



Curriculum Development  
Centers Program

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

# **Component 9: Networking and Health Information Exchange 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:

1. Learning objectives
2. Suggested student readings, texts, reference links to supplement the narrated PowerPoint slides
3. 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

1. Application Activities (e.g., discussion questions, assignments, projects) with instructor guidelines, answer keys and/or expected outcomes

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## Component Overview

This unit will address the OSI, including the purpose and content of each of its seven layers: physical, data link, network, transport, session, presentation, and application. Products, processes, protocols and tools at each level will be explained. This unit will also focus on the flow of data through the models as data is transmitted and receive by end devices.

## Component Objectives

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

- Explain the functions of all layers of the ISO OSI models, including how they are interconnected and supported.
- Recommend components of networking hardware that meet standards and support information exchange.
- Analyze standards associated with the EHR functional model, the PHR functional model, and the family of profiles associated with specific domain functional requirements
- Explain the process and value of EHR certification.
- Describe data standards required for the interoperable exchange of health care data, including terminology, data elements, document standards, imaging standards, and medical device standards.
- Describe components of health IT standards (including HL7 and TC215) for health information exchange used by various stakeholders.
- Examine additional standards related to shared and effective use of data, including clinical decision support.
- Describe enterprise architecture models; including centralization vs federation and grids, service oriented architectures, and local implementations with respect to systems from single units to organizations, regions (RHIOS and HIEs), states, and nationwide healthcare information systems (NHIN).
- Incorporate professional and regulatory standards related to privacy, confidentiality, and security when implementing and maintaining networks and health information exchange systems, including NHIN.

## **Component Authors**

### **Assigned Institution**

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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 9/Unit 1

### Unit Title

### ISO Open Systems Interconnection (OSI)

### Unit Description

This unit will address the OSI, including the purpose and content of each of its seven layers: physical, data link, network, transport, session, presentation, and application. Products, processes, protocols and tools at each level will be explained. This unit will also focus on the flow of data through the models as data is transmitted and receive by end devices.

### Unit Objectives

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

1. Explain the OSI representation of the various layers involved in networking, including the general functions of each layer and their interconnections
2. Explain the concept of the Application layer
3. Explain the concept of the Presentation layer
4. Explain the concept of the Session Layer
5. Explain the concept of the Transport layer
6. Explain the concept of the Network layer
7. Explain the concept of the Data Link layer
8. Explain the concept of the Physical layer
9. Explain connection-oriented versus connectionless communication
10. Explain the use of network addressing including security considerations and vulnerabilities

### Unit Topics / Lecture Titles

1a Application, Presentation, Session and Transport Layers of the OSI model

1b Network, Data Link and Physical Layers of the OSI model

### Unit References

(All links accessible as of 1/5/2012)

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\*Indicates this link is no longer functional.



## Lecture 1a

1. *LLP - Lower Layer Protocol*. (n.d.). Retrieved January 6, 2012, from INTERFACEWARE™ Inc. website: <http://www.interfaceware.com/llp.html>
2. *MIME: Multipurpose Internet Mail Extensions*. (n.d.). Retrieved January 6, 2012, from Network Dictionary website: <http://www.networkdictionary.com/protocols/mime.php>
3. Network Working Group. (1987, June). *XDR: External Data Representation Standard*. Retrieved from Sun Microsystems website: <http://tools.ietf.org/html/rfc1014>

## Lecture 1a Charts, Tables and Figures

- 1.1 Table: Parrish, Michele. 2011.
- 1.2 Table: Parrish, Michele. 2011.
- 1.3 Table: Parrish, Michele. 2011.

## Lecture 1a Images

Slide 5: Source, Medium and Receiver. Courtesy Michele Parrish. Used with permission.

Slide 9: OSI Model showing layers and their functions. Courtesy Michele Parrish. Used with permission.

Slide 10: Model Comparison. Courtesy Michele Parrish. Used with permission.

Slide 11: PDU. Courtesy Michele Parrish. Used with permission.

Slide 12: Protocols. Courtesy Michele Parrish. Used with permission.

Slide 20: Handshake. Courtesy Michele Parrish. Used with permission.

Slide 21: Sequence. Courtesy Michele Parrish. Used with permission.

Slide 22: Acknowledgements. Courtesy Michele Parrish. Used with permission.

