

**Who shares wins:
efficient,
collaborative
radiology solutions**

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Introduction

In 2006–2007 NHS hospitals across the UK invested in radiology information system (RIS) and picture archiving and communications system (PACS) solutions; in England this was via the National Programme for Information Technology (NPfIT). This allowed a step change in the way imaging departments deliver their services, enhanced radiology reporting efficiency and benefited the workflow of many other hospital departments. Investment in RIS and PACS led to improved image and report management within hospitals but, as yet, the NHS has not delivered reproducible, inter-hospital image and report sharing. At present, the majority of image sharing in England and Wales relies on the image exchange portal (IEP). Although the IEP is successful, a disadvantage is that reports are divorced from the images to which they belong. The image-sharing process is also reliant upon manual input from PACS teams and radiographers, and requires prior knowledge of imaging studies performed in other hospitals if these are to be downloaded and viewed.

This document specifies what imaging departments should demand from RIS and PACS vendors to ensure their radiology information technology (IT) systems can function in the modern teleradiology environment in a vendor-neutral way. It has been written by practising NHS radiologists with extensive input from imaging industry experts. Much of the technical detail in the appendices goes beyond that necessary for most clinical radiologists, and is designed to be shared with local RIS/PACS managers and IT departments. It will enable radiologists to have informed, standards-based discussions with potential suppliers, providing advice on exactly what radiologists need to ask for when specifying a modern RIS-PACS and network teleradiology platform (NTP), so that they can be confident that systems from different vendors will interact seamlessly with each other.

A recent Royal College of Radiologists (RCR) survey identified deep frustration among radiologists at the difficulties encountered when attempting to share imaging studies between local and regional hospitals, including: the length of time taken to organise multidisciplinary team meetings (MDTMs), the difficulty in getting images and reports transferred together via the image exchange portal (IEP), poor or non-existent 'in-house' NHS teleradiology facilities and the lack of home reporting capability in many trusts.¹ The information detailed in this document will help overcome these difficulties. It will also facilitate setting up NHS 'in-sourcing' networks between neighbouring hospitals, (irrespective of their RIS/PACS vendor), whereby radiologists can benefit from resilience of specialist radiological opinion across the region, and from in-sourced out-of-hours reporting schemes set up at local level. The didactic guidance given in this document is intended to help radiologists to help themselves achieve a solution which will make their working lives easier and more efficient.

Understanding the terminology

Picture archive and communication system (PACS) image display systems

PACS is an IT system used to transfer, display and manipulate radiology images using a standardised digital imaging and communication in medicine (DICOM) format. In this document, hospital-level PACS systems are referred to as enterprise PACS.

Radiology report creation systems (radiology information systems [RIS])

The RIS is an IT system used to generate radiology reports, linked to PACS images. (It is also used to manage and schedule radiology examination appointments.) Transmission of reports and other information occurs via Health Level 7 (HL7) observation result (ORU) messaging.

Network teleradiology platform (NTP)

An NTP is an IT system used to connect multiple RIS and PACS systems across a clinical network. It is essentially a MiniRIS and MiniPACS system.

- MiniRIS offers reporting functions only, that is, no scheduling or vetting.
- MiniPACS is a short-term DICOM database with a DICOM viewer capable of remote image display over slower networks.

Demographics validation

- An NTP does not perform patient demographic validation. This information should already have been checked in the enterprise RIS and PACS before being sent to the NTP for reporting.

NTP connections

- Each enterprise PACS connects with the NTP using standards-based, DICOM C-FIND, DICOM C-MOVE and DICOM query retrieve (QR) messaging.
- Each RIS connects with the NTP via standards-based HL7 order messaging (ORM) and ORU messaging.

Data retention within the NTP

- The NTP is a short-term archive of images for the purpose of reporting only. The long-term archives of images and reports are the enterprise RIS-PACS systems. This needs to be clearly understood between trusts when they embark on collaborative reporting via an NTP.

Importantly, consistent use of NHS terminology, identifiers and coding in HL7 and DICOM messaging are key to 'plug and play' interoperability between RIS, PACS and NTPs (see [Appendix A](#) for more details).

Vendors participating in network sharing solutions will need to ensure that data security and confidentiality meets NHS information governance standards.

Why invest in a network teleradiology platform?

It is important to understand that teleradiology is not a replacement for local, on-site, departmental radiology clinicians. Radiologists are medically trained and interact constantly with other doctors, radiographers and patients, giving advice on a range of issues and providing strategic leadership to imaging departments in their quest to accommodate the ever growing demands placed upon them. However, teleradiology can act as a useful adjunct and may help to mitigate the current and projected shortage of NHS radiologists.

Any NTP should be at least as good as the enterprise RIS-PACS solution for radiology report creation.

Network teleradiology platform functions

Radiologists and departmental managers need to understand what functionality they wish to achieve with an NTP, and use the appropriate appendices in their procurement documentation.

Networked out-of-hours reporting

- Networked out-of-hours reporting would reduce the number of radiologists disturbed at night. (See [Appendices A and B1](#). If the network is planning to use junior radiologists for first on-call reporting, [Appendix B4](#))

Share expertise across the network

- Special interest radiologists participate in regular MDT meetings and are experts in their specialties (whether in teaching hospitals or district general hospitals [DGHs]). Smaller specialties such as paediatric radiology may be reliant on a single radiologist in a department. Networked reporting allows for support of such individuals and cross-cover during periods of leave (see [Appendices A and B1](#)).

Networked MDT meetings

- Cancer and other clinical MDT meetings increasingly rely on discussion of cases with regional specialist centres. Radiologists in these institutions need easy access to external images and reports and to be able to record second opinions and other addenda against them (see [Appendices A and B2](#)).

Networked support for regional specialties such as acute stroke care and neurosurgery

- Often clinical management decisions on thrombolysis, head injury and intracranial haemorrhage are taken at regional network levels. This would include planning patient transfers and treatment. Access to images and reports across the network is essential (see [Appendices A and B3](#)).

Networked reporting of unreported studies

- The RCR surveys in 2015 and 2016 revealed a large, number of unreported imaging examinations nationwide.²⁻⁴ An NTP would enable departments to make use of any spare resource in neighbouring NHS trusts, rather than outsourcing to the independent sector, if this is seen as desirable (see [Appendices A and B1](#)).
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Clinical standards for teleradiology reporting

The reporting experience using an NTP should mirror that of enterprise RIS-PACS reporting.

