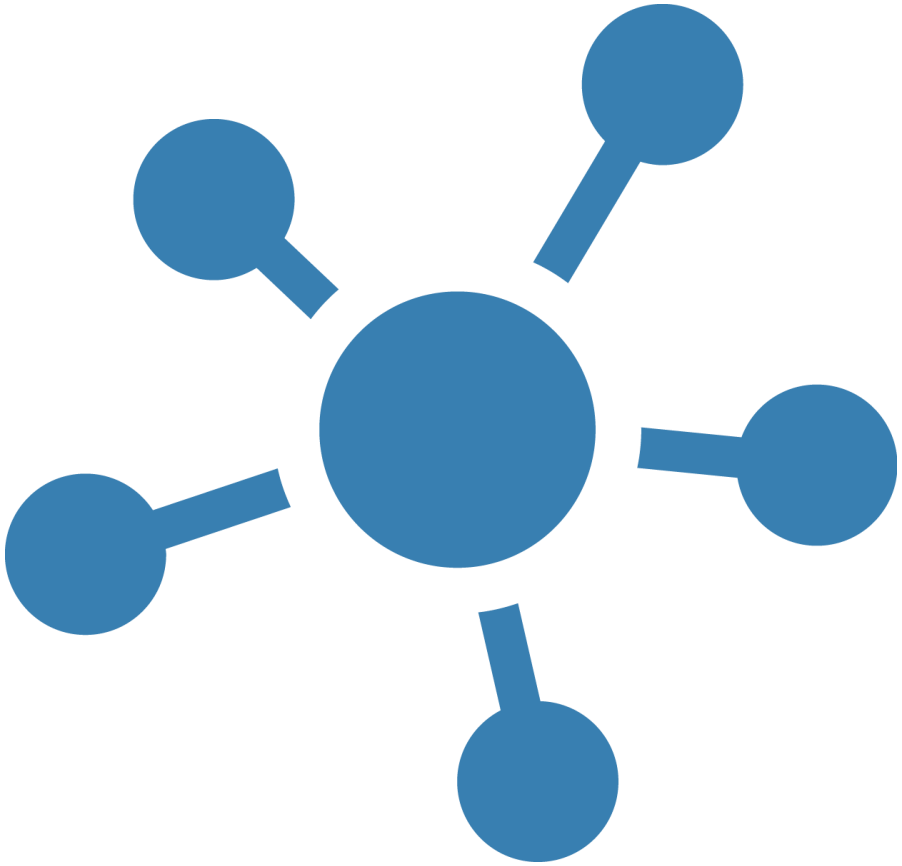
Establishing a Single Pathology Service: Challenges

- **The challenge:** Different issues experienced in bringing the single service together; geographical and local issues, creating a common vision and shared values, engaging the workforce in what is a significant change for some

- Key issues:

  - Staff engagement
  - Partnership working
  - Conflation of issues between single service/future delivery framework
  - Timing

Longer Term: Preferred Delivery Framework – Hub & Spoke



- All routine work is undertaken in the central hub. Emergency/urgent work will be undertaken in the Essential Services Laboratory (ESL) on each acute site

- The future model **will not be a one size fits all** and there will be a bespoke approach to designing ESLs to respond to geographical factors and to meet the clinical requirements and specialties of specific acute sites

- Progress with this work once capital allocation is received

- Further engagement planned with staff to agree delivery framework and associated model of care

- A Quality Committee will be convened to ensure all issues/risks raised are considered and mitigated as the future model is designed

Components of Making Progress/Key Enablers

- **Leadership – appointment of Managing Director.** It is critical that there is clear leadership to agree a strategy and critically support the implementation of that strategy

- **Resources to recruit** a clinical and managerial team to develop the new service. Immensely beneficial in supporting the transformation and driving development of a single service

- **Establishment of an Executive Board** comprising clinical leaders and executive leaders from each of the 4 Trusts that provide pathology services within Lancashire & South Cumbria

- **Driving the formation and implementation of the strategy** to develop a single service and subsequently a new clinical model for patients within the ICS

- **Securing commitment from each of the Trust Boards** and particularly the Chief Executive Officers of each organisation to support the transformation process and to allocate resources as required

- **Development of governance arrangements** to support the hosted service where all the staff and other resources come together to provide a new model of service for our patients

- **Consolidation and collaboration to implement technology led solutions** to improve services. Procurement of a new Laboratory Information Management System (LIMS) which will be deployed across all services.

Components of Making Progress/Key Enablers

- **Chief Executive Officers have taken a key leadership role** in championing the new service and ensuring that there is appropriate support from the Lancashire and South Cumbria ICS and regional and national colleagues

- **Establishing a new model of 'shareholder ownership'** underpinned by a collaboration agreement. Formation of Shareholder Board where Chairs and Chief Executive Officers of each provider trust receive assurance on the delivery of the strategic objectives

- **Formation of an Executive Board** to oversee day to day running of the service

- **Representation and influence at regional level**, seats on regional steering group and Clinical Director appointed as North West Pathology Lead

- **Investment in time to develop a clear vision, values and strategic objectives** to clearly convey the purpose of the new service whilst in parallel ensuring the formation of governance arrangements needed to develop new models are clear, understood and agreed by all shareholders.

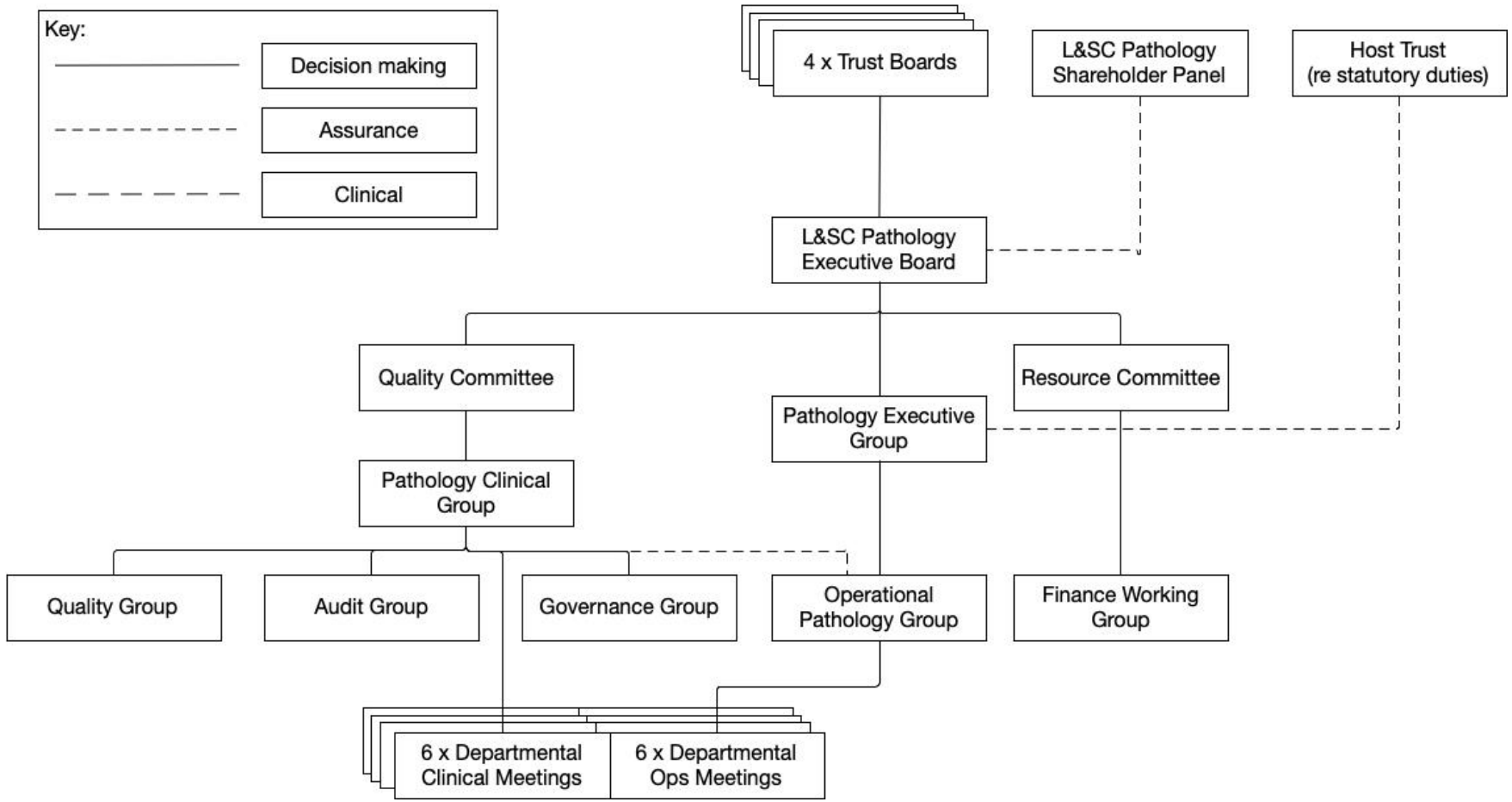
Wider Components of Making Progress/Key Enablers

