PARCA Certified PACS System Analyst (CPSA) Requirements

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This document contains the detailed requirements for the certification of a CPSA or Certified PACS System Analyst. The requirements for the Systems Analyst focus on general understanding of the PACS components. Achieving the PARCA CPAS or Certified PACS Associate certification is a requirement for this certification. There is a strong emphasis on understanding the clinical and workflow aspects of the System Administration functions.

1. PACS overview

1.1 PACS architecture and components: PACS has several components, i.e. acquisition devices, with or without a preview monitor and/or QA station, archiving, and display/print as well as output media such as CD burners. Images flow a certain way in this system. – Know how to distinguish the different PACS components.

1.2 Architecture: PACS systems can use a thin or thick client to connect their work stations. – Know how to distinguish between both architectures and the cons and pros of each one.

1.3 Acquisition rate and typical data generation: In order to size a PACS system infrastructure as well as databases and archiving capacity, one has to calculate the data generation and retrieval rate. – Know how to develop a spreadsheet with the data rate generation, do a forecast of the required data storage capacity and infrastructure.

1.4 Communication: The image communication is done over a dedicated or shared network. Dedicated lines to offices and/or other facilities could be used using VPN's over DSL. Proper sizing and support are critical. – Know how to size network capacity and recognize the need for proper support.

2. PACS components, acquisition and viewing

2.1 Image Acquisition: Digital modalities such as CT, MR, US, RF, and NM typically connect directly to the PACS system. Digital X-ray systems (CR/DR), film digitizers, frame grabbers and interface boxes also serve as data generators. – Know differences between various acquisition devices and typical applications.

2.2 CR/DR: CR and DR are two different techniques for acquiring X-rays, with DR having various technologies. – Know difference between CR and DR technology, the different DR technologies, and the difference between the film and digital technology response (digital being linear).

2.3 Image viewing general: Viewing stations can be categorized depending on their category (diagnostic, review), application (specialty, general), usage (hospital, web-based) and require often specialized video boards. – Know the characteristics of each type, category and application.

2.4 Workstation requirements: Workstations can be characterized by several parameters, including performance, user-friendliness, image quality, security provision,

architecture, display technology used, and level of integration. – Know to specify parameters for each of these characteristics.

2.5 Viewing functionality: The viewing functionality can be divided in several groups, i.e. Image and Information Management, basic display features, image manipulation, metrics, advanced features and modality/application specific features. – Be able to differentiate between these features and list the most critical features in these categories.

3. PACS components, image archiving

3.1 Archiving components: A PACS archive has several components, i.e. image manager, image store/archive, workflow manager, and system administration features. – Know how to distinguish between the different components and the function of each one of these.

3.2 Storage technology: Archives typically use either DAS, NAS, or SAN technology, while the disks themselves are mostly RAID's. MOD, DVD or Tape libraries could be used for secondary or tertiary storage or back-up. – Know how a RAID-5 works, and the difference and characteristics between SAN, NAS and DAS. Also be able to compare cost/ benefit and performance of MOD, DVD and tape vs. RAID.

3.3 Exchange media: CD's are often used to exchange patient information to be given to a patient or sent to a physician. – Know typical applications for CD exchange media.

3.4 ASP services: Archiving could be outsourced either for storing the primary data or for back-up and/or data recovery purposes. – Know the advantages and disadvantages of ASP services.

3.5 DB integrity and maintenance: Databases require a certain integrity otherwise, it is "garbage-in garbage-out". In order to maintain integrity, most databases provide a "holding area" where improperly identified images as well as images that contain conflicts with information already stored are kept to be rectified by an administrator. – Know of the most common database integrity problems.

4. Integration

4.1 Different levels of integration: Applications can be integrated in different manners, tight or loose, using different type of protocols such as DICOM, HL7, IHE, or CCOW. – Know how to distinguish a certain level of integration and the advantages and disadvantages of a certain level.

4.2 Modality Integration: A modality is integrated with both the RIS and PACS. – Know the mechanism used for integration and the most common issues with this integration.

4.3 HIS/RIS/PACS integration: The HIS communicates the admission, demographic and order information with the RIS , the RIS communicates demographic and order information with the PACS, while the results are being exchanged between the PACS and the RIS. – Know how to distinguish the different interfaces, the importance of the actor definition by IHE and to avoid overlap and/or gaps between the HIS/RIS/PACS.

4.4 Report Integration and Speech Recognition: For report integration it is critical to determine how speech recognition is integrated with the RIS and workstation, whether the work list is RIS or PACS "driven" and the whether one operates in real-time, batch mode. In addition, one should determine the continuing role of the transcriptionist, i.e. whether they are still involved. – Know different methods for integrating speech recognition, and different methods for operating speech.

4.5 Electronic Health Record: The Electronic Health record is critical for exchanging information within the enterprise. The EHR standard defines – Know difference between CPR, EMR, and EHR. Know at least 6 of the 8 eight core functionalities and the three domains defined by the EHR standard.

4.6 IHE: Integration the Healthcare Enterprise is a definition of actors, transactions, and subsequent profiles. – Know the basic functionality and purpose for the most critical radiology IHE profiles.

5. Workflow

5.1 Workflow analysis: A workflow study is critical, before, and after PACS implementation. Workflow consists of the activities and interaction between people and devices. Workflow optimization is key to achieving higher efficiency. – Know why and when a workflow analysis is critical.

5.2 Workflow tools: Several tools can be used to perform a workflow study such as pictorial charts, flow charts, diagrams, time/motion studies, etc. – Know the advantages and disadvantages of each and when to use each workflow assessment tool.

