Curriculum Development Centers Program

Awardee of The Office of the National Coordinator for Health Information Technology

HEALTH IT WORKFORCE CURRICULUM
COMPONENT BLUEPRINT
Version 3.0/Spring 2012

Component Number: 8
Component Name: Installation and Maintenance of Health IT Systems

Component Description: Instruction in installation and maintenance of health IT systems, including testing prior to implementation. Introduction to principles underlying system configuration. Hands-on experiences in computer labs and on-site in health organizations.

Assigned Institution: Duke University
Team Lead(s):
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Team Members:
Harry Bulbrook, (Consultant)
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Workforce Roles:

- Implementation support specialists
- Implementation managers
- Technical/software support staff

This material was developed by Duke University, funded by the Department of Health and Human Services, Office of the National Coordinator for Health Information Technology under Award Number IU24OC000024.

Component Objectives:
At the completion of this component, the student will be able to:

1. Articulate the elements of Health IT systems, including their advantages and disadvantages.
2. Justify criteria to be considered when recommending vendors and software
3. Design a comprehensive plan to install a health IT system
4. Design a comprehensive plan to maintain and troubleshoot a health IT system, incorporating system updates and user feedback
5. Implement project plans by installing and configuring hardware and software, interacting with vendors and users as needed
6. Verify plan implementation

Component Units with Objectives and Topics

Unit 1 (Elements of a Typical EHR System):

Description: This unit will give a brief overview of a typical Electronic Health Record (or EHR) system, including discussion of the Institute of Medicine's six aims for improving healthcare, what an EHR is, and how it has evolved. Additionally, it will outline the types of network elements an EHR system needs to function, as well as its typical hardware and software components.

Objectives:

1. Identify the core elements that comprise an EHR system
2. Describe the use of client and server hardware for access to and storage of EHRs
3. Describe network needs for access to and storage of EHRs
4. Identify the application software and back-end data storage software needed for a comprehensive, effective health IT system

Topics:

1. Six aims for improving Healthcare
2. Outline and advantages of EHR system functions and capabilities
3. Elements of EHR system
   a. Hardware
   b. Software
   c. Client-Server model
   d. Network – LAN and WAN

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Unit 2 (System Selection – Software and Certification):

Description: This unit will discuss the differences in COTS (Commercial Off-The-Shelf) and in-house/homegrown systems and how to select the system to meet the needs of the end users.

Objectives:

1. Compare and contrast COTS (Commercial Off-The-Shelf) and In-House /homegrown systems and describe their relative advantages and disadvantages
2. Verify system compliance with ONC-ATCB certification
3. Identify purpose and categories of ARRA "Meaningful Use" criteria

Topics:

1. System selection
   a. Commercial Off the Shelf
   b. In-house developed
2. Certification and compliance with regulations
   a. HIPAA
   b. ONC-ATCB
   c. ARRA Meaningful use criteria

Unit 3 (System Selection - Functional and Technical Requirements):

Description: This unit explores aspects of functional requirements of systems (by users) and technical requirements (by the system), including how to determine, document, prioritize, and act on those requirements.

Objectives:

1. Identify 12 possible steps to choosing an EHR system
2. Gather functional requirements from institution and users
3. Document use-cases and relate them to functional requirements

Topics:

1. Twelve steps in evaluating EHR systems
2. Functional requirements and the HL7 model
3. Non-Functional requirements
4. Use Cases pre- and post-EHR
5. Hardware and software requirements

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Unit 4 (Structured Systems Analysis and Design):

Description: This unit will discuss generalities about project management along with the role of the project manager. It will also cover in some detail the various components of a typical project plan and how to design a project plan for a typical EHR system.

Objectives:

1. Identify the 8 basic components to a project plan
2. Define the role of a project manager
3. Equate the basic project plan components to a typical EHR implementation plan
4. Create a project plan for system design and implementation

Topics:

1. Project plan components and phases
2. Project roles, including Project Manager
3. Project Plan
4. Ten factors in factor analysis
5. Sample project plan for small medical practice

Unit 5 (Software Development Life Cycle):

Description: This unit will discuss methods for planning for the creation, development, implementation, and eventual phase-out of software packages using various Software Development Life Cycle Models.

Objectives:

1. Define the steps of the Software Development Life Cycle (SDLC) and the purpose and importance of each.
2. Describe different models of the SDLC and their key differences.
3. Describe how and why the SDLC applies to HIT software deployment.

Topics:

1. SDLC definition and purpose
   a. Success factors
2. Models
   a. Waterfall
   b. Iterative and Incremental
   c. Spiral
3. Model phases for Example implementation

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Unit 6 (System Security Procedures and Standards):

Description: This unit will discuss the security rules required by regulation and best practices for implementation and monitoring of security in EHR systems.
Topics in this unit include: Federal, state, and local health information regulations for EHRs, computer and network system vulnerabilities and best practices for identification and mitigation of those vulnerabilities, information access and protection measures, and user security training.

