



Curriculum Development  
Centers Program

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

# **Component 8: Installation and Maintenance of Health IT Systems**

## **Instructor Manual**

**Version 3.0/Spring 2012**

## Notes to Instructors

This Instructor Manual is a resource for instructors using this component. Each component is broken down into units, which include the following elements:

- Learning objectives
- Suggested student readings, texts, reference links to supplement the narrated PowerPoint slides
- Lectures (voiceover PowerPoint in Flash format); PowerPoint slides (Microsoft PowerPoint format), lecture transcripts (Microsoft Word format); and audio files (MP3 format) for each lecture
- Self-assessment questions reflecting Unit Objectives with answer keys and/or expected outcomes
- Application Activities (e.g., discussion questions, assignments, projects) with instructor guidelines, answer keys and/or expected outcomes
- Labs/Simulations for virtual machines

## Contents

Notes to Instructors .....	2
Disclaimer .....	9
Component 8/Unit 1.....	10
Component 8/Unit 2.....	14
Component 8/Unit 3.....	17
Component 8/Unit 4.....	19
Component 8/Unit 5.....	22
Component 8/Unit 6.....	24
Component 8/Unit 7.....	27
Component 8/Unit 8.....	29
Component 8/Unit 9.....	32
Component 8/Unit 10.....	36
Component 8/Unit 11 .....	39
Component Acronym Glossary.....	42
Creative Commons Attribution-NonCommercial-Share Alike 3.0 Unported .....	52
Appendix 1: Sunny Happy Care Family Practice Scenario .....	53

## **Component Overview**

This component covers fundamentals of selection, installation and maintenance of typical Electronic Health Records (EHR) systems. Students will be introduced to the principles underlying system configuration including basic hardware and software components, principles of system selection, planning, testing, troubleshooting, and final deployment. System security and procedures will also be introduced in this component.

Each Learning Unit requires 2-5 contact/instructional hours and an additional 6-15 hours of independent or team work on the part of the student in order to be completed successfully. Each unit contains more material than would likely be used in any one teaching/learning experience so that the instructor can pick and choose material most applicable to local workforce needs.

Unit 1, Elements of a Typical EHR System

Unit 2, System Selection – Software and Certification

Unit 3, System Selection – Functional and Technical Requirements

Unit 4, Structured Systems Analysis and Design

Unit 5, Software Development Life Cycle

Unit 6, System Security Procedures and Standards

Unit 7, System Interfaces and Integration

Unit 8, Troubleshooting; Maintenance and Upgrades; Interaction with Vendors, Developers, and Users

Unit 9, Creating Fault Tolerant Systems, Backups, and Decommissioning

Unit 10, Developing a Test Strategy and Test Plan

Unit 11, Pilot Testing and Full Scale Deployment

This entire Component is estimated to require 18-45 total contact/instructional hours plus 54-135 additional hours of independent or team work, depending on the learning activities and assessments used within each unit.

## **Component Objectives**

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

- Describe the use of client and server hardware for access to and storage of EHRs
- Describe network needs for access to and storage of EHRs
- Identify the application software and back-end data storage software needed for a comprehensive, effective Health IT System

- Compare and contrast COTS (Commercial Off-The-Shelf) and In-House /homegrown systems and describe their relative advantages and disadvantages
- Verify system compliance with ONC-ATCB certification
- Identify purpose and categories of ARRA “Meaningful Use” criteria
- Identify 12 possible steps to choosing an EHR system
- Gather functional requirements from institution and users
- Document use-cases and relate them to functional requirements
- Identify the 8 basic components to a project plan
- Define the role of a project manager
- Equate the basic project plan components to a typical EHR implementation plan
- Create a project plan for system design and implementation
- Define the steps of the Software Development Life Cycle (SDLC) and the purpose and importance of each.
- Describe different models of the SDLC and their key differences.
- Describe how and why an HIT software application would go through the SDLC
- Identify regulatory requirements for EHRS and integrate into the project plan
- Identify best practices for OS and network system security installation and patches (such as those provided by vendors, SANs, and ISC2) and integrate into project plan
- Identify and assess protection measures including access control, firewalls, intrusion detection and encryption
- Provide training for system users regarding the methods and importance of security compliance
- Determine and document system interfaces and integration requirements
- Describe the pitfalls associated with installing a new application in an environment of pre-existing applications
- Give examples of interfacing modalities
- Identify and implement an effective troubleshooting procedure for reporting, evaluating, fixing, deploying, and follow-up of errors, problems, or limitations for the system
- Integrate downtime schedule for OS, network, database, and client application maintenance and updates

- Develop a process for communicating requirements and supplying updates between vendors/developer and users
- Create a baseline for system performance measurement and comparison for troubleshooting
- Create redundancy and fault-tolerance in systems for access and data storage, providing high performance and reliability
- Backup and restore databases, applications, and operating systems
- Develop a plan for decommissioning systems and data
- Gather user feedback and performance baseline for system validation and testing
- Document problems with their resolution status
- Create, execute, and document a test plan
- Identify pilot group and plan scope of pilot
- Install pilot system, train pilot users, and make pilot available
- Gather and prioritize feedback from pilot test, revising project plan if necessary
- Develop and implement strategy for:
  - Communicating deployment plan to end users and management
  - Technical support of deployment (e.g. live on-site support versus phone/Internet support)
  - Getting feedback from end users following deployment
  - Evaluating usage and capacity of system resources under conditions of full deployment
- Deploy revised system

## **Component Authors**

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## **Disclaimer**

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*Likewise, the above also applies to the Curriculum Development Centers (including Columbia University, Duke University, Johns Hopkins University, Oregon Health & Science University, University of Alabama at Birmingham, and their affiliated entities).*

## Component 8/Unit 1

### Unit Title

#### Elements of a Typical EHR System

### Unit Description

This unit provides an overview of what a typical electronic health record system is and focuses on the elements that make up such a system -- hardware, networks, software, and storage requirements.

### Unit Objectives

By the end of this unit the student will be able to:

1. Describe the use of client and server hardware for access to and storage of EHRs
2. Describe network needs for access to and storage of EHRs
3. Identify the application software and back-end data storage software needed for a comprehensive, effective Health IT System

### Unit Topics / Lecture Titles

- 1a Elements of a Typical Electronic Health Record System
- 1b Elements of a Typical Electronic Health Record System

### Unit References

(All links accessible as of 3/12/2012)

#### Lecture 1a

DesRoches, C.M. et al. (2008). Electronic Health Records in Ambulatory Care — A National Survey of Physicians. *N Engl J Med.* 359:50-6. <http://www.nejm.org/doi/full/10.1056/NEJMsa0802005>

Dickinson, G., Fischetti, L., & Heard, S. (2003). HL7 EHR System Functional Model and Standard. Retrieved July, 2010, from HIMSS.org: [http://www.himss.org/Content/Files/EHR\\_Functional\\_Model\\_Ballot.pdf](http://www.himss.org/Content/Files/EHR_Functional_Model_Ballot.pdf)\*

Garrett, P., & Seidman, J. (2011, January 4). EMR vs EHR – What is the Difference? Health IT Buzz. Retrieved December, 2011, from <http://www.healthit.gov/buzz-blog/electronic-health-and-medical-records/emr-vs-ehr-difference/>

Greenhalgh, T. et al (2009). "Tensions and Paradoxes in Electronic Patient Record Research: A Systematic Literature Review Using the Meta-Narrative Method". [PDF on the Internet]. *The Milbank Quarterly*. [Cited June 2011]. <http://www.milbank.org/quarterly/8704feat.html>\*

\*Indicates this link is no longer functional.

Gurley, L. (2004). Advantages and disadvantages of electronic medical records. Retrieved from <http://www.aameda.org/MemberServices/Exec/Articles/spg04/Gurley%20article.pdf>\*

Institute of Medicine. (2001, March 1). Crossing the quality chasm: a new health system for the 21st Century. Retrieved June 30, 2010, from <http://www.nap.edu/catalog/10027.html>

Pawola, L. (2011, February 22). The history of the electronic health record. Health Informatics and Health Information Management. Retrieved December, 2011, from <http://healthinformatics.uic.edu/the-history-of-the-electronic-health-record/>\*

Maons, D. (2011, November 11). EHRs are inevitable, experts say. Health-care IT News. Retrieved from <http://www.healthcareitnews.com/news/ehrs-are-inevitable-experts-say>

Medical Associates. Electronic Medical Record. Retrieved September 2011 from <http://www.medical-software.org/electronic-medical-record.html>

Steele, E. (2009, December 16). Research explains why EHRs won't achieve "Meaningful Use." Retrieved Nov, 2011, from <http://blog.srssoft.com/2009/12/research-explains-why-ehrs-won%E2%80%99t-achieve-%E2%80%9Cmeaningful-use%E2%80%9D/>\*

Torrey, T. What is an EMR (Electronic Medical Record) or EHR (Electronic Health Record)?" (2011, April 11). Retrieved June, 2011, from Patients.About.Com: <http://patients.about.com/od/electronicpatientrecords/a/emr.htm>

Torrieri, M. (2011, August 23). EHR adoption grows slowly, steadily at small practices. Retrieved from <http://www.searchmedica.com/resource.html?rurl=http%3A%2F%2Fwww.physicianspractice.com%2Fblog%2Fcontent%2Farticle%2F1462168%2F1933985%3F-CID%3Drss&q=Kleveland&c=pm&ss=physiciansPractice&p=Convera&fr=true&ds=0&srId=3>

Wikipedia. (2011, August). Client Server Model. Retrieved June, 2011, from Wikipedia.com. <http://en.wikipedia.org/wiki/Client%E2%80%93Server>

## Lecture 1a Charts, Tables, Figures

1.1 Figure: MITRE, 2006 Electronic Health Data—Pre EHR Figure 1 Electronic Health Records Overview , <http://www.ncrr.nih.gov/publications/informatics/EHR.pdf>\* Used with Permission.