5.3 Workflow issues: There are several common bottlenecks in the workflow, for example, the absence of a radiology order, absence of previous images for comparison, unscheduled patients, where to perform the QA and by who, changing procedures, etc. – Know the most common workflow issues and how to potentially deal with these.

5.4 CR/DR workflow: The most dramatic changes from a technologist perspective is the introduction of CR/DR. Compared with the film based workflow, there are additional steps, some of which will be eliminated. – Know the basic CR/DR workflow and major differences between them and film.

5.5 Workflow exercise: Workflow mapping is typically done by a PACS administrator and changes and discussions about workflow are often initiated by the SA. – Be able to perform a workflow study.

6. PACS system administration

6.1 Project management: Project management skills are required, including the use of project management software. In addition, planning, workflow mapping, post installation management and training can be considered part of this activity. – Know

how to use project management tools to determine the list of tasks, their dependencies and the critical path and plan and schedule these activities.

6.2 System Maintenance: This includes the first line of support, managing configurations, participating in a management or oversight committee, performing and/or coordinating preventive maintenance, general system maintenance and acceptance testing. – Know how to organize a support infrastructure, and coordinate and manage configuration support.

6.3 Image and Information Management (IIM): Image quality, data integrity, QA, communication issues, off-line storage management are critical tasks to maintain the system integrity. – Know the importance and functions of the IIM tasks.

6.4 Continuity of care: A SA is not only responsible for the support but also the planning, anticipation and implications of computer / network systems failures. This includes downtime planning, testing the back-ups, determining and implementing fail-over capabilities and assessing the business impact & continuity of care. – Be able to assess and anticipate critical areas and downtime scenarios and implement solutions.

7. Outside radiology

7.1 Cardiology: Cardiology has specific requirements with regard to performance, storage, compression and the availability of special applications on the workstations. In addition, integrating with other instruments in the cath lab is essential as well as the resulting reporting such as procedure logs, hemodynamics, QVA, and QCA and the waveform data. – Know the specific requirements for integrating cardiology with radiology and the additional data that might have to be managed in conjunction with the images.

7.2 Radiation therapy: RT is not only a user for radiology imaging, but also generates their own specific DICOM objects such as the RT Structure sets, plans, RT images, Dose and treatment records. – Know about the specific requirements of the RT department, the DICOM objects that could be generated and a typical workflow.

7.3 Nuclear Medicine: NM is special because it has dedicated NM processing stations, that often maintain their unprocessed, raw data, and, last but not least, has had a poor track record integrating due to poor implementations of the DICOM NM multiframe object which caused the IHE to specify a dedicated profile. – Know about the NM issues and to require IHE profile support for connections.

7.4 Other clinical specialties: Ophthalmology, endoscopy, pathology and other "-ologies" will need to be integrated with the PACS systems for availability to the physicians. – Know the specific DICOM SOP Classes to be supported for these specialties of the main issues that might be expected.

8. Security and patient privacy (HIPAA) requirements for PACS

8.1 HIPAA requirements for PACS: A PACS system deals with patient information and is therefore subject to the US federal HIPAA regulations. The HIPAA components

that are applicable are the Transactions and Codes, Identifiers, Privacy and Security sections. The privacy/security regulation defines PHI, and specifies "minimally necessary information which can be implemented by role-based access. – Know which standard is used for EDI, and some of the coding systems that are applicable, the PHI, BA, CE definition, impact of minimally necessary information availability, and TPO rule.

8.2 Implementation zones: From a device perspective, there is always a trade-off between the implementation of policies/procedures and appropriate technical means that complement the procedures. The specific implementations and trade-offs depends on the locations, i.e. the different zone in which the technical means are used. – Know to identify the different zones applicable to the HIPAA implementation.

8.3 Administrative safeguards: These safeguards cover the processes and procedures that have to be in place to meet HIPAA requirements. This includes a risk management process, with as important part the risk analysis. In addition, it covers assigned security responsibility, workforce security, information access management, security awareness and training, incident procedures and contingency plans. – Know the major sections of the HIPAA administrative safeguards.

8.4 Physical Safeguards: The physical safeguards deal with physical access to information, including facility access controls, workstation use and security as well as device and media controls. – Know the major sections of the physical safeguards.

8.5 Technical safeguards: These deal with the technical aspects, including the access control, audit controls, preserving the integrity of the information, authentication and transmission security. . – Know the major sections of the technical safeguards.

9. PACS implementation

9.1 The implementation process: PACS systems are implemented with proper planning in several phases, with a clear deliverable for each phase and identification of responsibility for that phase. – Know about the different phases of the PACS implementation and their function.

9.2 RFP components: A Request for Information (RFI) or Proposal (RFP) is used in most cases to allow one or more vendors to specify how the requirements of a specific institution could be met using the vendor's PACS system.- Be able to identify several components of the RFP.

9.3 Economic justification: Return on investment is critical for a PACS system, whether it is a financial return, better physician or patient satisfaction, or better outcomes from a healthcare perspective. There are several models that can be used to justify the purchase, i.e. the input, output, analytical decision and strategic decision model. – Know when to use what model and the characteristics of each one.

10. Miscellaneous

10.1 FDA approvals: All medical devices are subject to US regulations defined by the FDA. They are classified in different classes and require a PMA or 510(k) depending

on whether there is already a “substantial equivalent” device on the market. – Know the impact of the FDA approval process on medical devices and the classifications for PACS and PACS components.