Where humans meet AI: integrating to achieve

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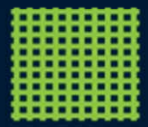
NHS England and NHS Improvement

Content

- A brief overview & personal perspective of AI & opportunities for AI in imaging
- Integrating radiology using networked solutions
- NHS England and NHS Improvement Imaging work

Cognitive systems excel at:

Natural Language



Pattern Identification

Locating Knowledge

Machine Learning

Eliminate Bias

Endless Capacity

Humans excel at:

Common Sense

Dilemmas

Morals

Compassion

Imagination

Dreaming

Abstraction

Generalization

AI in imaging

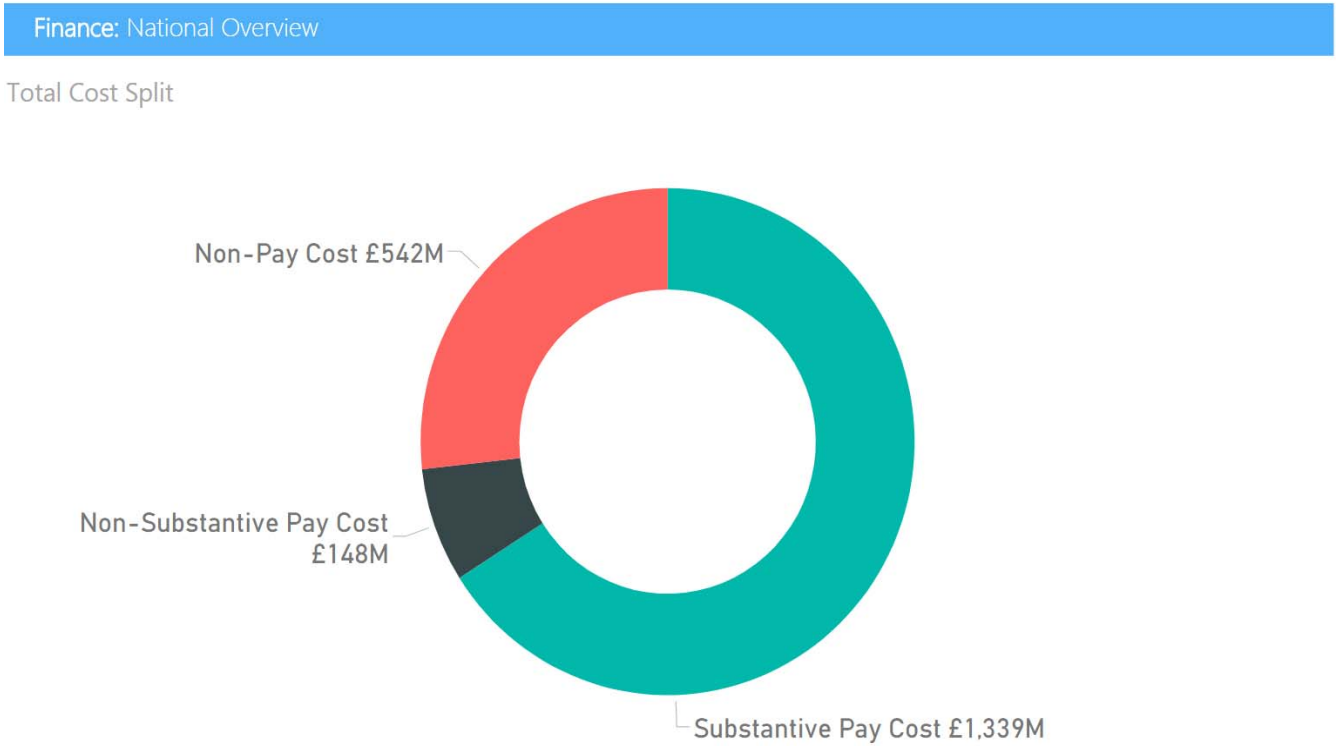
- IBM Watson, Google Deepmind, Microsoft and 100s possibly now 1000s of others
- All the OEMs: GE, Siemens, Philips, etc etc
- Much more than CAD

The potential for AI in UK imaging now

- Prioritisation of scans/slices with abnormal findings
- Comparison of sequential data sets to show change
- One of 2 reports for screening mammography
- Detection of abnormalities: pulmonary nodules, metastases, vascular abnormalities, haemorrhage etc
- Potential to speed up acquisition, reporting and increase capacity
- Increased automation and accuracy of image acquisition across modalities

