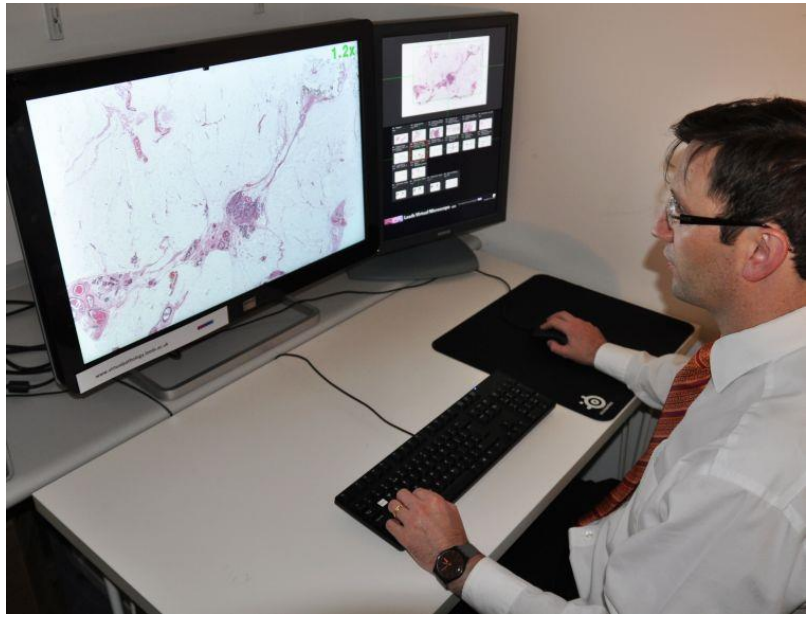
Darren Treanor BSc (Computing) PhD FRCPath
Consultant Pathologist, Leeds Teaching Hospitals
Hon Clin Prof, University of Leeds
Adjunct Prof, Linköping University, Sweden

What is pathology?

The Royal College of Pathologists
Pathology: the science behind the cure

What is a pathologist doing *here*?

Digital pathology: What it is and what it does



Why? I prefer my microscope…

FIGURE 4 NUMBER OF PATIENTS ON THE TWO WEEK WAIT PATHWAY, ENGLAND

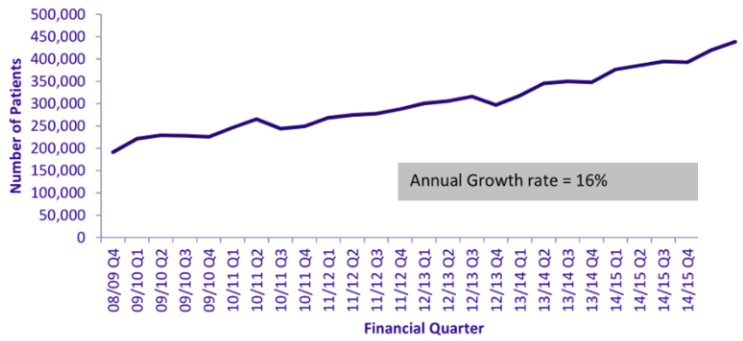
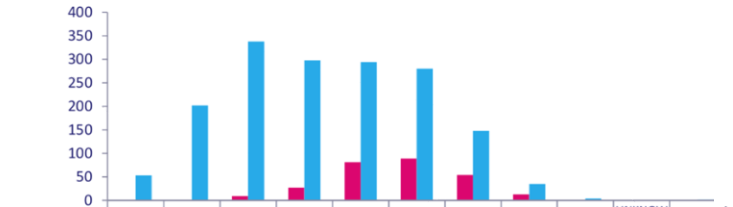
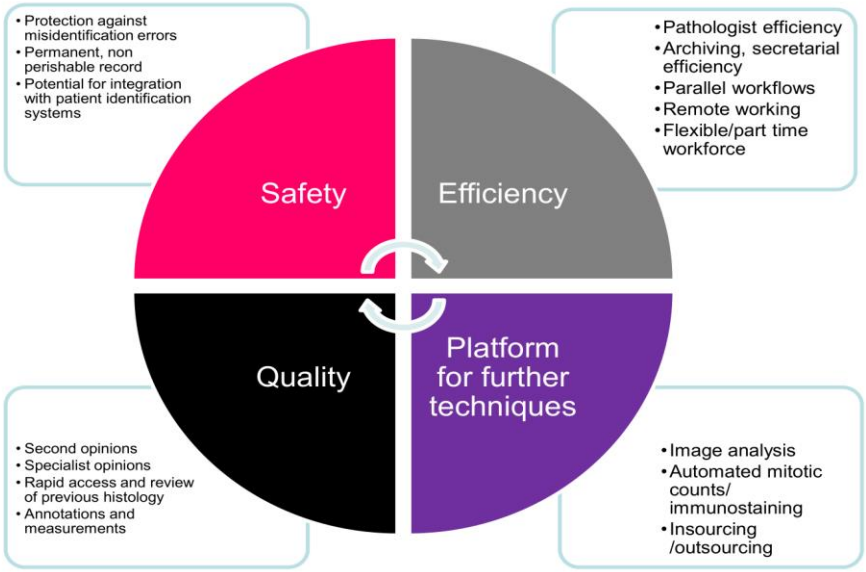


