

# Factors contributing to a successful regional radiology network

## What were we asked to look at?

The Scottish Health Technologies Group (SHTG) was asked to identify factors that are important for the development of a successful radiology network to inform the plans to establish such a network in the north of Scotland.

## Why is this important?

The north radiology alliance (NRA) seeks to establish a regional radiology network across the six health boards in the north of Scotland (NHS Western Isles, NHS Highland, NHS Orkney, NHS Grampian, NHS Shetland, NHS Tayside). The NRA requested our support in establishing the resources and infrastructure that will be required to ensure the sustainability and resilience of radiology services across the north region.

In March 2022 in the north of Scotland, there were 27,481 patients on a waiting list for all radiology tests, with 44.5% waiting over 6 weeks and 17.4% waiting over 13 weeks. Waiting lists ranged from 22 patients in NHS Orkney to 10,285 in NHS Grampian.<sup>1</sup> Medical and dental agency locum spend in the region was £41.7m of which a proportion was on radiology services (March 2022).<sup>2</sup> The clinical radiology vacancy rate across the north region at end March 2022 was 10.6% (NHS Highland 18.6%, NHS Grampian 17.0%, no vacancies in NHS Tayside or NHS Western Isles, NHS Orkney and NHS Shetland have no posts). Only NHS Highland had vacancies for 6 months or more with one position unfilled (6.2%).<sup>2</sup>

## What was our approach?

We conducted a comprehensive literature search to look for common success factors in establishing radiology networks. We conducted a survey with representatives from five English radiology networks to explore their views on the factors contributing to successful radiology networks. The literature and survey findings were reviewed by Scottish topic experts and their responses are included in the final report.

## What next?

This work will be shared with the Scottish clinical imaging network (SCIN), Scottish radiology transformation programme (SRTP), Scottish Government as part of discussions towards delivering sustainable radiology services in Scotland.

## Key findings

- The available evidence relating to factors required for a successful radiology network was limited to guidance documents and websites.
- Radiology network leaders in England described multiple benefits of setting up a radiology network. Key benefits of the network approach were image sharing, joint procurement, sharing of best practice and insourcing.
- Radiology network leaders in England reported that key enablers to a successful network were:
  - wide and early engagement, ensuring equity of network members, transparency and building trust
  - creation of a dedicated core management team with dedicated leadership
  - funding
  - communication
  - digital capability
  - programme management support
  - clear governance.
- Network leaders agreed that workforce culture was an important consideration in the development of their radiology networks. Cultural factors considered important were:
  - a collaborative culture of transparency and trust
  - shared goals and understanding
  - establishing a distinct brand for the network
  - widespread and early engagement with the right people
  - sharing best practice
  - giving all network members an equal voice.
- Scottish experts agreed with the factors described by English network leaders and in addition highlighted that the existing culture of collaboration in Scotland will pave the way for network working. Awareness of existing alliances, local identity and local systems and processes will be important. Inequities as a result of social and geographic factors should also be considered.

## Contents

Introduction .....	5
Research question.....	5
Literature search.....	5
Published literature.....	6
NHS England experiences: survey .....	8
Limitations of survey.....	16
The Scottish perspective .....	16
Conclusion .....	18
Acknowledgements .....	19
References.....	21
Appendix 1: Questionnaire.....	22
Appendix 2: Table of abbreviations.....	24

## Introduction

Radiology is a medical specialty that uses imaging to diagnose and treat diseases seen within the body. It is vital to almost every specialty and every part of the NHS, and is fundamental to the ability to provide high quality, effective and timely treatment to patients.

The need for national and regional collaboration and coordination in order to achieve a sustainable and resilient radiology service led to a shared vision and target operating model (TOM)<sup>3</sup> which was approved by NHS Scotland's chief executives group in August 2020 and supported by the SRTP. The TOM was developed with a wide spectrum of stakeholders and is owned by the radiology community and informed by patient, carer and referrers' experiences. The TOM outlines collective recommendations towards the delivery of radiology services in Scotland over the next 10–15 years, and covers workforce, demand and culture, organisation of radiology services, digital technology, education and training, business information and data, and processes.

The six boards in the north of Scotland (NHS Grampian, NHS Highland, NHS Orkney, NHS Shetland, NHS Tayside and NHS Western Isles) have formed an alliance to in order to address problems that are specific to the north boards.

## Research question

What are the benefits of a radiology network and what factors are important for the development of a successful radiology network (in the north of Scotland)?

## Literature search

A comprehensive literature search was undertaken to look for common success factors in establishing radiology networks.

A systematic search of the literature was carried out between 23 February and 2 March 2022. Medline, Medline in process and Embase databases were searched and results were limited to English language.

