



NHSSCOTLAND SHARED SERVICES NATIONAL RADIOLOGY PROGRAMME

BUSINESS CASE

NATIONAL INFORMATION TECHNOLOGY (IT) CONNECTIVITY



**NATIONAL RADIOLOGY INFORMATION AND INTELLIGENCE
PLATFORM (NRIIP)**



NATIONAL WORKFORCE SOLUTIONS

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BUSINESS CASE APPROVAL

This document has been approved as the final version of the Radiology Programme Business Case concerning a funding request in support of a National Radiology Information and Intelligence Platform (NRIIP), National Information Technology (IT) Connectivity and the initiation of a National Radiology Implementation Programme to implement Workforce Solutions.

The accurately reflects the current understanding of the Programme.

Approved by

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GLOSSARY

The following terms appear throughout this document and its related attachments:

A & E	Accident and Emergency
ADRC	Administrative Data Research Centre for Scotland
BAS	Radiology Business Analytics System
BI	Business Intelligence
CCN	Change Control Notice
CDW	Corporate Data Warehouse
CE	Chief Executives
CG	Clinical Governance
CLO	NSS Central Legal Office
Cost Book	Scottish Health Services Costs
EMRAD	East Midlands Radiology Network Services
GEM	Generic Economic Model
GG&C	Greater Glasgow & Clyde
GMC	General Medical Council
HCPC	Health & Care Professions Council
IA	Initial Agreement
IG	Information Governance
IT	Information Technology
ISD	Information and Statistics Division
KPI	Key Performance Indicators
MRI	Magnetic Resonance Imaging
NES	NHS Education for Scotland
NPC	Net Present Cost
NPV	Net Present Value
NRAC	National Resource Allocation Model
NRDR	National Radiology data Requirements
NRIB	National Radiology Implementation Board
NRIP	National Radiology Information and Intelligence Project
NSS	National Services Scotland
OJEU	Official Journal of the European Union
PACS	National Picture Archiving Communication System
PBPP	Public Benefit and Privacy Panel

PHI	Public Health & Intelligence
PA	Programmed Activities
PIA	Privacy Impact Assessment
PIN	Prior Information Notice
QA	Quality Assurance
RCR	Royal College of Radiologists
RCR SSC	Royal College of Radiologists, Scottish Standing Committee
RIS	Radiology Intelligence Solution
ROR	Radiology Operational Requirement
RRIG	Reporting Radiographer Interest Group
SCIN	Scottish Clinical Imaging Network
SEAT	South East and Tayside
SERRIS	South East Regional Radiology Insourcing Solution
SG	Scottish Government
SLA	Service Level Agreement
SME	Subject Matter Expert
SoR	Society and College of Radiographers
SRO	Senior Responsible Officer
SWAG	The Scottish Workforce and Staff Governance Committee
The Model	The National Radiology Model
VFM	Value for Money
VR	Voice Recognition
WRG	Workforce Reference Group
WTE	Whole Time Equivalent

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A. EXECUTIVE SUMMARY

This Business Case is in response to a request made by the National Chief Executive (CE) Group to explore solutions for diagnostic radiology concerning disparate, local approaches around Information Technology (IT) Connectivity, data management and workforce. These three, interdependent requirements underpin a new paradigm for a sustainable, future diagnostic radiology service in Scotland: The National Radiology Model (hereinafter referred to as 'The Model'): **Appendix 1**; was approved by CEs in August 2016.

This Business Case therefore discusses the outcome of the exploration undertaken by the radiology programme team and presents the capital and revenue requirements needed to turn The Model into a reality and set the foundation for change. It also outlines a set of Recommendations which, if approved by the CEs, will become key drivers to perpetuate an ongoing national change programme for diagnostic radiology.

Particular focus of our Business Case will be to highlight the key challenges facing diagnostic radiology, what the principles of The Model can do to begin to address these challenges, the impact 'Doing Nothing' would have on patients, the service itself and the wider NHS clinical services.

1. KEY CHALLENGES FACING DIAGNOSTIC RADIOLOGY IN SCOTLAND

There is an ongoing, year-on-year increase in service demand:

- Patients awaiting radiology tests for over six weeks has risen from 329 to 4,565 over an 18 month period from Nov 2015 to Mar 2017: **A 1,288% increase.**
- Total net costs for diagnostic radiology have risen from £244m to £280m over a four year period: **An increase of £36m or 14.75% from 2012 – 2016.**
- The National Records of Scotland predicted in mid 2014 that the Scottish population would grow to 5.4m by 2020. This predicted 2.4% growth was achieved by June 2016: **An increase of 31,700 people in 2 years, which demonstrates a continuous growth in demand for services.**

Over the six month period between Sep 2016 and Mar 2017 the Consultant Radiologist vacancy rate increased 51%¹. The current vacancy rate across Scotland for Consultant Radiologists is **13.2% or 33.4 WTE².**

The RCR³ also reported that expenditure on outsourcing and additional payments had **increased by 50%**, from an estimated £3.5m for 2013/14 to £5.25m for 2014/15: **This is a £1.75m increase.**

Spend on locum and agency staff has **increased from £7.9m to £8.7m** (2015/16 to 2016/17 half year data): This represents a **10% increase in one year.**

¹ Radiology programme team data capture exercise Sep 2016

² www.ISDScotland.org/Health-Topics/Workforce/Publications/data-tables2017.asp

³ RCR SSC (2016) The Clinical Radiology Workforce in Scotland: 2015 Census Report

2. HOW DOES THE MODEL BEGIN TO ADDRESS THESE CHALLENGES?

2.1 NATIONAL IT CONNECTIVITY SOLUTION

The current radiology IT set up in NHS Boards varies significantly. There is no singular method or supplier to facilitate a national approach to radiology image reporting. Where local, cross boundary service level or IT Connectivity arrangements have been achieved, they too are disparate, but have been required to satisfy urgent local needs. One such arrangement will require a national IT Connectivity solution to follow immediately after expiry of the short term contract. This fire fighting approach to challenges continues to be an ongoing trend which exacerbates the inability to achieve a singular, national solution.

Through extensive work with a multi-disciplinary group of stakeholders, we compiled a set of documents to support an Official Journal of the European Union (OJEU) procurement process. The result is in an agreed National IT Connectivity solution aligned to the principles of The Model and ensures the retention of local patient access to imaging and to the specialist radiologist opinion.

It should be noted that should the national IT Connectivity solution not follow the short term contract, there is a high financial and legal risk to the respective NHS Boards. Also, if we do not award a procurement contract, there is a risk that we could be challenged legally by suppliers.

2.1 NATIONAL RADIOLOGY INFORMATION AND INTELLIGENCE PLATFORM (NRIP)

We found that as the approach to IT Connectivity is disparate, so too is the approach to data: There is currently no national dataset therefore collating a reliable whole of Scotland perspective on radiology activity is unachievable.

Our stakeholders have been working to define and agree upon a national data set and definitions. These data will be stored in the National Radiology Information and Intelligence Platform (NRIP) within the National Services Scotland (NSS) Corporate Data Warehouse (CDW) and will facilitate the ability to collate, analyse and share national radiology data through the National Radiology Dashboard. This will enable regional and national service planning and improvement.

During our scoping activities, we found that the use of radiology data captured within the Scottish Health Services Costs (Cost Book) was critically viewed by stakeholders. As a result, we have also made exploration with the Cost Book team to consider how we could work together to establish robust, national radiology financial data.

2.3 NATIONAL WORKFORCE SOLUTIONS

Having achieved a national IT Connectivity solution with a defined, singular data set, the existing workforce can be optimised through flexible working across traditional NHS Board boundaries. We have been engaging with a number of national Human Resource stakeholders to create a suite of support documentation fundamental to achieving such an aim.

It must be stressed that once The Model is in place and utilisation of existing workforce optimised, a shortfall will still remain within the reporting capacity.

We have therefore captured a number of Recommendations at the end of this

document highlighting solutions to combat this problem; such as an international recruitment drive for Consultant Radiologists, increased training places and increased use of Reporting Radiographers.

2.4 IMPLEMENTATION OF THE MODEL

Implementation of the National IT Connectivity and NRIP solutions will be undertaken by NSS IT, Business Intelligence (BI) and Public Health Information (PHI) teams in collaboration with regional implementation teams. Implementation of the Workforce solutions will be undertaken by the National Radiology Implementation Programme team.

It is recommended that oversight and programme management of all activities to facilitate implementation of The Model are provided by the National Radiology Implementation Programme team. In addition there is a National Radiology Implementation Board supported by a lean management team to embed the ongoing national radiology service change and ensure benefits realization over a ten year period.

2.5 BENEFITS OF THE MODEL

Whilst this Business Case demonstrates limited financial savings, the key driver is service sustainability: non-monetary benefits.

The key non-monetary benefits are detailed below.

The following were developed in conjunction with key radiology stakeholders from across Scotland and have been used as scoring criteria within the Economic Case.

- **Improved quality and access to services:**
 - Maintain local image acquisition and therefore local patient access;
 - Retain radiologists at local level;
 - Reduce the clinical risks associated with outsourcing, locum and agency staff;
 - Allow improved expert Radiology input to Multi-Disciplinary Team meetings leading to improved diagnosis, staging and treatment plans for patients including cancer patients;
 - Allow more effective use of the expert skills of the radiology workforce;
 - Support cross-boundary image requesting and request justification;
 - Support cross-boundary image reporting;
 - Allow cross-boundary requests for specialist opinion; and
 - Improve patient experience by expediting diagnosis and treatment.
- **Data Security and Information Governance (IG):**
 - Stores data in a Safe Haven; and
 - Complies with NHSScotland Information Governance process; Privacy Impact Assessment (PIA) and Public Benefit and Privacy Panel (PBPP)
- **Sustainable service – improved efficiencies leading to cost reduction:**
 - Support for clinical services in acute and primary care;
 - Support emergency and unscheduled care 24/7;

- Support remote and rural NHS Boards;
 - Increased resilience of service at a local level (e.g. ability to cope with local sickness absence);
 - A resilient and flexible service that can respond to challenges around capacity and demand via a collegiate approach;
 - Supports improved workflow and increased productivity;
 - Maximisation of role utilisation and flexibility;
 - Ability to create reporting work lists and allocate reporting across Health Board boundaries;
 - Ability to operationally manage and strategically plan services utilising NHS data mart; and
 - Ability to model future services, utilising NRIIP within the CDW.
- **Standard consistent approach pan Scotland**
 - Reduce unwarranted variation in demand for radiology services; and
 - Reduce unwarranted variation in radiology practice.
- **Improved well being of staff:**
 - Recruitment and retention of staff;
 - Increased job satisfaction;
 - Reduction in work-related stress;
 - Modern fit for purpose infrastructure;
 - Supports requirements of current clinical services;
 - Meets the anticipated needs of future clinical services;
 - Supports linkage to current NSS CDW data marts; and
 - Delivers future flexibility of data analysis according to anticipated service needs.

3. IF WE DO NOTHING

Within the Business Case we have identified there are some ongoing financial benefits to be realised through implementation of The Model, in addition to the non monetary benefits listed above. Benefits are detailed within the Economic Case on page 31.

It should be borne in mind that if no changes are made to the current operating model, then diagnostic radiology will aspire to a future service that is unsustainable; a service which will see:

- uncontrolled growth of annual running costs;
- an impact upon patients by inadequate access and quality of services;
- an impact upon staff wellbeing and career progression; and
- a future service that is not fit for purpose.

Without radiology for diagnostic capability, other clinical services including primary care and acute services cannot make a timely diagnosis, which impacts on the ability of clinical services to deliver a treatment plan and appropriate high quality care. The real risk of doing nothing is that radiology services will fail and this will have a catastrophic impact on patient diagnosis and treatment in acute and primary care settings.

There is a capital and revenue investment required for IT Connectivity, NRIIP and for the

associated implementation of The Model:

- **Capital £0.67m** (£0.76m including VAT); **and**
- **Revenue non-recurring £2.45m**

A total investment of £3.1m (£3.2m including VAT).

This investment will return a recurrent saving of circa £1.5m per annum. This is conservative estimate of potential savings based on prudent modeling of additional capacity only.

4. WHAT WE ARE ASKING OF THE CHIEF EXECUTIVES?

We have been presented with a unique window of opportunity to influence change across Scotland. Since inception, we have built strong working relationships with a range of national stakeholders who have helped to influence the radiology component of a Regional Implementation Plan around The Model. National and regional implementation aligned to The Model is the foundation of that opportunity. Therefore, CEs are asked to:

- a) Approve this Business Case;
- b) Confirm a relevant source of investment for implementation;

Investment routes which may be applicable are:

- **The Transformation Fund**
- **National Resource Allocation Committee (NRAC) Formula (Refer to tables 10 and 11, p 48)**
- **Scottish Government funding to improve waiting times for cancer patients to speed up access to diagnostic tests**

The CEs are asked to approve one of the above or provide an alternative investment solution.

- c) Approve the Programme Structure, Governance and Reporting arrangements;
- d) Commit to appoint a clinical and managerial lead in each region for implementation;
- e) Mandate the implementation of the Workforce Solutions and recommendations;
- f) Develop a new financial and accountability model, which promotes the pooling of resources at a regional level, rather than via individual inter-Board Service Level Agreements (SLAs);
- g) Consideration should be given to the development of national radiology Key Performance Indicators (KPIs);
- h) Consider a national approach to procuring voice recognition (VR) software and licenses; and
- i) Update Cost Book to take account of the financial and managerial radiology data and utilise the outputs of NRIP.

***National Radiology Programme Team
Health Portfolio, NHSScotland Shared Services***

B. THE STRATEGIC CASE FOR CHANGE

1. INTRODUCTION TO DIAGNOSTIC RADIOLOGY

Diagnostic radiology has evolved over the last century from the plain film x-ray to the modern suite of digital imaging services and differing diagnostic procedures that are integral to the provision of healthcare across Scotland. Available in a wide range of healthcare settings, diagnostic radiology services provide a key diagnostic function in the support and delivery of a number of patient pathways, which facilitate timely diagnosis for patients and improve patient outcomes. Equitable access to a robust, quality and timely imaging service is vital for clinicians involved in both emergency and elective care to ensure optimal outcomes for their patients. Co-location of diagnostic radiology is an absolute requirement for the provision of Accident and Emergency (A&E) as well as acute medical, surgical and orthopaedic clinical services.