Slide 23: Window Sizing. Courtesy Michele Parrish. Used with permission.

## Lecture 1b

None were used for this lecture.

## Lecture 1b Charts, Tables and Figures

None were used for this lecture.

## Lecture 1b Images

Slide 6: IPv4 Addresses. Courtesy Michele Parrish. Used with permission.

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Slide 7: Special IP Addresses. Courtesy Michele Parrish. Used with permission.  
Slide 9: IP Address Parts. Courtesy Michele Parrish. Used with permission.  
Slide 11: Subnetting. Courtesy Michele Parrish. Used with permission.  
Slide 12: Router. Courtesy Michele Parrish. Used with permission.  
Slide 15: Ping. Courtesy Michele Parrish. Used with permission.  
Slide 16: Tracert. Courtesy Michele Parrish. Used with permission.  
Slide 17: Data Link. Courtesy Michele Parrish. Used with permission.  
Slide 18: MAC Addresses. Courtesy Michele Parrish. Used with permission.

### Unit Required Readings

None

### Student Application Activities

1. *Internetworking Basics*. This article includes terminology used in networking, networking basics and an in-depth look at each layer of the OSI model. [http://docwiki.cisco.com/wiki/Internetworking\\_Technology\\_Handbook](http://docwiki.cisco.com/wiki/Internetworking_Technology_Handbook)
2. *Port Numbers*. This is the official IANA document that lists all port numbers and their associated protocols/applications. <http://www.iana.org/assignments/port-numbers>
3. *Frame Relay*. More information about frame relay. [http://docwiki.cisco.com/wiki/Internetworking\\_Technology\\_Handbook](http://docwiki.cisco.com/wiki/Internetworking_Technology_Handbook)
4. *PPP*. More information about PPP. [http://docwiki.cisco.com/wiki/Internetworking\\_Technology\\_Handbook](http://docwiki.cisco.com/wiki/Internetworking_Technology_Handbook)
5. *ATM*. More information about ATM. <http://www.telecomspace.com/vop-atm.html>
6. *NRZ Encoding*. More information about NRZ. <http://www.erg.abdn.ac.uk/users/gorry/course/phy-pages/nrz.html>
7. *Manchester Encoding*. More information about Manchester. <http://www.erg.abdn.ac.uk/users/gorry/course/phy-pages/man.html>

### Student Application Activities

Comp9\_unit1\_activity.doc  
Comp9\_unit1\_activity\_key.doc  
Comp9\_unit1\_self\_assess.doc  
Comp9\_unit1\_self\_assess\_key.doc

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\*Indicates this link is no longer functional.

## **Component 9/Unit 2**

### **Unit Title**

#### **Network Media and Hardware Communication Devices**

### **Unit Description**

This unit is designed to help the student understand network media, hardware devices, and how to select appropriate items to meet the guidelines for usage.

### **Unit Objectives**

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

1. Select appropriate network media types (such as Ethernet and Wireless) to facilitate networking and data exchange, taking into account access and regulatory requirements
2. Select appropriate hardware devices (such as routers, switches, and access points) to facilitate networking and data exchange, taking into account access and regulatory requirements

### **Unit Topics / Lecture Titles**

- 2a Network media
- 2b Network media
- 2c Hardware devices

### **Unit References**

(All links accessible as of 2/1/2012)

#### **Lecture 2a**

References were not used for this lecture.

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

None

#### **Lecture 2a Images**

Slide 3: Signals. Courtesy Michele Parrish. Used with permission.

Slide 5: Data Modulation. Courtesy Michele Parrish. Used with permission.

Slide 11: NICs. Courtesy Michele Parrish. Used with permission.

Slide 12: Wireless NICs. Courtesy Michele Parrish. Used with permission.

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\*Indicates this link is no longer functional.

## **Lecture 2b**

References were not used for this lecture.

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

2.1 Table: Parrish, Michele. 2011.

### **Lecture 2b Images**

Slide 4: Coaxial cable. Courtesy Michele Parrish. Used with permission.

Slide 5: Bayonet Neill-Concelman (BNC) connector. Courtesy Michele Parrish. Used with permission.

Slide 6: Twisted Pair (TP) Cable. Courtesy Michele Parrish. Used with permission.

Slide 7: RJ-45. Courtesy Michele Parrish. Used with permission.