1.2 Figure: MITRE, 2006 EHR Concept Overview Figure 2 *Electronic Health Records Overview* , <http://www.ncrr.nih.gov/publications/informatics/EHR.pdf>\* Used with permission

1.3 Figure: Neal, Scott. 2011. Client Server Model. Used with Permission

\*Indicates this link is no longer functional.

## Lecture 1a Images

None used in this lecture.

## Lecture 1b

1. Kleaveland, B. EHR Implementation: What you need to know to have a successful project: Part 2. Physicians Practice. Retrieved from [http://www.physicianspractice.com/files/audioconference/pdfs/id\\_7.pdf?CFID=1675309&CFTOKEN=75588070\\*](http://www.physicianspractice.com/files/audioconference/pdfs/id_7.pdf?CFID=1675309&CFTOKEN=75588070*)
2. Torrey, T. (2011, April 11). What is an EMR (Electronic Medical Record) or EHR (Electronic Health Record)? Retrieved June, 2011, from patients.about.com: <http://patients.about.com/od/electronicpatientrecords/a/emr.htm>.
3. Torrieri, Marisa (2011, August 23). EHR Adoption Grows Slowly, Steadily at Small Practices. <http://www.searchmedica.com/search.html?q=Torrieri>
4. Wikipedia. (2008, July). Thin Client. Retrieved from Wikipedia.com: [http://en.wikipedia.org/wiki/Thin\\_client](http://en.wikipedia.org/wiki/Thin_client) .
5. Wikipedia. Computer network. Retrieved from Wikipedia.com: [http://en.wikipedia.org/wiki/Computer\\_network](http://en.wikipedia.org/wiki/Computer_network) .

## Lecture 1b Charts, Tables, Figures

1.1 Table: Neal, Scott. EHR Hardware – Servers. Used with permission.

## Lecture 1b Images

Slide 15: Laptop. Courtesy Scott Neal. Used with permission.

Slide 19: Local Area Network (LAN). Courtesy Scott Neal. Used with permission.

Slide 20: Wide Area Network (WAN). Courtesy Scott Neal. Used with permission.

## Unit Required Readings.

None for this unit.

## Unit Suggested Readings

1. “What’s Inside My Computer?” by Jonathan Strickland, November 2006, <http://www.howstuffworks.com/inside-computer.htm> This “How Stuff Works” article and video explains the seven major components inside a typical computer system.

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\*Indicates this link is no longer functional.

2. "Understanding Application Servers" by Ajay Srivastava & Anant Bhargava 2003 <http://hosteddocs.ittoolbox.com/AS030504.pdf> This article explains in depth how application servers work, particularly in a three tiered system similar to a typical EHR system structure.
3. "What is a Server?" by Webopedia, [http://www.webopedia.com/DidYouKnow/Hardware\\_Software/2005/servers.asp](http://www.webopedia.com/DidYouKnow/Hardware_Software/2005/servers.asp) A short but thorough article about the function of a server, types of servers, and how the term applies to hardware and software.

### **Student Application Activities**

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## Component 8/Unit 2

### Unit Title

#### System Selection – Software and Certification

### Unit 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. We will also look at the advantages of purchasing a CCHIT-certified system and discuss ARRA and “meaningful use” in the context of EHR systems. Lastly we will look at estimating the typical costs associated with EHR system startup.

### Unit Objectives

By the end of this unit the student will be able to:

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.

### Unit Topics / Lecture Titles

2 System Selection – Software and Certification

### Unit References

(All links accessible as of 3/12/2012)

### Lecture 2

1. *About ARRA*. Retrieved from HITECH Answers website: <http://www.hitechanswers.net/about/about-arra/>
2. *ARRA Meaningful Use Snapshot*. (n.d.). Retrieved from Medical Information Technology, Inc. website: [http://www.meditech.com/intoperability/pages/ARRA\\_snapshot\\_final\\_0311.pdf](http://www.meditech.com/intoperability/pages/ARRA_snapshot_final_0311.pdf)
3. *Certified Health IT Product List*. Retrieved from Office of the National Coordinator for Health Information Technology, US Department of Health & Human Services website: <http://onc-chpl.force.com/ehrcert>
4. Electronic Medical Record. Retrieved June 20, 2010, from: [http://en.wikipedia.org/wiki/Meaningful\\_Use#Meaningful\\_Use](http://en.wikipedia.org/wiki/Meaningful_Use#Meaningful_Use)

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5. *EHR Incentive Programs Overview*. (n.d.). Retrieved from Centers for Medicare & Medicaid Services website: <https://www.cms.gov/EHRIncentivePrograms/>
6. Medicare and Medicaid Programs; Electronic Health Record Incentive Program (2010, July). Federal Register. [Internet]. Retrieved from <http://www.federalregister.gov/articles/2010/07/28/2010-17207/medicare-and-medicaid-programs-electronic-health-record-incentive-program> .
7. Fornes, D. (2008, February 6). Should CCHIT Influence Your EHR Selection? [Web log post]. Retrieved from Software Advice - The Medical Blog: <http://blog.softwareadvice.com/articles/medical/should-cchit-influence-your-ehr-selection>
8. Gates, M. (2009, Winter). All Systems Go? How to Select an EHR That Meets Your Needs. *Correct Care*, Retrieved from [http://www.ncchc.org/pubs/CC/selecting\\_ehr.html](http://www.ncchc.org/pubs/CC/selecting_ehr.html)\*
9. *Goals for EHR System*. Retrieved June 20, 2010, from Health Technology Review website: <http://www.healthtechnologyreview.com/viewarticle.php?aid=113>
10. *HITECH Act Enforcement Interim Final Rule*. (n.d.). Retrieved from U.S. Department of Health & Human Services website: <http://www.hhs.gov/ocr/privacy/hipaa/administrative/enforcementrule/hitech-enforcementifr.html>
11. McKinney, D. (2001, August). *Impact of Commercial Off-The-Shelf (COTS) Software and Technology on Systems Engineering*. Retrieved from Presentation to INCOSE Chapters website: <http://www.incose.org/northstar/2001Slides/McKinney%20Charts.pdf>
12. Medicare and Medicaid Programs; Electronic Health Record Incentive Program; Final Rule, 75 Fed. Reg. 44314 (2010) 42 CFR Parts 412, 413, 422, and 495 <http://edocket.access.gpo.gov/2010/pdf/2010-17207.pdf>
13. *ONC-Authorized Testing and Certification Bodies*. Retrieved from Office of the National Coordinator for Health Information Technology, US Department of Health & Human Services website: <http://healthIT.hhs.gov/ATCBs>\*
14. Pizzi, R. (2007, October 30). *EHR adoption an “ugly process,” but CCHIT can improve appeal*. Retrieved from Healthcare IT News website: : <http://www.healthcareitnews.com/news/ehr-adoption-ugly-process-cchit-can-improve-appeal>

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15. Rice, R. (2009). *Testing COTS-Based Applications*. Retrieved June 21, 2010, from <http://www.riceconsulting.com/articles/testing-COTS-based-applications.htm>
16. *Standards & Certification*. Retrieved from Office of the National Coordinator for Health Information Technology, US Department of Health & Human Services website: [http://healthit.hhs.gov/portal/server.pt/community/healthit\\_hhs\\_gov\\_standards\\_and\\_certification/1153\\*](http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov_standards_and_certification/1153*)
17. *Standards & Certification Criteria Final Rule*. Retrieved from Office of the National Coordinator for Health Information Technology, US Department of Health & Human Services website: [http://healthit.hhs.gov/portal/server.pt/community/healthit\\_hhs\\_gov\\_standards\\_ifr/1195\\*](http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov_standards_ifr/1195*)

## **Lecture 2 Charts, Tables and Figures**

None used in this lecture.

## **Lecture 2 Images**

Slide 13: ARRA recovery.gov logo [http://www.recovery.gov/News/mediakit/Picture%20Library/circle\\_recovery\\_logo.jpg\\*](http://www.recovery.gov/News/mediakit/Picture%20Library/circle_recovery_logo.jpg*)

Slide 13: Center for Medicare and Medicaid Services EHR Incentive Programs logo <http://www.cms.gov/EHRIncentivePrograms/Downloads/EHRIncentiveLogoweb.JPG>

## **Unit Required Readings**

None for this unit.

## **Unit Suggested Readings**

1. Should CCHIT Influence Your EHR Selection? By Don Fornes <http://www.softwareadvice.com/articles/medical/should-cchit-influence-your-ehr-selection/>. An excellent overview of CCHIT's role in EHR selection and the criteria certified by the organization.
2. Healthcare Industry show demonstrates wealth of opportunities, By Steve Hicks [http://mindset.mercurypay.com/?p=475\\*](http://mindset.mercurypay.com/?p=475*). An overview of Interoperability, Meaningful Use, and Revenue Cycle Management

## **Student Application Activities**

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## Component 8/Unit 3

### Unit Title

#### System Selection – Functional and Technical Requirements

### Unit Description

This unit will discuss the 12 different steps associated with system selection focusing on defining user functional requirements of systems and technical requirements (by the system), including how to determine, document, prioritize, and act on those requirements through the use of case studies and other means.

