In 2013 the PACS contracts come to an end. It is a time to reflect on the PACS & the EPR divide in NHS.
National programme of IT promised England a centrally procured electronic patient record.
However, today we have a PACS (a digital record for radiology images) & PPR (Paper patient record)
Let us look at the history of PACS & see how it has evolved and why is it so successful. 10-15 years ago in the absence of DICOM standard, each modality vendor used proprietary image formats
* thus we had a CT MiniPACS, MR MINIPACS, CR MiniPACS etc
These proprietary formats resulted in a fragmented digital image record.
Hence we printed to film to produce an integrated film record.
Due to wide-spread adoption of DICOM as the open standard for radiology images, we saw emergence of an integrated digital radiology image record—
* popularly called PACS.
PACS has been successful in providing Radiology images & reports at anytime & anyplace within an organization.
However, PACS has failed us today due to poor document display. No request cards displayed. Inability to view other documents like clinic letters, lab-results, prescription etc.
Let us look at the bigger picture. A secondary care hospital with multiple departmental systems. In the past, despite having digital systems we continued to print to paper & films due to lack of standards.
Today due to adoption of open DICOM standards we have an integrated digital record for radiology images popularly called PACS.

But we continue to print to paper for the rest of the patients clinical record. So today we have PACS & PPR.
However, Today PACS is producing a radiology data silo as it is separate from the rest of the clinical record.
The success of today’s PACS
* due to the widely adopted Medical Image Standard of DICOM
The globally emerging standard for medical documents is CDA of HL7
The globally emerging EPR standard is XDS/XDS-I bringing together images & documents.

* Your next generation PACS vendor MUST be able to incorporate Radiology images with EPR by adopting XDS-I
In the future with adoption of XDS & XDS-I we will see emergence of EPRs & incorporation of radiology images into a patient centric EPR. Dell Healthcare will describe this further.
The National Programme of IT PACS success
* was due to connect all strategy for modalities
* using DICOM
Whereas the EPR strategy was a RIP & replace strategy of departmental systems with single monolithic EPR systems

* TODAY we continue to print to paper due to lack of standards adoption
I hope that in the future NHS EPR projects will learn the lessons from the success of PACS, & we will connect departmental systems *using the global emerging EPR standard of XDS & XDS-I to create an XDS based EPR.*

Here---I would like to draw an analogy with the private healthcare system in America that each of these departments in NHS would be private enterprises in America—hence the name CROSS enterprise document sharing.
In the future we should see the emergence of XDS based EPR using the ethos of the PACS success.
There is something else we can learn from PACS & DICOM standard. Today transport of radiology images from 1 NHS Trust to another is electronic –

* Using global standard of DICOM Push
However transfer of documents still is based on paper & post
* Due to lack of standards adoption for doc
Globally emerging clinical document standard is HL7 CDA. It has both machine & human readable content.

* Request card & Radiology reports are clinical document in use in radiology.
XDR is a standard for a web-based point to point transfer of clinical documents.
XDR could be used to transfer of radiology requests from GPs to NHS Trusts
& also transfer of radiology reports to GP systems
* XDR CDA combination are similar to DICOM Push
Future is about vendor neutral plug & play interoperability using global standards.
In future, GP systems will transfer requests cards to hospital Ordercomms.
* using global standards of XDR & CDA
In future, RIS will transfer radiology reports to GP systems
* using global standards of XDR & CDA
Let us go back to our EPR discussions, Hospital IT Systems have 4 Layers Image & document creators—departmental systems like RISes, modalities etc Image & document displays---EPRs, PACS XDS Registries & DICOM Directories & Storage layer
15 years ago with no standards—each vendor tied you down to all 4 layers.

* We all remember the fragmented miniPACS systems.
Today due to DICOM standard we have a choice of a modalities.