Slide 8: T568A or T568B standards. Courtesy Michele Parrish. Used with permission.

Slide 10: Fiber Optic Cable. Courtesy Michele Parrish. Used with permission.

Slide 11: Copyright(c) Mrzeon and made available under Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic, and 1.0 Generic ([http://en.wikipedia.org/wiki/File:Optical\\_fiber\\_types.svg](http://en.wikipedia.org/wiki/File:Optical_fiber_types.svg))

Slide 13: Patch. Courtesy Michele Parrish. Used with permission

Slide 14: Horizontal Wiring. Courtesy Michele Parrish. Used with permission.

Slide 15: Work Area Outlet. Courtesy Michele Parrish. Used with permission.

## **Lecture 2c**

References were not used for this lecture.

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

None

### **Lecture 2c Images**

Slide 4: Hub. Courtesy Michele Parrish. Used with permission.

Slide 5: Switch. Courtesy Michele Parrish. Used with permission.

Slide 7: Back of Router. Courtesy Michele Parrish. Used with permission.

Slide 9: WAP. Courtesy Michele Parrish. Used with permission.

Slide 10: DSL Modem. Courtesy Michele Parrish. Used with permission.

Slide 11: Cable Modem. Courtesy Michele Parrish. Used with permission.

### **Unit Required Readings**

None

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\*Indicates this link is no longer functional.

## Student Application Activities

1. *How Digital Television Works*. On June 12, 2009 the United States transitioned from analog tv signals to all digital tv signals. Read about the difference between analog and digital tv and why the change was made. <http://electronics.howstuffworks.com/dtv.htm>
2. *List of device bit rates*. This article contains listings of the bandwidth for LANs, WANs, wireless networks and other devices. Bandwidth is important in determining the “pipe” that your data will be able to travel down. The bigger the bandwidth, the bigger the “pipe”. [http://en.wikipedia.org/wiki/List\\_of\\_device\\_bandwidths](http://en.wikipedia.org/wiki/List_of_device_bandwidths)
3. *Cabling*. This article includes information about the different types of network media including the categories of twisted pair and media connectors. <http://fcit.usf.edu/network/chap4/chap4.htm>
4. *GetConnected - Tech Talk - Ethernet Cables and Router Speed*. This video presents information about Ethernet cables and router speed. It discusses the type of cabling that you would use in a home or small network. 5 minutes and 50 seconds long. <http://www.youtube.com/watch?v=Qlibd2Fu3bo>
5. *Introduction to Structured Cabling*. This paper describes why the structured cabling standard should be followed and what the standard entails. Note: Since this is a 2000 document some of the bandwidth information may be out of date. <http://www.dit.gov.bt/sites/default/files/cablingstandard.pdf>
6. *Computer Basics: What Is a Computer Router?* This video explains what a router does. It includes captions. 2 minutes and 5 seconds long. [http://www.youtube.com/watch?v=9LhKWdkZvU&feature=PlayList&p=8B1DE1B35CA215B2&playnext\\_from=PL&index=14](http://www.youtube.com/watch?v=9LhKWdkZvU&feature=PlayList&p=8B1DE1B35CA215B2&playnext_from=PL&index=14)
7. *How to Make an Ethernet Cat5e/Cat6 Cable*. This page shows how to make a twisted pair cable. It shows the tools that are needed to make the cable. It also includes a video showing the process. Video is 7 minutes and 18 seconds long. <http://discountlowvoltage.blogspot.com/2009/10/how-to-make-ethernet-cat5e-cable.html>

## Student Application Activities

Comp9\_unit2\_activity.doc  
Comp9\_unit2\_activity\_key.doc  
Comp9\_unit2\_self\_assess.doc  
Comp9\_unit2\_self\_assess\_key.doc

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\*Indicates this link is no longer functional.

## **Component 9/Unit 3**

### **Unit Title**

#### **National and International Standards Developing Organizations**

### **Unit Description**

This unit introduces students to the national and international organizations that create standards used in networking and health information exchange

### **Unit Objectives**

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

1. Explain why standards related to networking and health information exchange are important in the current environment.
2. Standards development
3. How standards are developed
4. Who develops them
5. How standards are accredited
6. How standards are selected
7. Understand different kinds of standards being developed and for what purpose
8. Learn about Standards Developing Organizations and the standards they create
9. Demonstrate how to find, obtain, and use standards that are needed to facilitate networking and health information exchange

### **Unit Topics / Lecture Titles**

- 3a Importance of standards and their development
- 3b Kinds of standards
- 3c Standard organizations

### **Unit References**

(All links accessible as of 2/1/2012)

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\*Indicates this link is no longer functional.