### Unit Objectives

By the end of this unit the student will be able to:

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

### Unit Topics / Lecture Titles

3 System Selection – Functional and Technical Requirements

### Unit References

(All links accessible as 1/26/2012)

### Lecture 3

1. Adler, K. G. (2005). How to select an electronic health record system. *Fam Pract Manag*, 12(2), 55-62. Retrieved from <http://www.aaafp.org/fpm/2005/0200/p55.html>.
2. HIMSS. (2011). Davies Award past recipients (for achievement in implementation of EHRs). Retrieved from himss.org: [http://www.himss.org/davies/pastRecipients\\_org.asp](http://www.himss.org/davies/pastRecipients_org.asp).
3. HL7 Electronic Health Record (EHR) Work Group. (2007). HL7 2007 EHR-S Functional Model. Retrieved from [http://www.hl7.org/ehr/downloads/index\\_2007.asp](http://www.hl7.org/ehr/downloads/index_2007.asp).
4. Illinois Foundation for Quality Health Care. Guidelines for Evaluating EHRs. (2009). Retrieved from [http://www.ifmc-il.org/provider/documents/guidelines\\_for\\_evaluating\\_ehrs.pdf](http://www.ifmc-il.org/provider/documents/guidelines_for_evaluating_ehrs.pdf)\*
5. Johnson, N. (2011, September 12). HHS launches healthIT.gov, *FederalTimes.com*. Retrieved from <http://blogs.federaltimes.com/federal-times-blog/2011/09/12/hhs-launches-healthit-gov/>

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6. Office of the National Coordinator (ONC) for Health Information Technology. How to Implement EHRs, Step 3: Select or Upgrade to a Certified EHR. Retrieved from [http://www.healthit.gov/providers-professionals/step-3-select-or-upgrade-certified-ehr.\\*](http://www.healthit.gov/providers-professionals/step-3-select-or-upgrade-certified-ehr.*)
7. Quinsey, C. A. (2006). Using HL7 standards to evaluate an EHR. Journal of AHIMA, 77(4), 64A-64C. Retrieved from [http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1\\_031102.hcsp?dDocName=bok1\\_031102\\*](http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_031102.hcsp?dDocName=bok1_031102*).
8. Stratis Health. (2009). Requirements Analysis. Retrieved from [http://www.stratishealth.org/documents/HITToolkitNH/1.Adopt/1.3Select/1.3.5Requirements\\_Analysis.doc](http://www.stratishealth.org/documents/HITToolkitNH/1.Adopt/1.3Select/1.3.5Requirements_Analysis.doc).

### **Lecture 3 Charts, Tables, Figures**

3.1 Table: Quinsey, C. A. (2006). Using HL7 standards to evaluate an EHR. Journal of AHIMA, 77(4), 64A-64C. Retrieved from [http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1\\_031102.hcsp?dDocName=bok1\\_031102\\*](http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_031102.hcsp?dDocName=bok1_031102*).

### **Lecture 3 Images**

None in this lecture.

### **Unit Required Readings**

None in this lecture.

### **Unit Suggested Readings**

1. Should CCHIT Influence Your EHR Selection? By Don Fornes <http://www.softwareadvice.com/articles/medical/should-cchit-influence-your-ehr-selection/> An excellent overview of CCHIT's role in EHR selection and the criteria certified by the organization.
2. Healthcare Industry show demonstrates wealth of opportunities, By Steve Hicks [http://mindset.mercurypay.com/?p=475\\*](http://mindset.mercurypay.com/?p=475*) An overview of Interoperability, Meaningful Use, and Revenue Cycle Management

### **Student Application Activities**

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\*Indicates this link is no longer functional.

## Component 8/Unit 4

### Unit Title

#### Structured Systems Analysis and Design

### Unit Description

This unit will discuss the basics of developing a project plan and the role of a project manager.

### Unit Objectives

By the end of this unit the student will be able to:

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

### Unit Topics / Lecture Titles

4 Structured Systems Analysis and Design

### Unit References

(All links accessible as of 2/15/2012)

#### Lecture 4

- Brown, C (2009, March). "It Used to be the Iron Triangle" [Internet]. Available from <http://www.betterprojects.net/2009/03/it-used-to-be-iron-triangle.html>
- Columbus, Suzanne. "Small Practice, Big Decision: Selecting an EHR System for Small Physician Practices." *Journal of AHIMA* 77, no.5 (May 2006): 42-46. Available on the Internet: [http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1\\_031357.hcsp?dDocName=bok1\\_031357](http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_031357.hcsp?dDocName=bok1_031357)
- DerGurahian, Jean (2010, March). "Slow, steady EHR implementation plan better for doctors' offices" [Internet]. Available from: <http://searchhealthit.techtarget.com/news/2240016960/Slow-steady-EHR-implementation-plan-better-for-doctors-offices>
- Hohly, Marge. Project Plan Definition[Internet]. 2007. [Cited July 2010]: [about 5 screens]. [http://www.cerritos.edu/hohly/WorkExperience/project\\_plan\\_instructions.htm](http://www.cerritos.edu/hohly/WorkExperience/project_plan_instructions.htm)
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- A Roadmap for an EHR Implementation at a Practice. Binary Spectrum [Internet]. <http://www.binaryspectrum.com/HealthcareSolutions/ElectronicMedicalRecords/Roadmap-for-implementation-of-EHRsystem-at-a-practice.html>
- Turbit, Neville(2005,June). “Defining the Scope of a Project” [Internet]. PerfectProject.com. Available From: [http://www.projectperfect.com.au/info\\_define\\_the\\_scope.php](http://www.projectperfect.com.au/info_define_the_scope.php).
- Wikipedia (2011, December). “Scope (Project Management)” [Internet]. Cited December 2011 from Wikipedia.com: [http://en.wikipedia.org/wiki/Scope\\_\(project\\_management\)](http://en.wikipedia.org/wiki/Scope_(project_management))\*
- Wikipedia (2010, December). “Scope (Project Management)” [Internet]. Cited December 2010 from Wikipedia.com: [http://en.wikipedia.org/wiki/Scope\\_\(project\\_management\)](http://en.wikipedia.org/wiki/Scope_(project_management))\*

#### **Lecture 4 Charts, Tables, Figures**

None used in this lecture.

#### **Lecture 4 Images**

Slide 5 : The Project Diamond. Courtesy Scott Neal. Used with permission.  
Slide 7 : The Role of a Project Manager. Courtesy Scott Neal. Used with permission.

#### **Unit Required Readings**

None used in this lecture.

#### **Unit Suggested Readings**

1. “How to Successfully Navigate Your EHR Implementation” by Kenneth Adler, February 2007, <http://www.aafp.org/fpm/2007/0200/p33.html>
2. “EHR Implementation Roadmap: 2005 Pilot” 2005 <http://hosted-docs.ittoolbox.com/AS030504.pdf>. This is an EHR Implementation plan template students may use as a guide to developing their own plans for the activities.

#### **Student Application Activities**

comp8\_unit4\_activity.doc  
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comp8\_unit4\_self\_assess.doc  
comp8\_unit4\_self\_assess\_key.doc

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## Component 8/Unit 5

### Unit Title

### Software Development Life Cycle

### Unit Description

This unit introduces the student to the SDLC model and explores its application to well-known software and its utility for healthcare IT systems.

### Unit Objectives

By the end of this unit the student will be able to:

1. Define the steps of the Software Development Life Cycle, or SDLC, and the purpose and importance of each.
2. Describe different models of the SDLC and their key differences.
3. Describe how and why an HIT software application would go through the SDLC.

### Unit Topics / Lecture Titles

5 Software Development Life Cycle

### Unit References

(All links accessible as of 1/26/2012)

### Lecture 5

1. Kay, R. I. (2002, May 14). QuickStudy: System Development Life Cycle. *ComputerWorld.com.* , Retrieved from [http://www.computer-world.com/s/article/71151/System\\_Development\\_Life\\_Cycle?taxonomyId=011](http://www.computer-world.com/s/article/71151/System_Development_Life_Cycle?taxonomyId=011)
2. Sofandi, A. (2010, August 31). *Introduction to Software Development Life Cycle (SDLC)*. Retrieved from AlphaSoft Indonesia website: <http://agusofyandi.wordpress.com/2010/08/31/introduction-to-software-development-life-cycle-sdlc/>

### Lecture 1b Charts, Tables, Figures

None in this lecture.

### Lecture 1b Images

Slide 6: Waterfall model of SDLC. Image courtesy of Scott Neal.

Slide 7: Iterative model of SDLC. Image courtesy of Scott Neal.

Slide 20: Waterfall model of SDLC. Image courtesy of Scott Neal.

Slide 23: Iterative model of SDLC. Image courtesy of Scott Neal.

Slide 24: Spiral model of SDLC. Image courtesy of Scott Neal.

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\*Indicates this link is no longer functional.

## Unit Required Readings

None in this lecture.