- Approval of business cases and allocation of capital
- Close working and mutual aid – positive response to pandemic
- Alignment of management resources and protocols to operate as one service
- Signing of Collaboration Agreement
- Staff consultation & partnership working
- Procurement of a single LIMS
- Digital pathology (successful capital award)
- Blood science equipment procurement
- Logistics

Governance Arrangements

- The 4 Trusts in L&SC have agreed to form a single pathology service from 1 July 2022
- The single service will be governed by a Pathology Executive Board consisting of 2 Board directors from each Trust
- Each Trust has approved the delegation of certain decisions to their 2 directors sitting on the Pathology Board and also agreed what decisions are reserved for the individual Trust Boards
- The service will be hosted by one Trust on behalf of the others and all staff, budgets, contracts etc will transfer or novate to the host Trust by 1 July 2022
- All of the above is contained within a Collaboration Agreement which is the legally binding document all 4 Trusts need to approve
- These arrangements are partly driven by the current legal restrictions on Foundation Trusts in terms of establishing joint committees or delegating powers to others bodies
- The forthcoming NHS bill is expected to change some of these powers but in any event the partners have agreed to review the arrangements before the end of the first year of operation.

Governance Architecture



Financial Arrangements

- The four trusts have agreed to invest in the central team to drive forward and deliver this transformation of pathology services in L&SC

- This investment has been required for several years and ranges between £1.3m and £1.7m per annum. However, this is only non-recurrent as eventually these costs will either cease or be absorbed within the rest of the pathology budget

- The investment has included the costs of the core leadership team, legal support and communications (1 WTE senior comms person)

- Trusts are contributing pro-rata to the relative size of their existing pathology laboratories (as measured by budget in 2019/20)

- The Trusts have also agreed a gain/risk share should that be required at any stage of the term of the collaboration agreement.

Communication & Engagement

Invest in a dedicated communication resource in the senior team. This has enabled the development of a communication strategy aligned to programme milestones and supports engagement with employees and external stakeholders

- Established communication channels and processes for engagement - quarterly ‘MD Connect Event’, focus groups and forums
- Regular external engagement opportunities with MPs, overview and scrutiny committees, the Local Medical Committee and other key forums across the health economy
- The build of an Extranet site that all employees can access to view programme information
- The development of a vision and values for the future service, depicted in a strategic wheel
- Development of a visual identity for the future service, this will be applied to a suite of materials to create a corporate identity
- Establishment of a social media presence to raise the profile of the service and build partnerships
- Creation of high quality publications to promote and showcase progress

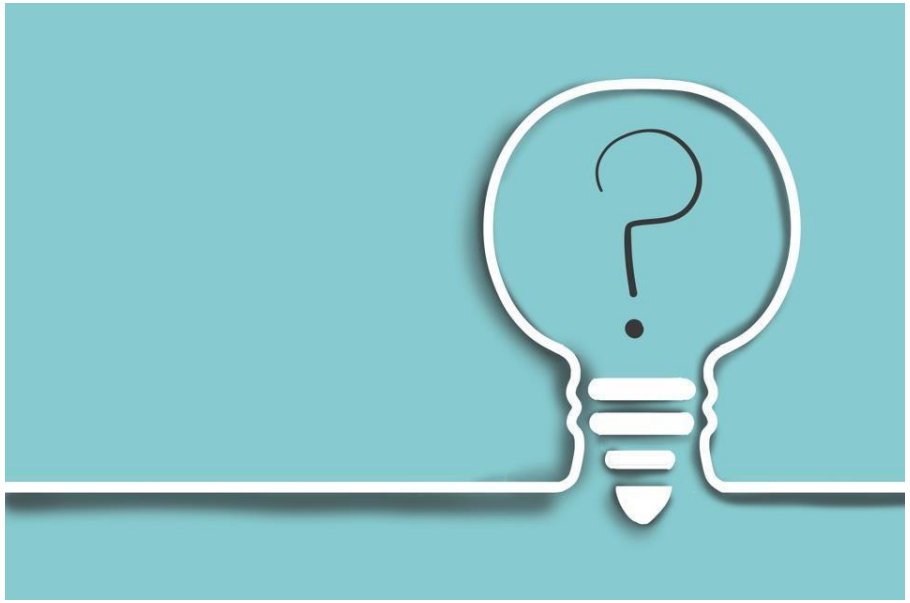
Top Tips to Take Away

- Invest in leadership that has the experience and influence to drive the change forward. Use a co-production model to ensure the balance of clinical and operational leadership
- Engage clinicians from the outset, establish a Clinical Reference Group – key forum for debate and the resolution of issues
- Involve and engage employees in workstreams as much as possible
- Create a culture of openness and transparency, share Board papers and details of key decisions that have been made
- Work in partnership, recognise that this is a big change for some

Lancashire and South Cumbria
Health and Care Partnership

NHS
Lancashire and South Cumbria
Pathology Service

Any Questions?



Web healthierlsc.co.uk/pathology | **Facebook** @HealthierLSC | **Twitter** @HealthierLSC

Mr Chris Sleight,
Greater Manchester Clinical Support Services Director – Chair of the Greater Manchester Imaging Network at Greater Manchester Provider Federation Board

NHS
in Greater Manchester

Greater Manchester NHS Provider Federation Board
Part of Greater Manchester Health and Social Care Partnership

Greater Manchester Pathology Network

Greater Manchester's Diagnostics Digital Enterprise Solution, and our journey to a Pathology Network

Chris Sleight – Chief Officer

April 2022

Greater Manchester Demographics

Greater Manchester has a population of 2.8 million and encompasses one of the largest metropolitan areas in the United Kingdom and comprises ten metropolitan boroughs of Bolton, Bury, Rochdale, Tameside, Stockport, Trafford, Wigan and the cities of Manchester and Salford.

Greater Manchester is a complex system, and in health terms service (for example the GM Imaging network) may include East Cheshire.

Greater Manchester Pathology Network

Greater Manchester has seen much Pathology Networking over the last 20 years. These include:

Pennine Acute Hospitals

PAWS (Pathology at Wigan & Salford)

Manchester Foundation Trust (South Manchester, Central Manchester and Trafford)

Northern Care Alliance

Stockport and Tameside & Glossop joint LIMS procurement

Greater Manchester Pathology Network

East Cheshire are not part of the GM Pathology Network, but the specialist Cancer Centre at Christie is included.

The Pathology Network was formally established in January 2021.

Currently our self assessment is “Pre Emerging” in terms of maturity, but we have significant plans to mature the network quickly and these are particularly advanced in our digital programme of works and future plans.

Why a GM Pathology Network?

