ABII American Board of Imaging Informatics

Test Content Outline

Approved Date: June 2018
Implementation Date: March 2019

		Number of Scored Questions[1]
A.	Procurement	6
B.	Project Management	7
C.	Operations	13
D.	Communications	10
E.	Training and Education	6
F.	Image Management	24
G.	Information Technology	18
H.	Systems Management	15
I.	Clinical Engineering	14
J.	Medical Imaging Informatics	17

The Test Content Outline lists the areas to be covered and the weightings reflecting their relative importance. Content outlines are developed by determining what imaging informatics staff at entry level are required to do on the job, and then defining the knowledge and skills necessary to perform those tasks.[2]

A detailed *Test Content Outline* continues on the following pages.

Note: The abbreviation "e.g." is used in this document to indicate examples of the topics covered, but the examples are not a complete list.

1   Each exam includes an additional 20 unscored (pilot) questions.

2   A special debt of gratitude is due to the hundreds of professionals participating in this project as committee members, survey respondents, and reviewers.

A. Procurement (6)

1. Needs Assessment
   a. Organization strategic plan and policies
   b. Procurement goals
   c. Methods of needs analysis
   d. Replacement or enhancement
2. Vendor Selection
   a. Collection tools
      1. Request for information (RFI)
      2. Request for application (RFA)
      3. Request for proposal (RFP)
   b. Vendor response analysis
   c. Vendor demonstrations
   d. Vendor evaluation
3. Vendor Contracts
   a. Contract development
      1. Acquisition and deployment budget
      2. Total cost of ownership (TCO)
      3. Return on investment (ROI)
   b. Standard components of contracts
      1. Licensing and user fee models
      2. Performance metrics/payment milestones
      3. Uptime guarantees
      4. Liability
      5. Obsolescence clauses
      6. Service level agreements
   c. Contract evaluation
   d. Contract negotiation

B. Project Management (7)

1. Goals, Scope, and Risks
   a. Identifying goals
   b. Identifying and limiting scope
   c. Identifying common risks
      1. Internal dependencies
      2. External dependencies
   d. Quantifying and controlling risks
2. Project Feasibility
   a. Needs assessment design
   b. Needs assessment implementation and review
   c. Financial viability analysis
3. Project Management Assessment Tools
   a. Documentation of readiness, planning, initiating, executing, monitoring, and closing processes (e.g., PERT charts, Gantt charts, milestones, time-and-task schedules)
   b. Budget, cost schedule, resource, quality, and procurement plan
4. Project Completion Assessment
   a. Performance validation
   b. Documentation validation
   c. User acceptance testing

C. Operations (13)

1. Quality Improvement (QI) Procedures
   a. Philosophical basis of QI
   b. Process improvement strategies (e.g., PDSA, Six Sigma, LEAN)
   c. Problem identification analysis and tools (e.g., runchart, fishbone)
2. Policies and Procedures
   a. System management (e.g., downtime, incidents, back-up and recovery, privacy and security)
   b. User management (e.g., access, roles)
   c. Compliance with Applicable Regulations (e.g., HIPAA, MQSA, HITECH Act, radiation dose tracking)

3. Operational Budgeting

4. Identifying and Reporting Ethical Issues

5. Systems Change Control and Problem Tracking (e.g., Remedy®, ServiceNow®)

D. Communications (10)

1. Roles and Relationships in Healthcare Settings
   a. Organizational chart
   b. Organizational theory
   c. Medical specialties (e.g., radiology, pediatrics, orthopedics, neurology)
   d. Customer service methods

2. Medical Terminology
   a. Anatomy, physiology, and pathology
   b. Common imaging positions
   c. Imaging planes
   d. Modality-specific terminology
   e. Coding with: ICD, CPT®, SNOMED, RADLEX™, LOINC

3. System Availability Issues or Changes, Notifications to Business Units
   a. Change management communications (e.g., who, what, when, why, how)
   b. Notifications (e.g., downtime, upgrades, changes in workflow)
   c. Plans and techniques based on user roles

4. Strategic Planning and Reporting
   a. Aligning department goals with organizational strategic plan
   b. Feedback mechanisms
      1. Reporting tools
      2. Surveying methods