## Lecture 3a

Additional resources for information contained in this lecture

1. *TC 215 Health Informatics*. (n.d.). Retrieved January 10, 2012, from ISO (International Organization for Standardization) website: [http://www.iso.org/iso/iso\\_technical\\_committee?commid=54960](http://www.iso.org/iso/iso_technical_committee?commid=54960)
2. *Technical Committees, Workshops and other bodies*. (n.d.). Retrieved January 10, 2012, from CEN (Comité Européen de Normalisation) website: <http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Pages/default.aspx?param=6232&title=CEN/TC%20251>
3. *Health Level Seven International*. (n.d.). Retrieved January 10, 2012, from HL7 website: <http://www.hl7.org>
4. *DICOM (Digital Imaging and Communications in Medicine)*. (n.d.). Retrieved January 10, 2012, from Medical Imaging & Technology Alliance - a division of NEMA website: <http://medical.nema.org/>
5. *IEEE Advancing Technology for Humanity*. (n.d.). Retrieved January 10, 2012, from IEEE website: <http://www.IEEE.org>
6. *CDISC Strength Through Collaboration*. (n.d.). Retrieved January 10, 2012, from Clinical Data Interchange Standards Consortium website: <http://www.cdisc.org>
7. *GS1 The global language of business*. (n.d.). Retrieved January 10, 2012, from <http://www.gs1.org>
8. *Welcome to IHTSDO*. (n.d.). Retrieved January 10, 2012, from International Health Terminology Standards Development Organisation website: <http://www.ihtsdo.org>
9. *Joint Initiative on SDO Global Health Informatics Standardization*. (n.d.). Retrieved January 10, 2012, from Health Level Seven International website: <http://www.jointinitiativecouncil.org/>
10. *World Health Organization*. (n.d.). Retrieved January 10, 2012, from WHO website: <http://www.who.int>
11. *OMG*. (n.d.). Retrieved January 10, 2012, from Object Management Group, Inc. website: <http://www.omg.org>
12. *IHE - Welcome to Integrating the Healthcare Enterprise*. (n.d.). Retrieved January 10, 2012, from IHE International website: <http://www.ihe.net>
13. *openEHR - Welcome to openEHR*. (n.d.). Retrieved January 10, 2012, from openEHR website: <http://www.openehr.org>
14. *OASIS - Advancing open standards for the information society*. (n.d.). Retrieved January 10, 2012, from OASIS website: <http://www.oasis-open.org>

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\*Indicates this link is no longer functional.

15. W3C. (n.d.). Retrieved January 10, 2012, from W3C website: <http://www.w3.org/>
16. *The Internet Engineering Task Force (IETF)*. (n.d.). Retrieved January 10, 2012, from Internet Society website: <http://www.ietf.org>
17. *ASTM International - Welcome to ASTM.org*. (n.d.). Retrieved January 10, 2012, from ASTM International website: <http://www.astm.org>
18. *ASCX12 - About ASC X12*. (n.d.). Retrieved January 10, 2012, from ASC X12 website: <http://www.x12.org>
19. *National Council for Prescription Drug Programs*. (n.d.). Retrieved January 10, 2012, from <http://www.ncpdp.org>
20. *MedBiquitous Advancing Healthcare Education Through Collaboration*. (n.d.). Retrieved January 10, 2012, from MedBiquitous Consortium website: <http://www.medbiq.org>
21. *American Dental Association*. (n.d.). Retrieved January 10, 2012, from American Dental Association website: <http://www.ada.org>
22. *ANSI - American National Standards Institute*. (n.d.). Retrieved January 10, 2012, from <http://www.ansi.org>
23. *National Institute of Standards and Technology*. (n.d.). Retrieved January 10, 2012, from U.S. Department of Commerce website: <http://www.nist.gov>
24. *National Quality Forum*. (n.d.). Retrieved January 10, 2012, from The National Quality Forum website: <http://www.qualityforum.org>
25. *U.S. National Library of Medicine - National Institutes of Health*. (n.d.). Retrieved January 10, 2012, from U.S. National Library of Medicine website: <http://www.nlm.nih.gov>
26. *ANSI Accredited U.S. Technical Advisory Groups (TAGs) to ISO*. (n.d.). Retrieved January 10, 2012, from [http://www.ansi.org/standards\\_activities/iso\\_programs/tag\\_iso.aspx](http://www.ansi.org/standards_activities/iso_programs/tag_iso.aspx)

