Diagnostic imaging network capital equipment planning guide

April 2021

Guidance developed in consultation with The Royal College of Radiologists, Society of Radiographers and Institute of Physics & Engineering in Medicine.

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1. Introduction

About 151 NHS trusts and foundation trusts provide their own imaging services, using operating models that need investment in premises, IT and equipment. There is also increasing demand for medical and non-medical staff.

To address these challenges, The NHS Long Term Plan committed the NHS to have established imaging networks across England by 2023; later our national imaging strategy outlined how their formation will maximise use of existing capacity, improve access to specialist opinion and make efficiencies and economies of scale. This strategy is backed by NHS evidence that networked imaging services and the modernisation that goes with this increase both quality of service for patients and efficiency, and make these services more resilient and sustainable.

We are now looking to up the ambition and accelerate the transformation of imaging services across the NHS. The national imaging strategy proposes transformation by introducing an image-sharing platform whereby all digital images acquired by imaging services within the network can be managed via a single shared worklist and transferred for reporting to any site in the network, or beyond. Networking enables imaging services to maximise the benefits of pooling the reporting workforce by making economies of scale and improving access to specialist opinion, while individual sites continue to image patients close to where they live.

Operating as networks, imaging services will be better placed to manage resources effectively due to their scale. This particularly applies to the capital resources on which diagnostic imaging services are heavily dependent. The purchasing power of an imaging network will be at least 10 times that of an individual trust that provides imaging services, and the scale of imaging networks will make them attractive strategic partners for industry with respect to technological innovation and research and development activities. Long-term strategic partnerships with industry are likely to lead to inward investment in NHS diagnostic imaging services.

1.1. Purpose

This document provides support to imaging networks on the key watchpoints when developing a strategic capital plan for their network. It has been reviewed and approved by the National Imaging Optimisation Delivery Board which has broad

representation from imaging services, including the Royal College of Radiologists (RCR), the Society and College of Radiographers (SCoR), the Institute of Physics and Engineering in Medicine (IPEM), and the imaging industry.

It does not provide a blueprint for that capital plan, but highlights the key areas for consideration, and the options available to networks in each of those areas. There is no 'one size fits all' solution and plans will vary from network to network according to local context, including the membership of the network (mix of NHS foundation trusts and trusts), age and distribution of the existing asset base, clinical case mix, geographical characteristics of the network (urban, rural) and the pattern and models of service delivery for those clinical service lines which are heavily dependent on imaging services.

The guidance reflects the principles and approaches in the national imaging strategy and should be read in conjunction with it, as well as the other documents we have written to support trusts form imaging networks.

It has been informed by imaging services management experience and expertise, a review of several case studies from diagnostic imaging networks, and input from the NHS England and NHS Improvement Capital and Cash Team.

We will update this guide regularly to reflect new information regarding capital planning in the context of developing networked imaging services.

1.2. Disclaimer

We provide guidance only and you should seek further specialist advice regarding capital accounting practice and guidance.

This guide is provided to support engagement with the supplier market. It is not a substitute for specialist procurement advice, nor is it intended to direct networks towards specific solutions, but to identify possible options and factors to consider when making decisions.

1.3. Useful further reading

- Capital regime, investment and property business case approval guidance for NHS providers
- Department of Health and Social Care. *Group accounting manual 2020-21*

- *Secretary of State's Guidance under section 42A of the National Health Service Act 2006: Financial support available to NHS providers*.

2. Asset ownership

At the point of its formation, the owner organisations of the imaging network will need to decide the preferred model of asset ownership for the network. The options available will be influenced by owner trusts' choice of operational governance structure for the network. Further guidance on the options for operational governance structures are set out in the *Diagnostic imaging network commercial structure and operational governance guide*.

This guide recommends three options for imaging asset ownership within an imaging network:

1. Assets to remain the property of the individual trusts that jointly own the imaging network.
2. Consolidation of asset ownership under a single owner organisation, either one of the member trusts, the network itself if established as a subsidiary company owned by the member trusts, or a third party (eg independent sector partner, managed equipment service (MES) supplier), on behalf of all network members.
3. Outsourcing the service in its entirety, including ownership of the capital assets required for delivery of the service, to a commercial partner.