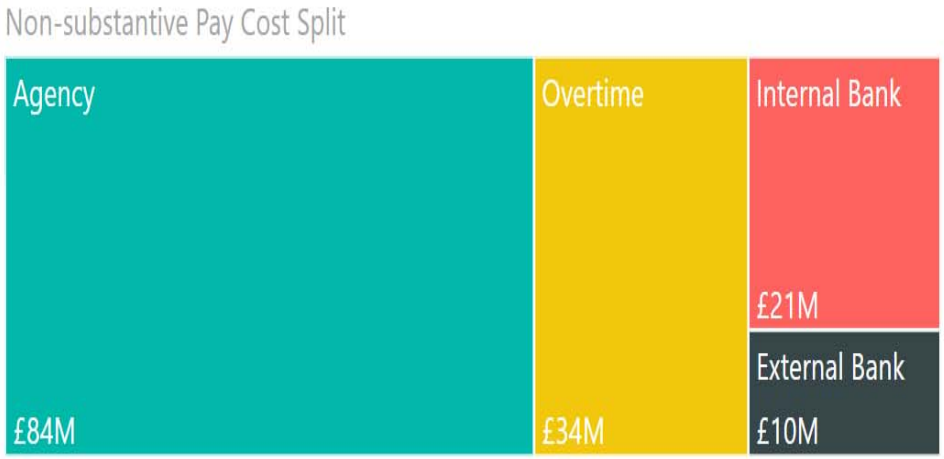
Why does this matter & where will AI help?

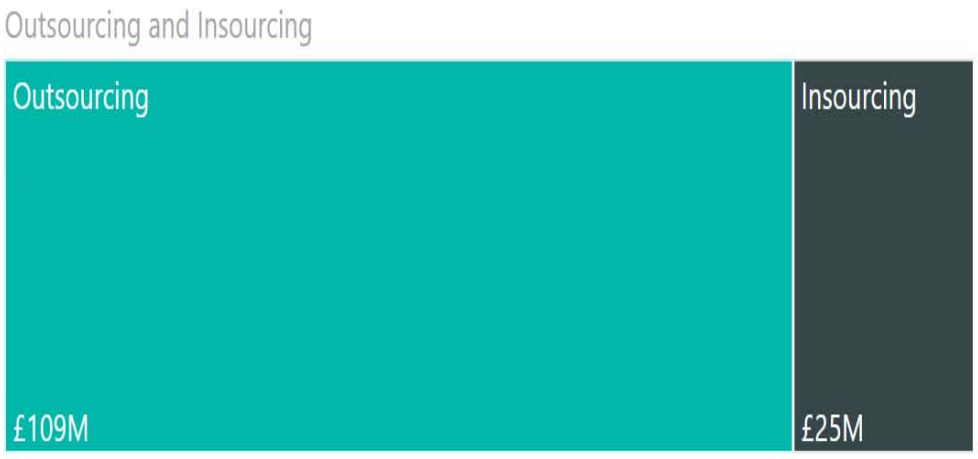
How much do we spend on imaging in England?



Costs of Imaging Service Delivery by Pay, Non-Pay (2017/18)

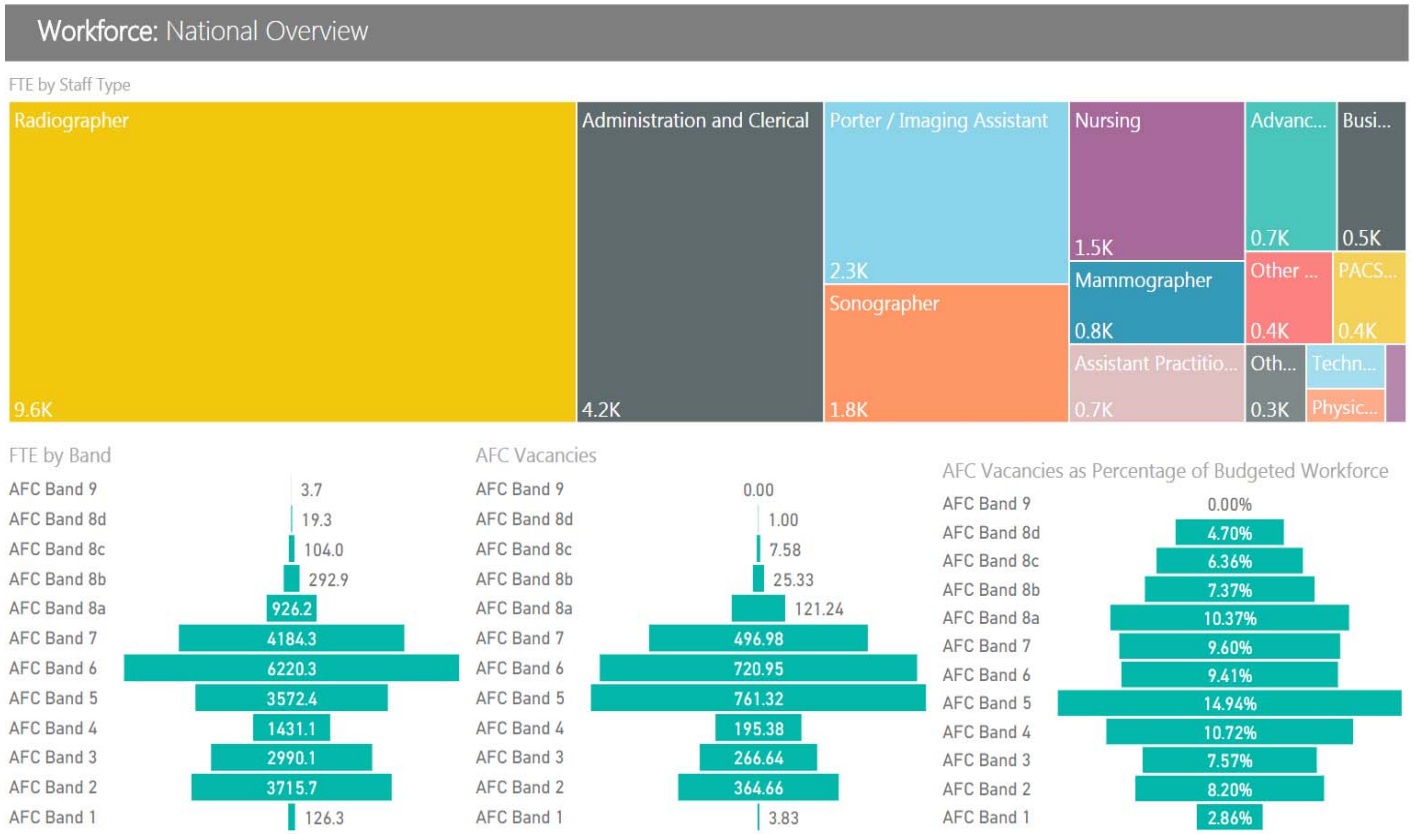
the capacity gap?