7. To fulfill the National mandate for developing a thriving Pathology network by **2024**
6. Recommended in several publications including Sir Mike Richards Report, State of the Nation report & Diagnostic Commercial Model Guidance
5. Increased demand for Pathology services particularly due to COVID and managing recovery
4. Work together on developing a region wide approach to introducing advanced technology and digitisation
3. Address workforce shortages and service pressures
2. Requirement to address levelling up of quality across GM pathology & equity of access
1. To reduce health inequalities

GM Pathology Network Statement of Work

1. To design and create a Greater Manchester Pathology Network which serves as a representative of all provider sites

2. To provide an appropriate governance structure to support transformational work of Pathology services at each of the NHS provider sites

3. To produce a Strategic outline case and full business case to describe the operating model for the Pathology network

4. To develop and implement a Greater Manchester Digital Pathology strategy and business case which will provide an integrated digital infrastructure across GM Cellular Pathology services

5. To lead on and engage relevant stakeholders on the development of a blueprint including coordinated procurement and alignment of the Laboratory Information Management System (LIMS) for a single LIMS operating model which will serve all providers within the GM Pathology network.

6. To work with regional workforce leads to perform a diagnostic check on current workforce and develop a shared pathology workforce strategy which seeks to standardise jobs and responsibilities across the Pathology disciplines

7. To understand the feasibility and functionality of developing a Greater Manchester Pathology data dashboard to provide a helicopter view of capacity and demand and present this data back to influence decision making

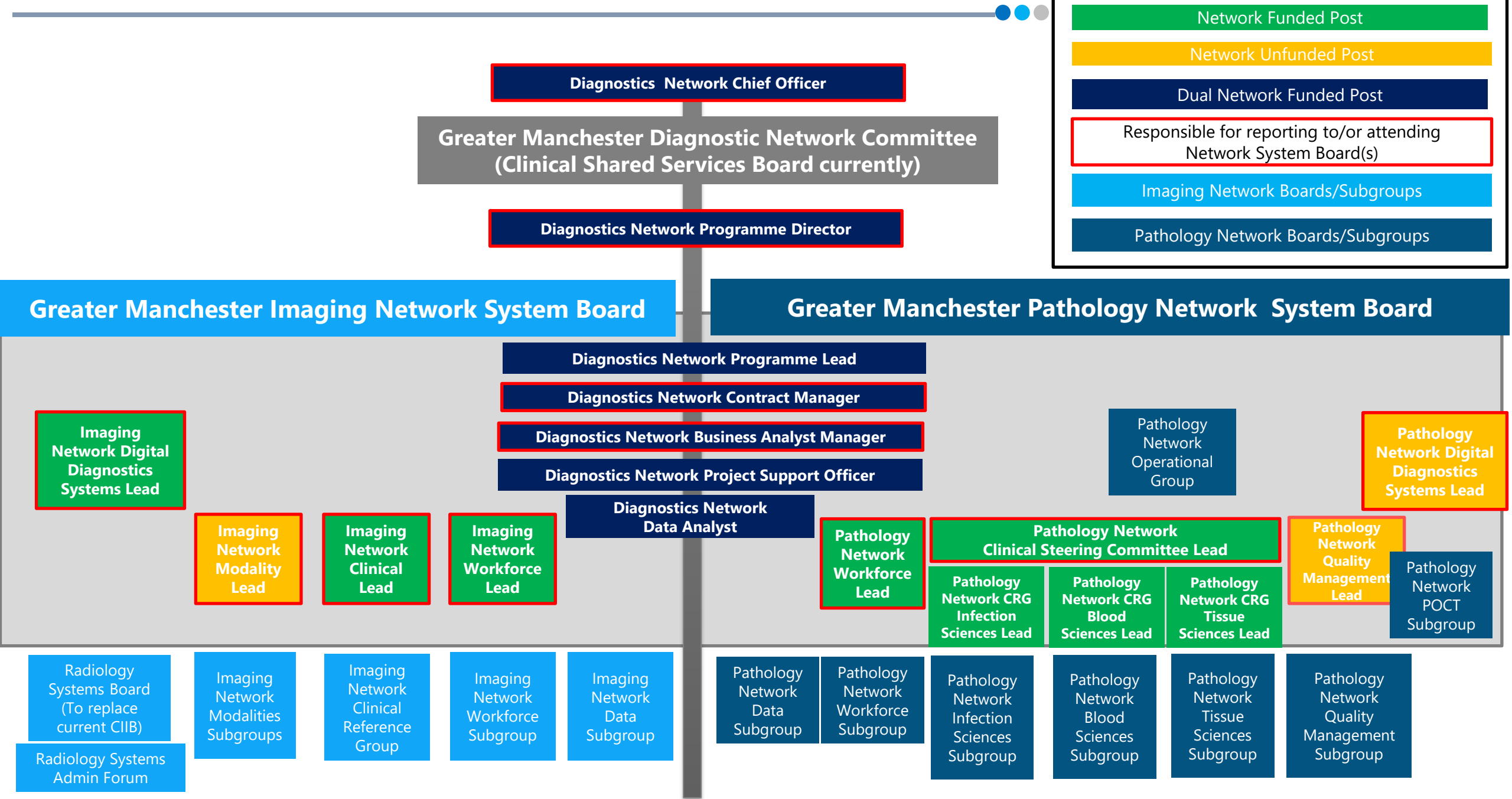
8. To develop a shared capital equipment plan that addresses ownership and replacement of assets and investment needed to manage diagnostic growth

9. To act as a collaborative influence for the procurement of Greater Manchester owned assets, provider owned equipment, consumable and outsourcing contracts

10. To influence and shape the Community Diagnostic Hub Programme for Greater Manchester and work in partnership with the GM Imaging Network to co-ordinate a local approach to deliver an overall CDH model for GM.

11. To work closely with the NW Regional Pathology networks to meet and deliver the regional and national demands of Greater Manchester.

GM DIAGNOSTIC NETWORK PROPOSED STRUCTURE



OUR NETWORK HIGH LEVEL DELIVERABLES

KEY ELEMENTS OF A PATHOLOGY NETWORK	WHAT HAS BEEN DELIVERED TO DATE				OUTSTANDING DELIVERABLES		
NETWORK OWNERSHIP & GOVERNANCE	Pathology Network SOC developed & approved	Lobbied region for GM Pathology network funding		SECURED	Recruit to network specific roles	Formalise new Senior Reporting Officer	Formalise collaborative network model with all providers
STATEMENT OF WORK, PRIORITISATION & MATURITY MATRIX	Statement of Work developed and approved			CAPITAL FUNDING	Prioritisation of schemes	Align GM Digital Strategy with Pathology initiatives	Align Pathology network matrix with statement of works
PATHOLOGY WORKFORCE	Identification of GM Pathology Workforce Lead	Formal establishment of workforce group		OVER £42MILLION	Develop a GM Pathology Workforce strategy	Workforce standardisation including pay and grades	
LABORATORY INFORMATION MANAGEMENT SYSTEMS	Work with GM Digital to develop a GM LIMS strategy & blueprint	Contribute to the GM Digital Diagnostic Capability Fund PID			Work with GM digital to agree standardise LIMS nomenclature	Procure & implement local LIMS systems	LIMS Interoperability Benefit Realisation
DIGITAL PATHOLOGY	Work with GM Digital to develop a GM Digital Pathology strategy	Development of a GM Digital Pathology Strategic Outline Business Case	Agreed a GM wide Digital Pathology solution to digitize 15% of laboratory workload		Procure and implement first phase of GM Digital Pathology solution	Develop full business case for GM Digital Pathology	Plan and deliver phase 2 GM Digital Pathology solution
CAPITAL EQUIPMENT & PROCUREMENT	Work with GM Digital to submit national funding application for GM digital solutions			To support LIMS replacement Digital Pathology LIMS Standardisation	Engagement with other system procurement groups	Establish GM procurement subgroup	Collaborative Insourcing & Procurement Processes
CAPACITY & DEMAND MODELLING	Work with GM Data Intelligence teams to develop a GM wide data analyst Job description				Recruitment of GM Imaging network data analysts	Establishment of a GM Pathology Data Group	Development of GM Pathology reporting data set
CLINICAL & OPERATIONAL LEADERSHIP	Circulate expression of interest for Pathology clinical leadership representative				Recruit to GM Clinical Pathology Leads per discipline		Review best practice Pathology pathways within GM
RESOURCES	Identify initial core GM programme team members	Established working relations with Health Innovation Manchester	Work with NW regional Pathology networks		Confirm GM network specific programme team	Agree plan for recruiting to fixed term delivery roles	

Our Greater Manchester Digital Enterprise Solution

Started as 11 Greater Manchester Trusts

Bolton NHS Foundation Trust;
The Christie NHS Foundation Trust;
East Cheshire NHS Trust*;
Central Manchester Foundation NHS Trust;
Pennine Acute Hospitals NHS Trust;
Salford Royal NHS Foundation Trust;
Stockport NHS Foundation Trust;
Tameside and Glossop Integrated Care NHS Foundation Trust;
Trafford General Hospital Trust;
University Hospital of South Manchester NHS Foundation Trust;
Wrightington, Wigan and Leigh NHS Foundation Trust.