The imaging network members will need to determine the scope of the assets considered to be essential for the delivery of the service and which of these to include in the asset register of the imaging network.

A key early decision will be whether the scope includes:

- imaging equipment only
- imaging equipment and the buildings from which the imaging services operate
- other infrastructure including imaging-specific IT applications (PACS, RIS).

The definition of imaging equipment needs to be carefully considered to ensure that robust and sustainable equipment replacement and investment plans are in place. Areas that may require more careful deliberation include, but are not limited to:

- **Breast services (including screening)** – in some localities breast services are managed separately from imaging services, and breast screening services may be delivered as a discrete service line or by an independent sector provider.

- **Cardiac imaging** – in some provider organisations, cardiac imaging services are managed separately from imaging services, with little or no input from radiology. There may, however, be advantages to including cardiac imaging due to the similarities in equipment, shared workforce and the potential to share infrastructure (IT applications, image archiving capacity).

- **Obstetric ultrasound** – obstetric services are often managed completely separately from imaging services, and have a separate workforce. However, this is not universal, and there may be shared benefit in considering their workforce, equipment and infrastructure alongside imaging services.

- **Point of care ultrasound** – ultrasound is widely used beyond the boundary of the imaging services, and ultrasound machines have an enormous range of functionality (and cost). It may be helpful to clearly define those ultrasound machines/services that are clearly part of the service governed by the imaging network, and those that sit outside.

Whichever option is chosen, owner trusts will need clarity about how the imaging network's asset base will be maintained, and how investment in growth will be managed, to ensure that the imaging network's services are sustainable.

3. Asset replacement

A clear plan for the ongoing replacement of the capital equipment assets is fundamental to the delivery of modern, high quality imaging services for the following reasons:

1. **Patient and staff safety** – a significant proportion of imaging equipment uses ionising radiation. Under the Ionising Radiation (Medical Exposure) Regulations (IR(ME)R), it is imperative that imaging services seek to ensure that their equipment assets are in full working order, and that radiation dose exposure for patients and staff is minimised wherever possible. Technological advances by manufacturers of imaging equipment have progressively reduced the radiation doses per examination (50% reduction over the last 10 years for CT), and networks should therefore ensure that this newer technology is adopted as soon as possible.
2. **Service quality** – in addition to reducing radiation dose, technological advances have progressively improved image quality and post-processing capabilities, enabling improved image resolution and new applications of imaging modalities to specific diagnostic investigations. Networks should therefore ensure that these new imaging techniques can be introduced as soon as possible to ensure optimal care is delivered to patients. With the advent of artificial intelligence (AI)-enabled imaging applications that interpret images and support clinical decision-making to augment the NHS workforce, there is a clear need to ensure that the NHS continues to invest in the latest technology.
3. **Service efficiency and productivity** – old equipment is prone to break down more frequently and a point will be reached where manufacturer support will no longer be available. For this reason alone, networks should ensure that equipment is replaced systematically when it reaches the end of its operational life. AI technology is widely used in the latest generation of MRI and CT scanners and can increase throughput and reduce the need for repeat scanning. It is used to support patient positioning and dose calculation, speed up image acquisition and minimise movement artefact, as well as provide a calming and patient-appropriate ambience within the

scanner offer. The efficiency and productivity enhancements from these advances can help NHS imaging services manage ever increasing demand.

Under the current NHS capital planning rules the resources for replacement of a trust's existing capital assets are generated through retained depreciation. Therefore, under this regime, the resources to purchase replacement capital equipment to sustain imaging service delivery will be available on the trust's balance sheet when the existing assets reach 'zero book value'.

At the formation of the imaging network, the owner trusts will need to determine how these resources from retained depreciation will flow from individual trusts into the imaging network. This will be influenced by the decision taken about asset ownership and, if asset ownership is transferred to the network, may involve an initial one-off transfer of funds from owner trusts to the network.

In practice, due to the range of demands on the capital resources available to trusts (eg estates backlog maintenance, digitisation, etc), trusts have historically adopted a risk-based approach to imaging equipment capital asset replacement. Therefore, networks will need to determine their available options for financing asset replacement (see Section 5).