The PACS vendor cannot dictate what CT scanner/MRI scanner or ultrasound machine we have to buy.
Adoption of XDS will offer the user community more choice of best of breed vendors for
Modality
Registry
Storage
Display
Dr. Hussain from Dell Healthcare will shed more light on this issue.
Due to a fragmented digital clinical record due to lack of document standard

* we have had a integrated paper record
Adoption of XDS gives an opportunity to create an Electronic Patient record from the very departmental systems that currently exist.
This slides provides a graphical view of an XDS based EPR. Suppliers like Forcare, GE etc already have XDS displays available off the shelf.
Let us go back to our 4 layers.  
Our Clinical user is only interested in display layer  
Display should be within 3-5 secs  
There should be appropriate manipulation tools  
And should provide the user a comprehensive clinical information to support clinical decisions
They would like the best of breed display with 3D, PET-CT fusion etc. XDS adoption will allow clinical users to display all clinical documents and images on the departmental systems.
Due to data held in multiple IT systems in hospitals, IT departments are facing a digital data tsunami.
Ability to consolidate storage will save costs, provide simpler demographic updates & allow secondary care trusts to replace outdated departmental systems with ease (in the same way as we replace our radiology modalities.
IT departments would like to choose the best of breed when it comes to storage. They will need to look at emerging storage technologies like storage virtualization, cloud storage etc.
Today due to DICOM, radiographers who are main users of modalities have a choice of the modalities. In future with adoption of XDS, we will see a choice of display for clinical users & choice of storage for IT departments.
XDS standard adoption would provide a local patient centric EPR view, *without the need to replace your existing functionally rich departmental systems.*
XCA which is an extension of XDS standard which will allow for regional or cancer-network/national patient centric view.
Let us look at the workflow of radiologists in the future. With implementation of Single sign on—a radiologist is able to log on to 4 IT systems RIS, PACS, Ordercomms & EPR with a single windows log-in & password (rather than 4 log-in & passwords)
Let us look at the workflow of radiologists in the future. With implementation of Single sign on—a radiologist is able to log on to 4 IT systems RIS, PACS, Ordercomms & EPR with a single windows log-in & password (rather than 4 log-in & passwords)
She is able to draw up an electronic worklist of requests that need vetting.
Joe Bloggs has a CT chest requested.

* With automatic context synchronization between RIS, PACs & Ordercomms, a radiologist is able to view the imaging history for the patient on PACS.
She wishes to view Chest x-ray image & report on PACS. This shows progressive massive fibrosis.
As the PACS is an XDS consumer, she is now able with 1 mouse click, to review the latest chest clinic letter on the XDS based EPR. Ronan Kirby from Siemens will elaborate on this further.
Any IT system which is XDS consumer will have access to images & reports registered to an XDS registry which means an XDS consumer will have access to EPR. Dirco Van Norden will show us the advantages of RIS being an XDS consumer.
Moving on to Reporting. Radiologist draws up a reporting worklist on RIS.
With automatic context synchronization current Chest xray appears on middle monitor on PACS. Previous CXR appears on the right PACS monitor due to automatic display of relevant prior.
In this case CT suggests acute pancreatitis. As the PACS is XDS Consumer, radiologist has access to blood results on PACS display. Siemens & Rogan Delft will emphasize the importance of XDS consumer in their talks today.
By reviewing blood amylase levels, a confident diagnosis of acute pancreatitis can be made—thus improving patient care.
Easy access to more clinical information on EPR will certainly improve patient care & safety by increasing diagnostic confidence.
Today a reporting radiologist has access to local imaging history.
In future she will have access to national imaging history if required through XDS/XCA model.
Let us look at a results acknowledgement workflow. Consultant Orthopaedic surgeon draws up a worklist of radiology reports that he needs to read & acknowledge.
As the results acknowledgement system is an XDS consumer, the doctor is able to view images or documents related to that patient on the same system.
Prior to filing away a result, he wishes to review the patient’s blood results. With 1 mouse click he has access to blood results, as the results acknowledgement system is XDS consumer complaint.
Here the breast screening PACS is also able to display all clinical images & documents registered on the XDS registry as this is XDS consumer compliant.
Similarly a Cardiology PACS is able to display all EPR related images & documents as it is XDS consumer compliant.
Similarly a Ophthalmology PACS is able to display all EPR related images & documents as it is XDS consumer compliant.
Similarly a Clinic Management System is able to display all EPR related images & documents by simply becoming a XDS consumer compliant.
Similarly a Critical Care System is able to display all EPR related images & documents by simply becoming a XDS consumer compliant.
We need to move from the 2002 NPFTT Rip & Replace strategy for EPR to a modular connect all strategy using the global standard of XDS.
In 2013 we will have a choice whether we are ready for the technological advances and to bridge the gap with EPR. We will hear from Siemens, Rogan Delft & Dell Healthcare about XDS/XDS-I as the emerging global standard for EPR. I have requested & reminded all vendors to keep their presentations educational and not a sales pitch about their product or their company portfolio. I do hope that they will respect the philosophy of the group.
Any questions.