- The entire local patient imaging history must be available as a minimum (see [Appendix B](#) for details).
- Other relevant information such as blood, histopathology results and electronic patient record (EPR) information should also be available efficiently to radiologists (enterprise EPR systems would need to be web-enabled to allow for url based context linking between NTP and enterprise EPR).
- Ideally, standardised video conferencing software should also be incorporated into NTP software to mitigate the effects of reduced clinician-to-clinician dialogue associated with off-site working.
- The ability to view a network-wide imaging history is highly desirable (see [Appendix C](#) for further details).

All NTP transactions must meet NHS information governance standards. Current reporting quality and efficiency must not be compromised by the teleradiology reporting solution.

Billing, invoicing and cross-charging

NHS trusts are increasingly focusing on the expense incurred when reviewing and reporting images not generated in local departments. The concept of cross-charging is essential to ensure that individual NHS departments remain financially viable, and able to recruit appropriate numbers of radiologists. Billing software must be built in to the NTP solutions to enable cross-charging. Simple fee-per-item tariffs may not suffice; tariffs must be based on national exams codes and out-of-hours uplifts may need to be incorporated (See [Appendix D](#) for examples of billing information required).

An NTP should also automatically issue technology handling fees to cover the costs of upload, transfer and temporary storage of files at central and remote locations.

Vendor mechanisms employed to share unified imaging histories across a network

Patient journeys are increasingly reliant on cancer, stroke and trauma networks. Images and reports may be acquired in multiple hospitals across a region. A unified and comprehensive patient imaging history with real-time access to all images and reports within the network is essential and has been highlighted as a requirement in the RCR survey.¹ Access to all images and reports relating to a patient improves report quality and clinical management decisions and reduces unnecessary additional imaging. Various options for how this sharing can be achieved are detailed in [Appendix C](#) (and are the subject of ongoing debate). When specifying a local RIS-PACS solution and/or an NTP, purchasers should ask vendors for details of how they propose to provide unified patient imaging histories across the network.

Glossary of terms

Health Level-7 or **HL7** refers to a set of international standards for the transfer of clinical and administrative data between software applications used by various healthcare providers, including RIS applications.

HL7 ORM is a general ORder Message that is used to transmit information about an order (electronic request). An order can be defined as a 'request for service' that is sent between healthcare IT applications.

HL7 ORU is an Observation ResUlt message (ORU) that provides clinical observations. Clinical observations can include: clinical laboratory results, reports of imaging studies (that is, text), electrocardiogram (ECG) results, pulmonary function studies and so on.

Digital imaging and communications in medicine (DICOM) is a standard for handling, storing, printing and transmitting information in medical imaging. It includes a file format definition and a network communications protocol. It applies predominantly to imaging data.

DICOM C-FIND is a service in PACS terms that enables one PACS client to query a PACS/ server for matches against a template of key DICOM tag values.

DICOM C-MOVE is a service in PACS terms that allows one PACS to instruct ('command') another PACS to transfer/move stored DICOM instances (studies) to another PACS using the **DICOM C-STORE** operation.

Web access to DICOM object (WADO) is a standard that specifies a web-based service for accessing and presenting DICOM persistent objects, such as images and medical imaging reports. WADO is intended for the distribution of results and images to healthcare professionals.

Open database connectivity (ODBC) is a standard application programming interface (API) for accessing database management systems (DBMS). This could be used to query data items within a database using criteria for the query.

References

1. The Royal College of Radiologists. *It's good to share: medical image and report exchange between UK health service providers*. London: The Royal College of Radiologists, 2016.
 2. The Royal College of Radiologists. *Unreported X-rays, computed tomography (CT) and magnetic resonance imaging (MRI) scans: Results of a snapshot survey of English National Health Service (NHS) trusts*. London: The Royal College of Radiologists, 2015.
 3. The Royal College of Radiologists. *Unreported X-rays, computed tomography (CT) and magnetic resonance imaging (MRI) examinations: results of the September 2015 snapshot survey of English NHS acute trusts*. London: The Royal College of Radiologists, 2015.
 4. The Royal College of Radiologists. *Diagnostic radiology – our patients are still waiting ...* London: The Royal College of Radiologists, 2016.
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Appendix A. NHS clinical terms with their associated HL7 and DICOM tag mapping

NHS clinical data items in RIS database	HL7 segments and fields	DICOM header data items in the DICOM database
Creating and updating electronic radiology requests	Transmission by RIS, Ordercomms and teleradiology platform	PACS or vendor-neutral archive [VNA] or teleradiology platform
	Event trigger: ORM^O01 New order – NW Edit order – XO Cancel order – CA Hold order – HD Status changed – SC Accession not assigned by RIS – send order/service number – SN	
Creating and updating radiology report – primary report or addendum	Event trigger: ORU^R01 – unsolicited transmission of observation message	
Patient name	PID field 5	0010,0010 – PatientName <i>(updated by admit, discharge and transfer [ADT]-A08 and A40 messages from enterprise patient administration system [PAS])</i>
Patient date of birth	PID field 7	0010,0030 – PatientBirthDate <i>(updated by ADT-A08 and A40 messages from enterprise PAS)</i>
Patient gender	PID field 8	0010,0040 – PatientSex <i>(updated by ADT-A08 and A40 messages from enterprise PAS)</i>
Patient address	PID field 11	
PAS/enterprise unique ID	PID: 3.1 – PAS number PID: 3.4 – assigning authority ie NHS ODS [organisation data service] code PID: 3.5 – MR (identifier type code for PAS number)	0010,0020 – PatientID <i>(updated in enterprise PACS by ADT-A08 and A40 messages from enterprise PAS)</i>

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
NHS number/national unique ID	PID: 3.1 – the unique NHS number PID: 3.4 – NHS (assigning authority) PID: 3.5 – NH (identifier type code for NHS number)	OtherPatientIDsSequence (0010,1002) DICOM tag has two important components: <ol style="list-style-type: none"> HL7 ADT PID: 3.1 for NHS number must be mapped to DICOM tag (0010,1010) of OtherPatientIDsSequence HL7 ADT PID: 3.4 'assigning authority' must be mapped to (0010,0021) IssuerOfPatientID which is part of the sequence too. <p>In England/Wales this would be 'NHS'. <i>(updated by ADT-A08 and A40 messages from enterprise PAS)</i></p>
Patient category a. NHS b. Private c. Category 2	PV1: 18 (patient type)	
Unique order number Assigned by Ordercomms for electronic requests and RIS for paper requests	ORC: 2 – placer order number and/or OBR: 2 – placer order number	0040,2016 – PlacerOrderNumberImagingServiceRequest
Group order number Exams requested together in Ordercomms	ORC: 4 – placer group number	
Accession number Unique number generated by RIS/scheduling system for each exam	ORC: 3 – filler order number and/or OBR: 3 – filler order number	0008,0050 – AccessionNumber 0008,0051 – assigning authority that issued the accession number
Visit number Generated by RIS/scheduling system for exams grouped together for a single visit	PVI: 19	