As part of their plans for replacing imaging assets ,networks should consider:

- **Asset renewal age –** current guidance from the European Society of Radiology recommends that assets should be replaced at an interval of 10 years. Equipment downtime and maintenance costs escalate for assets over 10 years old. The National Imaging Data Collection found that significant numbers of CT and MRI scanners in use in the NHS are over 10 years old (>30% of MRI, >15% of CT). Although this has been addressed through a one-off government injection of capital, this level of extra funding cannot be relied on. Networks should establish, for planning purposes and for determining the asset life for the purposes of depreciation, the equipment replacement interval or useful asset life. This may vary between imaging modalities. It should be set by considering information including but not exclusively:
  - guidance from professional bodies and societies (RCR, SCoR, IPEM, etc)
  - manufacturer's recommendations
  - data from service history and maintenance records

- data from operational performance (eg equipment downtime)
- advice from the network's radiation protection adviser.

Networks may choose to adopt a risk-based approach whereby the performance of each asset is regularly reviewed once it reaches the pre-determined renewal age, to establish whether it remains safe and reliable from an operational perspective.

- **Technical specification** – over the life of individual pieces of imaging equipment there is likely to have been technological advances (eg new machine functionality) and changes to clinical service standards (eg NICE guidance), both of which may impact on the delivery of the network's imaging services. Therefore, each asset replacement represents an opportunity to invest in the latest available technology and address any gaps in clinical service capability. Each asset replacement will therefore require careful consideration of the required technical specification before going to market. Within an imaging network it will not be necessary for every piece of equipment to have full and comprehensive functionality. Clinical service delivery, particularly for specialist services which may require certain advanced imaging service functionality, can be designed so that equipment with high-end specification is located in specific centres across the network.
- **Location** – where equipment is to be replaced there is an opportunity to consider whether or not it is currently optimally located to support clinical service delivery. Within an imaging network, the spread of equipment resources can be considered across a wider geography than has previously been the case. Organisation of services in networks enables the owner trusts to consider options for consolidating sub-specialty care in fewer locations, separation of imaging support for elective and non-elective services to ensure timely patient access, or how to address any inequalities in provision across the population the imaging network serves.

4. Investment in new/additional imaging equipment

Demand for diagnostic imaging has risen rapidly in recent years,[1] and the Richards' independent review *Diagnostics: Recovery and renewal* signals that this growth is expected to continue, and in some imaging modalities to accelerate. Also, the NHS Long Term Plan makes a wide range of commitments to earlier diagnosis and improving clinical outcomes, and a specific commitment to investing further in CT and MRI[2] to deliver 'faster and safer tests'. Planning for this growth, and the capital investment in extra equipment that will be necessary to deliver it, is a key responsibility of imaging networks.

This planning should take a long-term view – over a seven to 10-year horizon – and be underpinned by detailed capacity and demand modelling for each imaging modality within scope of the imaging network. Imaging network capital plans should form part of wider STP/ICS health system capital plans and relevant approvals from the relevant system(s) obtained.

Key areas for consideration within the capacity and demand modelling include:

- the current utilisation of existing imaging equipment across the imaging network, and the target utilisation the network is aiming to achieve
- the extent of seven-day working for each modality on each site, and the number of imaging services with 24/7/365 service provision to support non-elective clinical service delivery
- the need for periodic preventive maintenance of imaging equipment to ensure optimal performance and avoid unplanned equipment downtime
- whether new clinical guidelines (eg NICE guidelines) require a shift between imaging modalities and/or will increase or decrease in demand

[1] https://www.england.nhs.uk/statistics/statistical-work-areas/diagnostic-imaging-dataset/
[2] NHS Long Term Plan, paragraph 3.60

- the impact of the redesign of clinical services, eg stroke networks and outpatient service transformation, on the demand for, timing of and location of supporting imaging services
- the sub-specialty case mix for each imaging modality (eg cardiac, neuro and musculoskeletal), as the volumes of sub-specialty activity will drive the imaging network's requirements for scanners with specific capabilities, and therefore the required specification of new equipment.