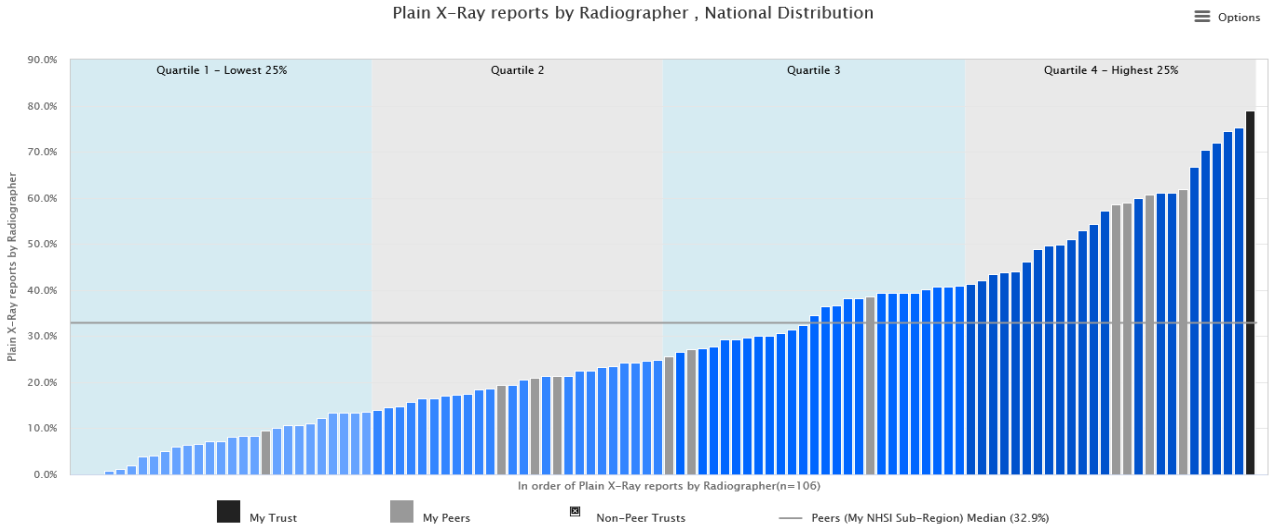
Breakdown of non-substantive pay by type, Outsourcing and insourcing total cost (2017/18)