Key websites were searched for guidelines, policy documents, clinical summaries, economic studies. Websites of relevant organisations were also searched, for example Royal College of Radiologists, British Institute of Radiology, American College of Radiologists and Canadian Association of Radiologists.

Concepts used in all searches included: imaging or radiology networks. A full list of resources searched and terms used is available on request.

## Published literature

Available evidence took the form of UK guidance documents and websites.

A set of four NHS England guidance documents<sup>4-7</sup> was identified which support the networking of radiology services across NHS England<sup>8</sup> a Health Education England report on Radiology Academies.<sup>10</sup> We identified websites that were relevant to the research question from three networks in NHS England.<sup>11-13</sup>

In November 2019, NHS England and NHS Improvement published a national strategy<sup>8</sup> which committed to establishing imaging networks across England by 2023, an important reconfiguration of radiology services. Four guidance documents were produced to support the delivery of the strategy. The documents were guided by early adopter experience and a review of case studies from diagnostic imaging networks and professional bodies:

- Workforce guidance<sup>4</sup> developed in consultation with The Royal College of Radiologists, Society of Radiographers and Institute of Physics and Engineering in Medicine (April 2022) aimed to optimise the current workforce by providing guidance, case studies and tools to support development of a strategic workforce plan for a network. The guidance highlighted that in order to increase network capacity there needs to be increased training opportunities for the workforce and priority given to staff retention. Critical areas for consideration included: the importance of good network leadership, understanding current workplace opportunities and challenges, optimising skill mix within the workforce, guidance on supporting movement of staff physically and virtually across the network, guidance on a network-wide pooled reporting model and advice on collaborative strategies to recruit and retain staff.
- The implementation guide (April 2021)<sup>5</sup> for diagnostic imaging networks was informed by senior clinical input from radiology services, imaging services management, case studies and input from teams with experience of leading the implementation of other clinical and diagnostic networks. The guide describes the benefits of a network for patients, service operations and for staff. Eight key themes for a successful network were identified: network ownership and governance, workforce plan, image sharing technology, capital equipment, procurement, capacity and demand modelling, clinical and operational leadership and resources for implementing change.
- The guide to capital equipment planning (April 2021)<sup>6</sup> was informed by imaging services management, case studies and input from NHS England and NHS Improvement Capital and Cash Team. The guide identifies key themes towards

developing a strategic capital plan for a network: asset ownership, asset replacement, investment in new and additional equipment, financing options, procurement and disposal of assets.

- The guide to commercial structure and operational governance (April 2021)<sup>7</sup> was informed by imaging services management, case studies and input from trust executives with experience of establishing a network. The key themes described were organisational structure, commercial structure, commercial concerns and governance.

An NHS Health Education England National review of the Radiology Academy training model<sup>10</sup> in 2017 looked at academic performance, service impact and cost effectiveness of three Radiology Academies established by The Royal College of Radiologists and the then, Department of Health in 2005, compared to three traditional hospital based programmes from the same regions. The review found:

- Academies provided greater access to protected learning spaces, educational resources and direct consultant supervision. They offered structured and supervised simulation activity and more formal assessment than traditional models. A direct comparison between the two models was not made as a result of limitations related to data collection. Clinical radiology trainee numbers increased between two and five times since the inception of the Academies. The review team also noted an increase in training in more rural areas.
- No statistics were given but the review reported that academy based trainees transitioned from full supervision to working independently more confidently and sooner than those in traditional schemes. The review team highlighted the increased inter-professional teaching available in the academies workforce would better reflect current models of service provision. They noted an efficient and adequately resourced administrative infrastructure was essential for managing the teaching estate and the large numbers of trainees at multiple clinical placement sites across a wide area.
- The review team noted that the education and training in the academies did not reflect the current and evolving models of imaging service provision and access to academies should be expanded to support training across a wider healthcare workforce. Costs were higher for the academy trainees with a return on investment that could be higher with more efficient use of teaching resources. The addition of further Radiology Academies as they were currently configured was not supported.

Three NHS England radiology network websites were identified; East Midlands imaging network (EMRAD),<sup>11</sup> Cheshire and Merseyside radiology imaging network (CAMRIN)<sup>12</sup> and Yorkshire imaging collaborative.<sup>13</sup>

The EMRAD network<sup>11</sup>, a partnership of eight NHS trusts, has five programme areas: today's radiology services (shared technical system with complete radiology records), research and

innovation, education, recruitment and retention, procurement, and collaboration and transformation.

CAMRIN<sup>12</sup> was formed in 2012 and consists of 12 hospital trusts. Funding allowed a programme management office to be established in 2019, a formal programme of change (clinical transformation, data, digital, procurement, workforce) and a data work stream that runs through the projects. They have developed an imaging workforce strategy in which they outline how to develop and nurture a skilled workforce.