## Unit Suggested Readings

1. "Software development Life Cycle" Volumes I and II by the State of Maryland , Revised August 2008, <http://doit.maryland.gov/policies/Documents/sdlc/sdlcvol1.pdf>\* and <http://doit.maryland.gov/policies/Documents/sdlc/sdlcvol2.pdf>\* These articles give a great in depth introduction to managing large scale projects using SDLC. These articles serve as the State of Maryland's guidelines for SDLC with step- by – step breakdowns of each of the accepted SDLC phases.
2. "Systems development Life Cycle Models." [Powerpoint via the Internet]. <http://www.docstoc.com/docs/7806897/SDLC-Models> This is a concise introduction to a wide variety of SDLC models including those discussed in the lecture.
3. "Introduction to Software development Life Cycle" as found in Agus Soyfandi's blog <http://agusofyandi.wordpress.com/2010/08/31/introduction-to-software-development-life-cycle-sdlc/> This article offers a more abridged perspective to SDLC and SDLC methodologies.
4. "Quick Study: Systems Development Life Cycle." By Russel Kay (also available in podcast from the website.) [http://www.computer-world.com/s/article/71151/System\\_Development\\_Life\\_Cycle?taxonomyId=011](http://www.computer-world.com/s/article/71151/System_Development_Life_Cycle?taxonomyId=011) Another introduction to SDLC, the waterfall model, and the spiral model. The next text, which may be behind a "paywall" or not easily accessible, since it is suggested.

## Student Application Activities

comp8\_unit5\_activity.doc  
comp8\_unit5\_activity\_key.doc  
comp8\_unit5\_self\_assess.doc  
comp8\_unit5\_self\_assess\_key.doc

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## Component 8/Unit 6

### Unit Title

#### System Security Procedures and Standards

### Unit Description

This unit includes 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.

### Unit Objectives

By the end of this unit the student will be able to:

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

### Unit Topics / Lecture Titles

6 System Security Procedures and Standards

### Unit References

(All links accessible as of 1/31/2012)

### Lecture 6a

1. Department of Health and Human Services (HHS), Office of Civil Rights (OCR), HIPAA Privacy Rule. 45 CFR Subtitle A (10-1-11 Edition) Part 154.514 Retrieved January 20, 2012 from GPO: <http://www.gpo.gov/fdsys/pkg/CFR-2011-title45-vol1/pdf/CFR-2011-title45-vol1-sec164-514.pdf>
2. *Enforcement Highlights*. (2012, January 12) Retrieved from U.S. Department of Health & Human Services website: <http://www.hhs.gov/ocr/privacy/hipaa/enforcement/highlights/index.html>
3. Hamilton, K. (2009, January 15). *EHR security and privacy*. Retrieved from SC Magazine website: <http://www.scmagazine.com/ehr-security-and-privacy/article/125983/>

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\*Indicates this link is no longer functional.

4. *Minnesota Health Information Clearinghouse, Medical Records Information.* (n.d.) Retrieved January 12, 2012 from Minnesota Department of Health: <http://www.health.state.mn.us/clearinghouse/medrecords.html>
5. *Numbers at a Glance.* (n.d.) Retrieved January 12, 2012, from U.S. Department of Health & Human Services website: <http://www.hhs.gov/ocr/privacy/hipaa/enforcement/highlights/indexnumbers.html>
6. Poremba, S. M. (2008, May 23). Retrieved from SC Magazine website: <http://www.scmagazine.com/proliferating-hipaa-com-plaints-and-medical-record-breaches/article/110555/>
7. *Summary of the HIPAA Privacy Rule.* (n.d.). Retrieved from U.S. Department of Health & Human Services website: <http://www.hhs.gov/ocr/privacy/hipaa/understanding/summary/index.html>
8. *Summary of the HIPAA Security Rule.* (n.d.). Retrieved from U.S. Department of Health & Human Services website: <http://www.hhs.gov/ocr/privacy/hipaa/understanding/srsummary.html>

### **Lecture 6a Charts, Tables, Figures**

None in this lecture.

### **Lecture 6a Images**

None in this lecture.

### **Lecture 6b**

1. *Common Types of Network Attacks.* (n.d.) Microsoft Windows TCP/IP Core Networking Guide. Distributed Systems Guide, Windows 2000 Server . <http://technet.microsoft.com/en-us/library/cc959354.aspx>
2. Hartley, Carolyn (2005). *A Secure EHR Foundation.* [PowerPoint slides]. Retrieved from <http://www.mtech.edu/nchci/EHRConference/Attachments/Securing%20the%20EHR%20System.pdf>
3. *Health Information Privacy - Summary of the HIPAA Security Rule.* (n.d.). Retrieved February 8, 2012, from U.S. Department of Health & Human Services website: <http://www.hhs.gov/ocr/privacy/hipaa/understanding/srsummary.html>
4. Password Strength (n.d.). Retrieved January 12, 2012, from Wikipedia: [http://en.wikipedia.org/wiki/Password\\_strength#Guidelines\\_for\\_strong\\_passwords](http://en.wikipedia.org/wiki/Password_strength#Guidelines_for_strong_passwords)

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\*Indicates this link is no longer functional.



5. *University of Wisconsin-Madison HIPAA Security Best Practices Guidelines, #3 Audit Controls, 4D.* (2004, April 13). Retrieved from University of Wisconsin – Madison: <http://hipaa.wisc.edu/docs/auditControls.pdf>

### **Lecture 6b Charts, Tables, Figures**

None in this lecture.

### **Lecture 6b Images**

Slide 8: VPN example, 2012. Provided by Scott Neal

Slide 10: Firewall example, 2012. Provided by Scott and Nolan Neal

### **Unit Required Readings**

None in this lecture.

### **Unit Suggested Readings**

1. “Hardening Servers with Security Templates” by WindowsSecurity.com , 2010, <http://www.windowsecurity.com/articles/Hardening-Servers-Security-Templates.html> This article outlines the use of security templates and group policy to harden server infrastructure. The article provides a look into the many faucets that must be considered when implementing a secure server strategy.
2. “Educating your Employees on Basic Security Principles.” By David Kelleher; May 27, 2009 [Podcast via the Internet]. <http://www.net-security.org/article.php?id=1241>

### **Student Application Activities**

comp8\_unit6\_activity.doc  
comp8\_unit6\_activity\_key.doc  
comp8\_unit6\_self\_assess.doc  
comp8\_unit6\_self\_assess\_key.doc

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## Component 8/Unit 7

### Unit Title

### System Interfaces and Integration

### Unit Description

This unit explores the issues and challenges involved in interfacing and integrating systems including understanding system requirements and the messaging and other techniques used between various systems.

### Unit Objectives

By the end of this unit the student will be able to:

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

### Unit Topics / Lecture Titles

7 System Interfaces and Integration

### Unit References

(All links accessible as of 2/15/2012)

### Lecture 7

1. Adler, K. G. (2005). How to select an electronic health record system. *Fam Pract Manag*, 12(2), 55-62. <http://www.aafp.org/fpm/2005/0200/p55.html>
2. Chaffee, B. W., & Bonasso, J. (2004). Strategies for pharmacy integration and pharmacy information: Technical aspects of interfaces. *Am J Health Syst Pharm*. 61(5). <http://www.medscape.com/viewarticle/471252>
3. Corepoint Health. (2010). The role of an interface engine in modern healthcare. [http://www.corepointhealth.com/whitepapers/role-of-interface-engine-in-modern-healthcare\\*](http://www.corepointhealth.com/whitepapers/role-of-interface-engine-in-modern-healthcare*)
4. DeSonier, N. (2006). What is cardinality in HL7? HL7standards.com. <http://www.hl7standards.com/blog/2006/11/02/what-is-hl7-cardinality/>

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\*Indicates this link is no longer functional.

5. Zywiak, W., & Drazen, E. (2010). Integrating EHRs: Hospital trends and strategies for initiating integrated EHRs within their communities. CSC.com. [http://assets1.csc.com/health\\_services/downloads/CSC\\_Integrating\\_EHRs.pdf](http://assets1.csc.com/health_services/downloads/CSC_Integrating_EHRs.pdf)

## **Lecture 7 Charts, Tables, Figures**

7.1 Table. Neal, S., 2012.

## **Lecture 7 Images**

Slide 6: Illustrations of point-to-point & interface engine. Images courtesy of Scott Neal.

Slide 18: HL7 interface engine. Image courtesy of Scott Neal.

Slide 21: Point-to-point EHR interface. Image courtesy of Scott Neal.

Slide 22: Point-to-point vs. HIE EHR interfaces. Image courtesy of Scott Neal.

## **Unit Required Readings**

None in this lecture.

## **Unit Suggested Readings**

1. "HL7 Messages" By Gunther Schadow. [Internet], Revised 1996, <http://aurora.regenstrief.org/~gunther/oldhtml/messages.html> This is a reference guide for deciphering HL7 2X messages
2. "HL7 International." [Internet], Revised 2010, <http://www.hl7.org/> This is the official HL7 website which highlights HL7, discusses HL7 as a standard and outlines the organization's goals and achievements.
3. Interfaceware's website at: <http://www.interfaceware.com/hl-7.html> This site provides users with an excellent launching point for understanding the HL7 standard

## **Student Application Activities**

comp8\_unit7\_activity.doc  
comp8\_unit7\_activity\_key.doc  
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## Component 8/Unit 8

### Unit Title

### Troubleshooting, Maintenance and Upgrades, and Interaction with Vendors, Developers, and Users

### Unit Description

This Unit explores aspects of setting up a robust support structure for troubleshooting and maintaining the system, including developing troubleshooting and escalation procedures, measuring system performance, and communication with vendors (or local developers).