The journey began as a GM PACS procurement and grew into a Digital Enterprise Solution for Diagnostics

START

July 2013 Year 1

Formation of a GM PACS Procurement Consortium

2016

Consortium agrees programme funding

Commissioned a 3rd party to produce a GM PACS business case

2018

Procurement Process shortlisted 3 preferred options

Issues identified with site visits

2019

New SRO appointed

Full Programme reset expanded to Digital Enterprise Solution across Diagnostics

2020

New Programme team appointed

Overhauled rewrite of the business case

GM wide approval for business case

PACS implementation commences with Pennine becoming the first trust to go live

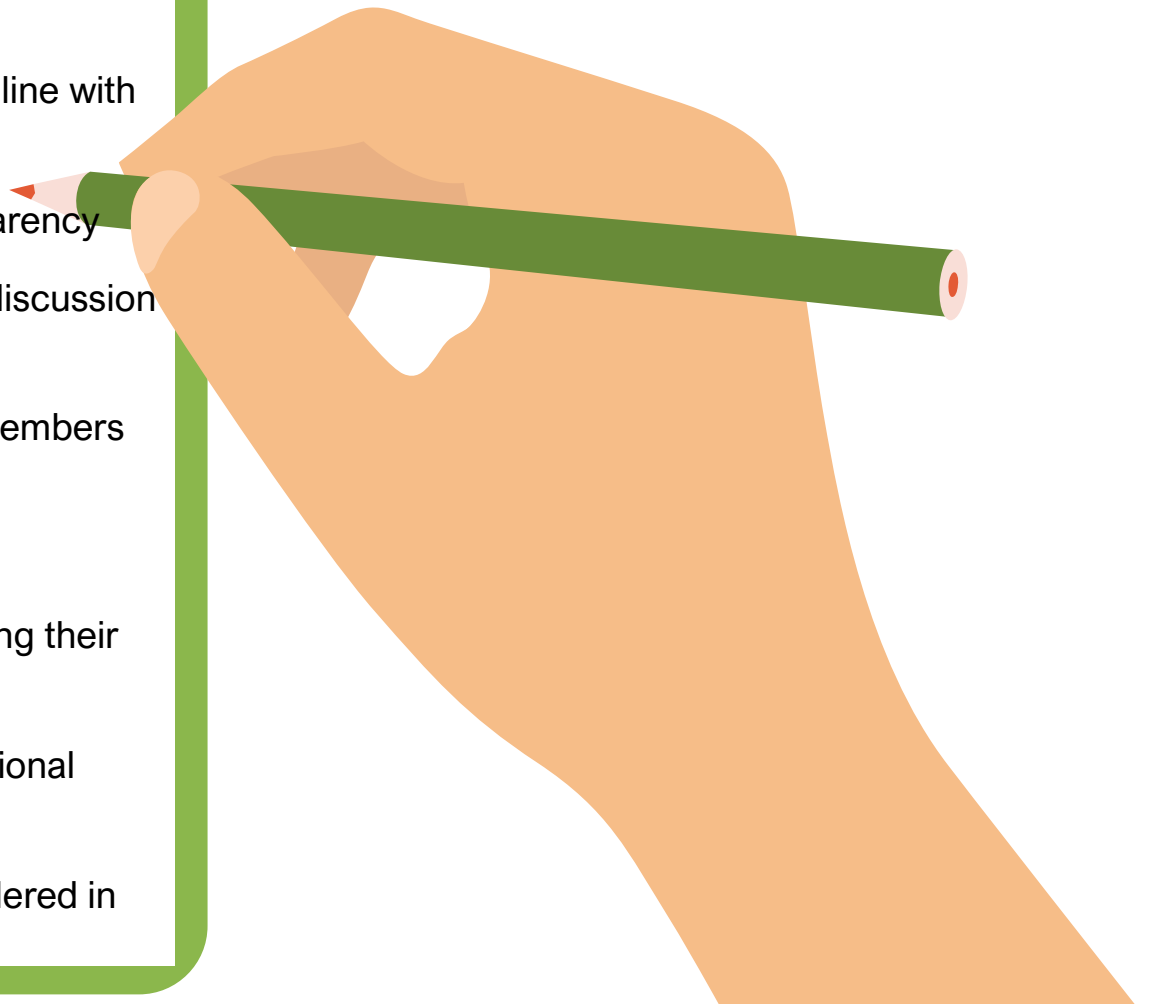
March 2022 Year 10

All organisations bar one are now live with the new PACS system. Final go-live on 7th May 2022.

First Phase of Digital Pathology agreed 2021.

Our Recommendations for a Successful Collaborative Procurement

1. Provide adequate funded project resourcing, particularly procurement, technical and delivery
2. Form central (single top team) with ring fenced project resourcing
3. Establish project, board governance and function in line with best practice programme management methodology.
4. Ensure strong technical decision making and transparency
5. Leverage workstreams for expertise and to remove discussion from board level
6. Deliver clear weekly communication updates with members and suppliers and other stakeholders
7. Use site visits only to validate scoring
8. Develop smaller evaluation team - scorers only scoring their own areas of expertise – but plan this meticulously.
9. Remit – Ensure transformation alignment against regional priorities.
10. Ensure Innovation/Future tech /AI strategy is considered in scope of project



Greater Manchester Pathology Network – Digital Pathology Phase 1

Activity
GM capacity to digitise 13.9% of overall activity

Hardware/Software
100 workstations
9 Digital Pathology scanners

Implementation Delivery Team
X4 posts

Opportunities
1. GM wide Cellular Pathology Reporting Model

2. Use of Artificial Intelligence to support reporting workflows and diagnosis

3. Standardisation of Digital Pathology processes

4. Sustainability of Cellular Pathology services

GM Digital Pathology Programme – Phase One Proposed Implementation Plan

	22/23 Q1 APR - JUN	22/23 Q2 JULY - SEPT	22/23 Q3 OCT - DEC	22/23 Q4 JAN - MAR	23/24 Q1 APR - JUN	23/24 Q2 JULY - SEPT	23/24 Q3 OCT - DEC	23/24 Q4 JAN - MAR
Stockport	UKAS DP				UKAS	LIMS		
Bolton		UKAS Replacement blood tracking	DP			UKAS LIMS		
Christies		UKAS GM PACS				UKAS		DP
Salford	UKAS			DP	UKAS			
Oldham			UKAS		DP		LIMS UKAS	
Oxford Rd		UKAS				UKAS DP		
Whythenshawe			EPR ?LIMS UKAS				UKAS	

GM Digital Pathology Programme

Greater Manchester Pathology Network – Digital Pathology Future

GM capacity to digitise up to 100% of Cellular Pathology Images (definitely over 75%)

Expansion of the Digital Pathology infrastructure into other 'ologies'

NHS
in Greater Manchester

Greater Manchester NHS Provider Federation Board
Part of Greater Manchester Health and Social Care Partnership

Greater Manchester Pathology Network

Any questions????