E. Training and Education (6)

1. Needs Assessment
   a. Reasons for training
   b. Types of learners
      1. Learning styles
      2. Characteristics of adult learners
   c. Measurement methods (e.g., surveys, task analysis)
   d. Instructional objectives

2. Training Programs
   a. Instructional methods
   b. Instructional tools
   c. Educational resources
   d. Assessment of training

F. Image Management (24)

1. Environmental Design for Viewing and Interpreting Images
   a. Ergonomics
   b. Environmental factors
   c. Room layout and physical considerations

2. The Human-Computer Interface
   a. EMR/RIS/PACS/SR/LIS/dictation integration
   b. Key image selection and image annotation
   c. Input devices
   d. Display devices

3. Work Flow Processes
   a. Postprocessing workflow
   b. Compression
   c. Image workflow (e.g., hanging protocols, read-ready)
   d. Teaching files
   e. Clinical trials
   f. Image acquisition and display terminology

g. Reporting and results communication
h. Data integrity QC checks (e.g., storage commitment, reconciliation, modality worklist)
i. Workflow optimization
j. Remote interpretations (e.g., telehealth, teleradiology)

4. Image Import and Export
   a. Policies and procedures
   b. Workflow procedures (e.g., IHE, PDI)
   c. Data integrity
   d. Digitizing technology
   e. Standards of file exchange
   f. Cross enterprise image exchange

5. Enterprise Imaging
   a. Visible light
   b. Radiology
   c. Cardiology

G. Information Technology (18)

1. Storage and Archive Technology and Architecture
   a. Architectures (e.g., NAS, SAN, DAS)
   b. Storage network protocols (e.g., SCSI, fibre channel, ATA/SATA)
   c. Archive strategies
      1. Online
      2. Nearline
      3. Data throughput
      4. Methods for storage management (e.g., virtualization, replication, mirroring)
      5. Storage metrics
   d. Vendor Neutral Archives (VNA)

2. Network Architecture
   a. Network protocols (e.g., Ethernet: Wireless, Bluetooth, OSI/ISO mode, TCP/IP)
   b. Transmission protocols (e.g., DICOM, FTP, HTTP, SSH)
   c. Load balancing, fault tolerance, and redundancy
   d. Network components and hardware (e.g., hubs, switches, routers, gateways, trunks, CAT-5e, CAT 6, fiber)
   e. Network configuration (e.g., IP address, LAN, WAN, VLAN, DNS, ARP, NAT, firewall, SSL, ports)
   f. Network metrics/dashboard (e.g., capacity, bandwidth, performance, cost)

3. Hardware and Software Components
   a. Hardware components
      1. Video card
      2. CPU, GPU
      3. Memory
      4. Hard drive
      5. Network interface card
      6. Motherboard connectivity (e.g., PCI, USB, SCSI, AGP)
      7. Removable media hardware (e.g., CD, DVD, MOD, flash)
   b. Software components
      1. Operating systems
      2. Mobile devices
      3. Browser
      4. DNS
      5. Group policy
      6. Remote management tools (e.g., RDP, VNC, Bomgar®, WebEx®)

7. Authentication mechanisms
   a. Active Directory
   b. LDAP, LDAPS
   c. Kerberos
   d. Two-factor authentication
   c. Server architecture
   d. Virtual architecture (e.g., Citrix®, VMware®)
4. Data Retrieval for Operations, Quality Assurance, and Planning Purposes
   a. Structured Query Language (SQL)
   b. Data analytics and data mining (e.g., methods, statistics)
   c. Key performance indicators (e.g., utilization, performance, uptime, capacity, exceptions, unread exams, lost studies)
   d. Database design, management, and maintenance
      1. Relational versus hierarchical
      2. Basic principles (e.g., keys, normalization, table joining, performance)
5. Appropriate IT Standards
   a. Data structures (e.g., XML, JSON)
   b. File systems (e.g., CIFS, NFS)
6. Obsolescence Planning
   a. Technology lifecycle
   b. Moore's Law

H. Systems Management (15)

1. Requirements for Optimal and Cost-Effective System Capacity and Throughput
   a. Study size calculations
   b. Scalability considerations
      1. Database
      2. Storage
      3. Server
      4. Networking