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
Study instance UID Unique identifier of the study in DICOM		0020,000D – StudyInstanceUID generated by the equipment/modality
Order status a. Requested b. Held c. Scheduled d. Patient arrived in department e. Exam started/in progress (patient in room) f. Completed g. Cancelled	ORC: 5 – order status Requested/new – NW Held – HD Scheduled – SC Patient arrived (in progress, in department) – IP Exam completed – CM Cancelled – CA	0040,0020 – ScheduledProcedureStatusID
Priority U – urgent R – routine 2WW – 2 week wait	ORC: 7.6 or OBR: 27.6 quantity/timing	0040,1003 – RequestedProcedurePriority
Requester – junior doctor, nurse specialist etc a. ID – GMC number/HCPC number/NMC number ¹⁻³ b. Name c. Job role (NHS data dictionary) ⁴ d. Main specialty (NHS data dictionary) ⁵ e. Institution of the referring clinicians – as per ODS code for trust/general practitioner (GP) surgery ⁶	ORC field 10 – entered by a. ORC: 10.1 – national ID (GMC number/HCPC number/NMC number etc) ¹⁻³ b. ORC: 10.2 and 10.3 – surname and name c. ORC: 10.5 – job role d. ORC: 10.7 – main specialty e. ORC: 10.9 – institution	0040,2008 – OrderEnteredBy

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
Referring consultant/GP/clinician	ORC field 12 – ordering provider	0080,0096 – ReferringPhysician IdentificationSequence (GMC no)
a. ID – GMC number/HPCPC number/NMC number ¹⁻³	a. ORC: 12.1 for GMC number	0008,0090-ReferringPhysician Name (name) (mapped to ORC 12.2)
b. Name	b. ORC: 12.2 and 12.3 – surname and forename	>0008,0082-InstitutionCode Sequence (Institution) (mapped to ORC 12.9)
c. Job role (NHS data dictionary) ⁴	c. ORC: 12.5 – job role	0032, 1034 –RequestingService Code Sequence (mapped to ORC 12.7 NHS Main Specialty Code)
d. Main specialty (NHS data dictionary) ⁵	d. ORC: 12.7 – main specialty	ReferringPhysicianIdentification Sequence (GMC no)
e. Institution of the referring clinicians – as per ODS code in NHS data dictionary for trust/ GP surgery ⁶	e. ORC: 12.9 – institution code	0008,0090-ReferringPhysician Name (name) (mapped to ORC 12.2)
		>0008,0082-InstitutionCode Sequence (Institution) (mapped to ORC 12.9)
		0032, 1034 –RequestingService Code Sequence (mapped to ORC 12.7 NHS Main Specialty Code)
		ReferringPhysicianIdentification Sequence (GMC no)
		0008,0090-ReferringPhysician Name (name) (mapped to ORC 12.2)
		>0008,0082-InstitutionCode Sequence (Institution) (mapped to ORC 12.9)
		0032, 1034 –RequestingService Code Sequence (mapped to ORC 12.7 NHS Main Specialty Code)
		ReferringPhysicianIdentification Sequence (GMC no)
		0008,0090 – ReferringPhysician Name (name) (mapped to ORC: 12.2)
		>0008,0082 – InstitutionCode Sequence (Institution) (mapped to ORC: 12.9)
		0032,1034 –RequestingService Code Sequence (mapped to ORC: 12.7 NHS main specialty code)

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
Phone number of referring consultant/GP	ORC: 14 – callback telephone number	0008,0094 – ReferringPhysician'sPhoneNo
Location type At time of request (NHS diagnostic imaging dataset [DID] data dictionary ⁷ – patient source setting type) <ol style="list-style-type: none"> 1. Admitted patient care – inpatient (this healthcare provider) 2. Admitted patient care – day case (this healthcare provider) 3. Outpatient (this healthcare provider) 4. GP direct access 5. Accident and emergency department (this healthcare provider) 6. Other healthcare provider 7. Other 	ORC: 13.6 <ol style="list-style-type: none"> a. Inpatient b. Daycase c. Outpatient d. GP e. A&E f. Other hospital g. Other 	
Patient location at request Description at time of request (full name of ward, clinic, GP surgery, accident and emergency department etc)	ORC: 13.9 – enterer's location description ORC: 13.1 – location code (national or local codes) ORC: 13.7 – hospital site or GP surgery ORC: 13.6 – location type (DID data dictionary) ⁸ ORC:13.4 – location organisation (NHS trust or GP practice – NHS data dictionary codes and description)	0040,2009 – OrderEntererLocation

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
Reason for cancellation Free text field reason for cancellation	ORC: 16 – order control code reason – text up to 250 characters	0074,1238 – ReasonForCancellation and also part of DICOM structured report for cancellation reason
Person cancelling the exam a. ID – for example GMC number/ HCPC number/NMC number ¹⁻³ b. Name c. Job role (NHS data dictionary) ⁴ d. Main specialty (NHS data dictionary) ⁵ e. Institution of the person – as per ODS code in NHS data dictionary for trust/GP surgery ⁶	ORC: 19 – actioned by ORC: 19.1 – GMC number/HCPC number/NMC number ¹⁻³ ORC: 19.2 and 19.3 – surname and name	
NHS national exam code and description for radiology studies as per NHS data dictionary⁸	OBR: 4 – universal service ID	0008,1032 – ProcedureCodeSequence 0008,1030 – StudyDescription >Code value (0008,0100) >Code meaning (0008,0104) >Coding scheme designator (0008,0102) – National Interim Procedure Codes (NICIP) >Coding scheme version (0008,01030)
Modality DICOM codes for modalities	OBR: 24 – diagnostic serv set ID	0008,0060 – Modality
Date and time of request Exam status – requested	ORC: 9 – Date/time of transaction	0040,2004 – IssueDateOfImaging ServiceRequest and/or 0040,2005 – IssueTimeofImaging ServiceRequest