The Yorkshire imaging collaborative<sup>13</sup> was established in 2016 and consists of eight trusts which work together across a transformation programme (defines the culture and direction) and technology programme (strategy, procurement and deploying technology to realise transformation goals).

### NHS England experiences: survey

We carried out a survey to explore the perceived benefits of a network, what factors were useful to network set up, what lessons had been learned and what challenges were faced in the setting up of radiology networks in NHS England. Questions are listed in Appendix 1. The Head and Deputy Head of Imaging Services Transformation, NHS England and NHS Improvement supported our approach by inviting 18 network leaders across NHS England to take part in our survey. We received two survey responses, a further three responses were captured via a semi-structured interview based on the survey questions. The five responders are referred to as R1, R2, R3, R4 and R5.

Of these five, three were from established networks (R1, R2, R3) and two from less established networks (R4, R5). The five respondents represented five different networks across NHS England.

One network leader from a radiology network in its infancy had many years of experience of setting up (non-radiology) networks in Scotland and as such, much of their response was on network set up generally, as opposed to the set up of a specific radiology network. Where their responses related to network set up generally, this has been reported in the 'General advice on setting up networks' section.

#### ***Benefits of the networks***

Respondents were asked about the benefits their networks provided for patients, staff, service operations and about financial benefits. Their replies highlighted benefits in terms of image access, joint procurement, sharing of best practice, insourcing, flexible working arrangements, joint recruitment and the creation of training academies.

Three respondents noted that fast and almost **universal image access** was a benefit:

- improved turnaround times for reports and therefore, for clinical decisions (R1)



- no need for duplication of imaging when transferring hospitals (R1) and therefore patients being treated more quickly (for example, for critical patients on the trauma pathway going from one trust to another, their images are there when they arrived) (R3)
- patients not having to be rescanned (R3)
- access to appropriate expertise – a patient can be seen in one hospital and the image can be reported on at another hospital by appropriate specialist (R3), and
- faster diagnosis and access to treatment pathway (R3).

Benefits of the image access for staff included:

- staff freed up from non-patient related tasks (for example manual administration and information technology (IT) tasks) (R1,R3), and
- more opportunities for career development (R1).

Benefits for of the image access service operations included:

- improved efficiencies (R1), and
- improvement in out of hours operations (R2).

Financial benefits of the image access included:

- reduced administration costs (R1).

Three respondents stated **joint procurement** was a benefit which allowed:

- access to more up to date equipment (R1, R2)
- access to data at different levels (for example regional data, trust level data) (R1)
- reduced costs (R1, R3) and the ability to buy resources that would have otherwise been unaffordable (R3), and
- patients to spend less time on waiting list (R2).

Three respondents said the network facilitated the **sharing of best practice** which led to:

- more efficient working through sharing and supporting each other, practically and around processes and documentation (R2)
- a consistent approach to information sharing (R2), and
- an improvement in processes and staff wellbeing (R3).

**Insourcing** (using staff resource flexibly by employing staff to work outside normal working hours remotely from their homes) was another benefit mentioned by three respondents which helped to:

- reduce backlogs (R1), and
- reduce the costs of outsourcing (R1, R2, R3).

One respondent said the **flexible working arrangements** had led to a better work-life balance (R1). Another respondent said **joint recruitment** had enabled an international recruitment programme (R2).

The creation of **training academies** was highlighted as a benefit by one respondent which resulted in:

- a consistent training process with no duplication of training as Higher Education Institutions (HEIs) can talk to each other (R2), and
- funding being made available for a clinical placement expansion programme which has increased the supply of radiographers (R2).

### ***Key enablers for a successful network***

We asked respondents what factors had enabled a successful network. Respondents highlighted engagement, the creation of a dedicated team, governance, funding, communication and digital capability as enablers to their networks.

Four of the five respondents said that **engagement** and buy-in was important. Engagement had been achieved in different ways:

- by ensuring equity and transparency, allowing small and big trusts to contribute equally (R1)
- talking and building trust with all staff including frontline staff and those in more administrative roles which supports the flow of dialogue and the network functioning effectively (R1)
- via a financial subscription model, with trusts paying a subscription to be part of the network and having 'skin in the game' (R3), and
- knowing and engaging with key people to champion the network (R5) including clinical leadership to develop wider clinical buy-in (R4).

Four of the five respondents said the creation of a **dedicated team** to support the network was an important enabler of success. The following points were raised:

- a dedicated team allows the rapid facilitation of projects (R1)
- dedicated leadership is essential. Clinical capacity is low and having dedicated people in the network with the time and space to commit is important. Clinicians need to be given discrete pieces of work and sessions allocated to the network within their working week (R2)
- project support is essential to management and administration of the network (R4) and to drive meetings and keep them focused (R3).