Investing in new equipment enables the imaging network and its owner trusts to review the model of care provided. This may be as part of a wider review of clinical strategy and the reconfiguration of other services within a health system, or to support local trust-level service reconfiguration. As part of this review, imaging networks are strongly encouraged to invest in new equipment to separate the imaging service support for elective and non-elective services. Providing ringfenced capacity for non-elective care pathways to ensure appropriate access to scan acquisition can deliver significant efficiencies through improved patient flow and reduced delays. It also protects elective services from on-the-day cancellation of planned activity, thereby improving efficiency and enhancing patient experience.

Physical separation of imaging service capacity for elective and non-elective clinical services enables more strategic planning of service location. Imaging networks should be seeking to locate elective imaging services close to where patients live to improve accessibility and convenience. This may create opportunities for co-location with other elective diagnostic services in community diagnostic hubs,[3] reduce congestion and release valuable clinical space on acute hospital sites.

Investing in new equipment to meet growing demand on its own will not achieve the desired increase in imaging capacity without also considering the workforce required to operate it and report the scans generated. Imaging networks should also seek to develop long-term workforce plans – we will publish guidance on this planning in due course.

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[3] See recommendation 4 of the Richards' independent review *Diagnostics: Recovery and renewal*"

5. Financing options

There are a range of options available to imaging networks to support the financing of investments in diagnostic imaging capital equipment, each with a different set of upsides and downsides which should be carefully considered by the imaging network board. Each imaging network and its owner trusts will be operating in a different local context, and therefore all options may not be available to every imaging network.

5.1. Capital

If available, capital funding may be the simplest and least expensive way to finance the purchase of imaging equipment. Through capital purchase, the trust, or imaging network, will own the equipment and it will have a book value on the trust or imaging network balance sheet. Under NHS capital accounting rules, all capital assets will attract a capital charge of 3.5% per annum in addition to the annual cost of depreciation. To ensure best value, capital purchase should be undertaken through a mechanism that maximises the commercial benefit of the NHS's purchasing power, such as a procurement framework – see Section 6.

However, due to number of other competing uses for the funding that is available, imaging networks may need to consider options other than capital purchase.

5.2. Lease finance

Both operating and finance leases (subject to testing under appropriate accounting standards) are options available to trusts or networks where capital funding from their own retained depreciation or other sources (eg charitable funds) is not available. However, trusts and networks should be aware that finance leases require central government resource (CDEL) cover at the point that the assets become operational, in the same way as capital purchases do. With the adoption of IFRS16 international accounting standards now scheduled for 1/4/2021, both types of lease will need to be accounted for on the balance sheet and the assets will attract standard NHS capital charges. Although the trust or network has to recognise the asset on its balance sheet, technical ownership of the asset is held by the third-party leasing company. It may therefore be easier to replace equipment more frequently than if the assets were owned by the trust or network itself, depending on the terms of the lease agreement.

5.3. Managed equipment service (MES)

Managed equipment service solutions are available from both original equipment manufacturers (OEMs) and third-party specialist suppliers. Through these arrangements trusts or networks can enter into contracts for access to a range of imaging equipment over a defined number of years. The currency adopted in the MES agreement may be defined in terms of number of scanners of a certain type and specification with associated maintenance for the life of the contract, or in terms of hours of scanning time by imaging modality. Both OEMs and specialist firms offer these arrangements on a 'vendor neutral' basis, enabling the customer to retain control of which brand of imaging equipment is acquired for each modality. MES providers may offer associated services along with the equipment to support trusts or networks to optimise their utilisation of the equipment. These arrangements may be VAT exempt as they can be classified as services. Each customer should take specific specialist advice on the VAT treatment of their proposed MES arrangement. MES arrangements enable some risk transfer from trusts or networks to their MES supplier, and potentially offer greater flexibility in the choice of equipment and ability to replace equipment more frequently to ensure availability of the latest technology.

5.4. Joint venture with a third party

Some trusts or networks may seek to develop a deeper and more strategic partnership with a third-party supplier than that available through a typical transactional MES contract. Some imaging networks may choose to include an independent sector partner in their governance model and ownership structure– see the *Diagnostic imaging network commercial structure and operational governance guide*. In such a partnership or shared ownership model, the selected independent sector partner may provide the capital resources required to finance the network's equipment requirements over the lifetime of the partnership, in return for a share of the revenue generated by the network and/or other commercial benefits. These kinds of relationships may include collaborative research and development activities, access to anonymised clinical data to support product development and/or other joint commercial activities. The ability of imaging networks to enter into this kind of arrangement may be influenced by the mix of NHS foundation trusts and trusts among the owners of the network. Specific legal advice should be sought by each network before pursuing this option.