Chris Sleight – Chief Officer

April 2022

Dr Yasmine Makhlouf,
AI scientist of Precision Medicine Centre- Queen's University Belfast

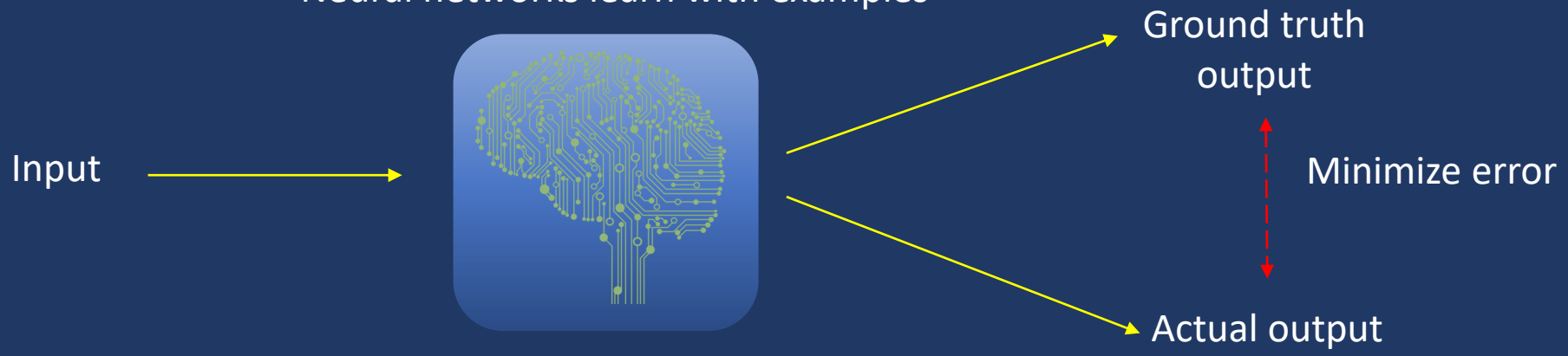
Artificial Intelligence In Digital Pathology:

A Roadmap To Routine Use In Clinical Practice

Dr. Yasmine Makhlouf
Lead data scientist
Precision Medicine Centre of Excellence
Queen's University Belfast

Deep learning-AI in general

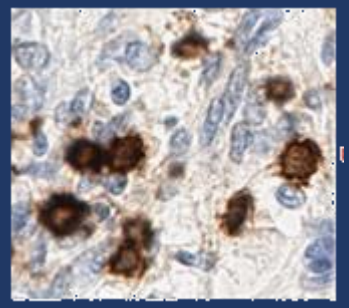
Neural networks learn with examples

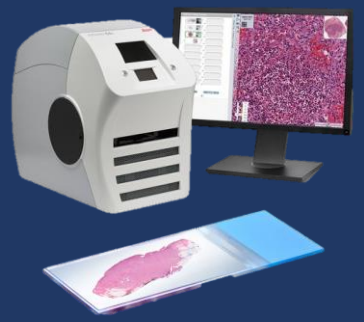


Adjust parameters to satisfy ground truth output

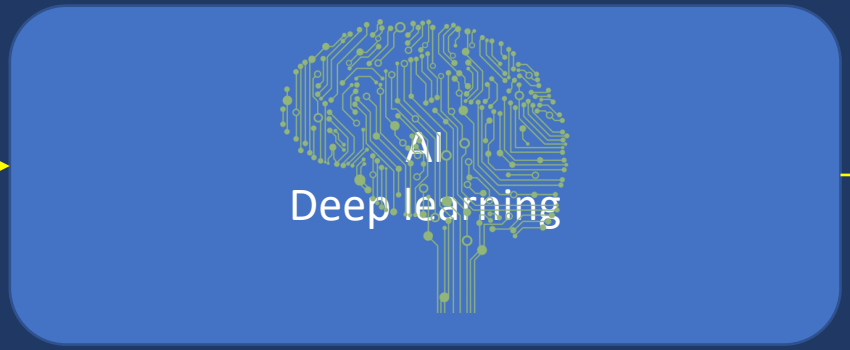
AI in Digital Pathology

Input

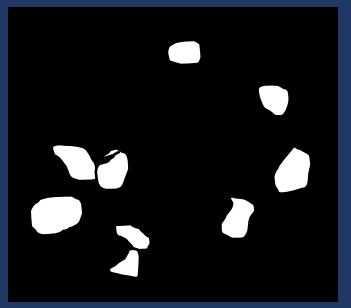


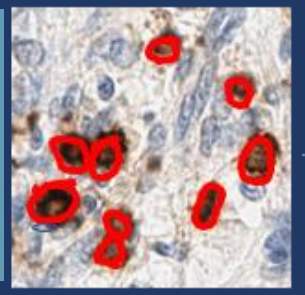


Laboratory staining and scanning



Ground truth output





Pathologists hand generated annotations

Applications

- Biomarkers detection and patient survival (CD3,CD4,CD8)

- IMAGE DX

- FDA-approved Paige Prostate

Applications :
Biomarkers detection and patient survival

Applications : Biomarkers detection and patient survival (PathLake)

- Five new Centres of Excellence in digital pathology and medical imaging.

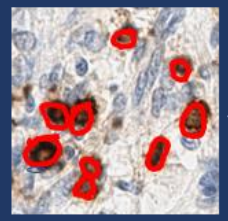
University Hospitals Coventry and Warwickshire NHS Trust	Oxford University Hospitals NHS Foundation Trust	Nottingham University Hospitals NHS Trust	Queen's University Belfast – Precision Medicine Centre of Excellence
Automated biopsy analysis	Prostate cancer	Breast cancer	Colorectal cancer

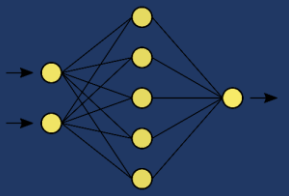
- Development, validation and implementation of AI in cellular pathology.

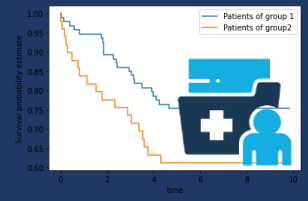
- Invaluable data resource for researchers and UK industry

Applications : Biomarkers detection and patient survival

Staining and scanning → Quality check in Image processing software → Hand generated annotations → Quality Check annotations → AI models design and training → Survival analysis

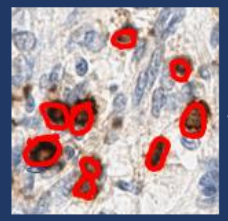


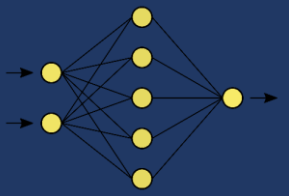


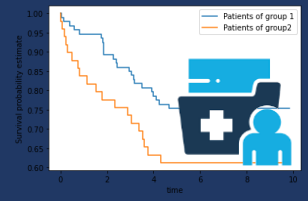


Applications : Biomarkers detection and patient survival

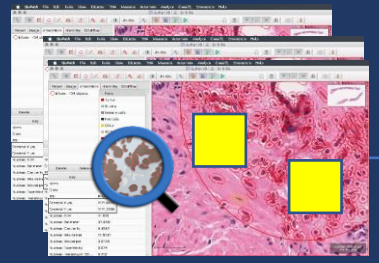
Staining and scanning → Quality check in Image processing software → Hand generated annotations → Quality Check annotations → AI models design and training → Survival analysis



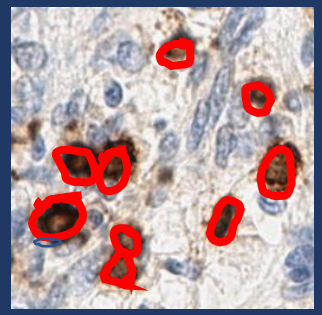




Annotations



Create projects + patches for each annotator



Annotators highlight features of interest using Qupath tools

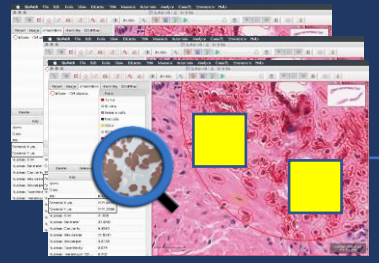
Pathologists

- Check quality of the annotations
- Identify inaccurate annotations, and correct them with a different class colour.

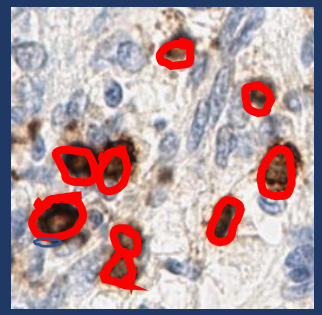
Data scientists

- Check annotations are adequate enough to properly train the models.
- Objects separated properly.