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

None

### **Lecture 3a Images**

Slide 5 – Photos courtesy of Dr. Ed Hammond

Slide 6 – Photos courtesy of Dr. Ed Hammond

Slide 7 – Photos courtesy of Dr. Ed Hammond

Slide 8 – *File:Brueghel-tower-of-babel.jpg*. (n.d.). Retrieved January 10, 2012, from Wikipedia, the free encyclopedia website: <http://en.wikipedia.org/wiki/File:Brueghel-tower-of-babel.jpg>

Slide 11 – Image courtesy of Dr. Ed Hammond

Slide 23 – Image courtesy of Dr. Ed Hammond

\*Indicates this link is no longer functional.



## Lecture 3b

Additional resources for information contained in this lecture

1. *TC 215 Health Informatics*. (n.d.). Retrieved January 10, 2012, from ISO (International Organization for Standardization) website: [http://www.iso.org/iso/iso\\_technical\\_committee?commid=54960](http://www.iso.org/iso/iso_technical_committee?commid=54960)
2. *Technical Committees, Workshops and other bodies*. (n.d.). Retrieved January 10, 2012, from CEN (Comité Européen de Normalisation) website: <http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Pages/default.aspx?param=6232&title=CEN/TC%20251>
3. *Health Level Seven International*. (n.d.). Retrieved January 10, 2012, from HL7 website: <http://www.hl7.org>
4. *DICOM (Digital Imaging and Communications in Medicine)*. (n.d.). Retrieved January 10, 2012, from Medical Imaging & Technology Alliance - a division of NEMA website: <http://medical.nema.org/>
5. *IEEE Advancing Technology for Humanity*. (n.d.). Retrieved January 10, 2012, from IEEE website: <http://www.IEEE.org>
6. *CDISC Strength Through Collaboration*. (n.d.). Retrieved January 10, 2012, from Clinical Data Interchange Standards Consortium website: <http://www.cdisc.org>
7. *GS1 The global language of business*. (n.d.). Retrieved January 10, 2012, from <http://www.gs1.org>
8. *Welcome to IHTSDO*. (n.d.). Retrieved January 10, 2012, from International Health Terminology Standards Development Organisation website: <http://www.ihtsdo.org>
9. *Joint Initiative on SDO Global Health Informatics Standardization*. (n.d.). Retrieved January 10, 2012, from Health Level Seven International website: <http://www.jointinitiativecouncil.org/>
10. *World Health Organization*. (n.d.). Retrieved January 10, 2012, from WHO website: <http://www.who.int>
11. *OMG*. (n.d.). Retrieved January 10, 2012, from Object Management Group, Inc. website: <http://www.omg.org>
12. *TC 215 Health Informatics*. (n.d.). Retrieved January 10, 2012, from ISO (International Organization for Standardization) website: [http://www.iso.org/iso/iso\\_technical\\_committee?commid=54960](http://www.iso.org/iso/iso_technical_committee?commid=54960)
13. *Technical Committees, Workshops and other bodies*. (n.d.). Retrieved January 10, 2012, from CEN (Comité Européen de Normalisation) website: <http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Pages/default.aspx?param=6232&title=CEN/TC%20251>

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\*Indicates this link is no longer functional.