FIGURE 19 AGE PROFILE OF CONSULTANT CELLULAR PATHOLOGISTS



	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	UNKNOWN	75 - 79
Cytopathology	0	1	9	27	81	89	54	13	0	0	0
Histopathology	53	202	338	298	294	280	148	35	4	1	2

Source: Workforce data from the Royal College of Pathologists



Williams et al 10.1136/jclinpath-2017-204926
https://ai.googleblog.com/2018/10/applying-deep-learning-to-metastatic.html

https://arxiv.org/abs/1703.02442

National Pathology Imaging Co-operative: Summary

- Largest of 5 UKRI Centres of Excellence in digital imaging and AI
- 2019-2023
- £33.0m public funding
  - Industry strategy challenge fund (Office of Life Sciences)
  - NHSE/NHSI
- £11.4m industry funding

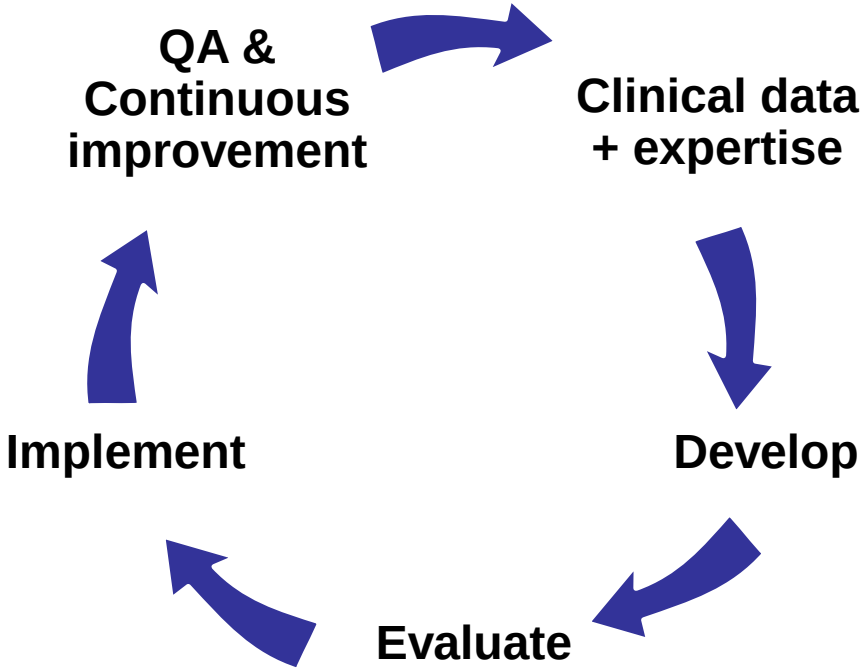
- Build a national digital pathology system as a *platform for the NHS*
- World leading scale
- > 30 hospitals to start, 3 Petabytes image data per year