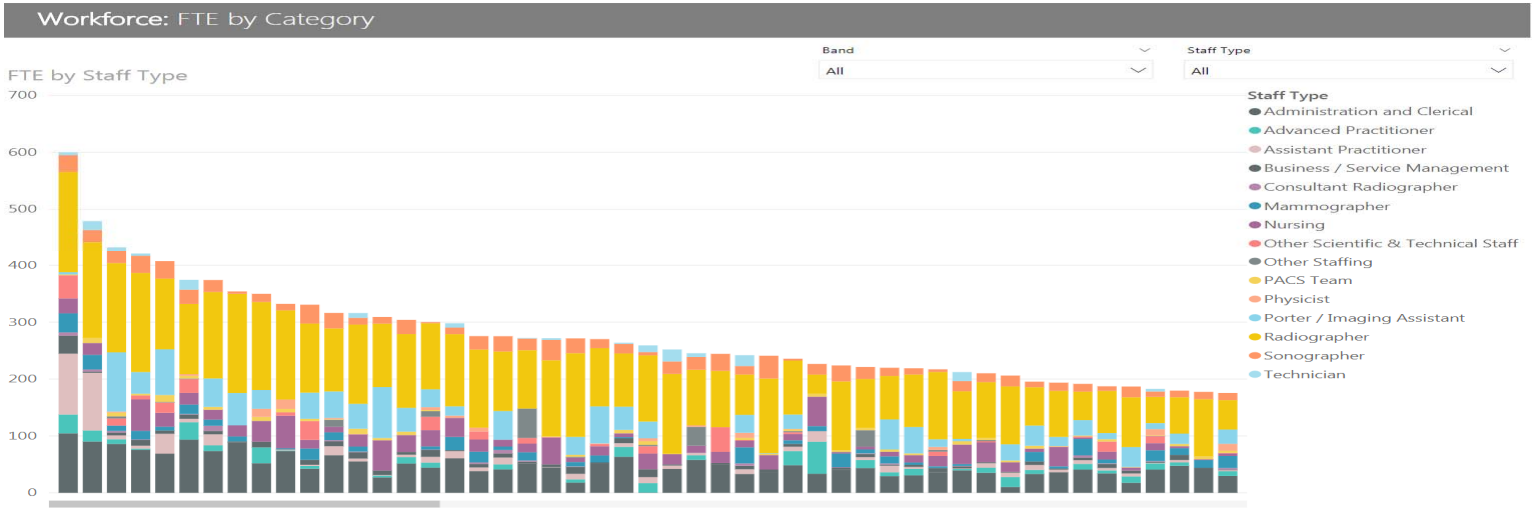
severe workforce shortages



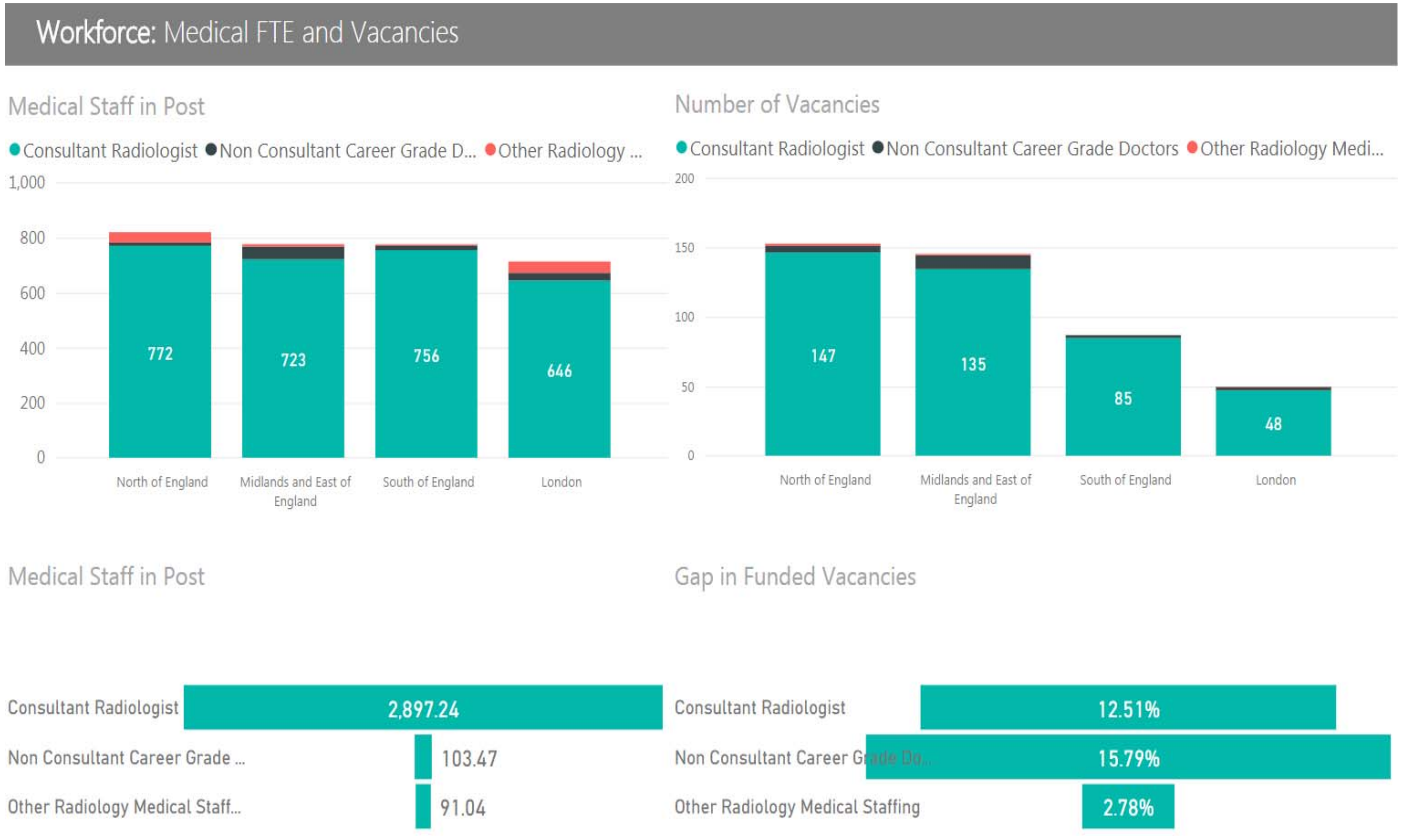
- Increase in radiographer vacancies at Band 8a, Band 7, Band 6 & Band 5 (1,984 in 16/17 to 2,100 in 17/18)