14. *Health Level Seven International*. (n.d.). Retrieved January 10, 2012, from HL7 website: <http://www.hl7.org>
15. *DICOM (Digital Imaging and Communications in Medicine)*. (n.d.). Retrieved January 10, 2012, from Medical Imaging & Technology Alliance - a division of NEMA website: <http://medical.nema.org/>
16. *IEEE Advancing Technology for Humanity*. (n.d.). Retrieved January 10, 2012, from IEEE website: <http://www.IEEE.org>
17. *CDISC Strength Through Collaboration*. (n.d.). Retrieved January 10, 2012, from Clinical Data Interchange Standards Consortium website: <http://www.cdisc.org>
18. *GS1 The global language of business*. (n.d.). Retrieved January 10, 2012, from <http://www.gs1.org>
19. *Welcome to IHTSDO*. (n.d.). Retrieved January 10, 2012, from International Health Terminology Standards Development Organisation website: <http://www.ihtsdo.org>
20. *Joint Initiative on SDO Global Health Informatics Standardization*. (n.d.). Retrieved January 10, 2012, from Health Level Seven International website: <http://www.jointinitiativecouncil.org/>
21. *World Health Organization*. (n.d.). Retrieved January 10, 2012, from WHO website: <http://www.who.int>
22. *OMG*. (n.d.). Retrieved January 10, 2012, from Object Management Group, Inc. website: <http://www.omg.org>
23. *National Quality Forum*. (n.d.). Retrieved January 10, 2012, from The National Quality Forum website: <http://www.qualityforum.org>
24. *U.S. National Library of Medicine - National Institutes of Health*. (n.d.). Retrieved January 10, 2012, from U.S. National Library of Medicine website: <http://www.nlm.nih.gov>
25. *ANSI Accredited U.S. Technical Advisory Groups (TAGs) to ISO*. (n.d.). Retrieved January 10, 2012, from [http://www.ansi.org/standards\\_activities/iso\\_programs/tag\\_iso.aspx](http://www.ansi.org/standards_activities/iso_programs/tag_iso.aspx)

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

None

### **Lecture 3b Images**

None

### **Lecture 3c**

1. *Clinical Trials Networks Best Practices - Standards Inventory*. (n.d.). Retrieved January 10, 2012, from [http://www.ctnbestpractices.org/standards-inventory\\*](http://www.ctnbestpractices.org/standards-inventory*)

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\*Indicates this link is no longer functional.

2. Joint Initiative for Global Standards Harmonization Health Informatics Document Registry and Glossary . (n.d.). Retrieved January 10, 2012, from <http://www.skmtglossary.org>
3. *Main Page* - [http://IHEWiki.wustl.edu\\*](http://IHEWiki.wustl.edu*): *Support of IHE Connectathons*. (n.d.). Retrieved January 10, 2012, from [http://ihewiki.wustl.edu/wiki/index.php/Main\\_Page](http://ihewiki.wustl.edu/wiki/index.php/Main_Page)

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

- 3.1 Table: created by Dr. Ed Hammond
- 3.2 Table: created by Dr. Ed Hammond

### **Lecture 3c Images**

Slide 22: courtesy of Dr. Ed Hammond

### **Unit Required Readings**

None

### **Student Application Activities**

1. ISO TC 215 [http://www.iso.org/iso/iso\\_technical\\_committee?commid=54960](http://www.iso.org/iso/iso_technical_committee?commid=54960)
2. Health Level 7 <http://www.hl7.org>
3. CDISC <http://www.cdisc.org>
4. CEN <http://www.cen.eu/cen/Sectors/Sectors/ISSS/Committees>
5. GS1 <http://www.gs1.org>
6. NCPDP <http://www.ncdp.org>
7. ASC X12N <http://www.x12n.org>
8. ASTM E31 <http://www.astm.org/COMMIT/COMMITTEE/E31>
9. IHE [http://www.himss.org/ASP/topics\\_ihe\\*](http://www.himss.org/ASP/topics_ihe*)
10. DICOM <http://medical.nema.org/>
11. IHTSDO <http://www.ihtsdo.org>
12. ONC [http://healthit.hhs.gov/portal/server.pt?open=512&objID=1200&mode=2\\*](http://healthit.hhs.gov/portal/server.pt?open=512&objID=1200&mode=2*)

### **Student Application Activities**

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 Comp9\_unit3\_activity\_key.doc  
 Comp9\_unit3\_self\_assess.doc  
 Comp9\_unit3\_self\_assess\_key.doc

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\*Indicates this link is no longer functional.

## Component 9/Unit 4

### Unit Title

#### Basic Health Data Standards

### Unit Description

This unit provides an orientation to the important data-related standards that enable interoperable health data interchange.