Radiology also has an, as yet, unrealised opportunity to make use of available technology and a workforce skill mix to deliver a new national service model. These will provide services which uncouple the requesting and capturing of images from the associated reporting and mobilise the available workforce to greater effect. Separation of acquisition of images from reporting already happens in terms of the timing: that is, images are captured at one point in time and reported upon at a later time. However, separation of acquisition of images in terms of location does not generally happen. This is what is innovative about the proposed Model; it will enable cross boundary working.

2. THE STATUS QUO

Historically, radiology services have evolved on a hospital by hospital basis and in response to increasing local demand including that originating from primary care. **Appendix 2** refers.

The radiology service in Scotland is unsustainable in its current format. This is due to a number of challenges facing radiology in Scotland which are adversely impacting on a timely diagnosis for patients with the resultant impact on patient outcomes. These include a decrease in numbers of available workforce, viz. reduced capacity coupled with a rapid increase in demand for services. Costs of the service are rising at an alarming rate.

There is increasing patient expectation around access to and delivery of services, a growing complexity of disease and increasing options in relation to diagnosis, treatment and ongoing monitoring. New guidelines relating to patient diagnostic pathways for cardiac, cancer and stroke will result in additional demand for Computerised Tomography (CT) and Magnetic Resonance Imaging (MRI) examinations.

According to the National Records of Scotland mid-2014 Population Estimates, the **predicted population growth was 2.4% from 5.3m people to 5.4m by 2020**. The **mid-2016 figures⁴** reported the population of Scotland had already **grown to 5.4m**.

It is evident that demand on the service will be intensified due to the population and demographic growth for Scotland and supporting the need for seven day working. **Appendix 3** refers.

⁴ <https://www.nrscotland.gov.uk/files//statistics/nrs-visual/mid-year-16/16mype-cahb-info.pdf>: Mid Year Population Estimates Scotland 2016

The main challenges faced by radiology services are outlined below.

3. WORKFORCE CHALLENGES

3.1 CONSULTANT RADIOLOGIST VACANCIES

Workforce shortages are challenging capacity in radiology services which is impacting on the ability to meet increasing demand; resulting in delays to diagnosis and treatment. **Appendix 4** demonstrates a trend of increasing patient waiting times⁵.

In the 18 month period shown from the low of November 2015 the:

- total number of patients waiting has **increased by 43%**;
- number of patients **waiting more than 4 weeks by 375%**; and

At 30 November 2015 there were **329 patients waiting more than 6 weeks** which has risen to **4,565 at 31 March 2017** (hitting a peak of 5,092 at 31 January 2017): **An increase of by 1,288%**.

Each of these increases illustrates the real pressure present on the radiology service and in particular the recent difficulties in meeting Waiting Times Targets. At this point it is unclear whether the trend will continue in the manner highlighted above as the figures to March 2017 are the most recently published.

According to the Shared Services Radiology Programme National Radiology Data Capture Exercise⁶ undertaken in September 2016, the number of Consultant Radiologist vacancies across Scotland is 22.1 WTE: Appendix 5 refers. However, **by Mar 2017 this figure had increased to 33.4 WTE which represents a 51% increase over the six month period. These vacancies are acute within remote and rural areas and the situation will exacerbate over the coming years due to approaching retireals.**

There is a high age profile in the Consultant Radiologist workforce, with anticipated retirements over the next two years which will exacerbate the current situation.

The RCR⁷ estimate that by 2025 between 30–36% of current Consultants will have retired. By 2030, the figure is expected to be 47–53%.

Vacancies are not spread evenly across NHS Boards and, in recent years, there has been significant migration of established Consultants from smaller and more remote NHS Boards to the larger teaching centres. This migration is creating significant challenges to service sustainability for some NHS Boards. Similar challenges exist in other radiology workforce groups and in particular in the discipline of Sonography.

In addition, there is an increasing need for sub-specialisation which further dilutes the available workforce.

⁵ NSS ISD (National Services Scotland Information Services Division) 2017

⁶ Shared Services Radiology Programme (2016) National Radiology data Capture Exercise

⁷ RCR SSC (2016) The Clinical Radiology Workforce in Scotland: 2015 Census Report

3.2 SUB-SPECIALISATION

There is a continuing and accelerating trend towards sub-specialisation within radiology. It is clear that individual hospitals and smaller NHS Boards will not be able to sustain a Consultant radiology workforce that is able to cover all of the diagnostic sub-specialisation that current and future radiology will require.

The necessary collaborative working between networks of Radiologists that is required to support sub-specialisation cannot be delivered within the existing individual hospital and Health Board based service delivery models.

3.3 SUPPORTING ON-CALL

Diagnostic radiology is now extensively utilised outside normal Consultant working hours to support timely delivery of secondary care services. Much of this time is contracted through local Radiologists during “on call” arrangements. This contractual commitment consumes a significant resource in an inefficient manner and is unsustainable as locally provided services in the future.

3.2 TRAINING PLACES

There are currently insufficient Radiologists being trained at post-graduate level⁸.

Trainees and other non Consultant grades (including academic non Consultant posts) make up only **30% of the Radiologist workforce** (this compares to an average of 61% for all medical specialties in Scotland)⁹.

This figure raises questions of future replenishment and sustainability of numbers in the Consultant workforce.

In addition, Radiology trainees are not sufficiently exposed to remote and rural hospital placements during their training. This has a twofold effect; one is that once qualified, the trainees are less likely to apply for Consultant posts in remote or rural hospitals and secondly, the lack of trainees in remote and rural hospitals increases the on-call and out of hours intensity for Consultants making retention difficult.

This situation is aggravated by the net export of Radiologists at the end of their training to posts elsewhere in the United Kingdom and overseas.

3.3 REPORTING RADIOGRAPHERS

Radiographers have expanded their role over the years to encompass some aspects of image reporting. However, there is a wide variation in employment practices for Reporting Radiographers across the country including their scope of practice and productivity. The net effect of this variation is that this workforce resource is not being utilised to capacity and the transferability of skills across NHS Boards is limited. This is worsened through the lack of a standard educational pathway to underpin the Reporting Radiographer role.

⁸ RCR SSC (2017) Proposal for Additional Medical Specialty Training Intake Numbers 2017 2018 - Radiology

⁹ RCR SSC (2016) The clinical radiology workforce in Scotland: 2015 census report

3.4 SILO WORKING AND LOCAL SOLUTIONS

The structure of NHS Boards has evolved historically and the accountability for both financial, performance and quality targets remain within individual NHS Boards; there has been little cross boundary or regional working to address challenges.

The situation regarding Consultant vacancies has led to the outsourcing of image reporting to the private sector, the payment of additional sessions at enhanced rates to existing Consultants and the employment of agency and locum staff at exorbitant rates.

The RCR also reported that expenditure on outsourcing and additional payments had **increased by 50%**, from an estimated £3.5m for 2013/14 to £5.25m for 2014/15: **This is a £1.75m increase.**

The radiology programme team undertook a baseline data collection from all NHS Boards (achieving a 100% response rate) which showed an **expenditure of £6.3m in 2015/16 for outsourcing and additional payments; an increase of £1.05m** in the year from 2014/15 as provided by the RCR, **representing a 17% increase**¹⁰.

It is anticipated that these costs will continue to escalate due to a crisis within the service and the implementation of 'quick fix' solutions in some NHS Boards. **Appendix 6** refers.

A further solution to Consultant vacancies is the use of Locum and Agency staff. **Table 6 in Appendix 6** demonstrates that in **2015/2016 £11,674,968** was spent on non-substantive staff. Based on half year data for 2016/17, this figure is set to rise to a minimum of **£12,740,052.**

4. COSTS OF DIAGNOSTIC RADIOLOGY SERVICES IN SCOTLAND

The total net costs for diagnostic radiology are circa. £280m per annum¹¹. The associated costs are unplanned, unbudgeted and are escalating. **Appendix 7** demonstrates a five year trend in radiology service costs and activity data gathered by PHI of the radiology information available within the Cost Book.

This shows continuous growth in the total net cost of a number of examinations for a range of radiology services; **from £244m in 2011/12 to £280m in 2015/16: A 14.75% increase over a five year period.**

5. IT CHALLENGES FACING RADIOLOGY

There are disparate IT systems which neither enable service planning on a national basis nor utilisation of available resource across NHS Board boundaries. As a result, where

¹⁰ Source: Shared Services Radiology Programme (2016) National Radiology data Capture Exercise

¹¹ Scottish Health Service Costs (Cost Book) years ending 31 March 2016, 2015, 2014, 2013 and 2012

capacity may exist within the radiology service as a whole, the IT solution currently deployed does not allow available resource to provide support on a national basis. This results in several NHS Boards being under significant pressure with little resilience and a growing reliance on additional sessional payments to Consultants and outsourcing to meet demand.

The current radiology IT Solution comprises a national Picture Archiving and Communications System (PACS) which captures radiological images and reports from thirty-one local PACS instances. Additionally, each Health Board operates a local Radiology Information System (RIS) for each major hospital site which stores waiting lists, requests and booking data as well as the reports on individual radiological images. These solutions in each NHS Board are successful in their remit of providing radiology services locally, but there exists considerable opportunity to enhance these mechanisms with the ability to work from a wider base in support of patients.

To illustrate, a model already exists where the patient's images are captured in NHS Western Isles and reported upon in NHS Borders. This novel national service model will retain local patient access to imaging and to the specialist radiologist opinion, which is beyond that of interpretation of images.

The voice recognition (VR) software used to enable efficient radiology reporting is currently licensed through disparate vendors of software components of the current reporting process. This model prevents portability of the voice recognition functionality when these vendor software components are replaced. A more cost efficient model would be to procure voice software recognition licenses directly from the VR software company.

6. DATA CHALLENGES FACING RADIOLOGY

There is no nationally agreed data set or definitions for radiology and therefore an inability to meaningfully collate data for planning purposes or to measure and identify best practice. There is variation in the delivery of radiology services across NHS Boards ranging from service user access to reporting of images. Information systems are not integrated, and there is an inability to share patient information between NHS Boards. Furthermore, disparate and disjointed approaches to data collection, analysis and storage do not lend themselves to support strategic planning or service improvement.

6.1 BASELINE DATA

Radiology stakeholders have consistently highlighted the lack of available comparable data. CEs mandated the Radiology programme team to undertake a data capture exercise to evidence the case for change. The outcome of this exercise demonstrated the difficulty in obtaining data and the variability of data held. Many of the submissions had to be completed by hand. The difficulties experienced during the data capture exercise has also provided validation in support of the need to have agreed national data held within a central repository supported by intelligence specialists with an analytical capability: The NRIIP.

A summary of that data capture template is attached for information. [Appendix 8](#) refers.

Part of the baseline data capture exercise involved asking respondents what they perceived to be the biggest challenges facing their service currently. The responses are demonstrated [in Appendix 9](#).

7. SUMMARY OF STATUS QUO FOR RADIOLOGY SERVICES

In summary, the current landscape within the radiology service is unsustainable. Demand is outstripping capacity, costs are growing exponentially and future projections will only exacerbate the situation.

Without radiology diagnostic capability, other clinical services including primary care and acute services cannot make a timely diagnosis, which impacts on the ability of clinical services to deliver a treatment plan and appropriate high quality care. This in turn impacts on other services leading to higher hospital admission rates and increased hospital lengths of stay.

The real risk of doing nothing is that radiology services will fail and this will have a catastrophic impact on patient diagnosis and treatment in acute and primary care settings.

There is a compelling case for change, a strong business need to consider a 'Once for Scotland' approach, implementing The Model delivered on a local, regional and national basis.

The Model was developed in conjunction with stakeholders to address the current challenges facing the radiology service in Scotland and the achievement of a collegiate solution. The Model was outlined in the National Radiology Model Strategic Document and approved by the NHS Chief Executives in August 2016. Integral to this collegiate solution are three co-dependent, underpinning requirements:

- IT Connectivity;
- A nationally agreed data set and definitions held within The NRIP; and
- A flexible and optimised workforce.

The first two above require upfront and ongoing investment.

The CEs mandated the radiology programme team to develop a Business Case, primarily to address the first two underpinning requirements. However, the workforce is integral to the successful implementation of these elements and therefore forms the third section of the Business Case.

The solutions to the radiology challenges developed by the radiology programme team are detailed in the Commercial Case from page 19.

C. COMMERCIAL CASE

In August 2016, the Radiology team was mandated by the NHS Chief Executives to develop solutions to the radiology challenges of IT Connectivity, data and workforce.

The Commercial Case outlines the solutions and details the process of how the radiology programme team worked with stakeholders to develop those. The Economic Case provides further details of the shortlisting process adopted to reach those solutions.

1. IT CONNECTIVITY

Although there is a national PACS which contains patient images, image reporting is siloed within each NHS Board's local RIS. Individual NHS Boards have differing RIS systems where the image report is created and stored.

In the context of this Business Case, the definition of IT Connectivity is to enable the RIS systems to interface and allow requesting and reporting of images across NHS Board boundaries.

IT Connectivity is dependent upon an agreed national radiology data set and definitions which align to the NRIP.

Implications for data are that images will be shared across traditional NHS Board boundaries and the report on these images will be accessed, reported upon and returned to the host NHS Board RIS via the identified solution. Implementing IT Connectivity in this manner will enable the workforce to work across NHS Board boundaries on a virtual basis.

1.1 THE RADIOLOGY PROGRAMME AND A NATIONAL IT CONNECTIVITY SOLUTION

In July 2016, the radiology programme began engagement with key stakeholders to identify the current IT landscape within NHS Boards in order to determine the infrastructure and connectivity needed to enable full compatibility in support of The Model. The outcome of this data collection and analysis exercise informed the design of the IT Connectivity solution.

The radiology programme sought to explore the options around cross boundary IT Connectivity as it was identified as crucial in order to underpin the principles of The Model for the service nationally. The Model describes a new paradigm, a radiology service where NHS Boards work collegiately through a virtual utilisation of the scarce national workforce. This can, in part, be achieved through national IT Connectivity to, primarily, report upon images. The scope of the IT Connectivity therefore is pan Scotland, allowing staff situated anywhere in Scotland to report on an image captured in any NHS Board area and for that report to be stored in the local NHS Board RIS.