**Governance** was highlighted by three of the five respondents:

- governance was described as ‘absolutely key’ to allow a clear process to support making difficult decisions (R1) and ‘our main enabler’, noting it is important to have decision makers as part of the board (R3)
- one respondent noted that financial governance is ‘vital’ (R2)
- having a memorandum of understanding in place is important for data sharing and other network activities (R2).

**Funding** was cited by two respondents, one saying it was ‘critical’ to consolidate and grow the core team (R1) another stating that it enabled recruitment of key roles for the network (R4).

**Digital capability** was noted by two respondents, being described as ‘vital’ (R2) by one. The other respondent noted that existing image sharing capability can be built on (R4).

One respondent said that **improved communication** between national and regional teams had allowed better development of the network (R1).

### ***Challenges setting up the networks***

We asked respondents to think about the challenges in setting up their networks. Based on their experience all five respondents noted the importance of wide and early engagement with people both internal to the network and externally. One respondent highlighted the need to be visible early on (R1), another noted the importance of creating an identity; to be clear about what the network is for, to embed the purpose clearly in ‘people’s hearts and minds’ (R5). One respondent said that time has to be taken to talk to people, persuading them of the benefits in joining the network (R3).

The network leaders described specific challenges, and provided advice around **engaging internally**:

- moderate communication between non-clinical project managers and the clinical team to ensure mutual respect and trust and a smooth exchange of ideas in a safe space (R2)
- determine who your ‘challenging characters’ are as they can be disruptive to the network. Spend time getting them on board and secure a few champions of the network (R2)
- have decision makers on board (R3)
- communicate ‘common cause’ and be inclusive with all members of the network (R3)
- in order to overcome ‘initial scepticism from clinicians’, focus on smaller, practical improvements in line with clinicians’ priorities. Going for ‘big ticket items’ from the start may be counterproductive for engagement (R4).

Advice on **engaging with external stakeholders** was also provided:

- establish early dialogue with regional patient and public involvement (PPI) groups (R1)
- engage clinical interest groups, which can be difficult as a result of lack of immediate tangible outcomes and relying on goodwill for meetings to be attended (R1)
- establish communication with stakeholders outside the network that are relevant to network success, for example to support career development and education (R2)

### ***Consideration of workplace culture***

All five respondents said they had considered workforce culture when setting up a network, with one respondent describing the consideration of culture as the ‘biggest thing’, alongside a governance structure that helped everyone work equitably and having big decision makers within the team (R3). Another respondent advised that from the early stages, network leaders should help members to feel secure and not threatened by the network (R2). Respondents noted that all parts of the network should have an equal voice, there should be transparency and shared goals. The network should be collaborative and network leaders should have an awareness of what’s going on in other trusts.

Respondents highlighted the importance of members within the network have an **equal voice** (regardless of trust size or status) (R1, R2). One respondent noted the value of smaller trusts’ service improvement ideas (R2).

One respondent felt that a culture of **transparency** had enabled working through difficult decisions and sharing of information with other networks (R1).

Another recommendation given was to create a sense of **shared, for-the-greater-good purpose** beyond the immediate jurisdiction, in other words, a sense of providing equality of care across Scotland, with this being done early on (R2).

Respondents thought a network should be **collaborative**. Two respondents noticed a shift in the culture as their network formed, with one describing a move from being competitive to sharing and collaborative (R2). The second respondent noted a change in culture from 'competitive and isolation to open and transparent', stating that the 'trust that is built when you spend time with people being open and honest...is the biggest thing that changed' (R3). A third respondent advised 'don't do things to or at people' and use the experience and expertise of the network members to shape the network (R5).

Two respondents emphasised the importance of knowing and understanding **what is going on in other trusts** and how that may impact on how they engage with the network (R2) and would inform decisions on network configuration, based on existing cross-trust relationships and infrastructure (R4).

### ***Lessons learned in setting up the network***

We asked respondents what lessons they had learned in the setting up of their networks. Lessons reported included initially focusing on the network rather than IT, good engagement, clear communication and dedicated funding.

One respondent recognised that an **initial focus on the development of the network rather than leading with IT**, allied with a strong and clear governance structure that is transparently fair and allows a true regional voice in making decisions, was an important consideration in setting up their network (R1).

Taking the time to determine who the **right people to engage with** was cited as a lesson learned, with advice to think past the immediately obvious stakeholders. Credibility can easily be lost with one project, this can be avoided or lessened by engaging and getting the right people round the table; to ensure they are aware of what's going on and give them the opportunity to input to actions and decisions (R2). An example of this was given by one respondent who reported when appropriate IT support was not given it created a poor impression of the network (R1).