### Unit Objectives

By the end of this unit the student will be able to:

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

### Unit Topics / Lecture Titles

8 Troubleshooting, Maintenance and Upgrades, and Interaction with Vendors, Developers, and Users

### Unit References

(All links accessible as of 1/15/2012)

### Lecture 8a

1. Boyer, E. and Soback, M. (2005). Production Support. *Implementing an Electronic Health Record System*. J. M. Walker, E. J. Bieber and F. Richards, Springer London: 95-100. <http://www.springerlink.com/content/n520ghg078416463/>
2. Felt-Lisk, S; Johnson, L; Fleming, C; Shapiro, R; Natzke, B. 2009 September 22 [Internet]. . Toward understanding EHR use in small physician practices. Available from: <http://www.thefreelibrary.com/Toward+understanding+EHR+use+in+small+physician+practices.-a0216632134>
3. Heubusch, K. "Physician Practices and Information Management: HIM Professionals Offer Value in Changing Practices." *Journal of AHIMA* 79, no.8 (August 2008): 18-22.

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\*Indicates this link is no longer functional.

4. Lake, T, Collins, T, and Ginsburg, P (2011). "Fostering Health Information Technology in Small Physician Practices: Lessons from Independent Practice Associations". National Institute for Health Care Reform. [Internet]. <http://www.nihcr.org/HIT-and-IPAs.html>.
5. Pereira, P (2010). "After EHR system implementation, maintenance, service questions remain", SearchHealthIT. [Internet]. <http://searchhealthit.techtarget.com/news/2240020962/After-EHR-system-implementation-maintenance-service-questions-remain>

### **Lecture 8a Charts, Tables, Figures**

None in this lecture.

### **Lecture 8a Images**

Slide 8: "EHR Troubleshooting Workflow" by Scott Neal. Used with Permission

### **Lecture 8b**

1. Boyer, E. and M. Soback (2005). Production Support. *Implementing an Electronic Health Record System*. J. M. Walker, E. J. Bieber and F. Richards, Springer London: 95-100. <http://www.springerlink.com/content/n520ghg078416463/>
2. "Event Tracing for Windows" (2011). Microsoft.com. [Internet]]. <http://msdn.microsoft.com/en-us/library/ff545699.aspx>.
3. "Guide to Reducing Unintended Consequences of Electronic Health Records" (2011). AHRQ. [Internet]. <http://www.ucguide.org/>
4. Halamka, John. "10 tips for troubleshooting complex EHR infrastructure problems". KevinMD.com. [Internet]. <http://www.kevinmd.com/blog/2010/09/10-tips-troubleshooting-complex-ehr-infrastructure-problems.html>.
5. "SQL Server Security, Performance & Tuning." (2009).SSQA.net. [Internet]. [http://sqlserver-qa.net/blogs/perftune/archive/2009/07/26/5820.aspx\\*](http://sqlserver-qa.net/blogs/perftune/archive/2009/07/26/5820.aspx)
6. "Technical Comparison of Oracle Database 10g and SQL Server 2005: Focus on Manageability, May 2005" (2005, May). Oracle. [Internet]. <http://www.oracle.com/technetwork/database/focus-areas/manageability/ss-1.pdf>
7. Wunder, Bill "Benchmarking Techniques Using T-SQL Part 1 - System Statistical Functional". [Internet]. [http://64.29.220.154/articles/viewarticle.aspx?id=17797\\*](http://64.29.220.154/articles/viewarticle.aspx?id=17797).

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\*Indicates this link is no longer functional.

## **Lecture 8b Charts, Tables, Figures**

None in this lecture.

## **Lecture 8b Images**

None in this lecture.

## **Unit Required Readings**

None in this lecture.

## **Unit Suggested Readings**

1. “Try these Efficiency Strategies When Setting Up a Helpdesk ” by Techrepublic.com , 2004, [http://articles.techrepublic.com.com/5100-10878\\_11-5112468.html](http://articles.techrepublic.com.com/5100-10878_11-5112468.html) This article goes through 5 steps of. Setting up an effective and successful help desk from the ground up.
2. “Educating your Employees on Basic Security Priciples.” By David Kelleher; May 27, 2009 [Podcast via the Internet]. <http://www.net-security.org/article.php?id=124>

## **Student Application Activities**

comp8\_unit8\_activity.doc

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## Component 8/Unit 9

### Unit Title

#### Creating Fault Tolerant Systems, Backups, and Decommissioning

### Unit Description

Unit description goes here.

### Unit Objectives

By the end of this unit the student will be able to:

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 and
6. Decommission systems and data

### Unit Topics / Lecture Titles

- 9a1. Creating Fault Tolerant Systems, Backups, and Decommissioning
- 9a2. Creating Fault-Tolerant Systems, Backups, and Decommissioning
- 9a3. Creating Fault-Tolerant Systems, Backups, and Decommissioning

### Unit References

(All links accessible as of 2/17/2012 (9a) and 2/17/2012 (9b))

#### Lecture 9a

1. Benson C. Security Planning. (n.d.) Available from: <http://technet.microsoft.com/en-us/library/cc723503.aspx>
2. Maniscalchi, J. Threat vs. Vulnerability vs. Risk. (June 2009) Available from: <http://www.digitalthreat.net/2009/06/threat-vs-vulnerability-vs-risk/>
3. *A Conceptual Framework for System Fault Tolerance - 1.1 What is a System?* (1995, March 30). Retrieved from National Institute of Standards and Technology website: [http://nvl.nist.gov/chissa/SEI\\_Framework/framework\\_3.htm](http://nvl.nist.gov/chissa/SEI_Framework/framework_3.htm)\*

\*Indicates this link is no longer functional.

4. *A Conceptual Framework for System Fault Tolerance - 5 Putting It All Together* (1995, March 30). Retrieved from National Institute of Standards and Technology website: [http://hissa.nist.gov/chissa/SEI\\_Framework/framework\\_20.html](http://hissa.nist.gov/chissa/SEI_Framework/framework_20.html)\*
5. *Server Availability Trends In The Time Of Electronic Health Records*. (January 2010) Forrester Research, Inc. Available at [http://www.himss.org/content/files/Stratus%20Tech%20-%20ServerAvailabilityTrends\\_EHR\\_ForresterPaper.pdf](http://www.himss.org/content/files/Stratus%20Tech%20-%20ServerAvailabilityTrends_EHR_ForresterPaper.pdf)\*

Acknowledgement: The following reference generally informed the unit

1. Shackhow, T. et al. (June 2008). *EHR Meltdown: How to Protect Your Patient Data*. *Fam Pract Manag*, 15(6), A3-A8. Available from: <http://www.aafp.org/fpm/2008/0600/pa3.html>

### **Lecture 9a Charts, Tables, Figures**

None in this lecture.

### **Lecture 9a Images**

None in this lecture.

### **Lecture 9b**

1. RAID [cited 2012 January 31]. Retrieved from: <http://en.wikipedia.org/wiki/RAID>
2. Sanford, R. (April 2010) *Electronic Health Records Need a Fail-Proof Foundation to Deliver on Quality, Economy Promises.* *Health News Digest*. Available from: [http://www.healthnewsdigest.com/news/Guest\\_Columnist\\_710/Electronic\\_Health\\_Records\\_Need\\_a\\_Fail-Proof\\_Foundation\\_to\\_Deliver\\_on\\_Quality\\_Economy\\_Promises\\_2\\_printer.shtml](http://www.healthnewsdigest.com/news/Guest_Columnist_710/Electronic_Health_Records_Need_a_Fail-Proof_Foundation_to_Deliver_on_Quality_Economy_Promises_2_printer.shtml)
3. Tulloch, M. (April 2005) *“Implementing Fault Tolerance on Windows Networks”*. Available from: [http://www.windowsnetworking.com/articles\\_tutorials/Implementing-Fault-Tolerance-Windows-Networks.html](http://www.windowsnetworking.com/articles_tutorials/Implementing-Fault-Tolerance-Windows-Networks.html)

Acknowledgement: The following reference generally informed the unit

1. Shackhow, T. et al. (June 2008). *EHR Meltdown: How to Protect Your Patient Data*. *Fam Pract Manag*, 15(6), A3-A8. Available from: <http://www.aafp.org/fpm/2008/0600/pa3.html>

### **Lecture 9b Charts, Tables, Figures**

None in this lecture.

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\*Indicates this link is no longer functional.