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
<p>Appointment scheduled date/time</p> <p>Same as arrival date and time for walk-in patients</p> <p>Exam status – scheduled</p>	<p>ORC: 7.3 – observation start date and time</p> <p>or</p> <p>OBR: 27.3 – observation start date and time</p>	<p>0008,0020 – StudyDate and 0008,0030 – StudyTime</p> <p><i>(NB. Study date and time is populated from appointment start date and time – OBR: 27.4, until this is replaced with acquisition date and time from modalities once the images arrive.)</i></p> <p>0008,0022 – AcquisitionDate comes directly from modalities and NOT from HL7</p>
<p>Exam completion date and time by radiographer</p> <p>Exam status – exam completed</p>	<p>ORC: 7.4 – observation end date and time</p> <p>or</p> <p>OBR: 27.4 – observation end date and time</p>	
<p>Date and time of exam cancellation</p> <p>Exam status – cancelled</p>	<p>ORC: 7.4 – observation end date and time</p> <p>or</p> <p>OBR: 27.4 – observation end date and time</p>	
<p>Scanner/machine that created the images:</p> <p>Machine/scanner ID</p> <p>Exam room code</p> <p>Exam room description</p> <p>Hospital site⁸</p> <p>Institution – NHS data dictionary terms for organisation⁶</p>	<p>PV1: 3.1 – exam room code (local table)</p> <p>PV1: 3.9 – exam room description</p> <p>PV1: 3.4 – facility (organisation: hospital trust – NHS data dictionary code and description)⁸</p> <p>PV1: 3.7 – hospital site</p>	<p>0008,1049 – PhysicianOfRecord IdentificationSequence</p> <p>>0008,0082 – InstitutionCode Sequence (Institution) (mapped from PV1: 3.4)</p>

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
Operator Radiographer/radiologist etc a. ID – for example, GMC number/ HCPC number/NMC number ¹⁻³ b. Name c. Job role (NHS data dictionary) ⁴ d. Main specialty (NHS data dictionary) ⁵ e. Employing institution – as per ODS code in NHS data dictionary for trust/GP surgery ⁶	OBR field 34 – technician a. ORC: 34.1 for GMC number b. ORC: 34.2 and 12.3 – surname and forename c. ORC: 34.5 – job role d. ORC 34.7 – main specialty e. ORC 34.9 – institution	0008,1049 – PhysicianOfRecord IdentificationSequence 0008,1048 – PhysicianOfRecordName (name) >0008,0082 – InstitutionCode Sequence (Institution) and/or 0008,1070 – OperatorsName
Radiographer comments Communication between enterprise RIS and teleradiology platform	NTE field 3 of ORM message – observation value (text – length up to 65,536 characters)	
Result status a. Registered (R) – report exists but content not available b. Preliminary (P) – preliminary, interim or unverified report c. Final (F) – verified or finalised report d. Corrected/amended report (C) – report modified after being verified/finalised (for grammatical, spelling errors) e. Appended report (B) – after a final status, additional report content is added but existing content is unchanged f. Deleted/withdrawn (D) – the report is deleted or withdrawn after a finalised version	OBR field 25 – result status a. Registered (R) b. Preliminary (P) – preliminary, interim or unverified report c. Final (F) – verified or finalised report d. Corrected/amended report (C) – report modified e. Appended report (B) – additional report content is added but existing content is unchanged f. Deleted/withdrawn – report is deleted or withdrawn after a finalised version	

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
Finalised report issued date/time	OBR: 22 – results date/time or OBX: 14	DICOM structured reporting (SR) object content
Intended recipients of report This will include referring consultant but may include others	OBR: 28 – results copies to	0040,1010 –NamesOfIntended RecipientsOfResults
Primary reporter a. ID – GMC number/HPCPC number/NMC number ¹⁻³ b. Name c. Job role (NHS data dictionary) ⁴ d. Main specialty (NHS data dictionary) ⁵ e. Employing institution – predefined by ODS code for trust/GP surgery ⁶	OBR field 32 – Principle result interpreter a. ORC: 32.1 for GMC no b. ORC: 32.2 and 12.3 – surname and forename c. ORC: 32.5 – job role d. ORC: 32.7 – main specialty e. ORC: 32.9 – institution	0008,1062 – PhysiciansReadingStudy IdentificationSequence 0008,1060 –NameOfPhysicians ReadingStudy >0008,0082 – InstitutionCode Sequence (Institution) (mapped from ORC 33.9)
Second reporter a. ID – GMC number/HPCPC number/NMC number ¹⁻³ b. Name c. Job role (NHS data dictionary) ⁴ d. Main specialty (NHS data dictionary) ⁵ e. Employing institution – predefined by ODS code for trust/GP surgery ⁶	OBR field 33 – assistant results interpreter a. ORC: 33.1 – GMC number b. ORC: 33.2 and 12.3 – surname and forename j. ORC: 33.5 – job role k. ORC: 33.7 – main specialty l. ORC: 33.9 – institution	0008,1062 – PhysiciansReadingStudy IdentificationSequence 0008,1060 – NameOfPhysicians ReadingStudy >0008,0082 – InstitutionCode Sequence (Institution) (mapped from ORC 33.9)

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
<p>Transcriptionist name with job role according to NHS data dictionary⁴</p> <p>a. Name</p> <p>b. Job role (NHS data dictionary)⁴</p>	OBR field 35 – transcriptionist	
<p>Narrative clinical history on radiology requests</p>	<p>OBX field 5 or NTE field 3 of ORM message – observation value (text – length up to 65,536 characters)</p>	
<p>Final radiology report narrative content</p>	<p>OBX field 5 of ORU message – observation value (text – length up to 65,536 characters)</p>	DICOM SR object
<p>Provisional report</p> <p>The report content should be preceded by a sentence which states, 'This is a provisional report only. It will be superseded by the final report.'</p>	<p>OBX field 5 of ORU message – observation value (text – length up to 65,536 characters)</p>	
<p>Corrected reports narrative</p> <p>(Reports that have been corrected after a final report was issued.)</p> <p>The narrative content should also include who corrected the report and when it was corrected, in addition to the clinical narrative content of the report.</p>	<p>OBX field 5 of ORU message – observation value (text – length up to 65,536 characters)</p>	DICOM SR object