The radiology programme team has been working extensively with stakeholders, IT specialists, procurement advisors and the NSS Central Legal Office (CLO) to discuss options for achieving IT Connectivity within the timescales required to sustain radiology services: from the most appropriate procurement route, through to implementation, the process and ultimate responsibility. There was a significant level of engagement with current system providers to understand existing solutions and input from a range of stakeholders utilising current IT platforms.

A market testing exercise was completed in November 2016 highlighting the key requirements of an IT Connectivity solution. A significant level of interest was received from suppliers and the programme team was advised by CLO that a Change Control Notice (CCN) with the current provider was not an option as there were other commercial suppliers who could provide a technical solution.

In order to further explore what solutions may be available, the radiology programme team engaged the NHS National Procurement team to issue a Prior Information Notice (PIN) enabling external suppliers to note their interest and available solutions for consideration. The PIN notice attracted a high level of response and it was identified that in order to progress with an IT supplier a full procurement process would be required.

In March of 2017 a full OJEU procurement process was initiated and co-ordinated by the radiology programme team. A large amount of input was captured from stakeholders to refine the full requirements of an IT Connectivity solution and to shortlist and score the responses from interested suppliers. The end result is an IT Connectivity solution from the preferred supplier that can be implemented quickly to the NHS Boards and improve the resilience of the service while reducing the level of costs required to sustain the status quo.

1.2 PROCUREMENT STRATEGY - OFFICE OF THE JOURNAL OF THE EUROPEAN UNION (OJEU)

The OJEU process in relation to IT Connectivity was initiated in March 2017 and concluded with the identification of a preferred supplier in June 2017.

The full process around the OJEU and the shortlisting of suppliers is detailed in the Economic Case from page 31.

A description of the service standards, outputs and performance measures required of the commercial provider is provided in the form of a Radiology Operational Requirement (ROR) and the Invitation to Tender (ITT) documents which can be seen in **Appendix 10**.

Each of the suppliers who expressed interest in the initial OJEU advert were invited to respond in detail to the ITT document and associated requirements. Of the fifteen suppliers who were invited to respond, six provided a response and were taken forward to the scoring / shortlisting stage.

The scoring / shortlisting was carried out by a range of stakeholders from the radiology service across Scotland, including both clinical and IT staff. The documentation provided by each supplier was shared with the scoring group in advance to allow them to individually assess the responses prior to the workshops beginning. For the purposes of scoring the responses equitably, the associated costs attached to each solution were removed and held separately to ensure they did not influence consideration of each potential solution.

Each requirement listed in the ROR document was scored with the following scale indicating the degree to which the response met the listed requirement:

SCORE	DESCRIPTION
0	Not answered OR does not meet requirement OR demonstrates no understanding
1	Insufficient Information OR only partially meets requirement OR demonstrates partial understanding
3	Meets requirement OR demonstrates understanding
	Provides additional features beyond the requirement

SCORE	DESCRIPTION
5	OR demonstrates complete understanding and provides additional relevant information

Table 1: Shortlisting Scoring Scale

To ensure the timeliness of the process and appropriate participation according to individual expertise, the attendees were divided into two groups to score individual requirements related to the functional and non-functional aspects of each proposed solution. The two scoring groups operated in parallel and on each requirement agreed a score as a consensus opinion across the sub-group.

On completion of the scoring process, a high-level summary discussion was held with the whole group to identify clarification required from suppliers.

Each supplier was invited to demonstrate their proposed solution to the group, the key functionality and several specific scenarios which had been requested. These demonstrations allowed review of the currently available solutions and clarification from each supplier.

Following the demonstrations, the group gathered to finalise the scores previously captured reflecting the queries answered and clarifications achieved via the supplier demonstrations. The functional / non-functional scorings were then combined with the costings provided by the suppliers to facilitate group agreement of the preferred supplier. Of the six suppliers considered, one was identified as the Preferred Option; assuming clarifications and site-visits provide the necessary clarity and assurance on their proposed solution.

Following approval of this Business Case, a contract will be agreed with the preferred supplier and detailed implementation plans will be drafted.

The responsibility for implementation of the IT Connectivity will be with the NSS IT team. The resource requirements provided by the NSS IT team are captured in **Appendix 11** of this document. Due to the interdependency of the IT Connectivity and The NRIIP, close co-operation amongst those responsible for implementation will be required.

The investment requirements for IT Connectivity are detailed in the Financial Case from page 45. However, indicative upfront costs are £0.46m (£0.55m including VAT).

There will also be recurring annual costs following implementation of approximately £0.13m.

1.3 PAYMENT STRUCTURE

The radiology programme team have been advised by the SRO that investment sources are not yet specified.

Investment routes which may be applicable are:

- **The Transformation Fund**
- **National Resource Allocation Committee (NRAC) Formula (Refer to tables 10 and 11, p 48)**
- **Scottish Government funding to improve waiting times for cancer patients to speed up access to diagnostic tests**

The CEs are asked to approve one of the above or provide an alternative investment.

1.4 CONTRACTUAL ARRANGEMENTS

The contractual management arrangements and key contractual issues are captured within the procurement documentation. There is a risk to NHS NSS that if we do not progress to award a contract due to lack of funding the organisation could be challenged legally by suppliers.

1.5 SOUTH EAST REGIONAL RADIOLOGY IN-SOURCING SOLUTION (SERRIS)

During the period that the radiology programme team were developing options for IT Connectivity, NHS Fife's radiology service was experiencing severe difficulties due to their Consultant Radiologists shortage.

NHSScotland's Chief Operating Officer commissioned a short life working group to rapidly source and deliver a radiology IT solution for the South East of Scotland which transcends traditional NHS Board boundaries. This solution has subsequently become known as the SERRIS.

SERRIS has adopted the Proof of Concept for cross boundary working as per the local arrangements between NHS Borders and NHS Western Isles which informed the principles of the National Radiology Model. The SERRIS contractual model for IT Connectivity is based upon cost per examination basis. This solution would **NOT** be sustainable if extrapolated across Scotland. SERRIS is contractually committed to their solution for a six month period after which the national IT Connectivity solution will be implemented.

The Model proposes a different contractual arrangement which is **not** based upon a cost per examination.

It should be noted that the national IT Connectivity solution must be ready to implement in the SEAT (South East and Tayside) Region immediately following the expiry of the SERRIS contract. If this does not occur, there is a high financial and legal risk to the NHS Boards within the SEAT region.

2. NATIONAL RADIOLOGY DATA REQUIREMENTS

As outlined in the Status Quo above, there is currently no national radiology data available, there is variation in radiology data which is collected and a lack of consistency around data definitions. In addition, there is little ability to access, collate and analyse data for the purposes of service planning, improvement and operational management at local and regional levels.

The need and benefits of such data was evidenced when the radiology programme team had the baseline capture exercise analysed and presented on a regional basis to Directors of Regional Planning to underpin service planning, improvement and change.

2.1 THE RADIOLOGY PROGRAMME AND A NATIONAL DATA SOLUTION

In May 2016, the radiology programme team established a project to identify national radiology data requirements (NRDR). This project worked with stakeholders to identify the radiology data currently in existence and to identify the future national data requirements. A national radiology data set and definitions were agreed, informed by the outcome of a

national baseline data capture, a scoping exercise of existing data sources and consultation with service users. The national data set will underpin the IT Connectivity solution. NHS NSS Business Intelligence (BI) and PHI colleagues advised the project how that data could be best extracted, managed, analysed and presented back to users.

The outcome of this NRDR project was the proposal for the development of NRIIP. The Preferred Option for NRIIP, as detailed in the Economic Case from page 31 is a repository stored within the NSS CDW. NRIIP will provide:

- Nationally consistent, robust, comparable information on radiology services¹² held in a data mart (BI platform) within the NHSScotland CDW¹³ to:
 - underpin The Model, including service and strategic planning at a national, regional and local level; and
 - support safe, efficient and resilient radiology service delivery across Scotland.
- A product which has been co-created in collaboration with key stakeholders to ensure it meets their needs.
- Radiology data linked to other datasets of relevance e.g. outpatient (SMR00), inpatient (SMR01), A&E, workforce and costs.
- Information presented in reports/dashboards e.g. Tableau Dashboard. The national reports and/or national dashboards required will be determined in collaboration with NHS Boards and will be developed via iterative development. Requirements to be determined via Board consultation but likely to include:
 - The ability to ‘drill-down’ from national to patient/clinician level (with appropriate permissions) and to different geographical configurations (local, regional and national);
 - A suite of analytics including visual analytics such as maps;
 - KPIs, quality measures and process measures;
 - Reports tailored to local needs with the ability for analysts and clinicians to develop additional visualisations and dashboards to meet local needs which can be shared via the national platform;
 - Reports linking into data sets held locally (subject to demand and outcomes of engagement); and
 - Options for predictive modelling will also be explored.
- One of the key benefits of delivering the NRIIP via NSS is that this will provide a national BI platform that NHS Boards will be able use to create bespoke data analytics and visualisations.
- Content tailored to NHSScotland’s requirements (not ‘out of the box’).
- A ‘wrap around’ consultancy and analytical service:
 - This will include analytical and interpretive expertise, predictive modelling (if this is not provided under the routine reporting) and routine nationally-commissioned analyses; and
 - It will also provide *ad-hoc* additional bespoke ‘wrap-around’ data analysis and consultancy.

¹² Based on national data definitions developed in collaboration with NHS Boards and mapping of local RIS codes to nationally agreed definitions and codes.

¹³ <http://www.isdscotland.org/Products-and-Services/Datamarts/>

- Training materials and ongoing support with a range of regular support activities.
- Routine maintenance, helpdesk, management of user access.
- Ongoing engagement with the user community to ensure the solution remains fit for purpose and to govern future developments.
- A BI platform which enables NHS Boards to carry out ad hoc analyses and supplement any national dashboard(s) provided with local dashboards as required to meet local needs. These dashboards would include KPIs which are yet undefined. Examples are:
 - CTs undertaken per 100,000 head of population;
 - MRIs undertaken per 100,000 head of population;
 - Image Reporting turnaround times;
 - Diagnostic activity levels;
 - Examinations undertaken by time of day;
 - Reports undertaken by individual Radiologist/Reporting Radiographer;
 - Level and cost of Reporting Outsourcing;
 - Level and cost of Agency/Locum Use;
 - Level and cost of additional sessional payments;
 - Staffing information, including vacancy rates;
 - Utilisation of Equipment;
 - Number of patients awaiting diagnostic examinations; and
 - Patient Waiting Times per diagnostic examination.

Other KPIs which are described within the English Diagnostic Atlas of Variation¹⁴ and captured in the English Diagnostic Dataset¹⁵ will also be available via the NRIIP. These are:

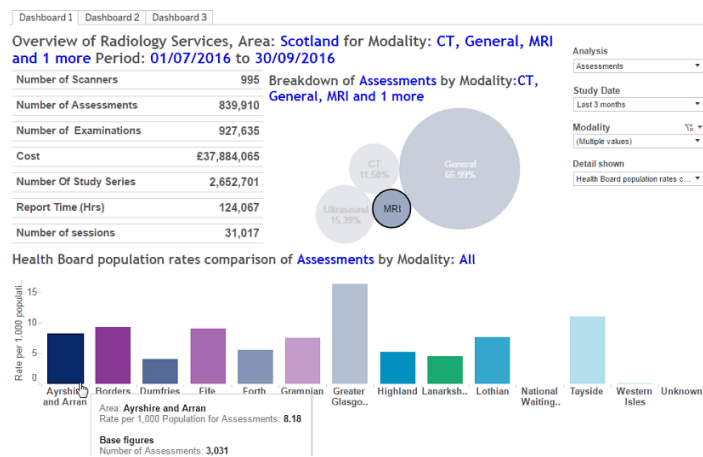
- Referral source and patient type;
- Details of the test (type of test and body site);
- Demographic information such as GP registered practice, patient postcode, ethnicity, gender and date of birth; and
- Waiting times for each diagnostic imaging event, from time of test request through to time of reporting.

Although these are indicative KPIs they can be amended to reflect performance against key pressures within diagnostic radiology as they change with time.

The below graphic demonstrates the potential KPIs which could be analysed nationally following the development of the NRIIP therefore utilising the national dataset.

¹⁴ Public Health England (2017) The 2nd Atlas of Variation in Diagnostic Tests in NHS England

¹⁵ Diagnostic Imaging Dataset Statistics. http://data.gov.uk/dataset/diagnostic_imaging_dataset_statistics



This solution will be available to all NHS Boards and will be provided by NSS.

The NRIIP will be developed and implemented in a phased manner. This is detailed in the Management Case and the BI/PHI joint proposal for implementation of the NRIIP is attached in **Appendix 12**.

The PHI/BI team have highlighted that there is a potential for unanticipated technical issues in relation to the IT Connectivity and the NRIIP.

2.2 NRIIP DEVELOPMENTS TO DATE

In response to a request to consider a “Quick Win” from the NHS CEs Group the radiology programme team requested that a ‘Proof of Concept’ in the form of a Radiology Dashboard be developed by BI and PHI colleagues. Once developed, this Dashboard was well received by radiology stakeholders and confirmed to be beneficial if rolled out to NHS Boards. The Dashboard provides a one-off limited data set extracted from the National PACS. The data presented on the Dashboard enables clinicians and service managers to begin to examine variation, plan and improve services.

As stated above, the Radiology programme team as part of the NRDR Project identified National Radiology data requirements. A National Radiology Information and Intelligence Project (NRIIP) has now been established and is being led by NSS PHI¹⁶. This project will take forward the work to provide the NRIIP to underpin The Model. However, please note that, although initial preparatory work towards the delivery of the NRIIP has started, this has been limited to what is required to inform the radiology Business Case only. Full project initiation will not be implemented until the Business Case has been approved.

Commissioned by the radiology programme team, PHI undertook a formal consultation on the national radiology dataset and this is in the process of being approved. This dataset will ensure the all Scotland consistent data and definitions required to support The Model and allow for demand management, shared planning and workload balancing across organisational / geographical boundaries.