Significant variation in how we use the workforce



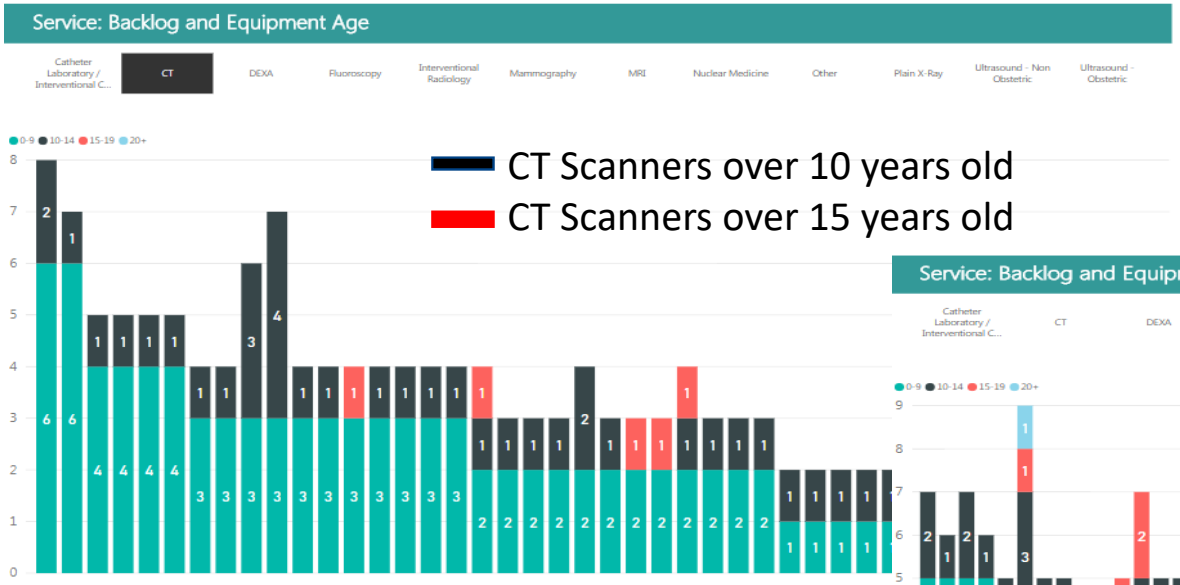


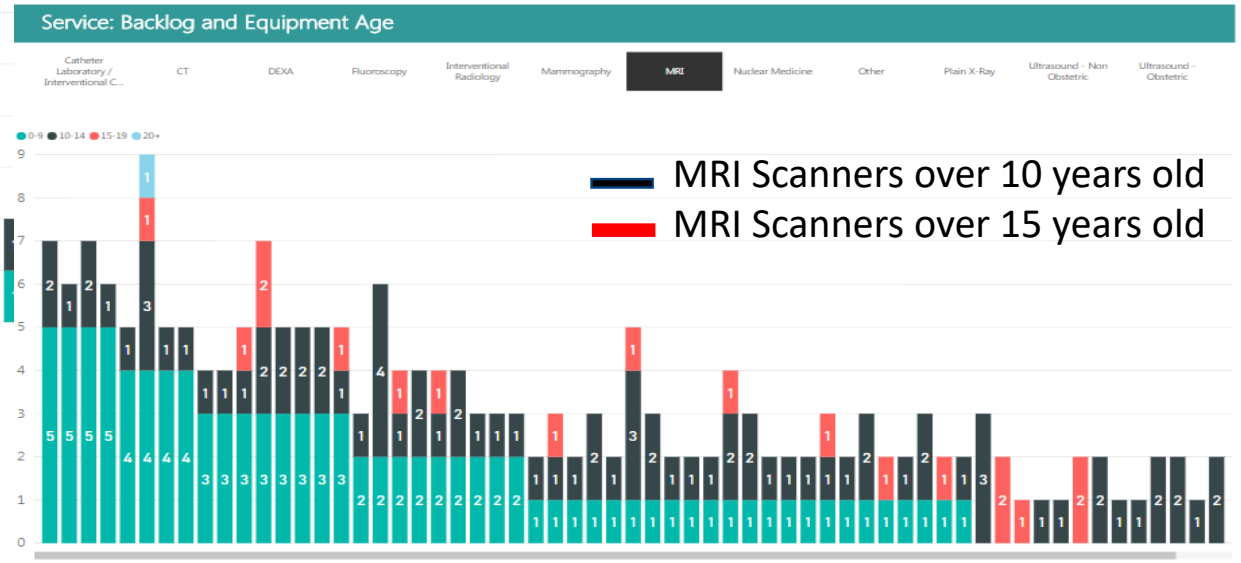
similar for Radiologists



significant challenges with capital equipment

We now know the size and scale of the challenge and a commitment in the Long Term Plan to do something about it