### Unit Objectives

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

1. Understand why it is necessary to use a common set of data elements with common names to be able to exchange and understand data from other places.
2. Understand what is meant by semantic interoperability.
3. Understand many of the sets of controlled vocabularies in use today – how they are used and who requires their use.
4. Understand the use, purpose and interrelation among sets of controlled vocabularies in use today.
5. Identify the more common controlled vocabularies in use today: ICD, CPT, DRG, NDC, RxNorm, and LOINC.
6. Identify the more common controlled vocabularies in use today: SNOMED, MEDCIN, MedDRA, Nursing terminologies, MeSH and UMLS.
7. Understand data elements; attributes of data elements.
8. Understand contribution of master meta-dictionary of data elements to semantic interoperability.
9. Explain how data structures can be built from basic data components.
10. Explain how templates and archetypes facilitate networking and information interchange.
11. Discuss Clinical Data Architecture (CDA), Continuity of Care Document (CCD), and Continuity of Care Record (CCR) Standards.

### Unit Topics / Lecture Titles

- 4a Semantic interoperability
- 4b Controlled vocabularies
- 4c Common controlled vocabularies in use today
- 4d Data elements

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\*Indicates this link is no longer functional.

4e Data structures

4f Clinical Data Architecture (CDA), Continuity of Care Document (CCD), and Continuity of Care Record (CCR) Standards

### Unit References

(All links accessible as of 2/1/2012)

### Lecture 4a

References were not used for this lecture.

### Lecture 4a Charts, Tables and Figures

None

### Lecture 4a Images

Slide 8: Photo courtesy of Dr. Betsy Humphreys of the NLM.

### Lecture 4b

1. *About DailyMed*. (n.d.). Retrieved January 12, 2012, from US National Library of Medicine, National Institutes of Health, Health & Human Services website: <http://dailymed.nlm.nih.gov/dailymed/about.cfm?CFID=22312512&CFTOKEN=586f234f58295f23-D2B4FA2C-B960-FECD-06EEEBDF69260A36&jsessionid=ca30bb9945e02b1a6f29>
2. Brown SH, Elkin ST, Rosenbloom ST, etc. VA National Drug File Reference Terminology: a cross-institutional content coverage study. *Stud Health Technol Inform*. 2004;107(Pt 1):477-81.
3. Cimino, JJ. Desiderata for controlled medical vocabularies in the Twenty-First Century. *Methods of Information in Medicine*, 1998; 37(4-5); 394-403.
4. *RELMA Regenstrief LOINC Mapping Assistant*. (n.d.). Retrieved January 12, 2012, from Regenstrief Institute, Inc. website: [http://loinc.org/relma/index\\_html/?searchterm=Windows-based%20mapping](http://loinc.org/relma/index_html/?searchterm=Windows-based%20mapping)
5. Standards Task Force. (2011). *Healthcare Informatics Organizations Participating in Standards Activities*. Retrieved from Healthcare Information and Management Systems (HIMSS) website: <http://himss.org/content/files/HealthcareInformaticsOrganizationsSDOJAN2011.pdf>\*

### Lecture 4b Charts, Tables and Figures

None

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\*Indicates this link is no longer functional.

## Lecture 4b Images

Slide 7: Courtesy of Dr. James J. Cimino, NIH Clinical Center

Slide 8: Courtesy of Dr. James J. Cimino, NIH Clinical Center

Slide 17: Courtesy of Dr. James J. Cimino, NIH Clinical Center

## Lecture 4c

1. Lindberg, D. A. B., Humphreys, B. L., & McCray, A. T. (1993). The Unified Medical Language System. *Methods Inform. Medicine*, 32, 281.

## Lecture 4c Charts, Tables and Figures

4.2 Table. Courtesy of Dr. James J. Cimino, NIH Clinical Center.

4.3 Table. Courtesy of Dr. James J. Cimino, NIH Clinical Center.

## Lecture 4c Images

Slide 10: Source: Courtesy of Dr. James J. Cimino, NIH Clinical Center.