**Clear communication** across the different areas of the network was cited as valuable; the overall aims of the network should be emphasised to the different areas within the network who could be joining the network bringing their own agenda (R1).

Another important consideration reported was to have **funding** in place to ensure sustainability and resilience of the network (R2).

### ***Need for a physical base***

We asked respondents whether they believed having a physical base was beneficial. Four responses were received.

One network leader has a central base and believed it to be essential, especially for the core team. They stated that having a base also serves to promote the network's identity as separate from the hospital which is important, especially early in formation (R1).

Two of the three without a physical base cited the COVID-19 pandemic as being the reason for currently being virtual (R2, R5). One network plans to establish a base, believing face-to-face networking is important, especially early on to build the relationships (R5). All agreed that face-to-face meetings are beneficial.

### ***Usefulness of the NHS England national guidance documents***

We asked the respondents whether they found the guidance documents produced to support the English national strategy for diagnostic imaging services useful. The guidance documents were published after four of the five networks had been set up so the respondents talked in general about the usability of the guidance. Four responded to this question.

All respondents agreed that the guidance was useful, with one stating that the main value was to confirm they were on the right track with some changes made because of the guidance, for example the creation of an independent chair of the management board (R1). The respondent with network experience now embedded in a new radiology network referred to the workforce document as a 'bible' which would be used in 'everything we will do in the network'. They also described a 2021 quality standard for imaging (QSI) document (College of Radiographers and The Royal College of Radiologists) as a 'bible' (R5). While another respondent said the implementation guidance was useful but not a 'bible' (R2).

One respondent thought that the guidance was generic and required tailoring for your own network. They created their own tailored workforce strategy, which is prescriptive and 'makes it easy for the network'. This tailored guidance was produced in collaboration with a Health Education England workforce planner. The respondent noted that having someone with those skills and not from the clinical side was 'vital' They also produced an implementation plan to cover supply, upskilling, leadership, management, new roles and new ways of working supported by a toolkit (R2).

One respondent reported that the commercial structure and operational governance guide was 'off-putting to clinicians' as a result of the corporate language used (R4).

### ***Comparison of published English national guidance and network leaders' responses***

Many of the responses throughout this survey echoed guidance from the NHS England and NHS Improvement guidance, but other factors highlighted by the respondents did not feature in the guidance. Factors commonly highlighted by network leaders which did feature in the implementation guidance included: the benefits of digital capability to enable real-time image sharing, increased access to best practice and expertise, flexible working opportunities, joint procurement, a workforce plan, clear governance and good clinical and operational leadership, collaboration, establishing a distinct brand for the network and engagement.

Responses from the network leaders added additional advice around the 'human' factors important for a successful network. Factors around the culture of the network such as building trust, transparency, widespread engagement with the right people early on, sharing best practice and giving all network members an equal voice were factors considered key by respondents.

### ***General advice on setting up networks from one respondent with many years' experience***

In addition to the responses in relation to setting up radiology networks, one respondent had many years of experience setting up networks within Scotland and gave the following additional advice:

- have a single shared digital solution
- a one stop provider solution for equipment will reduce costs
- people are busy with their day jobs, think about how to motivate people to want to contribute – make sure you have a good programme manager, an expert in running networks, who knows the methodologies to employ for a successful network
- get it right from the start; 'there is a way of setting networks up and if you don't get it quite right, you never get it quite right'
- set the right tone to the network and develop trust
- be clear about what the benefits of the networks are; the benefits to patients, to staff, to the economy of Scotland
- bring people together to share learning and strategy
- if you are new to networks, it might be 3 years before you feel the benefits. If you have expertise in networks, then that can be done more rapidly as you've learned from your mistakes, and

- let the experts in the network inform the network.

## Limitations of survey

As this was qualitative research, there were associated limitations in the methodology and analysis:

- there was difficulty in recruiting respondents, however despite low numbers, data saturation was achieved
- respondents were a self-selected group from a targeted population
- respondents, with their wide and varying experience may have been limited in what they could convey; via the semi-structured interviews, as a result of time limitation or via the questionnaire, as a result of necessity to succinctly communicate ideas in an online text format
- every questionnaire and semi-structured interview was incomplete, especially around the factual description of the networks represented
- detailed data analysis was compromised by the necessity to maintain anonymity of respondents (for example, not revealing geographical location), and
- there were methodological differences between capturing responses via questionnaires and via interviews.

## The Scottish perspective

We invited 19 members of the Scottish radiology community as well as three members of the SHTG Council to contribute the Scottish perspective on radiology network set up. Four members of the Scottish radiology community and one member of SHTG Council provided comments. The following section reflects the views of the four members of the Scottish radiology community and one member of SHTG Council who provided comments.

We asked the Scottish reviewers what enabling factors they thought were specifically important for the north of Scotland.