NHS clinical data items in RIS database	HL7 segments and fields Transmission by RIS, Ordercomms and teleradiology platform	DICOM header data items in the DICOM database PACS or vendor-neutral archive [VNA] or teleradiology platform
Appended reports Report has been modified subsequent to being finalised and new content has been added, but existing content hasn't changed. The narrative content should include who added this content, and when new content was added.	OBX field 5 of ORU message – observation value (text – length up to 65,536 characters)	DICOM SR object
Failsafe alert within a report	OBX: 8 A – abnormal flag (either null or A when there is an alert)	0010,2000 – MedicalAlert
Intended reporter This may be a radiologist or a group of radiologists to whom the exam has been allocated for reporting.	OBR: 32.2 in HL7 ORM message <i>(NB. OBR: 32 in HL7 ORU will contain the actual reporter of the study.)</i>	

Coding of the HL7 data items should use NHS data dictionary:

1. GMC number:
www.gmc-uk.org/doctors/register/LRMP.asp
 2. HCPC:
www.hpc-uk.org/check
 3. NMC number:
www.nmc.org.uk/registration/search-the-register
 4. Job role of staff:
www.datadictionary.nhs.uk/data_dictionary/attributes/j/job_role_code_de.asp
 5. Main specialty of referrer/reporter:
www.datadictionary.nhs.uk/data_dictionary/attributes/m/main_specialty_code_de.asp
 6. Employing institution of referrer/reporter (NHS trust or GP practice) ODS code:
www.datadictionary.nhs.uk/data_dictionary/attributes/o/org/organisation_code_de.asp
 7. Hospital site where image acquisition took place:
[www.datadictionary.nhs.uk/data_dictionary/data_field_notes/s/site/site_code_\(of_treatment\)_de.asp](http://www.datadictionary.nhs.uk/data_dictionary/data_field_notes/s/site/site_code_(of_treatment)_de.asp)
 8. National exam codes and descriptions:
www.datadictionary.nhs.uk/data_dictionary/messages/clinical_data_sets/data_sets/diagnostic_imaging_data_set_fr.asp
 9. NHS diagnostic imaging dataset patient source setting type:
www.datadictionary.nhs.uk/data_dictionary/messages/clinical_data_sets/data_sets/diagnostic_imaging_data_set_fr.asp?shownav=1
-

Appendix B. Network teleradiology platform workflows

1. Shared reporting workflow on a teleradiology platform

If cross-site reporting is required – whether it be for collaborative night on-call or for sharing of expertise (see *Network teleradiology platform functions*), the step-by-step workflow for enabling reporting on a teleradiology platform is described below:

- a. It is assumed that all hospitals within the network will have Ordercomms implementation and will be capable of sending electronic requests by HL7 ORM message (scanned paper requests work-arounds are not discussed here).
 - b. If a decision is taken to send a particular exam to the NTP for reporting, the RIS data item – ‘intended reporter or assigned radiologist’ is changed by the radiographer to, for example, ‘Teleradiologist–Dr.Smith’ on the enterprise RIS.
 - c. The ‘assigned radiologist’ maybe an individual, a specialist group or general group. Prefixing the assigned radiologist (intended reporter) with teleradiologist (for example, Teleradiologist–Dr.Smith, Teleradiology–chest and so on) will trigger the outbound HL7 ORM from the RIS to the teleradiology platform.
 - d. The intended reporter is assigned by the radiographer in the RIS. It is transmitted in OBR: 32 of the HL7 ORM message.
 - e. When an exam is sent to a teleradiology platform for reporting, it is essential that it is removed from the enterprise RIS reporting worklist (to avoid double reporting both on enterprise RIS and teleradiology platform).
 - f. It is important that radiologists working on the teleradiologist platform are aware what will be coming for reporting. Hence, ‘intended reporter’ allocation and transmission via HL7 ORM should happen from very early in the workflow by RIS status (scheduled, arrived, started and completed). This is essential for teleradiology reporting success.
 - g. The HL7 message to the teleradiology platform should contain ALL the data items in the HL7 ORM message described in [Appendix A](#).
 - h. The arrival of the HL7 ORM message should trigger a DICOM C-FIND query with a matching key attribute of 0010,0020 – PatientID to the relevant enterprise PACS, to submit DICOM data items in [Appendix E](#) as responding DICOM attributes. This is essential so that the radiologist reporting on the teleradiology platform has a full and comprehensive local imaging history on the DICOM viewer.
 - i. The HL7 ORM message should also trigger a pre-fetch with DICOM C-GET of the relevant prior ‘same exam code’ in the procedure code sequence (0008,1032). This will ensure that there is automatic relevant prior display on the teleradiology platform during reporting.
 - j. The HL7 ORM message should also trigger wide area discovery of all the imaging studies performed in the network. This is essential so that the radiologist has a unified network-wide imaging history on the DICOM viewer of the teleradiology platform (see [Appendix C](#) for wide area discovery).
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- k. HL7 ORM status updates of the exam will enable network based teleradiologists to be aware when the patient has been scheduled, when they have arrived in the department, when the exam has started and when it has been completed.
 - l. During reporting, image display of the current study and relevant prior studies should be instant (within three seconds). Radiologists may wish to review other imaging studies (in addition to the ones previously transferred as part of DICOM C-MOVE). An *ad hoc* DICOM C-MOVE or WADO display must be available to display previous studies held in the enterprise PACS. When WADO is used for display, it is important that the display happens on the same viewer with side-by-side comparison with previous images (a separate viewer for display of priors is not acceptable).
 - m. All standard DICOM tools for image interrogation must be available to radiologists (for example, window, pan, zoom, measure, comparison, cross-link and so on) during reporting on the teleradiology platform.
 - n. Reporting worklists: Radiologists must be able to filter, sort and prioritise their reporting worklists using the following data items on the teleradiology platform:
 - Urgency – (urgent, 2 week wait and routine) – sent in OBR: 27.6 or ORC: 7.6
 - Referring clinician (surname) – sent in ORC: 12.2
 - Referring specialty – sent in ORC: 12.7
 - Patient location type (A&E, inpatient, outpatient and GP) – sent in ORC: 13.6
 - Date of request – sent in ORC: 9
 - Date and time of exam completion – sent in ORC: 7.4 or OBR: 27.4
 - National exam description – sent in OBR: 4
 - Modality – sent in OBR: 24
 - Intended reporter (or assigned radiologist) – sent in OBR: 32 (to allow for both pooled allocation and individual allocation for reporting by radiographer/departmental agreements)
 - Referring institution (where exam was acquired) – sent in PV1: 3.
 - o. Work allocation or assignment: It will be down to network teams to decide how to allocate work for reporting. Options are:
 - Radiologist self allocation
 - Allocation by administrative staff
 - Automatic allocation by a computer application.
-

Data items for filtering and sorting as outlined in reporting worklists (above) are essential to facilitate work assignment – whether automated or manual.