Full engagement with radiology, finance, planning and information staff from across all NHS Boards is currently underway to consult in detail on the information and intelligence products and services required. Seven NHS Boards have been consulted. It is anticipated that this stage of the engagement will be completed by 31 July 2017. E-Health leads are also apprised of this work and will be directly engaged during the later stages of the project.

¹⁶ Public Health & Intelligence Strategic Business Unit (<https://nhsnss.org/how-nss-works/our-structure/public-health-and-intelligence/>)

Next steps are to refresh the documentation commenced by the radiology programme team to secure the necessary Information Governance (IG) approvals for the NRIIP work to progress and to identify data mapping required to map local RIS data to national dataset.

Following Business Case approval, the PHI team will commence the development of the information and intelligence products and services to be provided to radiology services in Scotland. Work will be progress in an incremental fashion¹⁷ and prioritised in accordance with feedback received through service engagement. There will be continued engagement with key stakeholders throughout the duration of the project.

Responsibility for the implementation of the NRIIP will sit with NSS PHI. Details of this are provided in the Management Case from page 53.

For the first time, comparable national radiology data will be available for analysis in support of local, regional and national priorities. This information is also essential to meet the expectations of Realistic Medicine¹⁸ and reduce variation and unnecessary examinations.

In order to develop a completed NRIIP funding is required. This is detailed in the Financial Case from page 45. However, indicative upfront costs are £0.21m capital with revenue of £0.53m giving a total of £0.74m.

During the time that the radiology programme team was involved in the development of the national NRIIP, NHS Greater Glasgow and Clyde (GG&C) initiated a project to procure a radiology Business Analytics System (BAS) from commercial suppliers. The BAS was marketed as a possible national solution and NHS GG&C later engaged with NHS Lothian in the development.

The Shared Services Health Portfolio Director and Senior PHI colleagues engaged with the Director of Diagnostics from NHS GG&C to establish if there was duplication of the requirements of the BAS and the national NRIIP.

It was established that the BAS is targeting demand management and clinical decision support however the BAS is unable to interface with any other NHS Board. The NRIIP will provide a comprehensive, national overview of the data required for operational management and strategic planning. The functionality of the BAS does not have the added value of linking to data within the CDW. Nor is the BAS technologically capable of fulfilling the national Radiology Programme data requirements as defined by stakeholders.

NHS GG&C and NHS Lothian have given assurance to both the radiology programme team and PHI that the BAS development:

- Will utilise and align with the national data set and definitions; and
- Will interface with the NRIIP within the CDW.

2.3 NATIONAL NRIIP PROCUREMENT STRATEGY – WHY NSS

NSS is ideally placed to provide the information and intelligence products, services and expertise required in support of The Model. This is in line with NHS National Services Scotland's remit and NSS PHI proven track record in:

¹⁷ The NRIIP will be developed in an incremental fashion with early release of Alpha and Beta versions of the dashboard prior to full release. See [Appendix 10](#) for further details.

¹⁸ The Chief Medical Officer's Annual Report 2014-15 "Realistic Medicine"

- Developing data marts to store and analyse NHSScotland data (in conjunction with NSS BI), including providing facilitation and definitional expertise to define and refine data requirements in association with stakeholders;
- Developing, capturing, analysing and publishing a wide range of information on health and social care in support of NHSScotland; and
- Providing information and intelligence consultancy services to NHSScotland.

The skills and expertise available within NSS will be utilised to work with the relevant stakeholders to co-design and define the information required to plan and deliver quality and resilient radiology services in Scotland.

The development of the NRIIP sits within the remit of NSS PHI and NSS BI and therefore there is no requirement to tender externally. However, for the sake of completeness the radiology programme team has included a 'do nothing' option along with the NRIIP as a comparator within the Economic Case from page 31.

2.4 BENEFITS OF DEVELOPING NRIIP WITHIN NSS

The key benefits associated with developing the NRIIP within NSS are that:

- The resulting solution will provide a 'once-for-Scotland' solution which underpins the national model for radiology.
- It will address the need for robust, comparable information to plan and deliver quality and resilient radiology services in Scotland in line with the radiology service delivery model outlined via the Shared Services work at a national, regional and local level.
- It will provide a package of support to NHS Boards, i.e. it will be more than just an IT solution.
- It will be backed up by national infrastructure and will use nationally agreed data set definitions to ensure data comparability.
- As well as providing the technical platform, the NSS solution will address data quality issues, coding differences etc. to ensure that the data required at local, regional and national level are consistent.
- It will provide the national, regional and local reporting and analytics required to underpin the national model, developed in collaboration with the service.
- It will provide a national data resource which can be used for multiple and secondary purposes (e.g. routine publications, to support research and researchers, strategic service planning, monitoring, patient pathway work, etc.) and supports the tracking of the benefits of the changes being proposed.
- It provides the possibility of linkage to other data sets to facilitate diagnostic analytics and support complex predictive and prescriptive modelling, such as:
 - Linkage to other data marts within the CDW (i.e. acute, A&E, waiting time, deaths, workforce [including sickness absence and payroll] and finance);
 - Linkage to common dimensions (reference data) within the CDW to enrich the data by providing details such as patient and population demographics, deprivation categories, rural/urban flags etc; and
 - Linkage to other data sets that may be required either now or in future developments.
- It provides the ability to tap into the wider expertise within the wider NSS:
 - Expertise in running and supporting existing national networks (NSD);
 - National Information and Intelligence teams (PHI);

- Data collection, data management and data quality expertise (NSS:PHI's Data Management Service);
 - IG, data protection and data security expertise;
 - Expertise and infrastructure / capacity to support data linkage e.g. linkage of patient-level radiology (imaging/results) data to other patient-level data to illuminate pathways of care, identify quality of care and monitor outcomes and value; and
 - Strong links with the electronic Data Research and Innovation Service (*eDRIS*)¹⁹, the Farr Institute in Scotland²⁰ and the Administrative Data Research Centre for Scotland (ADRC)²¹ which will help to facilitate research and knowledge creation.
- It provides the potential for utilisation of future developments in NSS NHS infrastructure arising from technical modernisation programmes.

Development phases and timescales of The NRIIP are outlined in **Appendix 12**.

2.5 PAYMENT STRUCTURE

The radiology programme team have been advised by the SRO that investment sources are not yet specified.

Investment routes which may be applicable are:

- **The Transformation Fund**
- **National Resource Allocation Committee (NRAC) Formula (Refer to tables 10 and 11, p 48)**
- **Scottish Government funding to improve waiting times for cancer patients to speed up access to diagnostic tests**

The CEs are asked to approve one of the above or provide an alternative investment.

2.6 CONTRACTUAL ARRANGEMENTS

Contractual arrangements are not outlined in this document due to the solution being managed by NSS.

2.7 INFORMATION GOVERNANCE (IG)

The radiology programme team explored and initiated the necessary IG permissions required to support the development of The Model and IT Connectivity. In addition this included the intention to hold data centrally in the NRIIP and for it to be accessed across Scotland with the appropriate access controls in place. IG approvals were also sought to enable information sharing required in cross NHS Board working.

A PIA was undertaken and a PBPP submission undertaken. The latter document will be refreshed by the PHI team in light of the preferred solutions having now been identified. The PHI team have highlighted that if IG approvals are delayed this would present a risk to the achievement of NRIIP implementation timescales.

¹⁹ <http://www.isdscotland.org/Products-and-Services/EDRIS/FAQ-eDRIS/>

²⁰ <http://www.farrinstitute.org/>

²¹ <https://www.adrn.ac.uk/about/network/scotland/>

3. WORKFORCE

In order to underpin the implementation of The Model, there is a requirement to maximise role utilisation throughout the service and enable flexibility for staff to work across traditional NHS Board boundaries. This work will require clear linkages to professional and technical Quality Assurance (QA) and Clinical Governance (CG).

3.1 THE RADIOLOGY PROGRAMME AND WORKFORCE SOLUTIONS

3.1.1 MAXIMISATION OF EXISTING WORKFORCE

As detailed in the Status Quo, the workforce shortages are not evenly spread across NHS Boards, resulting in significant challenges to service sustainability for some NHS Boards. A number of measures are proposed in The Model to alleviate these challenges.

It has to be stressed that these measures alone will not resolve the **issue of increasing demand outstripping capacity**.

In due course, NHS Boards will inevitably have to fund additional Radiology human resource.

3.1.2 CROSS BOUNDARY WORKING

The Model describes virtual mobilisation of the workforce, using a collegiate approach, with staff working across traditional NHS boundaries on a regional and sometimes inter-regional and national basis. This way of working will need to be enabled by appropriate contractual arrangements. Therefore the Shared Services Portfolio established a Workforce Reference Group (WRG) Chaired by Anne MacPherson, Director of Human Resources in NHS GG&C.

The WRG has developed the following:

- a. A Good Practice Guide of Employment Arrangements to support cross NHS Board boundary working for the workforce. **Appendix 13** refers;
- b. A Professional Governance Pathway to meet the Codes of Conduct of the relevant professional governance bodies [e.g. General Medical Council (GMC) and Health and Care Professions Council (HCPC)] in order to support cross boundary working **Appendix 13** refers;
- c. Explored the Terms and Conditions implications of regional and national Out of Hours Frameworks;
- d. Developed common Job Descriptions and identified Agenda for Change Banding for Reporting Radiographers; and
- e. Links with the local Board's workforce planning leads to identify for short, medium and long term challenges for radiology services.

The above documentation has been developed with full participation of partnership colleagues and has been approved by the Scottish Workforce and Staff Governance Committee (SWAG).

3.1.3 REPORTING RADIOGRAPHERS

In order to address the issue of variation in employment practices for Reporting Radiographers, the radiology programme team established a Project Group. Members included a wide range of stakeholders representing the service, education and the professional bodies such as the RCR and the Society and College of Radiographers (SoR). The Project Group developed a National Framework for Reporting Radiographers which includes:

- a) Common Job Descriptions.
- b) A role outline to incorporate:
 - (i) Educational Pathways;
 - (ii) Scope of Practice for Plain Radiograph Musculo-Skeletal Reporting;
 - (iii) Productivity;
 - (iv) Governance arrangements; and
 - (v) Continuing Professional Development.

Maximisation of the Reporting Radiographer workforce will require NHS Boards to consider the remaining skill mix within radiology departments and reflect these changes in their local Workforce Plans. For example, an expansion in Assistant Practitioner role may be required. This, in turn, will require availability of the requisite educational courses to prepare Assistant Practitioners for their roles.

The above documentation has been developed with full participation of partnership colleagues.

The National Framework for Reporting Radiographers is currently in draft form and is pending approval. **Appendix 14** refers.

3.1.4 RADIOLOGY SERVICE WORKING HOURS FRAMEWORK

The radiology programme team was asked by stakeholders to develop a National Framework around definitions of working hours in radiology departments to underpin The Model, to facilitate cross NHS Board boundary working and provide a common language for regional out of hours rosters.

The methodology adopted by the radiology programme team to develop the National Framework of Radiology services working hours is as follows.

In 2016 the Scottish Clinical Imaging Network (SCIN) were asked by the Scottish Government as part of their 24/7 Taskforce, to develop a Framework outlining the nature of the services that should be provided by radiology and at what time of day.

The resultant SCIN Sustainability and Seven Day Working Taskforce Report²² was subsequently used as a reference document by the radiology programme team and national stakeholders to define what constitutes a '*normal working day*', an '*extended working day*', '*overnight*' and '*weekend working*'.

In order to understand the variation in service hours provision and to achieve the requisite common definitions, the radiology programme team undertook a survey of all territorial NHS Boards in Scotland. The responses indicated that variation does exist however a significant proportion of the NHS Boards have similar working hours.

²² SCIN (2016) 'Radiology services: Sustainability and Seven Day Working Services Taskforce Report'

The National Radiology Services Working Hours Framework is currently in draft form and further work is required to complete this.

3.1.5 CONSULTANT RADIOLOGIST RECRUITMENT

In order to address the high number of Consultant Radiologist vacancies across Scotland as identified in the Status Quo, the WRG established a sub-group to develop a Good Practice Guide for NHS Boards to utilise when considering national and international recruitment of Consultant Radiologists. Stakeholder feedback indicates an appetite for a national recruitment exercise to undertake an international recruitment drive. This forms a recommendation in this Business Case, however as on 11 July 2017, the Chair of the CEs has mandated this work to progress with immediate effect.

In addition, there is an opportunity to explore the incorporation of a new reporting radiology bank as part of the Regional Medical Bank which is currently being developed.

3.1.6 RADIOLOGIST TRAINING PLACES

As outlined in the Status Quo, there are currently an insufficient number of Radiologists being trained at post-graduate level. The Radiology programme team has been endeavoring to establish where the responsibility for training numbers sits. This has proved complicated. To date, the team has engaged with the Scottish Government Health Department Reshaping Medical Workforce Board, The Academy of Medical Royal Colleges for Scotland, the RCR, and NHS Education for Scotland (NES). The Programme team will continue to attempt to influence those with responsibility to increase training places.

In addition, the radiology programme team has identified the need to influence NES to encourage rural placement for trainees.

4. CLINICAL GOVERNANCE, QUALITY ASSURANCE AND CLINICAL PATHWAYS

Implementation of The Model requires the development of CG and QA and Clinical Pathways. The development of these processes fits well with the remit of the SCIN. Discussions have been held with the Network and they have agreed to progress this Agenda within their workplan.

5. SUMMARY

In summary, the radiology programme team, mandated by the NHS CEs Group, has developed solutions for IT Connectivity, Radiology data (NRIIP) and Workforce.

There is sound economic evidence, both financial and non-financial, which supports the requirement to invest in IT Connectivity, The NRIIP and optimise the workforce. This evidence is detailed in the Economic Case which follows.

D. ECONOMIC CASE

1. INTRODUCTION

The usual process for developing a Business Case within the public sector is to undertake an Initial Agreement (IA), Outline Business Case and then proceed to a Full Business Case. The Radiology Programme began to develop an IA, however, it became apparent that the SCIM Guidance for development of an IA is designed for capital investment and not to describe a new service model. Advice was sought from the Chair of the CEs and it was agreed that what was required was a strategic document. This was taken forward by the radiology programme team. The National Radiology Model Strategic Document (subsequently termed as The Model) was approved by the CEs on 9 August 2016.