Annotations



Create projects + patches for each annotator



Annotators highlight features of interest using Qupath tools

Pathologists

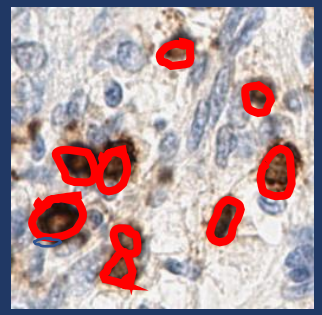
- Check quality of the annotations
- Identify inaccurate annotations, and correct them with a different class colour.

Data scientists

- Check annotations are adequate enough to properly train the models.
- Objects separated properly.

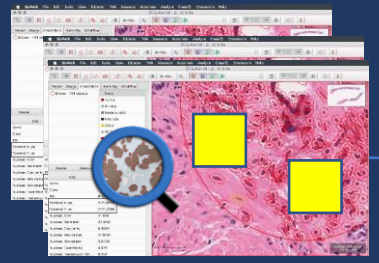
Annotations

Create projects + patches for each annotator

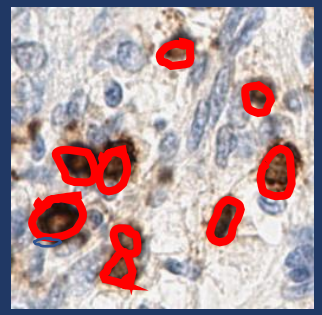


Annotators highlight features of interest using Qupath tools

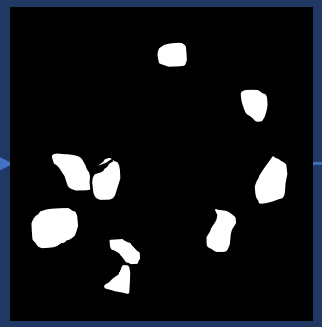
Annotations



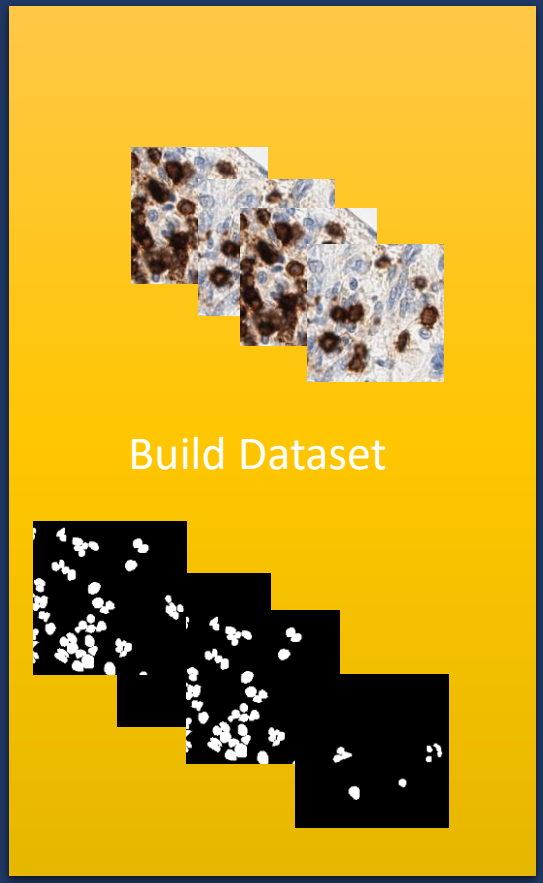
Create projects + patches for each annotator



Annotators highlight features of interest using Qupath tools

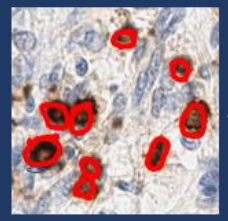


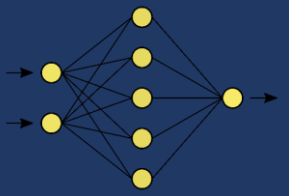
Extracted mask

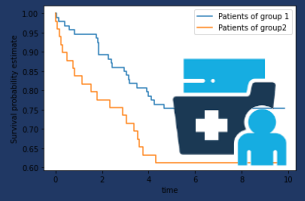


Applications : Biomarkers detection and patient survival

Staining and scanning → Quality check in Image processing software → Hand generated annotations → Quality Check annotations → AI models design and training → Survival analysis







*Sarker, Makhlouf et al. Cancers 13, 3825. https://doi.org/10.3390/cancers13153825

*Model Development

Test different deep learning architecture → Test different deep learning parameters → Find the best combination

1

Unet
Detetron 2
Densnet
UNetPus

2

Optimizer (Adam , gradient descent)
Loss function (BCE)
Patch size
Post-processing

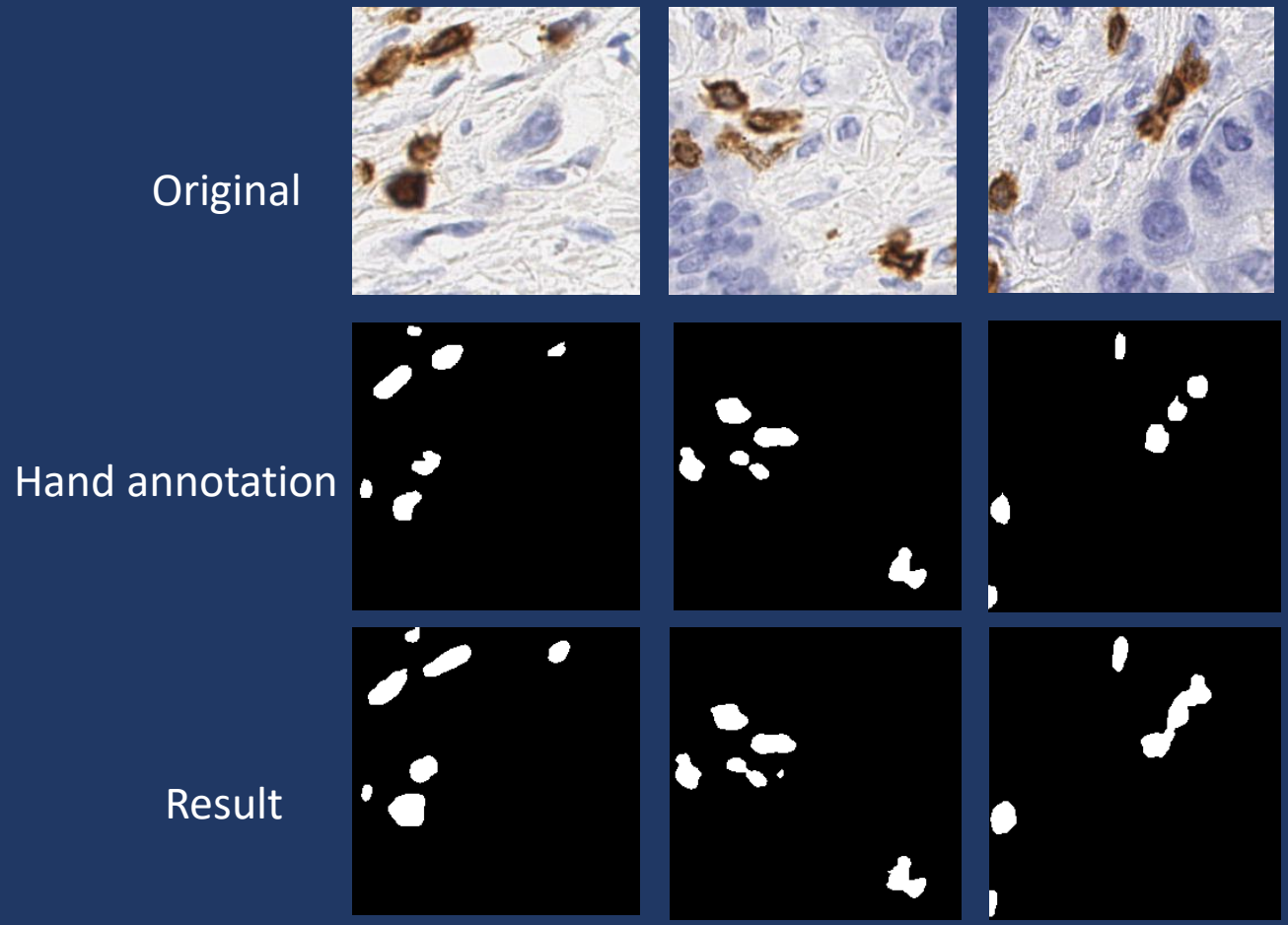
3

Unet (CD3) , PSPNet (CD4), UNet(CD8)
Optimizer : Adam
Loss function : Binary cross entropy