NPIC: Aims

1. Drive clinical use of digital pathology

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

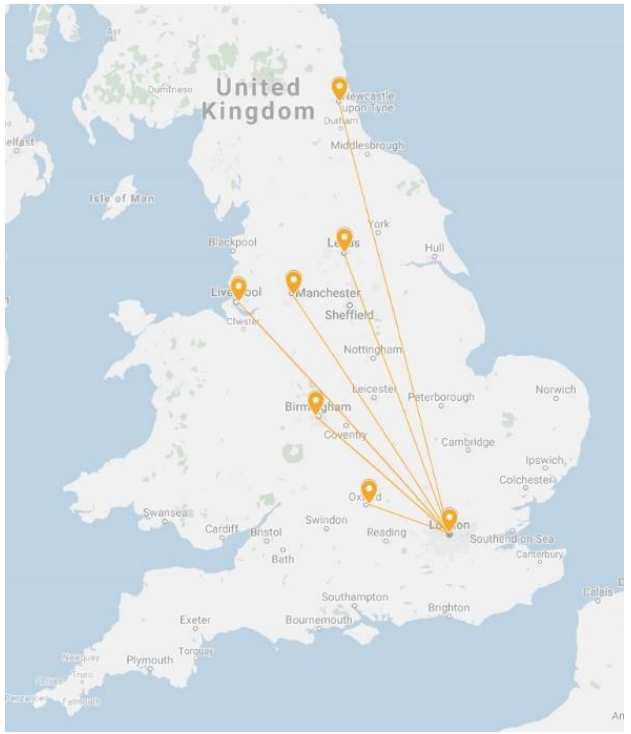
3. Support *further research and innovation*

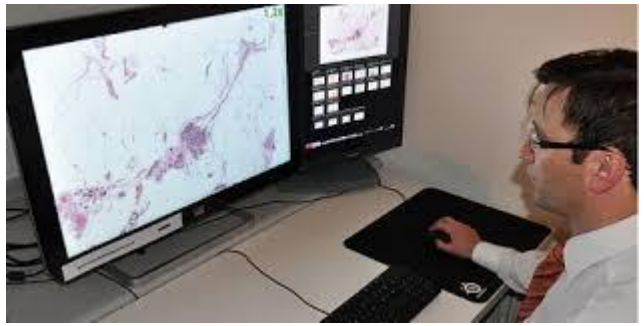


Supporting the entire AI lifecycle

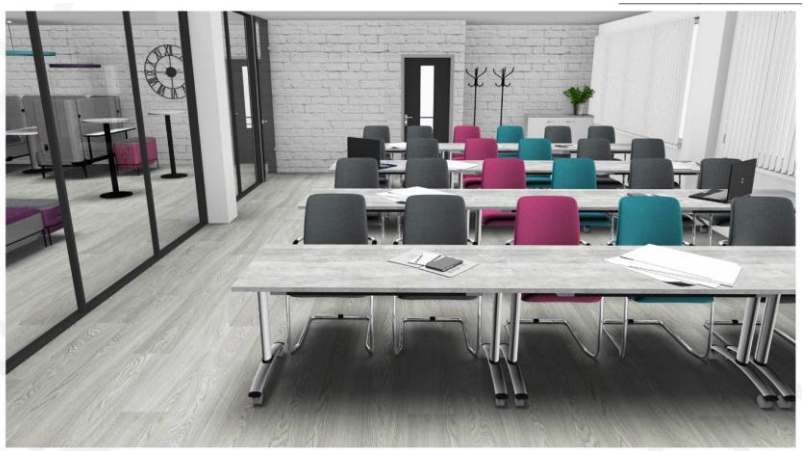
NPIC national VNA (Vendor Neutral Archive)

- *Centralised large data store* in secure PACS
  - Lowers barrier to entry - just need to connect scanner to it, or log on with your PC
- *Crosses regional boundaries*
- Facilitates clinical collaboration
  - See all slides in the network → Second opinion & MDT
- Better AI
  - Gather data from multiple sites at once
  - Roll out AI in multiple sites at once