Due to the service sustainability issues emerging within some radiology services, there was a compelling need to truncate the usual Business Case process. The CEs gave a mandate to proceed from IA directly to Business Case in order to achieve a timely solution. As a result the focus of the Economic Case is to compare The Model to the ‘Do Nothing’ option’, providing assurance that proceeding with The Model represents value for money. This will incorporate information from the tender process to procure the IT Connectivity solution.

2. DEVELOPING A SHORTLIST OF IMPLEMENTATION OPTIONS

Due to the two elements of The Model being interdependent (The IT Connectivity and the NRIIP), they are considered jointly in Option 2. A description of IT Connectivity and NRIIP solutions are detailed within the Commercial Case from page 19. All other options were ruled out as being impractical or not providing a solution to the challenges facing the service.

The two options are set out below:

1. Option 1 – ‘Do Nothing’ option

This is the base case and presents the likely revenue costs if planning and service delivery continues to be undertaken on a by Board by Board basis.

2. Option 2 – IT Connectivity provided by the preferred supplier as per outcome of the OJEU process and NRIIP provided by NSS PHI

This looks at the upfront and recurring costs and potential benefits to the services through implementing data connectivity as described earlier in the Business Case.

As stated in the Commercial Case, it has been established via NSS Senior Management that the development of the NRIIP sits within the national remit for NSS PHI and therefore there is no requirement to tender externally. This is why there is only one Option considered for the provision of NRIIP along with the baseline ‘do nothing’ option.

The process for reaching the Preferred Option for IT Connectivity was fully guided and supported by NHS National Procurement specialists and is outlined as follows. An advert for the provision of Radiology IT Connectivity for Scotland was placed within the OJEU on 24 March 2017. Suppliers were given 28 days to note an interest and to match pre-qualification criteria.

Those suppliers who noted an interest were sent the ROR document and ITT, **Appendix 10** and given 40 days to respond to the ITT in full. Following this, representative groups of radiology stakeholders were sent supplier’s responses to the ITT to review. These

stakeholders attended shortlisting workshops. The evaluation criteria utilised to shortlist can be seen in **Appendix 15**. Thereafter suppliers were invited to demonstrate their product and to answer queries raised through the review of ITT responses and shortlisting. This process resulted in the Preferred Option at a cost of £0.55m capital and £0.14m revenue.

The remainder of the Economic appraisal looks at the potential impact The Model (including IT connectivity and NRIIP) would have on the radiology service, considering the financial, value for money (VFM) and non-financial benefits and costs.

3. IDENTIFY AND QUANTIFY MONETARY COSTS AND BENEFITS OF OPTIONS

In order to show the option which provides the best VFM, the anticipated financial impact is demonstrated by using the generic economic model (GEM) to generate a net present cost (NPC) following SCIM guidance. The approach taken and the assumptions made in deriving both the capital and revenue cash flows are discussed in the following sections and in **Appendix 16**.

All baseline data in the Economic Case has been derived from a data capture exercise undertaken by the radiology programme team or from information published in the Information and Statistics Division (ISD) Cost Book. The data capture exercise achieved a 100% response rate from all 15 NHS Boards, and were signed off by the Director of Finance in each Board.

For the purposes of the economic appraisal, both options start from a baseline position with cost movements applied accordingly to reflect changes arising under each option. As such, the economic costs are presented in total rather than as increments from the baseline.

Table 2 below shows the main relevant costs input into the GEM, taking a single year's recurring costs (2020/21) and the non recurrent costs in total.

Cost	Option 1	Option 2	Difference
Revenue Costs	Annual £m	Annual £m	Annual £m
Substantive Pay Costs	158.48	161.38	2.91
Non Substantive Pay Costs	15.53	15.53	0.00
Non Pay Costs	56.66	52.21	-4.45
Total	230.7	229.1	-1.54
Incremental Costs/(Savings)			
Additional Radiologists	2.6	2.6	0.00
Additional Programmed Activity (PA)	0.00	2.14	2.14
Additional Radiographer Backfill	0.00	0.39	0.39
Additional Non Pay costs	0.00	0.34	0.34
Additional Non Reporting Staff	0.00	0.38	0.38
Saving on Outsourcing & Locums	0.00	-4.79	-4.79
Net Recurrent Cashflow Impact	2.65	1.11	-1.54
Non Recurrent Costs	Total	Total	Difference
IT Connectivity	0.00	0.46	0.46
NRIIP	0.00	0.74	0.74
Voice Recognition Software	0.00	0.60	0.60
Implementation	0.00	1.32	1.32
Total additional Non Recurrent Costs	0.0	3.1	3.1
Lifecycle costs (per annum)	0.00	0.09	0.09

Table 2: Main Inputs for the GEM

The table demonstrates that for non recurrent spending of circa £3.1m then a recurrent saving of circa £1.5m per annum can be made. It should be noted that it is expected that this saving will be used to mitigate costs associated with growth, rather than result in a net reduction in radiology costs viz. cost avoidance: That due to growth in demand, the cost of providing radiology services in Scotland will rise, but rise by less due to opportunities presented by implementing The Model.

The Lifecycle cost is an average per annum cost on the assumption that the IT Connectivity infrastructure would have to be refreshed on a 5 year cycle.

Appendix 16 provides further detail on the inputs into the GEM; however, the main points are captured below.

4. ASSUMPTIONS

The forecast in the GEM assumed a continued rising trend in activity, especially in MRI / CT. It was assumed that a proportion of this additional activity would be absorbed by additional staff. However, due to a shortage of Consultant Radiologists and trained Reporting Radiographers, half of additional activity would need to be sourced from outwith existing NHS staff.

The **additional capacity enabled by The Model** (see staffing section below) mitigates the cost increase to some degree. Therefore, the Preferred Option results in a lower NPC, despite the recurring and non-recurring costs associated with implementing Option 2.

Although The Model will substantially improve the current situation for radiology services, it alone does **not** provide the whole long term solution in terms of the workforce challenges. The solutions to the workforce challenges are being addressed currently by the programme team and by the recommendations in the business case.

Implementation of The Model will provide a platform for NHS Boards to work collegiately to undertake the modernisation of radiological working practices throughout Scotland. This, in turn, would be expected to realise significant additional efficiency and productivity gains in the provision of radiology services that have not been factored into the financial analysis of this Business Case.

Some of the main inputs into the GEM are:

- A 3.5% discount rate used over 30 year period;
- Consultant Radiologist Locum / Agency spend of £7.9m in 2015/16, increasing to £8.7m in 2016/17 (pro-rata). This increases to £11.7m and £12.7m for 2015/16 and 2016/17 when other specialists such as Sonographers are included;
- An increase in demand for CT examinations, circa 33,000 per annum;
- An increase in demand for MRI examinations, circa 16,000 per annum;
- The majority of departments (who returned information about surplus/deficit) running a deficit against budget for the first half of financial year 2016/17;
- Outsourcing costs for 2015/16 of £3.2, increasing to £3.9m in 2016/17 (pro-rata);
- A potential recurrent saving of £1.5m;
- Reporting productivity levels have been based on currently accepted payment norms (expected work rate of 20 plain-film x-ray equivalents per hour for

Consultant Radiologist; 17 per hour for Reporting Radiographer);

- Radiologists paid at double time for any additional work;
- Substantive pay of £152m in 2015/16 and £156.5m in 2016/17 (pro-rata); and
- The IT component of The Model will take 18 months to fully implement. Thus, potential full year savings start from 2019/20.

Other GEM inputs which need to be taken into consideration are:

- **Staffing**

Staffing costs and WTE were obtained from NHS Boards via the Radiology Data Capture Exercise template. These costs included data by job type including premium pay and non substantive pay, such as spend on locums. The assumption has been that The Model can drive a marginal increase in capacity in the NHS Boards whose Consultants work less than 11 Programmed Activities (PA) on average. An additional 33,000 hours could be added to the system through taking NHS Boards to a minimum of 11 additional sessions on average.

The financial modeling has assumed **50%** of this of being achievable, **so 16,500 additional hrs** had been used in Option 2. This equates to **4,125 additional sessions**.

Option 2 also assumes the maximisation of existing Reporting Radiographer output by factoring in an increase on the time spent on reporting to 50%²³.

This would **add resources equivalent to 8 WTE to dedicate to reporting**.

The monetary impact was modeled by assuming the additional Reporting Radiographer resource would focus on x-ray reporting and in turn free up Radiologists to concentrate on MRI/CT. The cost of backfill for the service to maintain non reporting duties has also been factored in.

Both options assume the same increase in substantive Radiologist WTE as it is recognised that additional core resource is required and that this would be the direction of travel irrespective of the approval of this Business Case.

The Business Case assumes 6 WTE per annum net growth in the WTE of Consultant Radiologists.

Option 2 factors in a **further 6 non Clinical staff once The Model has been implemented plus a clinical lead (1 day a week), Snr manager to co-ordinate plus an admin post**

The costs are based on an AfC band 4 and band 7 post being based in each region to support Clinical staff in effectively utilising the IT related aspects of The Model. The Clinical lead cost is based on the average Radiologist cost, the senior manager AfC band 8c and an admin post at band 5

- **Outsourcing**

Data obtained via the Data Capture Template showed an expected increase in costs and the number of images outsourced. The assumption is that, through The Model allowing more optimal use of the increased capacity described above that outsourcing could be reduced as compared to Option 1.

²³ (2017) Reporting Radiographer Interest Group (RRIG) Activity Stats 2017

The **reduction in outsourcing** could therefore result in a saving which has been factored into the GEM. As an example, combined **outsourcing & Locum of circa £15.9m in 2020/21 could decrease to £11.2m** if additional capacity was targeted towards, firstly, reducing the outsourcing of CT and then MRI reports.

This saving has been modeled on the assumption that The Model will allow for better resource allocation that facilitates maximisation of the financial benefit. The saving assumes that additional Radiologist capacity would be directed to reporting on CT and then MRI images outsourced inside normal working hours. Reducing Locum spend would follow CT and MRI reports if the focus is on allocating work to the additional resource with the aim of lowering costs.

The section below on sensitivity analysis highlights the impact of changing some of the assumptions, including the impact of additional capacity targeting a different mix of outsourcing and Locum spend.

- **Equipment costs**

The assumption is that these costs (apart from IT Connectivity and NRIIP) would not change between options as The Model impacts neither on the location of image acquisition nor on the volume of images captured. In the longer term, through the implementation of The Model, improved regional and national planning may identify ways to reduce future costs. However, at this stage it is not possible to place a monetary value on the potential cost reduction.

- **Property / Building running costs**

Base data has been included for completeness but the assumption in the GEM is that these costs are not impacted by The Model.

- **Initial capital costs**

Costs are based on the result of the OJEU process for the preferred supplier. Therefore the capital and revenue cost for the duration of the contract accurately reflect the level of upfront investment required. Based on advice from procurement specialists, the assumption is that the replacement cycle is five years for IT Connectivity and accordingly additional capital costs of £0.46m (excluded VAT for NPC calculation) have been factored into the GEM for Option 2 and then lifecycle costs of £0.09m per annum for the remaining years.

The intention is to treat part of the development of the NRIIP as capital: The costs have been supplied by PHI who worked closely with the radiology programme team, who produced this Business Case, to scope out the requirements. PHI have experience in developing and hosting other national Data Marts in conjunction with NSS IT.

- **Non pay revenue costs**

Existing operating costs have been taken from the Radiology Data Capture templates returned by each NHS Board. The assumption has been made that existing operating costs would not differ between the Options (with the exception of outsourcing) as the immediate impact of The Model would be focused solely on the reporting of images. However, the additional revenue costs associated with IT Connectivity and NRIIP have been factored into Option 2 (£0.34m per annum).

There are also non recurrent revenue costs that have been factored into the GEM. These are:

- £1.32m for implementation costs
- £0.53m for NRIIP development costs
- £0.6m for voice recognition software

- **Income**

Income, taken from the Radiology Data Capture template has been included for completeness. For simplicity of modelling the assumption has been made that net income would not be impacted. In reality, under The Model, more inter Board working may result in higher NHS income for certain NHS Boards if Radiologists are not paid directly. However, the assumption is this would be on a cost recovery basis, and therefore neutral overall to NHSScotland. So the modelling has not been done on a Board by Board basis to detail the impact of potential charges between NHS Boards as the economic appraisal is comparing the impact between Options at NHSScotland level.

- **Externalities**

These have not been factored into the GEM as there is no way to place monetary value on the concept of a more robust diagnostic service. However, it is important to note the pivotal diagnostic role radiology plays for other NHS services and that there will undoubtedly be benefits for patients and the NHS from a sustainable and more resilient radiology service. In addition, the NRIIP will be crucial in terms of providing data to inform the Realistic Medicine²⁴ agenda which targets the reduction of inappropriate testing of patients. Furthermore, early diagnostics in radiology have an impact on preventing admission and shortening length of stay in secondary care.

5. SUMMARY

In summary, the GEM focuses on the costs most likely to be impacted by the introduction of The Model. These include upfront costs, additional revenue costs incurred from the implementation of IT Connectivity, NRIIP and an increase in pay costs. Mainly through a reduction in outsourcing optimised through implementation of The Model, Option 2 returns a lower NPC.

Option	NPC £
Option 1	4,505,000,000
Option 2	4,469,000,000

Table 3: Net Present Cost – Total cost of diagnostic radiology services for 30 years

NOTE:

The differential NPC looks relatively close as the modeling has been done using the total costs for diagnostic radiology. However, the focus of the financial aspects of the Business Case is limited to the reporting costs within diagnostic radiology. There is no impact on the image acquisition costs within radiology. Therefore the financial cost avoidance is significant if viewed against radiology reporting costs alone.

Purely based upon monetary values, Option 2 is the Preferred Option. The next section provides some assurance around how sensitive Option 2 returning the lower NPC is to changes in some of the main assumptions.