- p. It must be possible to change the ‘intended reporter’ within the teleradiology platform solution at any time, so as to assign the work to another radiologist when required.
- q. Reports created within a teleradiology platform must be transmitted back to the local institution from which the HL7 ORM message was initiated, via an HL7 ORU message (See [Appendix F](#) for report types and report content). The HL7 ORU message must contain all the data items identified in [Appendix A](#). Usually the HL7 ORU message will be sent to the enterprise HL7 integration engine for onward distribution to all relevant IT systems (EPR, RIS, PACS, Ordercomms and so on) which receive and store radiology reports. (See [Appendix F](#) for radiology report status and data content.)
- r. Once the report is complete and authorised (using voice recognition [VR] technology), the next exam on the reporting worklist should open for reporting automatically.
- s. Teleradiology platform technology should support VR, digital dictation, typing and structured reports as methods of report generation.
- t. Teleradiology platforms must ensure that exams can be ‘locked’ if they are taken up by a radiologist for reporting. This will ensure that double reporting of the same exam does not take place within the teleradiology platform.
- u. Radiographer notes and comments must be available to a reporting radiologist (sent in NTE: 3 of HL7 ORM message).
- v. The clinical history must be available to the reporting radiologist on the same screen as the dictation screen.
- w. Radiologists should be able to generate addendums on previously reported exams. They may become aware of more clinical information following discussions with clinicians and they should be allowed to easily add an addendum to a reported study.

2. MDT meeting workflow on a network teleradiology platform

A radiologist may be required to review images from multiple hospitals within a cancer network during a network-wide MDT meeting. The step-by-step workflow is as follows:

- a. MDT co-ordinators would create MDT meeting worklists, detailing patients that need to be discussed using cancer/non-cancer databases such as the Somerset Cancer Registry, Infoflex etc.
 - MDT meeting lists should be identified by the name of the MDT meeting (for example, chest, urology and so on) and date for discussion.
 - Each patient to be discussed should be identified by the local PAS ID and National ID (for example, NHS number).
 - The unique accession number should identify each exam for MDT discussion.

- b. Each hospital should be able to push images for discussion to the teleradiology platform using DICOM push from their local PACS.
- c. The teleradiology platform should be able to use ODBC query-to-query and download MDT meeting worklists from the MDT meeting database (list of exams to be discussed with patient ID and accession number). In the absence of ODBC query support, radiologists should be able to manually create MDT meeting lists of studies on the teleradiology platform one by one, based on images sent via DICOM push.
- d. Radiologists must be able to save pre-prepared screen layouts, including: layouts simultaneously displaying exams from multiple different imaging modalities and stacks of images arrested temporarily at a particular slice.
- e. Radiologists should be able to create addenda on the teleradiology platform after an MDT meeting while leaving the original report unchanged.
- f. Appended reports are reports containing both the original report with unchanged old content and an addendum report with new content that has been added by the MDT meeting radiologist. These should be transmitted back via the HL7 ORU message to the local institution (where the imaging study was originally generated) for onward distribution to all relevant IT systems.

3. Image review workflow on a network teleradiology platform

Stroke physicians and neurosurgeons often cover multiple hospitals when on-call. They need to be able to review images from multiple institutions on a single viewing platform. The step-by-step workflow using teleradiology platform technology is as follows:

- a. A local A&E junior doctor wishes a patient's imaging study/ies to be reviewed by a regional stroke physician 'on-call'.
- b. The junior doctor uses DICOM push to send the imaging studies (and reports, which are stored in DICOM format [DICOM SR]) from the enterprise PACS to the NTP.
- c. The arrival of the imaging study should also trigger a pre-fetch of the PACS database with DICOM C-FIND query for all exams for that patient within the local PACS database.
- d. The arrival of the imaging study should also trigger a pre-fetch with DICOM C-GET of the relevant prior 'same exam code' in the procedure code sequence (0008,1032).
- e. The stroke physician should be able to perform a DICOM C-MOVE or WADO display of any other imaging studies that they may require (for example, magnetic resonance imaging [MRI] head and so on) which are visible to them from the C-FIND results.
- f. The arrival of the imaging study should also trigger wide area discovery of all the imaging studies performed in the network. This is essential so that the stroke physician has a full and comprehensive imaging history on the DICOM viewer of the teleradiology platform (see [Appendix C](#) for wide area discovery).
- g. The stroke physician should be able to review all of the images and reports for all the studies sent to them during the on-call period on a single teleradiology platform, irrespective of the hospital of origin of the images.

4. Trainee supervision workflow on a network teleradiology platform

If trainees are required to report on a teleradiology platform, it is really important that the need for proper supervision is met. The requisite step-by-step workflow is outlined below:

- a. Trainees access their reporting worklist on the teleradiology platform. Exams will be allocated to the trainee as the intended reporter/assigned radiologist. The trainee creates a radiology report. This may be a registered report (R) or a provisional report (P) (see [Appendix F](#) for definitions) (Provisional reports will be created by the more experienced trainee who can send out reports in the night for clinicians to read on their PACS/EPR.)
- b. Provisional reports must start with a sentence which states – *‘Beware: This is a provisional report and will soon be replaced by the finalised report, which may differ in content.’*
- c. The trainee must be able to allocate an intended supervisor (which may be a named radiologist or a group of radiologists).
- d. It should be possible to change the intended supervisor if required, at anytime in the workflow.
- e. The supervising radiologist must have access to a supervisor worklist of all exams allocated to them for supervision.
- f. The supervising radiologist should be able to edit the exams using VR or by typing. The trainee should be able to finalise the report, which is then sent out via HL7 ORU OBR: 25 with the report status of ‘final’.
- g. The trainee should be designated as the primary reporter in OBR: 32 and supervising radiologist in OBR: 33.
- h. All changes made to the trainee’s report by the supervisor should be stored within teleradiology platform with tracked changes (in the same way as standard word processing software).
- i. A trainee review worklist should provide the trainee with all the exams they have had corrected by a supervising radiologist, displaying for the trainee the tracked change version of the now verified report. Thus the trainee should be able to review the corrections made by the supervisor with ease. This will facilitate learning and professional development. Reports should be automatically removed from the supervisor worklist once the review is completed.
- j. There should be a facility for feedback via personal messaging, for example, a supervisor may wish to send a personal feedback message to a trainee with comments. Comments should only be stored on the teleradiology platform and only be visible to the specific trainee and supervisor.
- k. Workload figures for radiologists must include both the primary reporter and the secondary reporter (supervisor) and distinguish the two.