Many of the enabling factors proposed by the Scottish peer reviewers were similar to those experienced by the English network leaders. Culture was cited as of importance; building relationships and trust between stakeholders were mentioned and, specifically, one reviewer noted that competition and politics can exist within three similar sized boards in the north of Scotland. Engagement with staff and patients, leadership and a dedicated team, as well as clear governance (especially in communicating clinically important urgent



findings) and ownership were factors anticipated by the Scottish reviewers as being key to a successful network. The network leadership team should be engaging and capable of securing mobilisation of leadership within the network and it was noted that creating a visible and accessible senior leadership team will secure buy-in.

The sharing of tangible outcome data was cited as being important by one reviewer as availability of operational and clinical data would allow an assessment of variation and effectiveness of current processes and allow capacity planning against demand (including times to access, outcomes, delayed diagnosis and missed diagnosis). This reviewer also suggested developing a capacity model (based on 80 % utilisation) would offer greater insight and support the network. An understanding and promotion of financial data was considered important to allow assessment of the risks in moving to the network as opposed to operating independently. The financial data should be viewed alongside operational and clinical data to enable engagement with resource providers.

One reviewer recommended a good managerial team should engage with the key stakeholders, importantly the reporting radiologists. Other important factors included collaboration, funding, the ability to move work around the region and having an employment model that makes enabling staff to work across boards easy.

One reviewer suggested that consideration should be given to benefits that could be gained on a larger scale (Scotland wide). They cited Scotland's existing advantage of a national picture archiving and communication system (PACS) and national equipment teams working in collaboration suggesting this could be built on to support the network. Another reviewer suggested consideration should be given to social and geographical inequities for patients in remote areas, with limitations of transport.

We asked the Scottish reviewers what challenges in setting up a network they thought were potentially important for the north of Scotland.

The importance of engagement, cited by all English network leaders, was considered important by two Scottish reviewers, specifically, engaging with patient networks and identifying ambassadors who can spread the word across the boards. Effective leadership is required to secure engagement with stakeholders. Identifying and engaging with challenging characters was highlighted by two reviewers. Funding (noted by two reviewers) and digital capability were proposed as being a challenge, and these were two factors the English network leaders said had enabled them to set up their networks. Similar to the English network leaders, the Scottish reviewers identified communication as a key challenge as well as listening to others. Lack of available clinical time was also identified as a potential challenge.

Specifically for Scotland, one reviewer suggested clarification of the role of the NRA versus the new Diagnostics Strategic Network would be required. Other Scotland specific considerations were whether the north should stand alone or be part of a wider solution,

bearing in mind other alliances between boards, for example, strategic links between NHS Tayside and NHS Fife, and between NHS Western Isles and NHS Borders and NHS Greater Glasgow and Clyde. One reviewer noted that the prevailing ethos of NHS Scotland is collaboration and the challenge would be leaving existing allegiances at the door and collaborating for the common good. One reviewer suggested that it will be important to recognise, respect and account for the distinct processes which may be functioning well in individual boards. Another reviewer added variations in recruitment and employment terms and conditions should be considered. Account should also be taken of any loss of the identity experienced by local stakeholders.

We asked the Scottish reviewers what cultural factors they thought were important for the boards in the north of Scotland. Echoing the network leaders in England, equality of the network members, sharing and collaboration were cited. The need to share performance data and to be collaborative and constructive reflected the English network experience of noticing a shift from members being competitive to collaborative. A Scottish reviewer suggested there could be a reluctance to share data if it is not the best quality, if they were worried about how it would be used or if it would reflect badly on them. One reviewer proposed that cultural aspects may not be an issue as the boards have been working collaboratively for a decade now; with outsourcing companies and successfully as part of the Scottish National Radiology Reporting Service (SNRRS).

A Scottish specific comment suggested the culture of silo working in NHS Scotland as a result of the board structure and accountability setup should be considered. They suggested that authority should be devolved from boards to a regional or national construct in order that the network is able to function. Account should be taken of any loss of the identity experienced by local stakeholders; creating a strong identity and regional brand may mitigate any loss of local identity and effective organisation development will establish shared vision and goals.

Scottish reviewers highlighted a need for key performance indicators to determine the benefit of the network. They also called for consideration of potential duplication across national, regional, local levels, suggesting that health board strategies should align even if just local imaging ones.

## Conclusion

Guidance documents from NHS England, survey responses from English experts and the opinion of Scottish clinicians have been used to identify key factors in creating a successful radiology network, in this instance, in the north of Scotland.

Five English network leaders described multiple benefits from their radiology networks, in terms of advantages for patients, staff, service operations and finances. Universal image

access, joint procurement, sharing of best practice and insourcing were the most commonly mentioned benefits. Flexible working arrangements, joint recruitment, training academies and funding were also reported as potential benefits from setting up a radiology network.