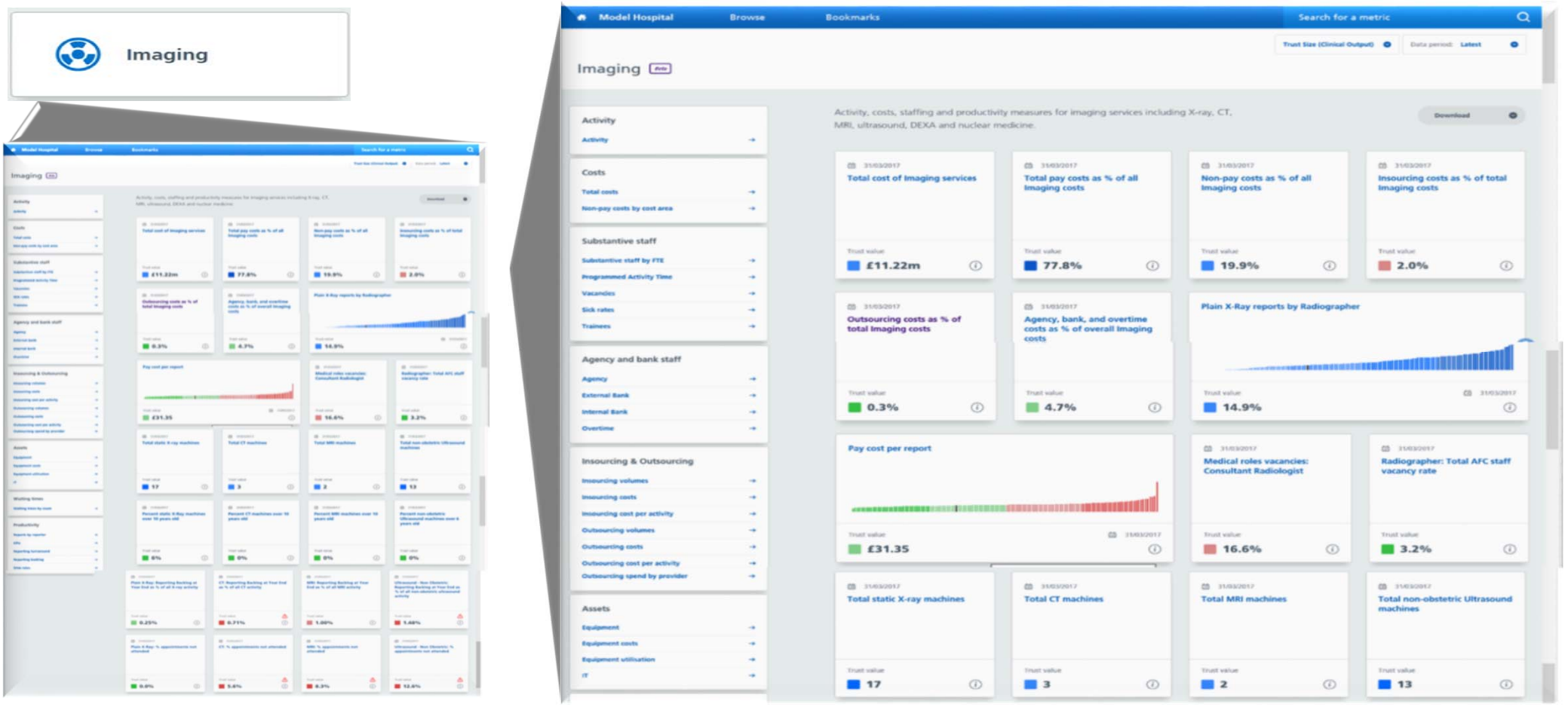




Long Term Plan Commitment

3.60. **The NHS will use its capital settlement to be negotiated in the 2019 Spending Review in part to invest in new equipment, including CT and MRI scanners, which can deliver faster and safer tests.**

Model Hospital



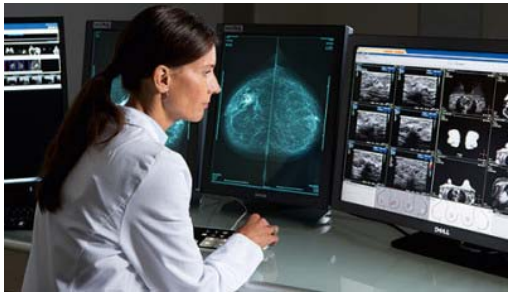
https://improvement.nhs.uk/resources/model-hospital/

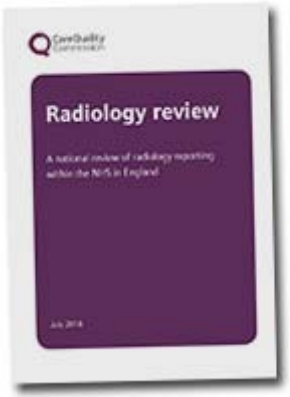
We know the service is struggling; is a new delivery model needed?