Appendix C. Wide area discovery of images and reports

A unified patient history (often referred to as a 'timeline' of radiology studies by PACS vendors) across the clinical network, visible on the enterprise PACS or teleradiology platform, requires a [wide area discovery of images and reports](#) within the network.

Options for this have been debated with industry and standards experts; there is no single right solution. Clinical networks will need to approach vendors that are offering network solutions and ask them to define their approach. Whichever solution is chosen, it is important that any system for distribution, caching and duplication of images and other content follows a well-defined life cycle management process, so that there is always only a single permanent master source location for each study which is clearly understood. Some of the options for a unified patient history are discussed below.

- 1. On-the-fly DICOM federated query and discovery:** With this solution, every enterprise DICOM viewer (PACS) will perform a real-time query and discover a list of imaging studies and reports that lie in all the other DICOM databases (PACS or VNA) within all other NHS trusts within the network to create a 'timeline'.

Vendor-neutral federated DICOM query requirements:

- All DICOM implementations in the NHS (PACS or VNA) must be able to respond to a DICOM C-FIND SCU query with the 'matching key attribute' of NHS number in England and Wales, community health index (CHI) number in Scotland or health and care (H&C) number in Northern Ireland in the PatientID DICOM tag 0010,0020 within the OtherPatientIDSequence (0010,1002).
- All PACS, VNA and teleradiology vendors must be able to initiate a DICOM C-FIND using PatientID DICOM tag 0010,0020 within the OtherPatientIDSequence (0010,1002) with a 'matching key attribute' of NHS number in England and Wales, CHI number in Scotland or H&C number in Northern Ireland.
- All PACS and VNA vendors must respond to the DICOM C-FIND query with the responding key DICOM attributes identified in [Appendix E](#). (These attributes are important clinical data items to form a comprehensive image history of patients on the DICOM viewer.)
- All PACS and VNA vendors in the network must communicate radiology reports as basic DICOM SR objects as part of the DICOM query/retrieve or WADO request for the study.

Many vendors have been concerned about whether [on-the-fly](#) DICOM federated queries to multiple DICOM databases may be limited by network speeds, and could thereby compromise the performance of the enterprise PACS.

- 2. DICOM based vendor-neutral index (VNI):** Many vendors have suggested use of a regional DICOM index with multiple patient IDs stored and mapped within the VNI database. Any vendor's PACS could interrogate the VNI. The teleradiology platform could also interrogate the VNI. The DICOM index would contain all the DICOM header information as described in [Appendix A](#).
- The VNI would be populated by real-time HL7 ORM and ORU messages from all the enterprise RIS within the network (and also DICOM header data from the PACS via DICOM C-STORE).
 - The VNI must convert the HL7 ORU message into DICOM SR to support any DICOM C-GET or WADO query for reports.
 - Historical data would be populated by a DICOM C-FIND query from all the enterprise PACS.
 - Demographics would be kept up to date by all the enterprise PAS within the network by real-time ADT demographics feeds (A08 and A40 messages).
 - The VNI must be able respond to a DICOM C-FIND SCU query with the 'matching key attribute' of NHS number in England and Wales, CHI number in Scotland and H&C number in Northern Ireland in the PatientID DICOM tag 0010,0020 within the OtherPatientIDSequence (0010,1002).
 - The VNI must respond to the DICOM C-FIND query with the responding key DICOM attributes identified in [Appendix E](#). (These attributes are important clinical data items necessary to form a comprehensive image history of patients.) This would allow all regional PACS and the network teleradiology solution to query the VNI.
 - If the user wished to review specific imaging studies and reports, the VNI would need to forward the WADO (or DICOM C-GET) request for display to the respective institutional PACS or to the existing regional VNA containing the imaging studies within the network (some regional collaboratives have already invested in a VNA).

Many vendors are already providing a proprietary regional index which is locked to their own DICOM viewer solution. The RCR promotes the concept of vendor-neutral index solutions as part of network sharing solutions.

- 3. Cross-enterprise document sharing (XDS) standards based sharing:** Some vendors and experts have suggested the use of XDS as the vendor-neutral standard for sharing of images and reports along with all types of clinical images and documents within the NHS. However, this requires all enterprise PACS and the teleradiology platform to be XDS consumers, and every trust would need an XDS registry, XDS repository, a cross-community access (XCA) gateway, an audit trail and node authentication (ATNA) and a patient identity cross reference (PIX) manager. Over the next few years we should see greater adoption of XDS within NHS.

Appendix D. Data items for business intelligence

Cross-charging between trusts is essential for clinical networks to be a success. Cross-charging will ensure that individual trusts can continue to implement their individual business plans for radiologist recruitment requirements, that is, how many radiologists they need to employ to meet their demands for reporting, intervention, radiological procedures and MDT meetings, at enterprise level.

Networks must agree [reporting tariffs](#). Tariffs would be linked within the NTP database to:

- National exam code,
- Day of the week/time (apply out-of-hours uplift).

The teleradiology platform software must have business intelligence to analyse which trusts sent exams for reporting, and also which trust's radiologists reported the exams.

The trust that uploaded the images for reporting will get two invoices:

- a. The teleradiology platform provider will send a monthly invoice to the trust that uploaded the exams: $n \times \text{modality type} \times \text{network-agreed rate for technology}$
- b. The reporting trust will also send a monthly invoice to the trust that uploaded the exams: $n \times \text{modality type} \times \text{network-agreed rate for reporting (based on time of day and week)}$.

Tariff agreements would allow trusts to make a decision about the cost and quality of NHS insourced network reporting versus private outsourced teleradiology reporting.