## Lecture 9b Images

Slide 5: RAID 0, RAID 1, RAID 5, RAID 6 [en>User:Cburnett]. c2006 [updated 2000 Jan 28; cited 2006 Feb 15]. Available from: [http://commons.wikimedia.org/wiki/Redundant\\_array\\_of\\_independent\\_disks](http://commons.wikimedia.org/wiki/Redundant_array_of_independent_disks)

## Lecture 9c

Harwood, M. (2003, September 24). *Storage Basics: Backup Strategies*. Retrieved from Enterprise Storage Forum.com website: [http://hissa.nist.gov/chissa/SEI\\_Framework/framework\\*](http://hissa.nist.gov/chissa/SEI_Framework/framework*)  
[http://www.enterprisestorageforum.com/management/features/article.php/3082691\\_3.html\\*](http://www.enterprisestorageforum.com/management/features/article.php/3082691_3.html)

*Surviving a Bottleneck - Insights into Managing Exponential Growth of Digitized Medical Images*. (2009, March 16). Retrieved from Scicasts website: [asts.com/specialreports/86-healthcare-it/2442-surviving-a-bottleneck-insights-into-managing-exponential-growth-of-digitized-medical-images](http://asts.com/specialreports/86-healthcare-it/2442-surviving-a-bottleneck-insights-into-managing-exponential-growth-of-digitized-medical-images)

Gordon, S. (n.d.). *Comparing different backup strategies*. Retrieved February 8, 2007, from SearchStorage website: <http://searchstorage.techtarget.com/tip/Comparing-different-backup-strategies>

Practice Brief-Retention of Health Information (updated) - Table 4: State Laws or Regulations Pertaining to Retention of Health Information. (n.d.). Retrieved February 8, 2012, from AHIMA website: [http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1\\_012547.pdf\\*](http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_012547.pdf)

## Lecture 9c Charts, Tables, Figures

None in this lecture.

## Lecture 9c Images

None in this lecture.

## Unit Required Readings

None in this lecture.

## Unit Suggested Readings

1. "EHR Meltdown: How to Protect Your Patient Data: Sidebar: Implementing a Three-Dimensional Backup Plan" by Drs. Schackow, Palmer, and Epperly, 2008, [http://www.medscape.com/viewarticle/579131\\_sidebar2\\*](http://www.medscape.com/viewarticle/579131_sidebar2) An excellent article outlining 23 different backup strategies for EHR systems.

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\*Indicates this link is no longer functional.

2. “Fault Tolerant techniques for Distributed Systems” By Brian Setlic; Jul. 27, 2004 [Internet]. <http://www.ibm.com/developerworks/rational/library/114.html>\* This article outlines concepts behind fault tolerant computing, general fault tolerance procedures, dependency, distributed systems, and creating fault tolerant patterns for distributed systems.
3. “Enhanced Server Tolerance for Improved User Experience” by Manish Marwah, Shivakant Mishra, and Christof Fetzer, June 2008; [Article available via Internet] <http://www.cs.colorado.edu/~mishras/research/papers/dsn08.pdf>

### **Student Application Activities**

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comp8\_unit9\_activity\_key.doc  
comp8\_unit9\_self\_assess.doc  
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## Component 8/Unit 10

### Unit Title

#### Developing a Test Strategy and a Test Plan

### Unit Description

This Unit explores aspects of testing the system, including the use of performance baselines and the role of test plans.

### Unit Objectives

By the end of this unit the student will be able to:

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

### Unit Topics / Lecture Titles

10 Developing a Test Strategy and a Test Plan

### Unit References

(All links accessible as of 2/27/2012)

### Lecture 10

1. ““Acceptance testing” (2011).Wikipedia.[Internet] [http://en.wikipedia.org/wiki/Acceptance\\_testing](http://en.wikipedia.org/wiki/Acceptance_testing) .
2. Kumar, K. (2007, May 18). *Beginners Guide To Software Testing* . Retrieved February 10, 2012, from KR Testing Solutions website: <http://kuldeepse.wordpress.com/2007/05/18/beginners-guide-to-software-testing-i/>
3. Tucker, J. (2003, September). *Definition - smoke testing*. Retrieved February 10, 2012, from SearchWinDevelopment website: <http://searchwindevelopment.techtarget.com/definition/smoke-testing>
4. Turbit, N. (2006, January 30). *Developing a Test Strategy*. Retrieved from PROJECT PERFECT website: [http://www.projectperfect.com.au/downloads/Info/info\\_test\\_strategy.pdf](http://www.projectperfect.com.au/downloads/Info/info_test_strategy.pdf)
5. *What is Acceptance Testing*. (n.d.). Retrieved February 10, 2012, from wiseGEEK - Conjecture Corporation website: <http://www.wisegeek.com/what-is-acceptance-testing.htm>.

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\*Indicates this link is no longer functional.

## Lecture 10 Charts, Tables, Figures

- 10.1 Table. Turbit, N. (2006, January 30). *Developing a Test Strategy*. Retrieved from PROJECT PERFECT website: [http://www.projectperfect.com.au/downloads/Info/info\\_test\\_strategy.pdf](http://www.projectperfect.com.au/downloads/Info/info_test_strategy.pdf)
- 10.2 Table. Turbit, N. (2006, January 30). *Developing a Test Strategy*. Retrieved from PROJECT PERFECT website: [http://www.projectperfect.com.au/downloads/Info/info\\_test\\_strategy.pdf](http://www.projectperfect.com.au/downloads/Info/info_test_strategy.pdf)
- 10.3 Table., N. (2006, January 30). *Developing a Test Strategy*. Retrieved from PROJECT PERFECT website: [http://www.projectperfect.com.au/downloads/Info/info\\_test\\_strategy.pdf](http://www.projectperfect.com.au/downloads/Info/info_test_strategy.pdf)
- 10.4 Table. Turbit, N. (2006, January 30). *Developing a Test Strategy*. Retrieved from PROJECT PERFECT website: [http://www.projectperfect.com.au/downloads/Info/info\\_test\\_strategy.pdf](http://www.projectperfect.com.au/downloads/Info/info_test_strategy.pdf)
- 10.5 Table. Turbit, N. (2006, January 30). *Developing a Test Strategy*. Retrieved from PROJECT PERFECT website: [http://www.projectperfect.com.au/downloads/Info/info\\_test\\_strategy.pdf](http://www.projectperfect.com.au/downloads/Info/info_test_strategy.pdf)
- 10.6 Table. Turbit, N. (2006, January 30). *Developing a Test Strategy*. Retrieved from PROJECT PERFECT website: [http://www.projectperfect.com.au/downloads/Info/info\\_test\\_strategy.pdf](http://www.projectperfect.com.au/downloads/Info/info_test_strategy.pdf)
- 10.7 Table. Kumar, K. (2007, May 18). *Beginners Guide To Software Testing* . Retrieved February 10, 2012, from KR Testing Solutions website: <http://kuldeepse.wordpress.com/2007/05/18/beginners-guide-to-software-testing-i/> and Turbit, N. (2006, January 30). *Developing a Test Strategy*. Retrieved from PROJECT PERFECT website: [http://www.projectperfect.com.au/downloads/Info/info\\_test\\_strategy.pdf](http://www.projectperfect.com.au/downloads/Info/info_test_strategy.pdf)

## Lecture 10 Images

None in this lecture.

## Unit Required Readings

None in this lecture.

## Unit Suggested Readings

1. "Testing: Test Plan development" by Craig Borysowich. February 2005; [Internet]. <http://it.toolbox.com/blogs/enterprise-solutions/testing-test-plan-development-step-1-2923> This online resource outlines the 10 steps to developing a test plan...from assembling the team to analyzing the reports.

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2. "How to do Software User testing (UAT) Really Badly"; [Internet]. <http://www.eviltester.com/index.php/2008/03/07/how-to-do-software-user-acceptance-testing-uat-really-badly/> This author takes a more –tongue –in-cheek approach to user testing by outlining things done wrong over years of UAT testing experiences.
3. "What is User Acceptance Testing?." By Exforsys. [Internet]. <http://www.exforsys.com/tutorials/testing/what-is-user-acceptance-testing.html> This article defines user testing and discusses each of the fundamental tasks.
4. "How to Plan a User Acceptance Test." By Tammy Clevenger, eHow. [Internet]. [http://www.ehow.com/how\\_5245146\\_plan-user-acceptance-test.html](http://www.ehow.com/how_5245146_plan-user-acceptance-test.html) This article outlines 11 steps for planning a user acceptance test.
5. "User Acceptance Test Plan." By University of Minnesota. [Internet]. [www.uservices.umn.edu/pmo/docs/Test/TEMPLATE\\_UAT\\_Plan.doc](http://www.uservices.umn.edu/pmo/docs/Test/TEMPLATE_UAT_Plan.doc)\* This is a sample test plan template.

### **Student Application Activities**

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## Component 8/Unit 11

### Unit Title

#### Pilot Testing and Full-Scale Deployment

### Unit Description

This Unit explores aspects of deploying the system to end users, including communication, technical support, user feedback, and system resource evaluation including initial pilot testing to obtain feedback before full deployment, including planning, identifying the user group, setting up the system, and gathering feedback

### Unit Objectives

By the end of this unit the student will be able to:

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

### Unit Topics / Lecture Titles

11 Pilot Testing and Full-Scale Deployment

### Unit References

(All links accessible as of 2/10/2012)

### Lecture 11

1. Adler, K. (2007 February). How to Successfully Navigate Your EHR Implementation. *Fam Pract Manag.*, 14(2), 33-39. Retrieved from <http://www.aafp.org/fpm/2005/0200/p55.html>
2. *EHR Adoption - Implementing*. (n.d.). Retrieved February 9, 2012, from Rhode Island Quality Institute website: <http://www.docehrtalk.org/benefits-adoption/implementing>
3. Fullerton, C., Aponte, P., Hopkins III, R., Bragg, D., & Ballard, D. J. (2006). Lessons learned from pilot site implementation of an ambulatory electronic health record. *Proc (Bayl Univ Med Cent)*, 19, 303-310. Retrieved from [http://www.baylorhealth.edu/Documents/BUMC%20Proceedings/2006%20Vol%2019/No.%204/19\\_4\\_Fullerton.pdf](http://www.baylorhealth.edu/Documents/BUMC%20Proceedings/2006%20Vol%2019/No.%204/19_4_Fullerton.pdf)

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\*Indicates this link is no longer functional.