The NPC modeling has attempted to ‘future proof’ the service by taking the following points into consideration:

- Additional 6 WTE Consultant Radiologists;
- Additional Consultant Radiologist sessions at enhanced rates;
- Increased Reporting Radiographer capacity;

²⁴ The Chief Medical Officer’s Annual Report 2014-15 “Realistic Medicine”

- Full Implementation Support Costs (including PHI, IT and Programme);
- Regional administrative support for workflows; and
- Reduced spend on outsourcing and locums.

The above are explained in Section 4 of the Economic Case and further detail is provided in the Assumptions in **Appendix 16**.

6. SENSITIVITY ANALYSIS

As the focus for this section is whether to recommend proceeding with implementation of The Model, sensitivity analysis was performed to test:

- The point at which the 'Do Nothing' Option becomes economically more advantageous;
- The impact of using the SERRIS expectation of 3 CT/MRI images reported per hour (assumption of 4 per hour has been used in this Business Case) and the SERRIS rate of pay; and
- If additional capacity was targeted at reporting images in a similar ratio to current practice for outsourcing and Locums.

This should provide assurance over the point at which the investment required in The Model does not produce a financial return, the impact of adopting SERRIS for the number of reports and cost per hour and also a lower level of saving by modelling the impact if the additional capacity is used less effectively (from a cost perspective).

The relative closeness of the NPCs is partly a result of not assuming further savings that may be possible beyond those factored in from utilising the additional capacity. The next section focuses on the financial scoring. However it should be highlighted that the non monetary benefits are not impacted to any major degree by the assumptions in the financial modeling. The results of the financial modeling sensitivity analysis are presented below:

PARAMETER 1: MODELLING THE POINT AT WHICH DOING NOTHING HAS A LOWER NPC

Firstly, if the costs hold true, **it takes a 67% reduction in estimated savings** (reduction in outsourcing net of additional pay costs for additional resource) to return an NPC in line with the 'Do Nothing' option. Therefore, if all other assumptions are held, the initial recurrent savings would have to be reduced by circa £1.5m to start to change the preference in favour of the 'Do Nothing' option (from a purely financial perspective). It is at this point that the benefit of reducing outsourcing does not cover the other costs associated with The Model

Looking at this another way, Option 2 would return a similar NPC to the 'Do Nothing' option if the benefit from increased capacity was solely from additional sessions of around 7,500 hours. Or if Reporting Radiographers were the only additional resource and this equated to 45% of their time dedicated to reporting. Thus, if the modelling holds true by keeping other parameters equal then a significant drop in the assumed additional capacity would still provide for the possibility of The Model being cost neutral.

This provides context and comfort that, even if there has been optimism bias in the proposed savings through overestimating the potential additional resource, there is a decent margin of error before doing nothing has a lower cost than implementing The Model.

Resetting and starting from Option 2 but increasing capital costs, the point at which capital costs for IT Connectivity (including lifecycle replacement costs) would change the decision to proceed is **if the costs ran to circa £8.5m. This is an increase of almost £8m over the costs in the Business Case.** As these costs are based on a tender exercise and upper

estimate for the NRIIP, they should accurately reflect the capital funding required but it does highlight the level of capital investment that could be made before it becomes uneconomical to proceed.

A third way to test at which point the decision to proceed would change is by modelling the impact of an increase in recurrent costs associated with The Model. The costs associated with IT Connectivity and NRIIP were provided by suppliers and therefore costs should be reasonably robust. However, holding all other assumptions in Option 2, the recurrent costs of The Model would have to increase from **£0.7m to £2.2m. This represents a 300% increase.** Note that this is taking the cash impact to use within the GEM so excludes capital charges.

PARAMETER 2: SERRIS PAYMENT ARRANGEMENTS

SERRIS have put in place that Radiologists would re-imbursed at £320 per 4 hour session (1 PA) and that the expected productivity would equate to 20 x-ray equivalents per hour and in turn an expectation of 3 CT/MRI images reported per hour.

With employer costs added this equates to a cost of £100 per hour where the Business Case used a cost of £110 per hour for reporting above standard contracted hours.

The net impact of using the SERRIS productivity rate and cost per hour is to reduce the expected benefit over the 'Do Nothing' option by £700k as compared to Option 2, increasing to almost £1m by 2020/21 as the lower productivity assumption combined with growth in demand increases the differential between Option 2 and SERRIS.

This highlights that the financial benefit is sensitive to the assumed productivity rate that any additional capacity would be expected to meet. In this case it drops the 2020/21 saving from circa £2.3m to £1.3m (gross saving before IT connectivity and NRIIP costs factored in).

The NPC using SERRIS payments arrangements is £4,488m, which is still lower than Option 1. So, if SERRIS type arrangements were used in the other regions within Scotland, approving implementation of The Model would still be recommended.

PARAMETER 3: NON MAXIMISATION OF ADDITIONAL RESOURCE

The savings in Option 2 are predicated on targeting additional capacity to items that would return the largest monetary saving. To test the impact if this demand optimisation could not be achieved, Option 2 was re-modeled on the premise that additional capacity would target the reporting of images done via CT/MRI outsourcing and Locums in a similar ratio as is currently done. This is to test a worst case scenario where no demand optimisation is made.

The results are shown below, with the saving per annum (before NRIIP and IT Connectivity costs) reducing from a potential £2.26m (Option 2) to £0.41m by 2020/21. Thus the saving is less than the additional costs (£0.34m non pay plus £0.33m for non Reporting staff). The NPC using this methodology is £4,511m, therefore it becomes marginally the higher cost when measured against the 'Do Nothing' option (NPC of £4,505m). Therefore, the decision to proceed would be driven by the non financial benefits and would still result in a compelling case for change.

The reason that the drop is so significant is that the data returned by NHS Boards indicated that average Locum costs were only slightly higher than paying a Radiologist at double time and that Locums are a more significant cost than outsourcing currently. Thus, if no demand

optimisation and NHS Boards prioritise reducing Locum hours than outsourcing then the marginal cost saving is significantly reduced.

Item	Non Optimised 20/21 Saving £m	Option 2 20/21 Saving £m
CT Outsourced	0.29	2.00
MRI Outsourced	0.09	0.26
Locum	0.04	0.00
Total	0.41	2.26

Table 4: Impact of no demand optimisation

The sensitivity analysis provides some assurance that from a purely financial perspective there is room for a decent margin of error in the values presented in Option 2 before the 'Do Nothing' option becomes the lowest cost option. It showed that the values are sensitive to changes mostly in the assumptions around demand optimisation and level of additional resource. But that cost neutrality against the 'Do Nothing' option is achievable with a more modest increase in capacity and no demand optimisation. So, Option 2 represents an ambitious but achievable level of savings and that if in reality savings would be lower The Model still represents a cost effective solution, given the relatively modest initial investment and recurrent costs required.

The financial benefits appraisal should not be viewed in isolation as there is a range of issues that must be considered in order to ensure there is a balanced approach to identifying the Preferred Option. The next section focuses on the non-monetary benefits to assess which option is the overall Preferred Option.

7. NON-MONETARY COSTS AND BENEFITS

A key component of any formal appraisal process is the assessment of the non-monetary or qualitative benefits that are likely to accrue from the options under consideration.

Where possible, costs and benefits should be valued in monetary or quantitative terms; however, this is not always cost-effective or practical. Very often, qualitative factors are crucial in informing the decision-making process. It is therefore important that the option appraisal process captures these non-financial costs and benefits and presents them alongside the quantitative measures.

The non-monetary benefits criteria for IT Connectivity and NRIIP were identified by the Subject Matter Expert (SME) in conjunction with radiology stakeholders. The criteria are listed below, along with a weighting assigned as to their relative importance as defined by the clinical and service need.

7.1 NON-MONETARY BENEFITS SCORING CRITERIA

- **Improved quality and access to services (Weighting: 24%)**
 - a) Maintain local image acquisition and therefore local patient access;
 - b) Retain Radiologists at local level;
 - c) Reduce the clinical risks associated with outsourcing, locum and agency staff;
 - d) Allow improved expert Radiology input to Multi-Disciplinary Team meetings leading to improved diagnosis, staging and treatment plans for patients including cancer patients;
 - e) Allow more effective use of the expert skills of the radiology workforce;
 - f) Support cross-boundary image requesting and request justification;

- g) Support cross-boundary image reporting;
- h) Allow cross-boundary requests for specialist opinion; and
- i) Improve patient experience by expediting diagnosis and treatment.

- **Data Security and Information Governance (Weighting: 10%)**

- a) Stores Data in a Safe Haven; and
- b) Complies with NHSScotland Information Governance process; PIA and PBPP.

- **Sustainable service – improved efficiencies leading to cost reduction (Weighting: 24%)**

- a) Support for clinical services in acute and primary care;
- b) Support emergency and unscheduled care 24/7;
- c) Support remote and rural NHS Boards;
- d) Increased resilience of service at a local level (e.g. ability to cope with local sickness absence);
- e) A resilient and flexible service that can respond to challenges around capacity and demand via a collegiate approach;
- f) Supports improved workflow and increased productivity;
- g) Maximisation of role utilisation and flexibility;
- h) Ability to create reporting work lists and allocate reporting across Health Board boundaries;
- i) Ability to operationally manage and strategically plan services utilising NHS data marts; and
- j) Ability to model future services, utilising NSS CDW data marts.

- **Standard consistent approach pan Scotland (Weighting: 18%)**

- a) Reduce unwarranted variation in demand for radiology services; and
- b) Reduce unwarranted variation in radiology practice.

- **Improved well being of staff (Weighting: 10%)**

- a) Recruitment and retention of staff;
- b) Increased job satisfaction; and
- c) Reduction in work-related stress.

- **Modern fit for purpose infrastructure (Weighting: 14%)**

- a) Supports requirements of current clinical services;
- b) Meets the anticipated needs of future clinical services;
- c) Supports linkage to current NSS CDW data marts; and
- d) Delivers future flexibility of data analysis according to anticipated service needs.

7.2 RESULTS OF NON-MONETARY BENEFITS OPTIONS APPRAISAL

An explanation of the technical image reporting capabilities proposed by suppliers in response to the OJEU procurement are outlined below:

- **Reporting within PACS**

This is an extension of the existing national PACS structure to include national reporting functionality, which is currently provided within local RIS systems and additional functionality required by the radiology business.

- **Reporting within an XL7 DICOM standard based brokerage system**

This is additional software that interfaces with the existing national PACS and local RIS systems to deliver national reporting functionality and additional functionality required by the radiology business.

	Supplier 1	Supplier 2	Supplier 3	Supplier 4	Supplier 5	Supplier 6
	Weighted score					
Functional requirements (40%)	21.89	18.48	20.48	19.95	19.07	26.17
Non-functional requirements (30%)	15.18	16.17	14.74	13.12	17.01	15.40
Cost (30%)	30.00	0.00	0.00	0.00	0.00	26.00
TOTAL SCORE	67.06	34.64	35.22	33.07	36.09	67.57
Ranking	2	5	4	6	3	1

Table 5: *Weighted OJEU Shortlisting scores

Interpretation of OJEU Shortlisting scores table

As demonstrated in **Table 5** above, the OJEU shortlisting considered responses from 6 suppliers. Each of the suppliers responses was assessed by a group of stakeholders from across Scotland on the functional and non-functional aspects of their proposed solutions. These scores were agreed by the group as a consensus, and then the associated costs were weighted and added to give the overall scores. The scores captured demonstrated that supplier 6 was the Preferred Option*.

**All scores listed are considered provisional at this stage pending the completion of the full OJEU process including clarifications from the supplier and site-visits to the bidders.*

The preferred supplier's response was combined with the NRIIP option and compared to the 'Do Nothing' option. Radiology stakeholders were asked to assess each of the options utilising the non-monetary benefits criteria. The results of the Options Appraisal can be seen in **Tables 6** and **7** below.

	Do nothing	NSS NRIIP and XL7 DICOM standard based brokerage system
	Option 1	Option 2
	Score (1-10)	Score (1-10)
Improved quality and access to services	2	8
Data governance and information security	6	8
Sustainable service	3	8
Standardised, consistent approach pan Scotland	3	7
Staff – wellbeing and career progression	3	7
Modern fit for purpose infrastructure	2	8
TOTAL SCORE	19	46
Ranking	2	1

Table 6: Non-weighted Options Appraisal

	Do nothing	NSS NRIP and XL7 DICOM standard based brokerage system
	Option 1	Option 2
	Weighted score	Weighted score
Improved quality and access to services	53	202
Data governance and information security	60	84
Sustainable service	72	187
Standardised, consistent approach pan Scotland	47	133
Staff – wellbeing and career progression	26	72
Modern fit for purpose infrastructure	25	106
TOTAL SCORE	283	784
Ranking	2	1

Table 7: Weighted Options Appraisal

Interpretation of results of Options Appraisal

As demonstrated in **Table 7** above, Option 2 scored highest in the ranking for non-monetary benefits. These results reflect the main benefits of an NSS provided NRIP and reporting within an XL7 DICOM standard based brokerage system as detailed below.

7.3 SUMMARY OF BENEFITS OF XL7 DICOM STANDARD BASED BROKERAGE SYSTEM

The XL7 DICOM solution leverages existing RIS functionality on a national basis, whereas the PACS extension does not provide such extensive national functionality. The brokerage based system allows clinicians to request images across NHS Boards, and for those requests to be vetted across sites. This solution is also likely to have a reduced training requirement, because it allows continued use of the existing software package. For that reason it is also likely to be easier to implement technically.

7.4 SUMMARY OF BENEFITS OF NSS PROVIDED NRIP

NRIP held and managed within NSS has the advantage that the data is held within a Safe Haven and supported by robust Information Governance permissions. The linkage to other data marts within the CDW will allow the ability to operationally manage and strategically plan and model services based on historical data and link to patient outcomes. In addition, an NSS-managed Data Mart will have the flexibility of adapting to anticipated service needs at minimal cost.

8. SENSITIVITY ANALYSIS

In order to test the robustness of the results of the Options Appraisal, a sensitivity analysis was undertaken. If an equal weighting is applied to all criteria, the ranking of the Preferred Option does not change.

The margin between options ranked as one and two was analysed. It was found that stakeholders would have had to increase their scoring of Option 1 by 270% before it matches the score of Option 2.

All those involved in scoring ranked the Preferred Option as highest. This level of consensus amongst key stakeholders provides further evidence that the Preferred Option is the best way forward in terms of the non-monetary benefits.