Dataset

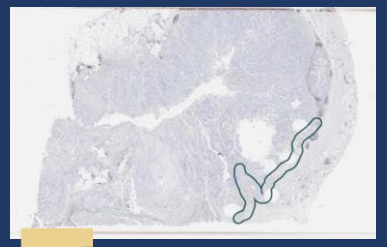
Results

Good concordance with hand annotations



Patients survival

CD3,CD4,CD8 density



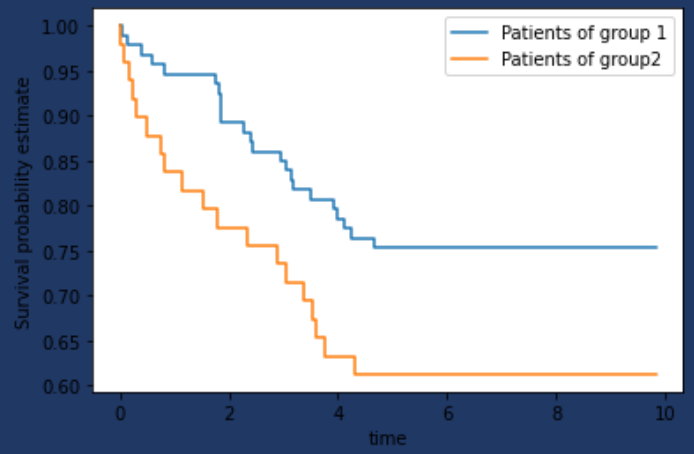
CD3,CD4,CD8 density

CD3,CD4,CD8 density

Group 1 > Threshold

Group 2< Threshold

Survival curves



P-value : 0.004
HR : 1.84
95% CI : 1.003 – 3.38

Applications

- Biomarkers detection and patient survival (CD3,CD4,CD8)

- IMAGE DX

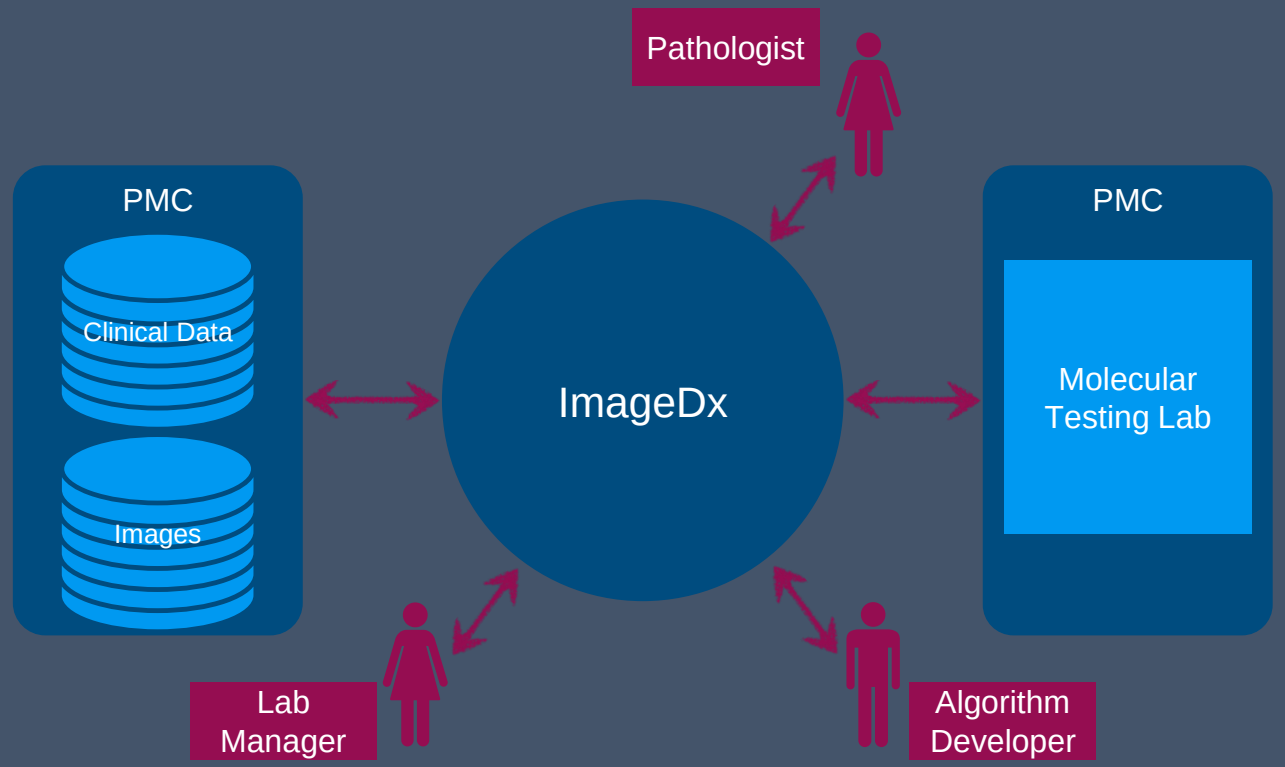
- FDA-approved Paige Prostate

Applications : IMAGE DX

NHSX AI Award

ImageDx

- Model for deployment of AI within a centralised lab
- MSI
  - Determining the Microsatellite Instability status using AI for colorectal cancer cases
    - Currently determined using lab tests
    - Aiming to reduce lab testing by 60%, with consequent time saving of ~2 weeks
- PD-L1
  - Determining the PD-L1 Tumour Proportion Score for Non Small Cell Lung Cancer cases
    - Currently determined manually by pathologists
    - Aiming to reduce pathologist time/case and improve consistency
- Will provide clinical evidence to seek CE-IVD approval for the algorithms and platform



SONRAI ANALYTICS

CURRENT STATUS & CHALLENGES

UK TESTS (NICE)		COSTS	
MSI:	PD-L1:	MSI:	PD-L1:
43,000	48,000	£4.1m - £8.4m	£7m
Per Annum	Per Annum	Per Annum	Per Annum

FURTHER CHALLENGES

Absence of a model for systematic delivery of AI diagnostics for personalised medicine

OUTCOMES

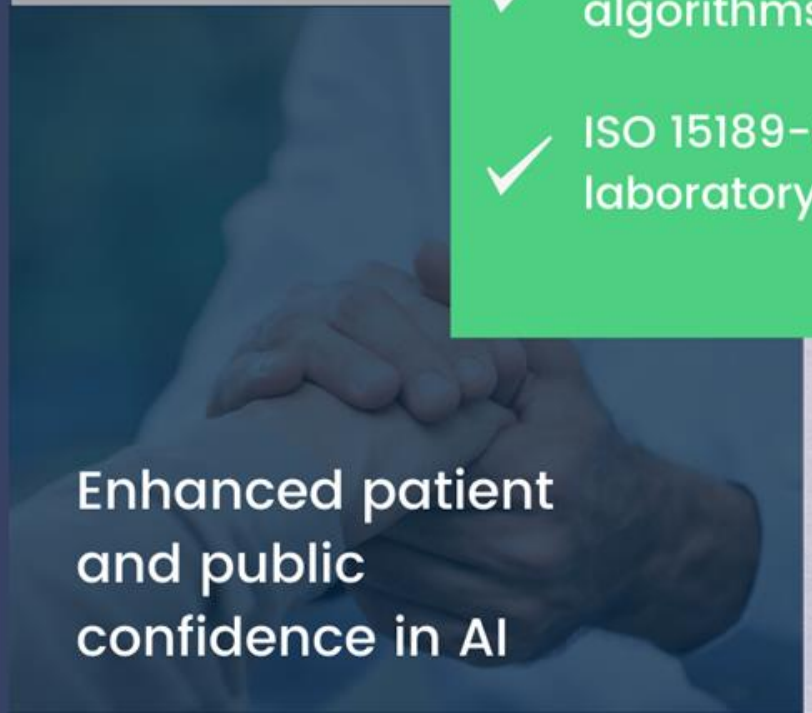
- Development of centralized model for testing - SPCH
- CE-IVD approved algorithms and platform - ImageDx CRC/Lung

