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	Certified Healthcare Enterprise Architect (CHEA) Requirements		

This document contains the detailed requirements for the certification of a CHEA, or Certified Healthcare Enterprise Architect. These requirements focus on the image enabling component of the EMR and how to implement and support it. The certification assumes that candidates have at least 5 years of prior experience and/or knowledge in the healthcare clinical and IT domain. A requirement for taking this certification exam is that the candidate has a CPEMS and either a CPSA or CPIA certification. The CHEA certification specifically does NOT address any generic IT knowledge, including networking components, basic clinical and/or knowledge about healthcare standards such as basic DICOM, HL7 and IHE as this knowledge should be acquired through experience and/or other preceding certifications.

Learning objectives: The candidate will be able to function as part of an implementation team and/or manager to implement a Electronic Health Record system in a healthcare environment. He or she will be able to participate in the planning and scope definition process because the candidate will have a thorough understanding and knowledge of the architecture, the interfacing and use by the various users.

		Item:	**The candidate should be able to:**	**Keywords:**
1		**Image enabling the EHR**		
1.1		**Implementation of image enabling**		
	1	Imaging characteristics	Characterize the different image types and their parameters which determine resolution, size, and their management	matrix size, bit depth, spatial, contrast and temporal resolution
	2	Integration methods	Identify the seven different levels of integration and provide examples	API, RPC, SQL, url, IHE profile, CCOW
	3	Implementation	Explain the impact of thick and thin clients and the impact of launching different applications	Thin, thick clients, zero footprint, launching aps
	4	Image conversion	List the differences between the DICOM and any other display formats for both static and dynamic imaging and the advantages and disadvantages as well as diagnostic impact.	True DICOM formats, jpeg, mpeg, avi, thumbnail, key images
	5	Protocol	Select the appropriate protocol for each application	File transfer, DICOM protocol, streaming, wavelet
	6	Web Access to DICOM images	Give an example of a DICOM Web Access protocol and list its capabilities	WADO, XDS-I
	7	IHE Radiology	Identify the radiology profiles important for EHR	Workflow, Content, Presentation, Radiology Infrastructure

	8	Other IHE imaging domains	Identify the other profiles important for EHR	Anatomic pathology, Cardiology, Eyecare, Pharmacy, Oncology and Quality, Research and public health
1.2		**Radiology, Cardiology and Veterinary imaging**		
	1	X-ray modalities	List the differences between CR and DR, from an acquisition perspective and image and study size impact on an electronic record	CR, DR, RF, Angiography, digital mammography, CAD
	2	CT, MRI and Ultrasound	Identify the characteristics of CT, MRI and Ultrasound acquisition and the image and study size impact of these modalities on an electronic record	CT, CTA, MPR, volume rendering, Ultrasound and IVUS, IV-OCT, MRI
	3	Nuclear modalities	List the characteristics of the nuclear medicine modalities, including PET and SPECT from an acquisition perspective and image and study size impact on an electronic record	NM, SPECT, PET and fusion
	4	Cardiology	Identify all of the data structures that are generated by a cath lab and their impact on an electronic record	Cardiology, LVA, QVA, QCA, waveforms
	5	Veterinary imaging	List the additions to the DICOM standard to facilitate the identification and management of animal imaging	breed, species, owner, RFID and neutered status
1.3		**Pathology**		
	1	Pathology workflow	Identify the typical steps in pathology including acquisition and diagnosis	Workflow, visible light, slides, stains, microscopy
	2	Pathology Imaging	Differentiate between the different pathology imaging formats and how specimen identification is added to other imaging modalities	Secondary Capture, Visible Light, specimen identification, container
	3	Worklist and queries	Identify the relationship between he worklist and MPPS in the context of pathology imaging and how queries are used	Worklist, MPPS, Query
	4	Whole slide imaging and image size impact	Explain how whole slide imaging works and the impact of the large image sizes	Whole slide imaging, image sizes, header
	5	Image compression and color consistency	Identify what compression is used and how color consistency and presentation is preserved	Compression and presentation, ICC, color consistency
1.4		**Dentistry, ophthalmology, visible light**		
	1	Dental workflow	Identify the interactions between the different modalities and departments	Dentistry workflow, Practice Management System
	2	Dental imaging	Differentiate between the different dental imaging types and modalities, including their DICOM encoding	Intra-oral imaging, panorex, cephalic radiography, visible light, digitized film, cone beam CT
	3	Dental Image exchange	Distinguish between dental and other exchange media application profiles for dentistry	Media exchange
	4	Dental protocols and scheduling	Appreciate the specific hanging protocol requirements for dentistry and the potential issues regarding scheduling for modalities.	Dental hanging protocol, scheduling