4. Huffmaster , T., & Holmes, M. L. (2008, June 18). *Selecting and Implementing a Communitywide EHR, Part 2*. Retrieved from Hospitals & Health Networks (H&HN) website: [http://www.hhnmag.com/hhnmag\\_app/jsp/articledisplay.jsp?dcrpath=HHNMOSTWIRED/Article/data/Spring2008/080618MW\\_Online\\_Huffmaster&domain=HHNMOSTWIRED\\*](http://www.hhnmag.com/hhnmag_app/jsp/articledisplay.jsp?dcrpath=HHNMOSTWIRED/Article/data/Spring2008/080618MW_Online_Huffmaster&domain=HHNMOSTWIRED*)
5. *The Design and Implementation of a Computerized Patient Record at the Ohio State University Health System – A Success Story*. (2001 Davies Organizational Award Winners). (2001). Retrieved from HIMSS website: [http://www.himss.org/content/files/davies\\_2001\\_osuhs.pdf](http://www.himss.org/content/files/davies_2001_osuhs.pdf)

### **Lecture 11 Charts, Tables, Figures**

None in this lecture.

### **Lecture 11 Images**

None in this lecture.

### **Unit Required Readings**

None in this lecture.

### **Unit Suggested Readings**

1. “Creating a New Software Plan” by Brien M. Posey. 2016; [Internet]. [http://articles.techrepublic.com.com/5100-10878\\_11-6130373.html](http://articles.techrepublic.com.com/5100-10878_11-6130373.html) Brien Posey discusses how to design a typical software development plan with emphasis on pilot testing, for organizational rollouts.
2. “Workflow - the Key Ingredient in Deploying EHR and CPOE Systems (two parts).” 2010; [Internet]. <http://www.santarosaconsulting.com/SantaRosaTeamBlog/post/2010/02/11/Workflow.aspx> <http://www.santarosaconsulting.com/SantaRosaTeamBlog/post/2010/02/17/Workflow-The-Key-Ingredient-in-Deploying-EHR-and-CPOE-Systems-Part-11.aspx> This article (part 1 and 2) emphasizes the importance of analyzing workflow design as a key ingredient in deploying EHR systems.

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3. "Selecting and Implementing a Communitywide EHR Parts 1 and 2." By Joe Sofianek and Michelle L. Holmes; [Internet]. [http://www.hhnmostwired.com/hhnmostwired\\_app/jsp/articledisplay.jsp?dcrpath=HHNMOSTWIRED/Article/data/Spring2008/080611MW\\_Online\\_Sofianek&domain=HHNMOSTWIRED](http://www.hhnmostwired.com/hhnmostwired_app/jsp/articledisplay.jsp?dcrpath=HHNMOSTWIRED/Article/data/Spring2008/080611MW_Online_Sofianek&domain=HHNMOSTWIRED) [http://www.hhnmag.com/hhnmag\\_app/jsp/articledisplay.jsp?dcrpath=HHNMOSTWIRED/Article/data/Spring2008/080618MW\\_Online\\_Huffmaster&domain=HHNMOSTWIRED\\*](http://www.hhnmag.com/hhnmag_app/jsp/articledisplay.jsp?dcrpath=HHNMOSTWIRED/Article/data/Spring2008/080618MW_Online_Huffmaster&domain=HHNMOSTWIRED*)

### **Student Application Activities**

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## Component Acronym Glossary

DCHI Acronym Guide (January 2011)

<b>Acronym</b>	<b>Name</b>
AAFP	American Academy of Family Physicians
ABIM	American Board of Internal Medicine
ACK	Acknowledgment (Data networks)
ACLs	Access Control Lists
ACM	Association for Computing Machinery
ACMI	American College of Medical Informatics
ACR	American College of Radiology
ADaM	Analysis Data Model (ADaM)
ADA	American Dental Association
ADEs	Adverse Drug Events
ADR	Adverse Drug Reaction
ADT	Admissions, Discharge, Transfer
AHIC	American Health Information Community
AHIMA	American Health Information Management Association
AHIP	America's Health Insurance Plans
AHRQ	Agency for Healthcare Research and Quality
AM	Amplitude Modulation
AMA	American Medical Association
AMIA	American Medical Informatics Association
ANSI	American National Standards Institute
API	Application Programming Interfaces
ARRA	American Recovery and Reinvestment Act
ASC X12	Accredited Standards Committee
ASTM	American Society for Testing And Materials
ASQ	American Society for Quality
ATA	American Telemedicine Association
ATCB	Authorized Testing and Certification Bodies
ATM	Asynchronous Transfer Mode
AUP	Acceptable Use Policy
BCMA	Bar Code Medication Administration
BCP	Business Continuity Planning
BIS	Bispectral Index
BMI	Body Mass Index
bps	Bits Per Second
BRIDG	Biomedical Research Integrated Domain Group
BSA	Body Surface Area

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BSLM	Bioinformatic Sequence Markup Language
CA	Certificate Authority
CaDSR	Cancer Data Standard Repository
CAP	College of American Pathologists
CBA	Cabarrus Health Alliance
CCD	Continuity of Care Document
CCHIT	Certification Commission for Healthcare Information Technology
CCOW	Clinical Context Object Workgroup (HL7)
CCR	Continuity of Care Record
CDA	Clinical Document Architecture
CDASH	Clinical Data Acquisition Standards Harmonization
CDC	Centers for Disease Control and Prevention
CDE	Common Data Elements
CDISC	Clinical Data Interchange Standards Consortium
CDM	Chronic Disease Management
CDS	Clinical Decision Support
CDSR	Cochrane Database of Systematic Reviews
CDSS	Clinical Decision Support System
CEN	European Committee for Standardization
CG	Clinical Genomics
CHF	Congestive Heart Failure
CHI	Consumer Health Informatics
CICA	Context Inspired Component Architecture
CIS	Clinical Information System
CMET	Common Message Element Type
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integration
CMS	Centers for Medicare and Medicaid Services
COPD	Chronic Obstructive Pulmonary Disease
COTS	Commercial Off-the-Shelf
CPM	Common Product Model
CPOE	Computerized Provider Order Entry
CPT	Current Procedural Terminology
CQI	Consumer Quality Initiatives
CRL	Certificate Revocation List
CRT	Cathode Ray Tube
CSI	Computable Semantic Interoperability
CSMA/CA	Carrier Sense Multiple Access/Collision Avoidance
CSMA/CD	Carrier Sense Multiple Access / Collision Detection

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CT	Computed Tomography
CTA	Center for Technology and Aging
CTSA	Clinical Translational Science Act
CWM	Common Warehouse Model
DAC	Discretionary Access Control
DAM	Domain Analysis Model
DFDs	Data Flow Diagrams
DHCP	Dynamic Host Configuration Protocol
DHHS	Department of Health and Human Services
DICOM	Digital Imaging and Communications in Medicine
DMAIC	Define, Measure, Analyze, Improve, Control
DMIM	Domain Message Information Model
DNS	Domain Name Service
DoD	Department of Defense
DoS	Denial of Service
DRG	Diagnosis-related Group
DSL	Digital Subscriber Line
DSS	Decision Support System
DSTU	Draft Standard for Trial Use
DTD	Document Type Definition
DURSA	Data Use and Reciprocal Support Agreement
EA	Enterprise Architecture
EBM	Evidence Based Medicine
ECG	Electrocardiography
ED	Emergency Department
EDI	Electronic Data Interchange
EDMS	Electronic Document Management System
EEG	Electroencephalogram
EHR	Electronic Health Records
EHR-FM	Electronic Health Record-Systems Functional Model
EHR-S	Electronic Health Record-Systems
EHRVA	Electronic Health Record Vendors Association
eMAR	Medication Administration Records
EMEA	European Medicines Agency
EMI	Electromagnetic Interference
eMR	Electronic Medical Records
EMR	Electronic Medical Records/ Patient Management
EMR/PM	Electronic Protected Health Information
ePHI	Enterprise Master Patient Index
EPMI	Electronic Prescribing

E-R	Entity-Relationship
ERDs	Entity-Relationship Diagrams
eRX	Electronic Prescribing
EVS	Enterprise Vocabulary Service
FACA	Federal Advisory Committee Act
FDA	Food and Drug Administration
FDDI	Fiber Data Distributed Interface
FERPA	Family Educational Rights and Privacy Act
FM	Frequency Modulation
FMEA	Failure Mode and Effects Analysis
FTP	File Transfer Protocol
FQHC	Federally Qualified Health Center
GDSN	Global Data Synchronisation Network
GELLO	an object-oriented expression language for clinical decision support
GEM	Guideline Elements Model
GIN	Generic Incident Notification
GIS	Geographic Information System
GLIF	GuideLine Interchange Format
HCD	Human Centered Design
HCIS	Health Care Information System
HDC	Health Disparities Collaborative
HDF	Hierarchical Data Format
HHS	U.S. Department of Health and Human Services
HIE	Health Information Exchange
HIM	Health Information Management
HIMSS	Health Information and Management Systems Society
HIPAA	Health Insurance Portability and Accountability Act
HIS	Health Information System or Hospital Information Systems
HISPC	Health Information Security and Privacy Collaboration
HIT	Health Information Technology
HITECH	Health Information Technology for Economic and Clinical Health
HITPC	Health Information Technology Policy Committee
HITSC	Health Information Technology Standards Committee
HITSP	Health Information Technology Standards Panel
HL7	Health Level Seven
HMD	Hierarchical Message Descriptions
HRSA	Health Resources and Services Administration