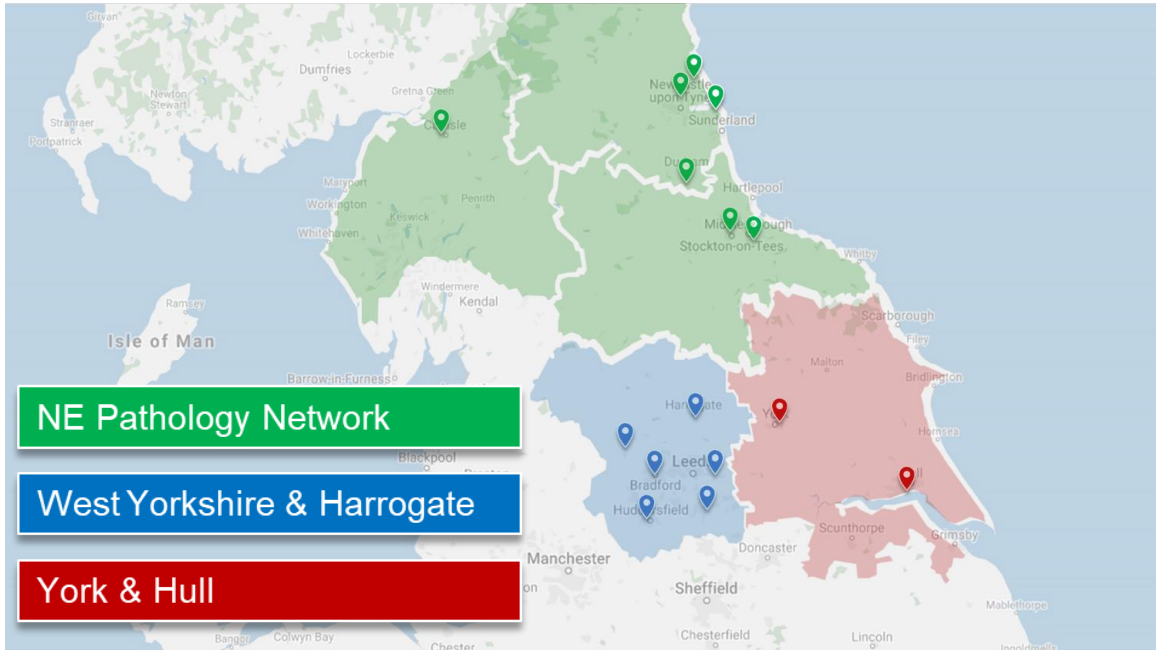
A National Digital Pathology Knowledge and Training Centre



- Hands on workshops and training for pathologists & biomedical scientists
- Centre for industry NHS collaboration including an incubator for start-ups
- Facility for scanning replicate datasets on diverse instruments

Scaling Up Full Deployment in 3 NHSI Pathology networks

- Full digitisation of 3 pathology networks in North – largest network in the world
- Share knowledge, procedures and QA processes from Leeds deployment



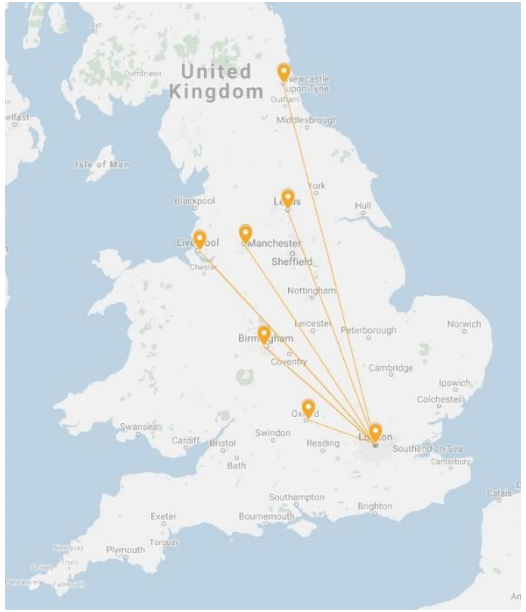
15	NHS Trusts
238	pathologists
6	million people
48	scanners
1	vendor neutral archive
2.4	million images per year

National Bone and soft tissue network

- Fully digitise RNOH (Royal National Orthopaedic Hospital)
- Link 7 soft tissue sites at Genomic Laboratory Hubs
- Link 50 pathologists