The key factors to enable a successful network were:

- engagement
- a dedicated core management team
- governance
- securing buy-in as well as having
- funding
- digital capability
- good communication

When asked about the challenges experienced in setting up their networks, all respondents reiterated the importance of wide and early engagement. They emphasised that work needs to be done to talk to all stakeholders and get their buy-in, with careful consideration given to who can champion the network. They saw the creation of an identity for the network and communicating the common purpose of the network as also key.

All respondents considered culture an important consideration in setting up the network; there has to be equity across all network members, transparency, a collaborative culture and understanding of each other's trusts.

The Scottish perspective, gathered from four members of the radiology community in the north of Scotland and one member of SHTC, aligned with many of the factors described by the English network leaders, notably the role of culture and collaboration, engagement, leadership and team in place and clear governance. Challenging characters, funding and digital capability were noted as challenges as was establishing the network in the context of existing alliances. It may be that the required cultural shift described by the English network leaders is not as pronounced in Scotland. One reviewer believed the work with outsourcing companies and the success of SNRRS have paved the way for collaborative working. Consideration of the existing individual processes and local identity of network members and any inequities as a result of social or geographic factors were also considered to be important for a successful network. There was agreement that creating a strong brand with visible and effective leadership and a shared vision among network members would be key.

## Acknowledgements

### Healthcare Improvement Scotland development team

- Julie Calvert, Health Services Researcher (lead author)
- Paul Herbert, Health Information Scientist

- Rory Maguire, Project Officer
- Dawn Mahal, Health Services Researcher

The following individuals contributed:

- Michael Conroy, Imaging Services Manager, NHS Tayside
- Nick Crohn, Radiology Services Manager, Orkney Health Board
- Mr Ali Mehdi, Vice Chair, Scottish Health Technologies Council, Healthcare Improvement Scotland, Consultant Orthopaedic Surgeon, NHS Borders
- Jillian Patte, National Programme Director, NHS National Services Scotland
- Dr Senthil Ragupathy, Unit Clinical Director and Consultant Radiologist, Department of Radiology, Aberdeen Royal Infirmary

Declarations of interest were received from all peer reviewers. All contributions from peer reviewers were considered by the lead author. The peer reviewers had no role in authorship or editorial control and the views expressed are those of Healthcare Improvement Scotland.

© Healthcare Improvement Scotland 2022

Published August 2022

This document is licensed under the Creative Commons Attribution-Noncommercial-NoDerivatives 4.0 International License. This allows for the copy and redistribution of this document as long as Healthcare Improvement Scotland is fully acknowledged and given credit. The material must not be remixed, transformed or built upon in any way. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc-nd/4.0/>

## References

1. Public Health Scotland. NHS waiting times - diagnostics. 2021 [cited 2022 Jul 15]; Available from: <https://publichealthscotland.scot/publications/nhs-waiting-times-diagnostics/diagnostic-waiting-times-waits-for-key-diagnostic-tests-31-may-2022/>.
2. Scotland NEf. Intelligence on the health care workforce in Scotland. 2022 [cited 2022 Jul 15]; Available from: <http://turasdata.nes.nhs.scot/data-and-reports/official-workforce-statistics/all-official-statistics-publications/07-june-2022-workforce/dashboards/nhsscotland-workforce/?pageid=6963>.
3. Scottish Radiology Transformation Programme. Radiology Target Operating Model (TOM). 2021 [cited 2022 Feb 23 ]; Available from: <https://www.radiology.scot.nhs.uk/wp-content/uploads/2021/08/Radiology-Target-Operating-Model.pdf>.
4. NHS England. Diagnostic imaging network workforce guidance. 2022 [cited 2022 Jun 9]; Available from: <https://www.england.nhs.uk/publication/diagnostic-imaging-network-workforce-guidance/>.
5. NHS England. Diagnostic imaging network implementation guide. 2021 [cited 2022 Feb 23 ]; Available from: <https://www.england.nhs.uk/publication/diagnostic-imaging-network-implementation-guide/>.
6. NHS England. Diagnostic imaging network capital equipment planning guide. 2021 [cited 2022 June 9]; Available from: <https://www.england.nhs.uk/publication/diagnostic-imaging-network-capital-equipment-planning-guide/>.
7. NHS England. Diagnostic imaging network commercial structure and operational governance guide. 2021 [cited 2022 Feb 23 ]; Available from: <https://www.england.nhs.uk/wp-content/uploads/2021/04/B0030-Operational-governance-guide-April-2021.pdf>.
8. NHS England. Transforming imaging services in England. 2019 [cited 2022 Feb 23 ]; Available from: <https://www.england.nhs.uk/transforming-imaging-services-in-england/>.
9. NHS England. Radiology: GIRFT Programme National Specialty Report 2020 [cited 2022 Feb 23 ]; Available from: <https://www.gettingitrightfirsttime.co.uk/wp-content/uploads/2020/11/GIRFT-radiology-report.pdf>.
10. Health Education England. National Review of Radiology Academies Summary report. 2017 [cited 2022 Feb 23 ]; Available from: <https://www.hee.nhs.uk/sites/default/files/documents/Review%20of%20radiology%20academies%20-%20summary%20FINAL.pdf>.
11. East Midlands Imaging Network. East Midlands Imaging Network. 2022 [cited 2022 Feb 24 ]; Available from: <https://www.emrad.nhs.uk/>.
12. Cheshire & Merseyside Health and Care Partnership. Cheshire and Merseyside Radiology Imaging Network (CAMRIN) 2019 [cited 2022 Feb 23 ]; Available from: <https://www.cheshireandmerseysidepartnership.co.uk/our-work/camrin/>.
13. NHS Yorkshire. NHS Yorkshire Imaging Collaborative 2022 [cited 2022 Feb 28 ]; Available from: <https://yorkshireimaging.nhs.uk/>.