1. Data items required for billing and cross-charging will include:
 - Referring institution – trust where the images acquired (sent in PV1: 3.4)
 - Reporting institution – employing institution of reporting radiologist (sent out in OBR: 32.9)
 - Tariffs for exam reports will need to be agreed based on national exam code, exam priority (urgent, 2WW and routine) and time of day report issued (night-time reporting will cost more than daytime).
2. Radiologist workload figures on the teleradiology platform:

Radiologists must be able to extract information about their workload for a date range both as a primary reporter and supervising radiologist, including details of the:

 - Exam code
 - Modality
 - Referring specialty
 - Location type – (A&E, inpatient, outpatient and GP)
 - Report type – primary or addendum
 - Reporter type – primary reporter or supervisor
 - Referring institution
 - Report date.

Appendix E. List of clinical data items displayed on DICOM image viewer

Items a–e are mandatory.

- a. Study date – 0008,0020
- b. Modality – 0008,0060
- c. Study description (NICIP code description) – 0008,1030
- d. Accession number – 0008,0050
- e. Institution where images were acquired – >0008,0082
InstitutionCodeIdentificationSequence from physician of record identification sequence
- f. Referring physician name (Name) – 0008,0090
- g. Requesting service (NHS main specialty of referrer) – 0032,1034
- h. Reason for cancellation – 0074,1238
- i. Number of study related instances (total number of images in the study) – 0020,1208
- j. Name of physicians reading study – 0008,1060
- k. Scheduled procedure status ID – 0040,0020

Appendix F. HL7 report status definitions

HL7 report status definitions must be understood by all suppliers for network based reporting and supervision to work appropriately. Report status is transmitted in OBR: 25 (result status).

- 1. Registered (R):** Status transmitted as '(R) registered'. However, narrative report content is not transmitted by HL7 ORU message. These may be unauthorised reports (following transcription) or trainee reports (awaiting supervision). Hence, the report is not visible to the requester/other clinicians, but they are made aware that a report exists in the RIS or teleradiology platform.
 - 2. Provisional/interim/preliminary (P):** Provisional report content sent out via HL7 ORU. (The report is visible to the requester/other clinicians.) This is subsequently replaced by the final report. User-level permission will decide whether a trainee can issue provisional reports or not. When a provisional report is sent out it must be prefixed with the following sentence – *'Beware: This is a provisional report and will soon be replaced by the finalised report, which may differ in content.'*
 - 3. Final report (F):** Final or authorised report.
 - 4. Corrected report (C):** Report content is corrected after a final status but no additional content is added (if a grammatical or spelling mistake is made, it allows a report to be corrected/edited with tracked changes kept in the report creator system for audit trail purposes). It should only be possible for the radiologist who created the original content of the report to edit/correct the report. When a report is corrected then it should be prefixed by the following sentence – *'Please note this report has been edited after the initial report was issued on [date].'*
-

5. **Appended report (B):** Additional report content, possibly from another radiologist, is added but the original report content is left unchanged. When additional content is added the report should be prefixed with *'Please note that additional content has been by added by Dr [...] on [date]. The original report/s is/are unchanged.'*
6. **Deleted report (D):** If a report has been issued in error, then it should be deleted and content removed from the receiving systems. Audit trails in the report creator system must show the report that was issued and also who deleted the report and when.

HL7 fields for reporters

OBR: 32 – should contain the GMC number, name, job role, specialty and employing institution of the primary reporter or trainee radiologist.

OBR: 33 – should contain the GMC number, name, job role, specialty and employing institution of the supervising radiologist.

Radiology report content

Whether a paper print out or an electronic radiology report is communicated via the HL7 ORU method, it should contain the following data items. For the HL7 fields see [Appendix A](#).

1. Patient demographics
 - a. Name
 - b. DOB
 - c. Sex
 - d. Address
 - e. PAS number
 - f. NHS number
2. Patient location at request
 - a. Location description: ward name and so on
 - b. Location type: A&E, inpatient, outpatient or GP
3. Requesting responsible consultant/GP
 - a. ID – GMC number
 - b. Name
 - c. Job role (as defined by the NHS data dictionary*)
 - d. Main specialty (as defined by the NHS data dictionary**)
 - e. Employing institution (as defined by the NHS data dictionary***)
4. Unique numbers
 - a. Accession number – unique scheduling number issued by RIS
 - b. Order number – unique number issued by Ordercomms/electronic requesting system (RIS for paper requests)

5. Reporter (primary +/- secondary)
 - a. ID – GMC number
 - b. Name
 - c. Job role of reporter (as defined by the NHS data dictionary*)
 - d. Main specialty (as defined by the NHS data dictionary**)
 - e. Employing institution (as defined by the NHS data dictionary***)
6. Exam completed – date/time (when image acquisition was completed)
7. Exam room and institution (which owns the machine where the image acquisition took place). (Mobile scanners should be identified.)
8. Date and time of primary report authorisation
9. Additional dates for corrections and report addenda, if issued, should also be included within the narrative text of the report.
10. Priority: urgent, 2 week wait, routine
11. Patient category: NHS, private, category II (medicolegal)
12. Modality – computed radiography (CR), computed tomography (CT), MRI and so on
13. Exam description – using national exam codes and description
14. Where/to whom, copies of reports were sent (if reports need to be sent to someone other than referrer)
15. Report type
 - a. Primary final report
 - b. Appended report (additional information is added but previous information is unchanged)
 - c. Corrected report (report content is changed)
16. Failsafe alert
 - a. No alert
 - b. Alert present
17. Narrative report text
 - a. **Primary report:** This should contain the narrative clinical content of the report.
 - b. **Corrected report:** When the report content is corrected, then the date and time of change, and person who edited the report should be included in the report text along with the clinical content.
 - c. **Appended report:** When the report content is added to the original report, then the date and time of change, and person who edited the report should be included in the report text along with the clinical content.

*http://www.datadictionary.nhs.uk/data_dictionary/attributes/j/job_role_code_de.asp

**http://www.datadictionary.nhs.uk/data_dictionary/attributes/m/main_specialty_code_de.asp

***http://www.datadictionary.nhs.uk/data_dictionary/attributes/o/org/organisation_code_de.asp





The Royal College of Radiologists

The Royal College of Radiologists
63 Lincoln's Inn Fields
London WC2A 3JW

+44 (0)20 7405 1282

enquiries@rcr.ac.uk

www.rcr.ac.uk

[@RCRadiologists](https://twitter.com/RCRadiologists)

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