9. IDENTIFYING THE PREFERRED OPTION

The purpose of this section is to present the case for the selection of a Preferred Option. It will begin by merging the results of NPC from the GEM and non-financial benefits to identify the cost per benefit point of each option. **Table 8** below, shows the results of the NPC, WBS and non-monetary benefits combined score.

	Option 1	Option 2
NPC £m	4,505	4,469
NPC Rank	2	1
Weighted Benefit Score (WBS)	272	738
WBS Rank	2	1
Combined cost per benefit point	17	6.1
Overall Rank	2	1

Table 8: NPC, WBS and non-monetary benefits combined score

Table 8 shows that Option 2 is the Preferred Option from both a monetary and non-monetary perspective. Option 2 provides the basis for connectivity amongst sites and thus allows virtual reporting and the derivation of better management information through NRIIP. It is clear that the 'Do Nothing' option is not economically advantageous.

As the non-monetary benefits were derived from scores by stakeholders with slightly different roles in the sector, the scores should provide an objective assessment of the relative benefits of each option. The consensus in the scoring, the relatively high scoring of the Preferred Option and that it is still the Preferred Option if the benefit criteria were equally weighted (i.e. all benefits are considered to be equally important) provide confidence that the best option has been selected as the Preferred Option.

The NPC are relatively close but this reflects that the base data includes all radiology costs. The financial modelling highlights that costs should be lower under Option 2; even after taking additional costs resulting from the implementation and ongoing maintenance of The Model are taken into consideration. Sensitivity analysis has shown that the level of savings are dependent on certain assumptions but that if additional resource can be secured and used effectively that Radiology should benefit from both a financial and non financial perspective.

10. SUMMARY OF PREFERRED OPTION

Thus, Option 2 has the lowest cost and the highest level of benefits.

Option 2 provides a solution which leverages existing RIS functionality on a national basis, whereas reporting within PACS does not provide such extensive national functionality. The

brokerage based system allows clinicians to request images across NHS Boards, and for those requests to be vetted across sites. This solution is also likely to have a reduced training requirement, because it allows continued use of the existing software package. For that reason it is also likely to be easier to implement technically.

Option 2 therefore sets the basis for more collegiate working and the optimal use of Radiologist and Reporting Radiographer time. This option also has the benefit that NRIIP is stored within and managed by NSS. This has the advantage of the data being held within a Safe Haven and being supported by robust IG permissions. The linkage to other data marts within the CDW will allow Service Managers to operationally manage and strategically plan and model services based on historical data and link to patient outcomes. In addition, an NSS managed NRIIP will have the flexibility of adapting to anticipated service needs at minimal cost.

Option 2 has been chosen as the Preferred Option by the economic appraisal; the next section focuses on the affordability of that option including detailing any funding required. There is a clear distinction between an option being the most economically advantageous and that option being affordable to implement in the given timescales. The Financial Case details the financial implications associated with implementing Option 2.



E. FINANCIAL CASE

1. INTRODUCTION

The purpose of the Financial Case is to demonstrate the affordability of the Preferred Option and set out any investment requirements.

This section will set out the financial profile and investment consequences (both capital and revenue) of the Preferred Option. Given that the implementation of this Business Case impacts all territorial NHS Boards and some special NHS Boards, there has been no attempt to artificially produce a balance sheet or statement of consolidated net expenditure for Radiology services in Scotland. Instead, the financial consequences are documented below, focusing only on the relevant costs.

Board specific investment issues are not discussed in great detail but the assumption is that upfront central investment would be made available to cover NRIIP and IT Connectivity costs; That NHS Boards would pay for the recurrent costs of these based on a fair measure such as users, volumes or NRAC; That payments would be made to Radiologists at double time to compensate for additional work and that any financial benefit from reduced outsourcing or Locum spend would stay at NHS Board level, rather than be distributed regionally or nationally. These are assumptions in absence of an agreed national investment framework for Shared Service projects and should be discussed further during implementation.

The source of up front capital and revenue investment has not yet been confirmed. Capital investment of circa £0.8m, primarily in 2017/18 and up to £2.5m of revenue investment over 24 months is required to ensure full implementation. The assumption is that revenue investment would come via the Transformation Fund and we seek approval from the CEs on the investment route. This Programme aligns with many of the themes in the Health and Social Care Delivery plan including;

- “...resource is spent where it achieves the most and focusing on prevention and early intervention”
- ”...support innovation and technology capacity-building at national, regional and local levels by facilitating, encouraging and empowering those who work in health and care to identify innovation challenges and develop partnerships to deliver solutions”.

2. NON-RECURRING INVESTMENT

The economic appraisal showed that the Preferred Option was more than cost neutral when compared to the ‘Do Nothing’ option. However, an initial upfront investment is required to enable the benefits to accrue. **Table 9** below outlines the investment required in the early years for Option 2.

Upfront cash flow of option 2	2017/18 £m	2018/19 £m	2019/20 £m	TOTAL £m
IT Connectivity – Capital	0.55	0	0	0.55
NRIIP – Capital	0.2	0.01	0	0.21
NRIIP implementation – Revenue	0.32	0.21	0	0.53
Programme Management –	0.38	0.74	0.2	1.32

Upfront cash flow of option 2	2017/18 £m	2018/19 £m	2019/20 £m	TOTAL £m
Revenue				
Voice Recognition Licenses – Revenue	0.09	0.51	0	0.6
Total Capital funding	0.75	0.01	0	0.76
Total Revenue funding	0.79	1.46*	0.2	2.45

Table 9: Non Recurring Costs

The capital costs above are inclusive of VAT

**Includes VR licenses*

Thus, upfront investment of circa £3.2m will be required, £1.54m of which will fall into 2017/18 to progress both the IT Connectivity and NRIIP.

- IT Connectivity - The costs and timescales for IT connectivity are based on information from the preferred supplier, selected after a tender process that followed OJEU rules.
- The cost and timescales for implementing NRIIP are based on an implementation plan produced by PHI/BI who would lead on developing and hosting the NRIIP. Part of the cost is expected to be capitalised, and **Table 9** above shows the split between revenue and capital investment. More information on the development of the NRIIP is available in **Appendix 12**.
- Project management resource is included to drive forward all aspects of implementing The Model. These include a central team who would be responsible for managing the IT Connectivity from the NHS, including linking with local IT departments to ensure data security.
- VR licenses – To be prudent an allowance has been made for the purchase of VR licenses to ensure the IT solution is compatible. Further work will be undertaken to test whether existing voice recognition software could be used and if not how many licenses may be required. The £0.6m above is hopefully an upper limit based on 200 concurrent licenses being required.

To summarise, this Business Case seeks upfront investment of £3.1 plus VAT (£3.2m), split between capital £0.67m plus VAT (£0.76m) and non recurrent revenue investment (£2.45m), phased as per **Table 9** above. The £2.45m of revenue investment required may decrease by up to £0.6m depending on the outcome of discussions around VR software.

Clarification is required on sources of investment. Potentially, non-recurrent revenue investment would be sought from the Transformation Fund and the Business Case seeks endorsement by the CEs to confirm the investment route. To illustrate the potential contribution required if central investment was not secured and NHS Boards had to contribute, the two **Tables** below use NRAC to split the capital and revenue investment required.

Region	Share of Capital costs £m
North	0.20
S East	0.22
West	0.34
Total	0.76

Table 10: NRAC Share of Capital Costs

Region	Share of non recurrent costs £m 17/18	Share of non recurrent costs £m 18/19	Share of non recurrent costs £m 19/20	Total £m
North	0.2	0.37	0.05	0.62
S East	0.23	0.43	0.06	0.72
West	0.35	0.66	0.09	1.1
Total	0.79	1.45	0.2	2.45

Table 11: NRAC Share of Non Recurrent Revenue Costs

3. RECURRENT REVENUE IMPACT

• Costs

Costs should be lower, compared to the 'Do Nothing' option, through implementation of The Model. However, there are additional recurring costs driven by The Model that will require to be funded and it is anticipated that these costs would be borne by NHS Boards. These costs sit outside the normal radiology costs at NHS Board level and the assumption is that a host NHS Board would be responsible for these costs. There would then be an equitable mechanism put in place to compensate the host NHS Board (possibly funded via top slicing).

These costs are detailed below:

Recurrent costs of option 2	2017/18 £m	2018/19 £m	2019/20 £m	2020/21 £m
IT Connectivity	0	0.16	0.14	0.14
NRIP	0	0.14	0.2	0.2
Capital Charges	0	0.14	0.15	0.15
Non Reporting Staff	0	0.11	0.26	0.38
Total	0	0.55*	0.76**	0.86**

Table 12: Recurrent Costs of Option 2

These costs do not include inflation and are based upon 17/8 prices.

** Excluding capital charges*

***Including capital charges*

Investment of around £0.9m per annum would be required in order to maintain support for the IT infrastructure and NRIP running costs. To place this into perspective, it equates to less than 0.5% of the annual direct revenue costs of the radiology service in Scotland as reported in the Cost Book.

- IT Connectivity – These costs are taken from the preferred supplier after a procurement tender exercise following OJEU processes and include maintenance and support. VAT has not been added on the assumption the VAT would be recovered under contracted out services heading 14.
- NRIP costs – There were provided by NSS PHI and include costs associated with the provision of the necessary data extracts by the RIS suppliers.
- Capital charges – Calculated using the straight line method and a useful life of 5 years based on the capital costs associated with both IT Connectivity and the NRIP. After 5 years the capital charges would be dependent on any future capital expenditure to maintain the IT Connectivity and NRIP.
- Non Reporting staff – Two elements, firstly for additional non Clinical staff based in Boards plus 3 staff to support The Model beyond implementation. The staff costs to support the IT solution are based on each region having 2 staff (1 x AfC Band 4 and 1 x

Band 7) to manage the post implementation running of the IT Solution. Therefore 6 additional WTE have been factored into the costs to ensure there is resource available to clinical staff to support the effective use of the enhanced reporting capability provided by The Model. 3 additional staff have also been factored in to ensure all aspects of The Model are driven forward beyond implementation. There is a Medical Director who would dedicate 1 day per week, a full time Programme Director (Executive Level D), Programme manager (Band 8a, 0.5WTE) and full time administrative support (AfC band 5)

The assumption is that NHS Boards would contribute towards these annual running costs using an appropriate and fair method such as NRAC or volumes. On the assumption that the IT connectivity and NRIIP costs are hosted in a single NHS Board then to provide indicative costs **Table 13** below apportions the 2020/21 costs on the basis of NRAC. If the National Waiting Times Centre was factored in on the basis of its proportion of national radiology costs then it would decrease the value shared between NHS Boards by £18k.

Region	20/21 share of revenue costs £M
North	0.22
S East	0.25
West	0.39
Total	0.86

Table 13: NRAC Share of Recurring Revenue Costs

4. LIFECYCLE COSTS

Based on advice from procurement specialists, a capital refresh every five years was factored into the Economic Case regarding IT Connectivity. Thus, even with this cyclical cost factored, Option 2 still has the lower overall cost in the economic analysis. However, for affordability, it has to be mentioned that in order to maintain the IT Connectivity investment on a five year cycle may be required. Assuming this would be a cost in the region of the original cost then circa £0.55m of capital would be required every 5 years. The assumption is that this would be top sliced from NHS Boards on an equitable basis.

4.1 SAVINGS / COST AVOIDANCE

It is anticipated that this ongoing investment in the service will result in net savings, mainly through a reduction in the level of outsourcing required as compared to the 'Do Nothing' option. **Table 14** below outlines the anticipated savings as compared to the 'Do Nothing' option.

The anticipated costs/savings are:

Saving	2017/18 £m	2018/19 £m	2019/20 £m	2020/21 £m	2021/22 £m
Option 2 Gross Saving	0.00	-0.84	-4.49	-4.79	-4.96
Option 2 Net Cash Saving	0.00	-0.30	-1.35	-1.54	-1.60
Option 2 Net Revenue Saving	0.00	-0.03	-1.20	-1.39	-1.45
Option 2 Net Revenue Saving if 1% efficiency gain	0.00	-0.13	-1.83	-2.01	-2.08

Table 14: Anticipated Savings

Allowing time for the infrastructure to be put into place, the assumption is that savings would not accrue in 2017/18. Savings would gradually begin to be realised in 2018/19.

- Gross saving – This is the saving from outsourcing fewer images before any additional costs are factored in.
- Net cash saving – this factors in all the recurrent costs (excluding capital charges), including the cost of additional capacity (EPAs at double time and Reporting Radiographers) and the costs associated with The Model.
- Net revenue saving – Includes impact of capital charges as a non cash item.
- One percent efficiency gain – this is for illustrative purposes to show the financial impact if improved infrastructure could enable more images to be reported due to quicker turnaround times. This saving is not factored in anywhere but does illustrate the scale of potential savings.

4.2 GROSS SAVINGS

The savings are predicated on The Model through optimisation of additional resource by 2020/21, saving circa £4.8m per annum compared to the 'Do Nothing' option. This would be achieved by:

- Marginally increasing capacity through better utilisation of Reporting Radiographers to 50% of their WTE;
- Additional direct clinical time for Consultant Radiologists through NHS Boards having a minimum average programmed activity (PA) of 11 sessions (figures assume 50% achieved for NHS Boards currently under 11 additional sessions on average); and,
- IT Connectivity and NRIP supporting demand optimisation of the additional resource.

The continuous increase in savings to 2020/21 relates to The Model providing the opportunity to maximise the financial benefit of targeting the items with the highest cost first. Savings would increase by circa £0.1m per annum on the assumption of continued growth in demand, unless further efficiencies or additional capacity could be found as the additional resource is already optimised.

4.3 NET CASH SAVING

This reflects that additional recurrent costs would be generated as a result of The Model and these have been described earlier in this section. The other additional cost that has not been mentioned so far in the Financial Case is the pay costs associated with the additional Radiologist/Reporting Radiographer resource described above.