NHS and partner organisations entering into agreements involving data must consider the Department of Health and Social Care's (DHSC's) five guiding principles for realising benefits to patients and the NHS where data underpins innovation. Networks should also review and consult the A buyer's guide for AI in health and care.

Trusts should take advice early on to ensure their organisation is addressing these principles when structuring any partnership and in its commercial negotiations. NHSX's Centre of Expertise can offer tailored guidance to NHS organisations in instances where data partnerships relating to health (using NHS and potentially other data) create new IP. Please contact the centre at centreofexpertise@nhsx.nhs.uk. The centre will publish a value-sharing framework and guidance, building on DHSC's five guiding principles.

5.5. Commercial loan finance

NHS foundation trusts in distress and NHS trusts may borrow from private sector sources or other government bodies/departments only if the transaction delivers better value for money than financing through DHSC. NHS foundation trusts in distress and NHS trusts must seek prior approval from DHSC via NHS England and NHS Improvement. Similarly, DHSC may also provide guarantees to providers' external borrowing.

However, in all these cases, non-government lenders generally face higher costs. Interest rates applied by DHSC can be found on the National Loan Fund website. Capital investment financed externally consumes capital resource and will therefore score against the STP/ICS capital envelope in the normal way.

External borrowing arrangements that are deemed novel, contentious or repercussive will require HM Treasury approval.

6. Procurement

For any individual trust, the purchase of an MRI or CT scanner is a major purchase, representing a significant percentage of its annual capital resource allocation, and something it does fairly infrequently. However, the NHS as a whole will buy in excess of 50 of these scanners every year.

Therefore, there is significant benefit to be gained from leveraging that purchasing power in the marketplace and drawing on the available expertise of the procurement specialists overseeing the operation of procurement frameworks at national level.

To support this procurement at national level, standard specifications have been developed, through clinical advisory groups made up of experienced clinicians, for the following items of equipment:

- MRI
- CT
- screening mammography
- symptomatic mammography
- mobile breast screening trailers.

Within the NHS procurement operating model, NHS Supply Chain Coordination Ltd's Category Tower 7 capital equipment provider is responsible for supporting NHS organisations to secure best value in the marketplace for imaging equipment. All trusts contribute to the costs of the category towers through a top-slice arrangement that pays for access to their framework contracting arrangements. Procurement decisions regarding capital investment in imaging networks remain entirely at the discretion of the network and its NHS trust owners in accordance with the network's chosen governance arrangements.

In addition to equipment purchasing, Category Tower 7 will provide advice and support to NHS customers regarding optimising whole life-cycle costs of equipment assets, including turn-key installations, point of sale maintenance arrangements, and various finance and contract options.

7. Disposal of assets

Although diagnostic imaging capital equipment assets may have reached ‘zero book value’ at the point of replacement, this does not mean that they have no intrinsic value. These assets retain some commercial value in the equipment market, and asset owners (trusts or imaging networks) should seek to recover that value at the point of replacement.

There are two main options for realising the residual value of imaging equipment assets at the point of replacement:

1. **Trade-in with the OEM** – all OEMs offer an equipment trade-in, usually as part of their overall pricing strategy and to incentive customers to buy new equipment from the same supplier. The supplier that manufactured the original item may give a higher trade-in value than a competitor. Trade-in through the supplier of the new equipment may help with the effective co-ordination of removal of the old asset and installation of the new one.
2. **Recovery of residual value through a specialist auctioneer –** a small number of specialist firms auction end-of-life medical equipment on behalf of the equipment owners. Trusts and imaging networks may wish to explore this as an alternative to a trade-in with the manufacturer of the replacement equipment to see if a higher residual value can be recovered.

Both these options ensure that old imaging equipment is removed and disposed of in a safe and environmentally-friendly way. Other modes of disposal should ensure equivalent financial recovery and environmentally appropriate asset disposal.

Contact us:
nhsi.imageservices@nhs.net

NHS England and NHS Improvement
Skipton House
80 London Road
London
SE1 6LH

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