- NHSI National Bone Pathology Network – only 5 pathologists in the UK

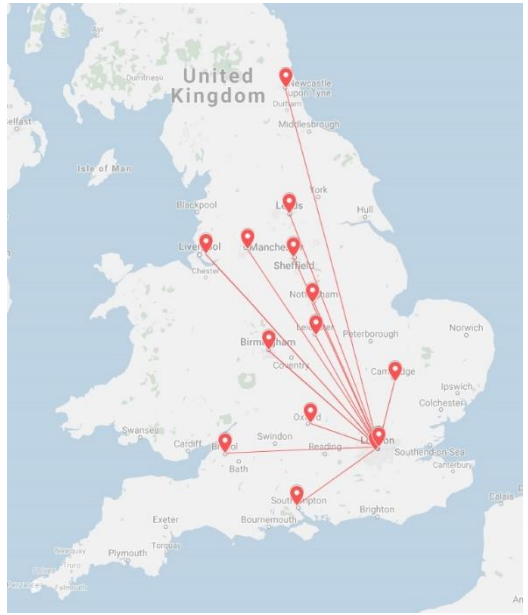
- Speciality with 25% rediagnosis rate – missing out on new therapies



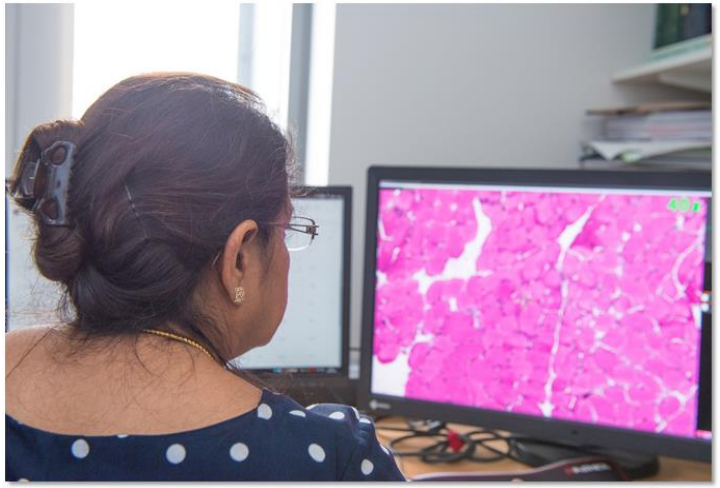
National paediatric pathology network

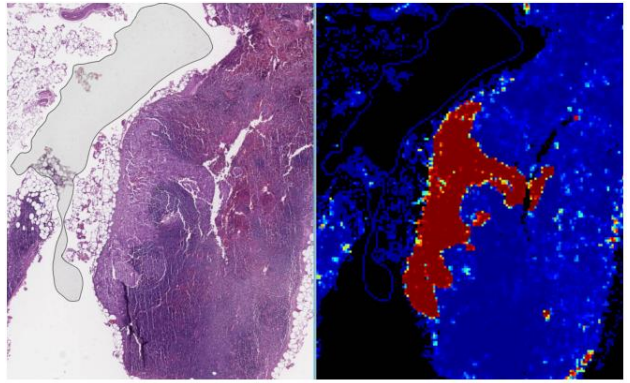
- Fully digitise GOSH (Great Ormond St Hospital)
- Link 19 Principle Treatment Centres (PTCs)
- 70 pathologists

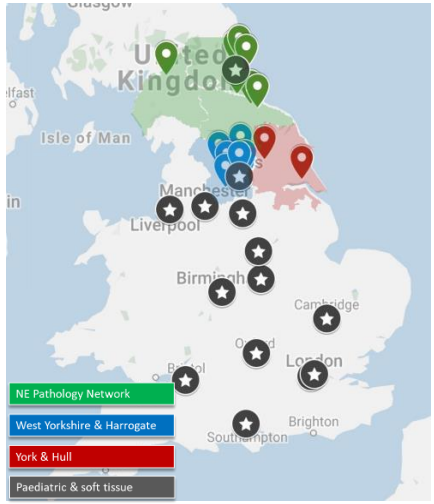
- Linked to Children's Cancer Care and Leukaemia group network (CCLG) and international expert review networks (SIOP)



National VNA and 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

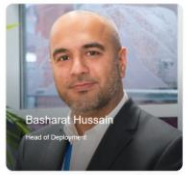
National research & innovation

- Pathology-Genome correlation in 2 cancer areas to start
- Support national clinical trials
- Support diagnostics innovation

Acknowledgements

Darren Treanor
Director
darrentreanor@nhs.net

Daljeet Bansal
Operations Director
daljeet.bansal@nhs.net



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