	5	Ophthalmology imaging	Recognize and understand the various ophthalmic photography modalities and techniques	Ophthalmic photography, OCT, Fundus Imaging, Corneal Topography
	6	Other Visible Light imaging modalities	Explain how visible light modalities such as used for endoscopy, laparoscopy and other photographic applications including dermatology are interfaced	Endoscopy, single and multi-frame, surgery, dermatology, MPEG
1.5	**Radiation therapy**			
	1	RT workflow	Describe a high level workflow in a RT department and	RT workflow
	2	RT images and other objects	List the specific RT objects and their usage	RT Image, Structure set, Plan, Dose, Summary Records, Port films, ION therapy
	3	RT simulation	Explain how CT imaging is used to simulate treatments	Virtual simulation, DRR and portals
	4	Treatment planning	Distinguish the steps involved with treatment planning and the role of a worklist to schedule computing intensive activities off-site	Worklist, Treatment planning
	5	Use cases	List the steps for RT use cases for simple and complex cases	RT Use cases
2	**Implementation**			
2.1	**Implementation Strategy**			
	1	Planning	Determine the most effective planning strategy method	Basic, issue based, alignment, scenario, organic
	2	Strategy definition	Determine the strategy components and the pros and cons of the different acquisition strategies	best of breed, best fit, both or hybrid
	3	Migration	Determine the most effective migration strategy based on the clincial and operational needs	Amount of data on-line, migration type and strategies, monitoring
	4	Roll-out	Create a roll-out plan and turn-over strategy depending on resources, complexity and other constraints	Big bang, phased
	5	Build/buy	Trade-off the advantages and disadvantages of building certain components or buy them	Configurability, adaptability
	6	Open source	Select either proprietary, semi-open, or open source solutions based on their pros and cons	Pricing, support, interoperability
	7	Open vs proprietary	Distinguish between open and closed platforms as well as interfaces	Platform,Interfacing
	8	ASP	Determine whether it is preferable to outsource certain applications	ASP, SSP, in-house, SLA
2.2	**Managing the procurement process**			
	1	Procurement introduction	List the procurement process steps and distinguish between different purchasing	Procurement steps, group and exclusive purchasing
	2	Project management	List the steps necessary for a typical Healthcare IT project	Health care IT planning steps

		3	Project tools	Generate charts and use tools	Gantt charts, PERT charts, and critical path analysis
		4	Project risks	Anticipate common risks	Risks, show stoppers
		5	Quality improvement	Explain and apply the Quality Improvement techniques	QI philosophy, five "R"'s,
		6	Quality improvement process	List the typical steps to perform the analysis	Analysis steps: identify, analyze, develop, test and implement
		7	QI techniques	Use applicable techniques	Scatter diagrams, pareto charts, fishbone diagrams, flow charts
2.3	**Pre-RFP Purchasing process**				
		1	Readiness	Determine organizational readiness	Strategic management process and formulation, readiness factors
		2	Needs Analysis	Identify goals, scope, risks	root causes, scope, priorities
		3	Financial assessment	Determine Financial Viability and feasibility	ROI, NPV, costing models: output, input, analytical, strategic
		4	Project team	Identify project team	stakeholders
		5	Planning	Create Project timeline and plan	Tools, budget, resources, plans
		6	Workflow	Perform workflow analysis	Re-engineering, tools, steps, mixed environment
		7	Requirements	Develop compliance criteria	federal, state, organizational, FDA, HIPAA, safety, MQSA, joint commission
		8	RFP	Prepare & release of RFP, receive and analyze	Major RFP sections, scoring, criteria
2.4	**Post-RFP Purchasing process**				
		1	Vendor interaction	Manage and support the vendor negotiation process	Philosophy, commitments, partnership
		2	Site visits	Develop a site visit plan with appropriate actors and criteria	Organized and secret site visits, team assignments
		3	Contract award	Negotiate and document award criteria	Licensing models, guaranty, uptime warrantees, service agreements
		4	Site prep	Plan the site preparation	Physical, network infrastructure, ergonomics and workstation locations
		5	Configure equipment	Develop criteria based on site and configure accordingly	Tables, templates, codes, descriptions
		6	Procedures	Develop policies and procedures	Policies for governance, operations and maintenance/support
		7	Acceptance testing	Create a test environment, and develop an acceptance test plan with the appropriate criteria, referring to the RFP requirements	Acceptance criteria

		8	Training	Plan and perform the application training of super-users, users and in-house service	ISD and ADDIE model, learning styles, instructional methods
3		**Practical use, connectivity hands-on**			
3.1		**System interactions**			
		1	System overview	Describe a conceptual description of the main system components and be able to interpret the major interactions and transactions among these subsystems using pictorial charts and UML	EHR, RIS/LIS, CVIS, PACS, Interface engine, Acquisition modalities, CDA, DICOM, HL7, IHE
3.2		**EMR**			
		1	Using a EMR	Be able to enter patient information, basic stats, schedule procedures, add notes and observations	flow sheets, tabs
3.3		**RIS/PACS**			
		1	IS/PACS interaction	Interpret a typical admission and order message using log files and tools	HL7, ORM, ADT
3.4		**PACS/Modality**			
		1	Modality and IS/PACS interaction	Query a modality worklist and send exam results (images) while being able to interpret the log files and sniffer results	Verification, MWL query, Store
3.5		**EMR ancillaries**			
		1	Interfacing with additional EHR systems	Be able to interpret the exchange between a EHR and ancillary system such as a lab and/or PHR as well as the creation of exchange documents	HL7, CDA