Quicker results & patient benefits

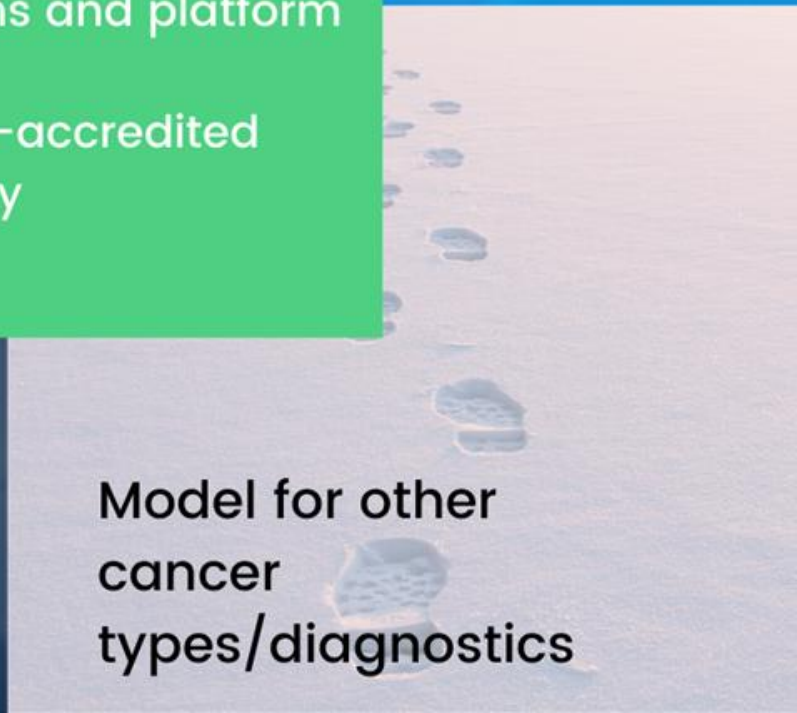
Cost Savings
£648k - £3.2m PA

Development of centralised model for testing

- ✓ CE-IVD approved algorithms and platform
- ✓ ISO 15189-accredited laboratory

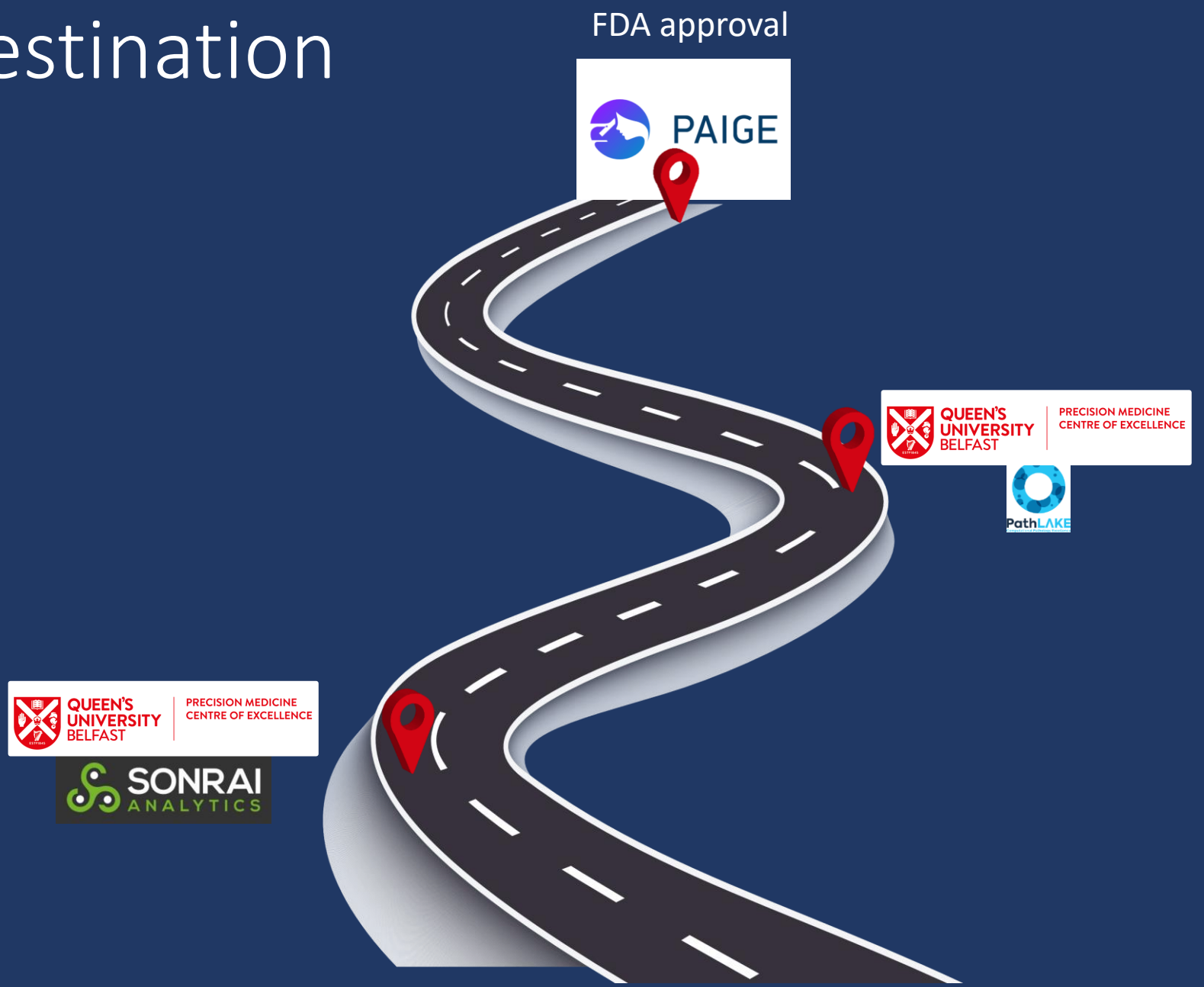


Enhanced patient and public confidence in AI



Model for other cancer types/diagnostics

Our destination



Applications

- Biomarkers detection and patient survival (CD3,CD4,CD8)

- IMAGE DX

- FDA-approved Paige Prostate

* https://info.paige.ai/prostate

Applications :

*FDA-approved Paige Prostate

* FDA-approved Paige Prostate

- Validated on slides from over 200 institutions.
- Offering robust performance without the need for tuning or recalibration.
- FDA approved

* https://info.paige.ai/prostate

Summary

- Deep learning-based pattern recognition methods can advance the field of pathology.
- PathLake Colon cancer tool and IMAGE DX projects are examples of promising future products for FDA approval.
- In discussion with potential industry partners.

NIBiobank
Northern Ireland Biobank

PathLAKE
Computational Pathology Excellence

QUEEN'S UNIVERSITY BELFAST
PRECISION MEDICINE CENTRE OF EXCELLENCE




















UKRI Innovate UK

INDUSTRIAL STRATEGY
UK Research and Innovation

Round up panel discussion:

- Jane Mills, Head of Pathology Transformation, NHS England and Improvement
- Mark Hindle, Managing Director, Pathology Collaboration, Lancashire and South Cumbria Integrated Care Partnership
- Saghar Missaghian-Cully, Managing Director at North West London Pathology
- Afshin Attari, Director of Public Sector and Unified Platforms at Exponential-e