Immediate

(Patient safety issues)

Referral to report (not test)





- NHSI tasked with developing standards for image reporting turnaround
- currently standards local & variable
- Inappropriate use of ‘auto-reporting’
- Timed pathways for cancer (28 day = same day turnarounds for some imaging exams)
- NICE stroke guidance
- NICE guidance for stable angina – CT
- Primary care – increased access
- Multi disciplinary Diagnostic Centres (MDC’s)
- Rapid Diagnostic Centres (RDCs)

Increasing pressures at the same time as rising demand

Current State - Workforce

Non Medical Workforce 23,500
vacancy rates 15%

3,000 Medical Consultants
vacancy rates 12.5% & ageing demographic

£134 Million spent on Outsourcing & Insourcing
to manage demand

Competition and lack of collaboration = Unsustainable position financial & workforce

Patient safety & risk

Cancer, Stroke, Trauma, Acute cardiac, Maternity,

Increasing demands

Current State – Assets & IT

Capital Equipment out of date
no capital replacement programme

International position for CT & MRI scanners per head of population poor 3rd lowest CT, 5th lowest MRI

No national approach to imaging IT infrastructure (local PACS replacement solutions), no interoperability platforms to join up disparate PACS / RIS systems delivered to date

Poor IT infrastructure to support improved delivery models

The Long Term Plan

- *Over 1.5 billion diagnostic tests are undertaken every year and feature in four in every five patient pathways. Capacity in diagnostic services has not kept pace with the growth in demand. We have fewer MRI and CT scanners per capita than most OECD countries, for example, while vacancy rates are 12.5% for radiologists and 15% for radiographers Yet, the number of patients referred for diagnostic tests has risen by over 25% over the last five years. So delivering an effective, high-quality service requires investment in new equipment and staff, underpinned by a new model of diagnostic provision.*

And commits to:

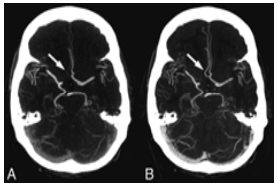
- ***by 2023, we will have introduced new diagnostic imaging networks***

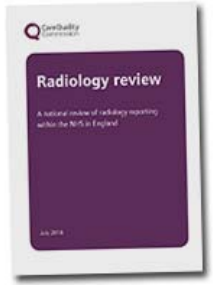
New model of delivery - Networks

Shared reporting of ‘backlog lists’ Or sharing new demand e.g. Lung Healthcheck

Improved turnaround times by sharing resource

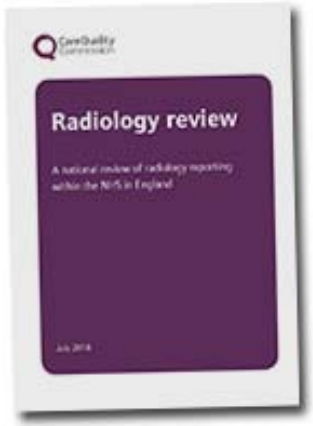
Access to specialist opinion 24/7 or in shortage specialties or rare conditions





Local delivery and timely transfer of images and results as required

The benefits of networking

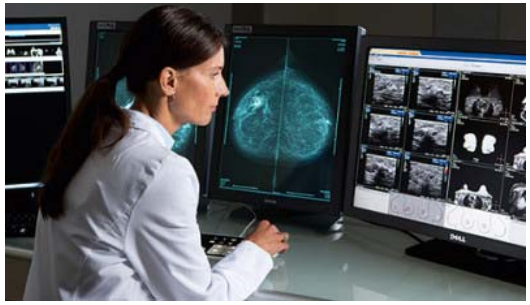


- Reducing rising backlogs of unreported images
- Improving service resilience, where small or remote sites are struggling to recruit
- Increased financial resilience utilising economies of scale on any outsourcing still required to fill capacity gaps
- Newer equipment, purchased across a network, also offers increased functionality including dose reduction features and economies of scale
- Improved IT interoperability which can mean rapid transfer of images in an emergency situation
- The planning of new developments that are likely to increase demand on services, such as Lung Healthcheck, Rapid Diagnostic Centres & increased access to stroke and cardiac services

The benefits of networking for patients

- Services sustained locally, patients can have scans locally
- Access to specialist opinion across a much wider geography.
- Faster turnaround times for reports, reducing anxiety and uncertainty for patients
- Reduced risk of missed diagnosis, as all images will be reported by a suitably trained clinician & improved access to specialist opinion
- Images and other test results (e.g. digital pathology) will all be available to the clinician at the point of treatment, reducing multiple visits
- Capital planning and procurement on a network basis will give more patients access to ‘state of the art’ imaging equipment with faster scan times, reduced radiation dose and higher quality images