These costs are:

Additional Clinical Staff Costs	2017/18 £m	2018/19 £m	2019/20 £m	2020/21 £m	2021/22 £m
Additional Programmed Activity (PA)	0.00	0.48	2.05	2.16	2.27
Additional Radiographer Backfill	0.00	0.08	0.39	0.39	0.39
Total	0.00	0.56	2.43	2.54	2.66

Table 15: Clinical Staff Costs

Therefore net revenue savings of around £1.5m that increase marginally each year could be made. This calculation factors in all annual costs that would be impacted by approving the Business Case. However, to be clear, this is not suggesting that all other Radiology costs will be constrained and thus the savings will result in fewer Radiology costs in future years. What it does show is how the assumed growth in demand would be met by a mixture of

substantive staff, outsourcing and how the Preferred Option can mitigate the increase as compared to the 'Do Nothing' option.

The savings have not been modeled at NHS Board level due to the number of local factors that could influence the values. This means that the net financial impact on a Board by Board basis is not presented. The Economic Case provided some assurance via sensitivity analysis that at a national level the net financial impact should be positive, even if some of the assumptions contained sub conscious optimism bias. So, there can be some confidence that approving Option 2 will result in lower net revenue costs than the 'Do Nothing' option.

4.4 EFFICIENCY GAIN

There is anecdotal evidence that the IT Connectivity equipment could improve productivity by facilitating more images to be reported each session.

To illustrate, a 1% increase in productivity could return between £600k and £900k of savings.

This is based on the assumption that more images would be reported with the same number of substantive staff doing the same number of hours. Thus no incremental costs but fewer images having to be outsourced, reported by Locums or done by NHS staff at premium rates.

Another way to look at this is that waiting list times could be reduced rather than take a financial saving.

That for the same cost, a 1% efficiency gain would allow for an additional 21,000 CT images to be reported on per annum.

There could also be further savings if a more collegiate regional/national planning model could result in less work being done at triple time. Again, this has not been factored into the savings.

4.5 GROWTH IN DEMAND

As mentioned above it is likely that due to growth in demand for Radiology services that costs will outstrip the savings documented above. The Economic Case factored in additional demand at:

Modality	Current Demand	Growth %age*	Growth examinations*
C T Scanner	527,842	6.7%	33,796
Magnetic Resonance Imaging	248,442	7.4%	16,608
Other	2,562,660	2.1%	58,381

Average over 2009/10 to 2015/16 as per volumes reported in Cost Book SFR 5.11

Table 16: Growth in Volumes

To illustrate the impact this would result in Do Nothing related costs increasing by the amounts in the **Table** below (not adjusting for inflation or incremental drift etc).

Year:	2017/18 £m	2018/19 £m	2019/20 £m	2020/21 £m	2021/22 £m
Locum, Pay & outsourcing	1.77	3.54	5.31	7.08	8.85

Table 17: Do Nothing Cost Increase

Table 17 highlights that the saving from The Model is not sufficient to completely offset the costs of expected growth (this is not factoring in cost increases associated with non reporting areas of radiology).

The Model provides a platform to improve the resilience of the service and capitalise fully on the potential financial gain from any additional resource that can be put into the system. However, The Model, in itself, does not solve the fundamental issue that demand for radiology services has outstripped supply of sufficiently qualified staff and hence why the cost of the service has increased by having to pay a premium for the reporting of an increasing amount of images.

The growth in demand and costs reflects the assumption (based on historical trends) that increase in demand is outstripping increase in capacity for the reporting of images.

For information, the cost as supplied for NHS Boards for Consultant Radiologists through agency/Locums was £7.9m in 2015/16 and rising pro-rata (based on half year actual) to £8.7m in 2016/17. Outsourcing was £3.2m and £3.9m for the same financial years. So, combined additional reporting capacity through Locums and outsourcing is a significant and rising cost and one of the main financial drivers of the Business Case.

To be prudent, no additional savings have been factored in. However, Option 2 has the potential for further savings, such as to increase the number of images reported per session through having a more responsive IT system.

5. SUMMARY

Overall, approving Option 2 should result in net savings as compared to the 'Do Nothing' option. However, a request for upfront investment is required to progress the two underpinning requirements, viz. IT Connectivity and NRIIP.

The upfront funding required is:

Investment	2017/18 £m	2018/19 £m	2019/20 £m	Total £m
Capital	0.75	0.01	0	0.76
Revenue	0.79	1.46*	0.2	2.45

Table 18: Up Front Funding Request

The revenue element of upfront funding could be sought from the Transformation Fund as The Model adheres to many of the themes in the Health and Social Care Delivery Plan: Such as making best use of resources, collaborative working, driving prevention and early intervention. The Business Case seeks CEs approval for the investment route.

Capital investment of £0.76m is required and a central source has yet to be identified.

Recurrent investment to maintain the IT Connectivity and NRIIP will be required. Including capital charges and additional non reporting staff, this amounts to circa £0.9m per annum. This should be funded by Boards from the savings (£0.9m is part of the net £1.5m saving

quoted). The mechanism for funding additional recurrent costs should be discussed regionally and with any potential host Board.

This investment should produce recurrent savings of £1.5m as compared to the 'Do Nothing' option.

Further detail around the assumptions can be found in **Appendix 16**.

F. MANAGEMENT CASE

1. INTRODUCTION

This section of the Business Case sets out the proposed arrangements that would be put in place to facilitate implementation of The Model which includes the proposed Programme Structure and associated Governance.

The CEs mandated the radiology programme team to produce this Business Case outlining the solutions to the challenges within radiology in Scotland.

It has been agreed that the specialist IT and data solutions, described within the Commercial Case, will be implemented by teams within NSS; the workforce solutions by a National Radiology Implementation Team.

It is proposed that implementation will be managed by a National Radiology Implementation Board (NRIB), which will adopt best practice programme and project methodologies.

The function of the NRIB will be implementation for the first two years; however the function will change for business as usual to incorporate oversight and leadership of the national service. The duration of the Board is anticipated to be for ten years, with regular review periods.

2. PROGRAMME IMPLEMENTATION STRATEGY

Over the duration of the National Radiology Programme, the programme team has built up empirical knowledge of the distinct projects it has been developing and established robust relationships with radiology stakeholder's at all organisational levels, including SCIN. A critical success factor moving forward into implementation and business as usual will be to maintain dedicated senior clinical and executive leadership for Scotland.

A national approach to implementation will maximise the existing expertise and build on existing structures to fully realise programme benefits, in the shortest possible timescale. A national Programme approach is essential not only to oversee the implementation of The Model but also to facilitate and embed regional and national ways of working, maintaining the principle of delivery of service as close to the patient as possible.

The radiology programme team researched similar implementation models and engaged with the East Midlands Radiology Network Services (EMRAD), **Appendix 20** refers. The EMRAD Consortium serves a population base of 6.5m, with a rural dispersion; however, it does not cover the remote geography which Scotland does; therefore allowances have to be made for this. The EMRAD is funded through a contribution by each NHS Trust within the region (circa £57k each per annum) as well as national "Vanguard" funding. Their leadership structure includes a dedicated Medical Director, Programme Director, Technical Director, Project Support Officer and Senior Responsible Owners in each Trust (x7) who are from a variety of executive backgrounds. The EMRAD implementation team includes a well resourced programme team to support the individual work streams.

It is therefore proposed in this Management Case that resourcing implementation of the Scottish national model learns from the EMRAD consortium methodology by securing senior

clinical and executive leadership. **Appendix 18** details the functions and an outline of the roles required to support those functions.

2.1 THE IT CONNECTIVITY PROJECT

Ownership of the IT Connectivity implementation will be project managed by NSS IT in conjunction and collaboration with NHS Boards across Scotland. The key roles and responsibilities will be detailed later in this section.

There will be a requirement to administer the workflow of cross board reporting and to maintain information and clinical governance for this workflow. This will require regional managerial oversight and administrative support. It is envisaged that this would be provided by a Regional Radiology IT Connectivity Manager (analogous to a RIS/PACS Manager) with administrative support. **Appendix 18 refers.**

2.2 THE NRIIP PROJECT

Ownership of the NRIIP implementation project will sit with NSS BI and NSS PHI in conjunction and collaboration with NHS Boards across Scotland. The key roles and responsibilities will be detailed later in this section.

2.3 THE WORKFORCE PROJECT

Implementation of new ways of working to achieve The Model on a regional basis will be supported by the radiology programme team in collaboration with Regional representatives.

2.4 THE CLINICAL GOVERNANCE, QUALITY ASSURANCE AND CLINICAL PATHWAYS PROJECT

It has been agreed with the Lead Clinician of the SCIN that the Network will develop CG, QA and Clinical Pathways required to support The Model. These activities fall within the remit of diagnostic networks and will therefore require no additional resource.

2.5 IMPLEMENTATION PLAN

In order to implement The Model plans have been developed by the individual projects. These reflect timescales, people and financial resources required. A summary of these requirements are captured in **Appendix 18**.

In addition, a high level timeline has been developed by the Implementation Programme team which highlights the phasing of activities over the next three years. **Appendix 19** refers. The timeline is subject to change dependent upon the CEs approval.

Implementation will be undertaken on a regional basis influenced by priorities identified by the regions.

2.6 PROGRAMME GOVERNANCE

There is a requirement to establish a National Radiology Implementation Board (NRIB) as a Governance Group accountable for the overall implementation of the Programme. The various teams involved in the implementation of The Model will report progress on their projects to the NRIB. In turn points of escalation of Programme Risks and Issues will be raised to the Sustainability and Value Board by the NRIB Chair.

Individual teams will be responsible for their own risk management and change management strategies. Escalation of risks will be to the NRIB.

3. BENEFITS REALISATION

Sustainability of the radiology service will demonstrate the successful realisation of benefits. Specific measures are outline in **Table 19** below.

Although it is not possible to quantify, it is anticipated that the implementation of The Model may mitigate the risk of some hospitals closing to acute activity. Please refer to KPIs outlined in Section 2.1, p 24 of the **Commercial Case**.

Benefit	Anticipated Measure	Anticipated Timescale
Net Financial Benefit	£1.5m per annum	2018/19 onwards
Reduction in overall costs of image reporting including outsourcing costs	£4.5m per annum	2020/21 onwards
Increased productivity due to improved IT	1% productivity gain £0.9m per annum	2018/19 onwards
Improved strategic planning	Demand and capacity planning via NRIIP	2018/19 onwards
Optimisation of workforce	Increased Reporting Capacity	2018/19 onwards
Service sustainability	Patient Access Targets	2018/19 onwards
Service improvement	Via NRIIP	2018/19 onwards

Table 19: Benefits Realisation

4. PROGRAMME EVALUATION

Through analysis of the data within NRIIP benefits realisation can be monitored.

At the end of the change programme, consideration needs to be given to ongoing evaluation from at least six months after implementation and annually thereafter. The purpose of the evaluation is to reflect how The Model is fit for purpose or requires adjustment and to ensure that the original deliverables have been achieved. This will be a business as usual function which can be undertaken at national, regional and local levels.

G. RECOMMENDATIONS

A number of recommendations are being put forward for discussion and approval by the CEs. They are:

- a) The Business Case is approved by the CEs;

There is a capital and revenue investment required for IT Connectivity, NRIIP and for the associated implementation of The Model:

- **Capital £0.67m** (£0.76m including VAT); and
- **Revenue non-recurring £2.45m**

A total investment of £3.1m (£3.2m including VAT).

This investment will return a recurrent saving of circa £1.5m per annum. This is conservative estimate of potential savings based on prudent modeling of additional capacity only.

- b) Confirmation of investment sources for implementation;
- c) Programme Implementation Structure, Governance and Reporting arrangements are approved by NHS Chief Executives;
- d) Commitment by NHS Chief Executives to appoint a clinical and managerial lead in each region for implementation;
- e) Mandate for National Reporting Radiographer Framework to be implemented across NHS Boards as a minimum standard;
- f) Appointment of a host Board to lead a national/international recruitment drive for Consultant Radiologists;
- g) Scottish Government increase the number of Radiologists training places;
- h) NES to develop remote and rural placements for trainee Radiologists;
- i) Regional Medical Banks to incorporate Reporting Radiology Bank;
- j) Completion of NHS Boards of National Radiology Services Working Hours Framework;
- k) NHS Boards should consider the skill mix within radiology departments and reflect these changes in their local Workforce Plans;
- l) Consideration be given to the direction of travel of the development of regional or national contracts of employment;
- m) Consideration should be given to developing a new accountability model, which promotes the management of performance targets such as patient Waiting Times at a regional level and aligns to regional delivery as per the Health and Social Care Delivery Plan;
- n) Consideration should be given to the development of national radiology KPIs;
- o) Consideration should be given to a national approach to procuring VR software and licenses; and
- p) Cost Book review should take account of the financial and managerial radiology data and utilise the outputs of NRIIP. **Appendix 17** refers.

Investment routes which may be applicable are:

- **The Transformation Fund**
- **National Resource Allocation Committee (NRAC) Formula (Tables 10 and 11 p48)**
- **Scottish Government funding to improve waiting times for cancer patients to speed up access to diagnostic tests**

The CEs are asked to approve one of the above or provide an alternative investment.

H. TABLE OF APPENDICES

The following is a list of appendices to this document. Due to the considerable number of appendices these are captured in The Radiology Business Case Appendices document.

Appendix Number	Content
1	The National Radiology Model
2	Radiology Services Locations Map
3	Scottish Population Estimates and Projections
4	Patients waiting for four key diagnostic radiology tests, NHSScotland Nov 2015 - March 2017
5	Consultant Radiologist Vacancies by NHS Board and by Percentage of Establishment
6	Total cost of reports outsourced, additional payments and cost of non-substantive Radiology staff NHSScotland 2016
7	Five year trends in Radiology service costs and activity, Scotland
8	National Baseline Data Capture Spreadsheet
9	Main Challenges for Radiology services
10	Radiology Operational Requirements and IT Connectivity ITT
11	IT Implementation Costs
12	The BI/PHI joint proposal for implementation of the NRIIP
13	Contractual Arrangements Good Practice Guide and Professional Governance
14	National Framework for Reporting Radiographers
15	IT Connectivity Evaluation and Weighting Criteria
16	Final assumptions for GEM Model
17	Radiology Cost Book Data – potential changes to improve utility
18	Implementation Costs
19	Implementation Plan – National Radiology Model
20	EMRAD Visit Report