Objectives:

1. Identify regulatory requirements for EHRs
2. Provide training for system users regarding the methods and importance of security compliance
3. Identify administrative, physical, and technical safeguards for system security and regulatory compliance
4. Identify best practices for system security
5. Identify best practices for risk / contingency management

Topics:

1. Regulation regarding security and privacy of health information
   a. HIPAA Privacy Rule
   b. HIPAA Security Rule
2. Safeguards
   a. Administrative
   b. Physical
   c. Technical
3. System Security Best Practices
   a. Vulnerabilities
   b. Baselines
   c. Contingency, Backup, and Disaster Recovery
   d. Data policies
   e. Inventories
   f. Logs

Unit 7 (System Interfaces and Integration):

Description: This unit will define interface and integration and explain their importance, discuss common interface methods point to point and interface engines and the types of protocols they use, examine HL7 and how it simplifies the process of communicating

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between various dissimilar components, and connecting your EHR system to the outside world.

Objectives:

1. Determine and document system interfaces and integration requirements
2. Describe the pitfalls associated with installing a new application in an environment of pre-existing applications
3. Give examples of interfacing modalities

Topics:

1. Interface and Integration
   a. HL7 communication protocol
   b. Integration between EHRs
2. Methods
   a. Interface Engine
   b. Point to point

Unit 8 (Troubleshooting, Maintenance and Upgrades, and Interaction with Vendors, Developers, and Users):

Description: This unit will discuss ways you can implement an infrastructure for troubleshooting, and maintaining EHRs and their existing infrastructure.

Objectives:

1. Identify and implement an effective troubleshooting procedure for reporting, evaluating, fixing, deploying, and follow-up of errors, problems, or limitations for the system
2. Integrate downtime schedule for OS, network, database, and client application maintenance and updates
3. Develop a process for communicating requirements and supplying updates between vendors/developer and users
4. Create a baseline for system performance measurement and comparison for troubleshooting

Topics:

1. Support staff
   a. Troubleshooting workflow
   b. Tiered approach
   c. Request prioritization
2. Application to small business
3. Diagnosing Infrastructure issues

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4. Performance testing
    a. Baseline measurement
    b. Measurement utilities
    c. Next steps
5. Maintenance and Upgrades
    a. Structured approach
6. Relationships
    a. Users
    b. Vendors

Unit 9 (Creating Fault Tolerant Systems, Backups, and Decommissioning):

Description: This unit will discuss ensuring availability and resiliency through fault tolerance, data reliability through backup, and secure decommissioning of EHR systems.

Objectives:

1. Define availability, reliability, redundancy, and fault tolerance
2. Explain areas and outline rules for implementing fault tolerant systems
3. Perform risk assessment
4. Follow best practice guidelines for common implementations
5. Develop strategies for backup and restore of operating systems, applications, configuration settings, and databases
6. Decommission systems and data

Topics:

1. Redundancy and Fault Tolerance
    a. Availability
    b. Reliability
    c. Redundancy
2. Areas for fault tolerance
    a. Hardware
    b. Software
    c. System
3. Rules for fault tolerance
4. Risk Assessment
5. Practices for Fault Tolerance
    a. Hardware
    b. Data Storage
    c. Virtualization
    d. Hosted access

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   e. Software as a Service
   f. Backup
6. Decommissioning

Unit 10 (Developing a Test Strategy and Test Plan):

Description: This unit will discuss the various elements required for developing a test strategy and plan for testing your EHR software prior to final acceptance.

Objectives:
1. Gather user feedback and performance baseline for system validation and testing
2. Document problems with their resolution status
3. Create, execute, and document a test plan

Topics:
1. User acceptance testing and testing steps
   a. Planning
   b. Designing test cases
   c. Testing team
   d. Test cases
   e. Documentation of defects
   f. Debugging and resolving
   g. Signoff

Unit 11 (Pilot Testing and Full-Scale Deployment):

Description: This unit will discuss rollout phases of an EHR system, to smaller test user communities and to the entire organization.

Objectives:
1. Identify pilot testing, deployment steps, and group for pilot testing
2. Develop a plan for training pilot users
3. Gather and prioritize feedback from pilot test
4. Recommend amount of legacy data to preload
5. Develop a plan for implementation using best practices
6. Identify post-implementation practices

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Topics:

1. Pilot testing
    a. User training
    b. Pilot implementation
    c. Learning from pilot test
2. Implementation options and best practices
    a. Big-bang
    b. Phased

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