## Appendix 1: Questionnaire

1. To give us a flavour of the size of your network, how many trusts are in the network? Please can you estimate how many large teaching/district general hospitals are in your network.

2. Which of the following best describes the geographical area the network covers?\*

Mainly Rural (80% or more of the population resides in rural areas)

Largely Rural (Between 50% and 79% of the population resides in rural areas)

Urban with Significant Rural (Between 26% and 49% of the population resides in rural areas)

Urban City and Town

Urban with Minor Conurbation

Urban with Major Conurbation

3. Across the imaging network, can you tell us the approximate number of the following roles to give us an idea of the make-up of the workforce\*:

Consultants

Trainee radiologists

Radiographers

Sonographers

Assistant practitioners

Nurses Administrative staff

Other—please specify

**For the following questions, please consider the different parts of the network. For example, it may be that some parts are at a further stage of maturity than others, or have undergone more radical development than other parts. We would like to hear about these different parts if you feel that there are significant differences between them.**

***Please note there is no word limit in the response boxes, please provide as much detail as possible.***

4. Compared to how radiology services operated prior to your network, what benefits has your network provided? For each of the following, please list the benefits you have experienced:

*Benefits to patients/carers, name top 3 benefits*

*Benefits for staff, name top 3 benefits*

*Benefits to service operations, name top 3 benefits*

### *Financial benefits*

5. Thinking about the implementation guidance NHS England produced on forming imaging networks, what parts of the guidance were of most value to the establishment of your network? Are there any parts that weren't useful?

Please tell us about up to three parts that were of most value and up to three that were of no or little value.

*What were the most value?*

*What were of no or little value?*

6 a. Can you identify the key enablers that supported a successful network?

Please list up to three enablers at a national level and up to three at a network level and describe how these were helpful.

Examples may include: funding, dedicated leadership, PMO, clinical capacity within the network, strategies to direct activities, governance, digital capability, outsourcing/workforce

*National level*

*Network level*

6b. In retrospect, was there anything else that could have enabled a more rapid or effective development of the network?

7. Can you tell us about any challenges in setting up your network or aspects of setting up your network that didn't work?

8. Thinking about the set up, sustainability and resilience of your network, what are your top 3 lessons learned (what might you have done differently)?

9. Thinking about the more practical elements of your network, is your central office (physical base) essential— please tell us why or why not?

10 a. We would like to get an idea of the timescales necessary to establish each stage of the network; from pre-emergent through to thriving. Considering the start of the network to be the formal governance set up for a networked approach, roughly how long did you spend in each stage?

10b. Please share any network development timelines you have to hand, eg a timeline diagram.

11. Did you consider organisational culture in creating the network? If so, what worked well?

12. We have access to the Future NHS platform. We would be grateful if you could direct us to any areas within this that might help support the setting up of a network in the north of Scotland.

13. Any other comments?

\*results from this question were not used in the analysis as because of the low number of responses the information could have identified the respondents

## Appendix 2: Table of abbreviations

EMRAD	East Midlands imaging network
GIRFT	Getting It Right First Time
HEI	Higher Education Institution
NRA	North radiology alliance
PACS	Picture archiving and communication system
PPI	Patient and public involvement
QSI	Quality standard for imaging
SCIN	Scottish clinical imaging network
SHTC	Scottish Health Technology Council
SHTG	Scottish Health Technologies Group
SNRRS	Scottish National Radiology Reporting Service
SRTP	Scottish radiology transformation programme
TOM	Target operating model