The benefits of networking for workforce

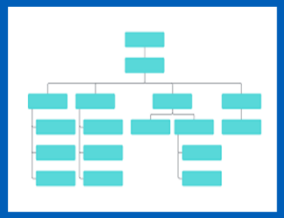


- best use of reporting capacity with shortage of radiologists, reporting radiographers
- improving access to multidisciplinary training environments through ‘academy style’ models
- Reducing the cost of outsourcing (currently £109m) by using ‘insourcing’ resources within the network.
- flexible working across sites and opportunities such as ‘home reporting’ and flexible retirement options
- better training & CPD opportunities for staff with the ability to work across different sites with new experience and training
- Opportunities to increase skill mix and advanced practice roles & assistant practitioner roles
- reduce variation
- improve retention through job satisfaction

Support required for set up and development

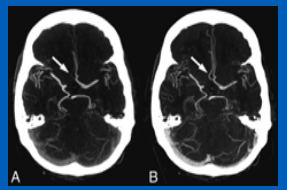
Clinical Leadership & infrastructure

- Clinical Lead
- IT / PACS Lead
- Programme Lead
- HR / workforce / OD Lead



Operational & governance structure

- Agreed governance framework / commercial model
- Alignment with other clinical networks (Stroke, Cancer alliances)
- Co-ordination with other diagnostic tests
- Quality & safety (assurance through accreditation)
- IT infrastructure set-up and deployment

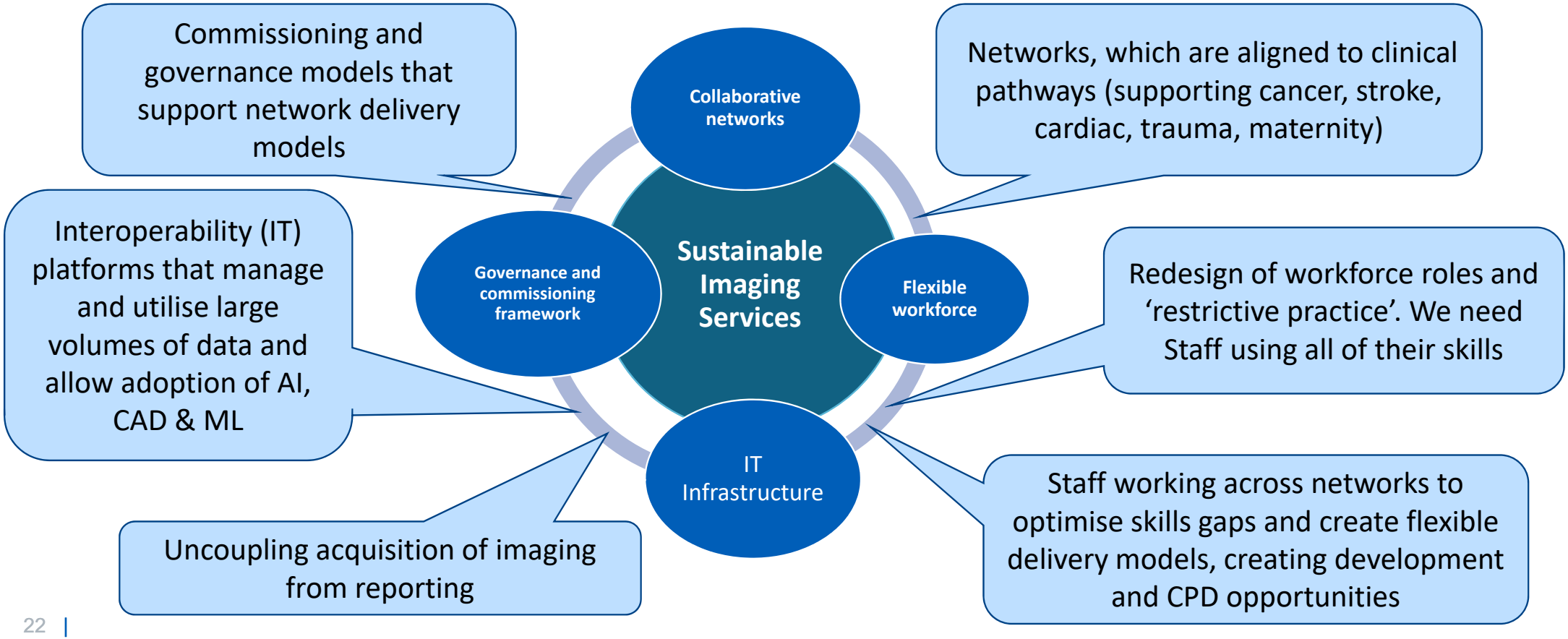


Pathway & protocol redesign

- Alignment of clinical protocols
- Alignment of staff T&Cs, transfer of contracts, OD
- Planning for future capital equipment & developments (AI, ML, CAD)

Implementation of imaging networks by 2023

Network Delivery
essential for efficient NHS radiology services and a sustainable model of provision to meet growing demand



How might this work?

Next steps on the journey for imaging networks

Agree Strategy – Executive Board

- Align to 10 year plan
- Agree implementation resource / support

Consult & Engage

- Inform stakeholders (Comms & engagement strategy)
- Publish the imaging strategy
- Develop implementation plan and guidance (agree with NHSE/I Regions)

Assess readiness

- Select Phase 1, Phase 2 & Phase 3 networks
- Target support and investment
- Move to implementation