5. Cloud
c. Impact of new technology (e.g., 256 slice CT, breast tomosynthesis)
d. Licensing models (e.g., concurrent, per/named user)

2. Disaster Recovery Plans and Business Continuity Strategies
   a. Policies and procedures
      1. Testing
      2. Downtime
      3. Failover
      4. HIPAA compliance
   b. Data and system recovery
      1. Offsite archiving
      2. Hardware and software solutions
      3. Applications Service Provider (ASP)
3. System Problem Management
   a. Availability monitoring and problem detection
      1. Reporting procedures
      2. Automated monitoring (e.g., dashboard)
      3. Alerts
      4. SNMP
   b. Troubleshooting/problem diagnosis (e.g., Wireshark®, DVTK)
   c. Root cause analysis
      1. Bottlenecks
      2. Single points of failure
      3. Alternate pathways
   d. Status reports to management
4. Data Migration Procedures
   a. Strategies for migration
   b. Physical data transfer considerations

c. DICOM standardization and data integrity

d. Work-product migration (e.g., key images, annotations, presentation states)

e. Cost and performance models

f. User impact

5. Data Security and Individual Privacy

   a. Standards, policies, and guidelines

     1. HIPAA

     2. ACR-SIIM Practice guideline for electronic medical information privacy and security

     3. NIST

   b. Security strategies

     1. Physical

     2. System

     3. Application

     4. Encryption

   c. Privacy

I. Clinical Engineering (14)

1. Support for Imaging Modalities and Techniques

   a. Radiography/Fluoroscopy/Tomography

   b. Breast imaging

   c. Magnetic resonance imaging (MRI)

   d. Computed tomography (CT)

   e. Ultrasound

   f. Nuclear medicine

   g. Cardiology

   h. Radiation therapy

   i. Interventional radiology

2. Support for Ancillary Services

   a. Oncology (e.g., tumor tracking)

   b. Orthopedic templates

   c. Surgical planning

d. Stereotactic imaging

e. Intraoperative imaging

f. Point of care imaging

g. Research imaging

3. Modality Integration

   a. DICOM configuration

     1. Configuration parameters (e.g., AE title, port)

     2. Modality worklist

     3. Performed procedure step

     4. Storage commitment

   b. DICOM services

   c. DICOM objects

   d. DICOM validation

   e. DICOM transfer syntax

   f. DICOM tools

   g. Other types of integration

4. Image Display Quality Control

   a. DICOM Grayscale Standard Display Function (GSDF) part 14

   b. AAPM TG18 report

5. Clinical Awareness

   a. Electrical hazards

   b. Ionizing radiation and radiopharmaceuticals

   c. Magnetic fields

   d. Infection/biohazards

   e. Sterile field procedures (e.g., operating room)

J. Medical Imaging Informatics (17)

1. Medical Imaging Workflow Solutions

   a. Implementation

   b. Evaluation/process improvement

2. Systems Integration

   a. HIS

   b. RIS

   c. EMR

   d. PACS

   e. CAD (e.g., breast, lung, prostate)

      f.   Dictation systems
      g. Postprocessing software or systems
      h. Radiation dose management
      i.   Contrast dose management
      j.   Modality content structured reporting (e.g., ultrasound, DXA)
      k. Decision support

         1. order entry
         2. exam protocols
         3. interpretation, case comparisons

      l.   Critical/urgent results communication
      m. Discordant findings notification
      n. Peer review
      o. Clinical analytics
      p. Integration methods (e.g., API, web services)
      q. Scanned documents

3. Medical Imaging Standards

      a. DICOM
      b. HL7
      c. MQSA
      d. ACR
      e. AAPM, SIIM
      f.   ICD, CPT®, SNOMED

4. Apply Appropriate IHE Guidelines (e.g., integration profiles, connectathon results)

5. Integrate Image Architecture into Organization's Long-Range Plan

      a. Enterprise archiving
      b. Master patient index
      c. Regional Healthcare Information Organizations (RHIOs)
      d. Enterprise imaging specialties (e.g., cardiology, pathology)