HSSP	Healthcare Services Specification Project
HTTP	Hypertext Transfer Protocol
HW	Hardware
Hz	Hertz
IANA	Internet Assigned Numbers Authority
ICD	International Classification of Diseases
ICD-10-CM	International Classification of Diseases, 10th Revision, Clinical Modification
ICH	International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use
ICMP	Internet Control Message Protocol
ICPC	International Classification of Primary Care
ICSR	Individual Case Safety Report
ICT	Information and Communication Technologies
ICU	Intensive Care Unit
IDS	Intrusion Detection System
IE	Internet Explorer
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IG	Implementation Guide (HL7)
IHE	Integrating the Healthcare Enterprise
IHS	Indian Health Services
IHTSDO	International Health Terminology Standards Development Organisation
IIS	Internet Information Services
INR	International Normalized Ratio
IOM	Institute of Medicine
IP	Internet Protocol
IP/OP	Inpatient/Outpatient
IS	Information System
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ISO/TC	International Organization for Standardization's (ISO) Technical Committee (TC) on health informatics
IT	Information Technology
ITS	Implementable Technology Specifications (HL7)
JIC	Joint Initiative Council
LAB	Laboratory Data Model

LAN	Local Area Network
LDAP	Lightweight Directory Access Protocol
Leapfrog Group	Consortium of major companies and other large private and public healthcare purchasers
LIMS	Lab Information Management System
LLC	Logical Link Control
LOINC	Logical Observation Identifiers Names and Codes
MAC	Mandatory Access Control
MAR	Medication Administration Record
MD	Medical Doctor
MDA	Model Driven Architecture
MDE	Master Data Element
MDF	Methodology Development Framework
MDM	Master Data Management
MEDCIN	System of standardized medical terminology developed by Medicomp Systems
MedDRA	Medical Dictionary for Regulatory Activities
MICR	Multipurpose Internet Mail Extensions
MIME	Magnetic Ink Character Recognition
MIS	Management Information System
MLM	Medical Logic Module
MLLP	Minimal Lower Layer Protocol
MMA	Medicare Prescription Drug, Improvement, and Modernization Act or Medicare Modernization Act
MMIS	Medicaid Management Information System
MOTS	Modifiable Off-the-Shelf
MPI	Master Patient Index
MSH	Message Header Segment
MU	Meaningful Use
NAHIT	National Alliance for Health Information Technology
NAT	Network Address Translation
NCPDP	National Council for Prescription Drug Programs
NCI	National Cancer Institute
NCI-CBIIT	National Committee on Vital Health Statistics
NCVHS	National Cancer Institute Center for Bioinformatics and Information Technology
NDC	National Drug Codes
NDF	National Drug File
NDF-RT	National Drug File-Reference Terminology
NEMA	National Electrical Manufacturers Association

NEDSS	National Electronic Disease Surveillance System
NETSS	National Electronic Telecommunications System for Surveillance
NetBUI	NetBios Extended User Interface
NGC	National Guideline Clearinghouse
NHIMG	National Health Information Management Group
NIC	Network Interface Cards
NIH	National Institutes of Health
NIST	National Institute for Standards and Technology
NIST-ATL	National Institute for Standards and Technology-Advanced Technology Laboratories
NHIN	Nationwide Health Information Network
NLB	Network Load Balancing
NLM	National Library of Medicine
NPI	National Provider Identifier
NRZ	Non Return to Zero
NTFS	New Technology File System
NQF	National Quality Forum
OASIS	Organization for the Advancement of Structured Information Standards
OCC	Office of Care Coordination
OCL	Object Constraint Language
OCR	Office of Civil Rights
ODM	Operational Data Model or Optical Character Recognition
OID	Object Identifier
OLAP	Online Analytical Processing
OMG	Object Management Group
ONC	Office of the National Coordinator for Health Information Technology
ONC-ATCB	Office of the National Coordinator Authorized Testing and Certification Body
OOD	Operating Room
OR	Object Oriented Design
OS	Operating System
OSI	Open Systems Interconnection
OTP	One-Time Passwords
OUI	Organizational Unique Identifier
OWL	Web Ontology Language
PACS	Picture Archiving and Communication Systems

PBMS	Pharmacy Benefit Managers
PCI	Peripheral Component Interconnect
PCT	Primary Care Trust
PDA's	Portable Digital Assistants or Personal Digital Assistants
PDCA	Plan-Do-Check-Act
PDSA	Plan-Do-Study-Act
PDU's	Protocol Data Units
PHDSC	Public Health Data Standards Consortium
PHER	Public Health Emergency Response
PHI	Protected Health Information
PHI	Personal Health Record
PHR	Public Health Informatics Institute
PHR-FM	Personal Health Record-Functional Model
PIC	Process Improvement Committee (HL7)
PIX	Patient Identifier Cross-Referencing
PKI	Public Key Infrastructure
PM	Project Management
PMH	Past Medical History
PMI	Patient Master Index
PMS	Practice Management System
POP	Post Office Protocol
PPP	Point-to-Point Protocol
QAP	Quality Assurance Project
QFD	Quality Function Deployment
QI	Quality Improvement
RA	Registration Authority
R-ADT	Reservation/Registration-Admission, Discharge, Transfer
RAID	Redundant Array of Independent Disks
RAM	Random Access Memory
RBAC	Role Based Access Control
RCRIM	Regulated Clinical Research Information Management
RELMA	Regenstrief LOINC Mapping Assistant
RF	Radio Frequency
RFI	Radio Frequency Interference
RFID	Radio Frequency Identifiers
RFP	Request For Proposal
RHIO's	Regional Health Information Organizations
RIM	Reference Information Model



RIS	Radiology Information Systems
RMIM	Refined Message Information Model
RMPI	Registry Master Patient Index
ROI	Return On Investment
RPM	Remote Patient Monitoring
RPS	Regulated Product Submission
RSNA	Radiological Society of North America
RX	Prescription
SAEAF	Services-Aware Enterprise Architecture Framework
SAIF	Services Aware Interoperability Framework
SAN	Storage Area Network
SATA	Serial Advanced Technology Attachment
SCO	SDO Charter Organization
SCSI	Small Computer System Interface
SDLC	Software Development Life Cycle
SDM	Systems Development Method
SDO	Standard Development Organization
SDTM	Study Data Tabulation Model
SEI	Subject Matter Expert
SME	Software Engineering Institute
SMTP	Simple Mail Transport Protocol
SNOMED	Systematized Nomenclature of Medicine
SNOMED CT	Systematized Nomenclature of Medicine--Clinical Terms
SNOMED RT	Systematized Nomenclature of Medicine--Reference Terminology
SNOP	Systematized Nomenclature of Pathology
SOA	Service Oriented Architecture
SOAP	Simple Object Application Protocol
SOP	Structured Product Labeling
SPC	Statistical Process Control
SPL	Standard Operating Procedure
SSA	Social Security Administration
SSID	Service Set Identifier
SSL	Secure Socket Layer
SSN	Social Security Number
SSO	Single Sign-On
STP	Shielded Twisted-Pair
TCP/IP	Transmission Control Protocol / Internet Protocol
TEPR	Toward an Electronic Patient Record Conference

TLS	Transport Layer Security
TOC	Table of Contents
TP	Twisted-Pair
TPS	Transaction Processing System
TSC	HL7 Technical Steering Committee
TTL	Time to Live
UAT	User Acceptance Testing
UDP	User Datagram Protocol
UML	Uniform Modeling Language
UMLS	Unified Medical Language System
URLs	Universal Resources Locators
UPI	Unique Patient Identifier
UPS	Un-interrupted power supply
US	Ultrasound
USB	Universal Serial Bus
US TAG	U.S. Technical Advisory Group
UTP	Unshielded Twisted-Pair
VA	Veterans Administration
VA_NDF-RT	Veterans Administration National Drug File-Reference Terminology
vMR	Virtual Medical Record
VPN	Virtual Private Network
VSS	Volume Shadow Copy Service
VUHID	Voluntary Universal Healthcare Identification System
VUMC	Vanderbilt University Medical Center
W3C	World Wide Web Consortium
WAN	Wide Area Network
WAP	Wireless Access Point
WHO	World Health Organization
WLAN	Wireless Local Area Network
WONCA	World Organization of National Colleges, Academies and Academic Associations of General Practitioners/ Family Physicians. (World Organization of Family Doctors)
WSDL	Web Services Description Language
WWW	World Wide Web
XDR	External Data Representation
XML	Extensible Markup Language



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## **Appendix 1: Sunny Happy Care Family Practice Scenario**

Activities have been created throughout this component referencing Sunny Happy Care to provide a more relevant and consistent experience for the student. The example was intentionally written to provide flexibility for the instructor, who can tailor the example to best meet the specific needs for the component.

The Sunny Happy Care documentation includes:

- An introductory lecture outlining Sunny Happy Care Family Practice (SHCFP)
- Notes and guidelines for using SHCFP documents
- Floor Plans for SHCFP, one with networking ports, one without.
- These documents can be found in the zip with file name: comp8\_SHC\_scenario.zip