## Lecture 4d

1. *USHIK United States Health Information Knowledgebase*. (n.d.). Retrieved January 12, 2012, from US Department of Health & Human Services: Agency for Healthcare Research and Quality website: <http://ushik.ahrq.gov/>
2. *ISO/IEC JTC1 SC32 WG2 Development/Maintenance*. (2010, October 25). Retrieved January 12, 2012, from ISO (International Organization for Standardization) website: <http://metadata-stds.org/11179/>
3. *National Cancer Institute*. (n.d.). Retrieved January 12, 2012, from National Cancer Institute at the National Institutes of Health website: <http://www.cancer.gov/>
4. *caBig (Cancer Biomedical Informatics Grid)*. (n.d.). Retrieved January 12, 2012, from National Cancer Institute website: [https://gforge.nci.nih.gov/projects/cadsrgeneral\\*](https://gforge.nci.nih.gov/projects/cadsrgeneral*)

## Lecture 4d Charts, Tables and Figures

4.4 Table: Source: *METeOR Metadata Online Registry: Person-sex, code N*. (n.d.). Retrieved January 12, 2012, from Australian Government: Australian Institute of Health and Welfare website: <http://meteor.aihw.gov.au/content/index.phtml/itemId/287316>

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\*Indicates this link is no longer functional.

4.5 Table: Source: *METeOR Metadata Online Registry: Person-sex, code N.* (n.d.). Retrieved January 12, 2012, from Australian Government: Australian Institute of Health and Welfare website: <http://meteor.aihw.gov.au/content/index.phtml/itemId/287316>

#### **Lecture 4d Images**

Slide 27: Source: W. Ed Hammond, PhD

#### **Lecture 4e**

1. *Detailed Clinical Models.* (n.d.). Retrieved from HL7 International website: [http://wiki.hl7.org/index.php?title=Detailed\\_Clinical\\_Models](http://wiki.hl7.org/index.php?title=Detailed_Clinical_Models)

Acknowledgement: Material used in this lecture comes from the following sources

1. *Health Level Seven International.* (n.d.). Retrieved January 12, 2012, from Health Level Seven International website: <http://www.hl7.org>
2. *openEHR.* (n.d.). Retrieved January 12, 2012, from openEHR website: <http://www.openehr.org>
3. *International Organization for Standardization.* (n.d.). Retrieved January 12, 2012, from ISO website: [http://www.iso.org/iso/iso\\_technical\\_committee?commid=54960](http://www.iso.org/iso/iso_technical_committee?commid=54960)
4. *cen - European Committee for Standardization.* (n.d.). Retrieved January 12, 2012, from CEN website: <http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Pages/default.aspx?param=6232&title=CEN/TC%20251>

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

None

#### **Lecture 4e Images**

None

#### **Lecture 4f**

Acknowledgement: Material used in this lecture comes from HL7 CDA standards and ASTM CCR Standard.

1. *Health Level Seven International.* (n.d.). Retrieved January 12, 2012, from Health Level Seven International website: <http://www.hl7.org>

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\*Indicates this link is no longer functional.

2. Dolin, R. H., Alschuler, L., Boyer, S., Beebe, C., Behlen, F. M., & Biron, P. V. (2004). *HL7 Clinical Document Architecture, Release 2.0*. Retrieved from Health Level Seven®, Inc. website: <http://xml.coverpages.org/CDA-20040830v3.pdf>
3. HL7 Structured Documents Technical Committee. (2004, August 20). *Health Level Seven Releases Updated Clinical Document Architecture (CDA) Specification..* Retrieved from <http://xml.coverpages.org/ni2004-08-20-a.html>
4. Dolin, R. H., Alschuler, L., Boyer, S., Beebe, C., Behlen, F. M., Biron, P. V. & Shabo (Shvo), A. HL7 Clinical Document Architecture, Release 2. (2006, Jan-Feb). *Journal of the American Medical Informatics Association*, 13(1), 30-39. PMID: PMC1380194
5. Dolin, R. H., Alschuler, L., Boyer, S., Beebe, C., Behlen, F. M., & Biron, P. V. (2004). *HL7 Clinical Document Architecture, Release 2.0*. Retrieved from Health Level Seven®, Inc website: [http://xml.coverpages.org/CDA-Release2-Unofficial.html#What\\_is\\_the\\_CDA](http://xml.coverpages.org/CDA-Release2-Unofficial.html#What_is_the_CDA)
6. Boone, K. W., Dolin, R. H., Mitchell-Jones, P., Peters, R., Russler, D., Shabo (Shvo), A., ... Auckerman, A. (2006, March 26). *HL7/ASTM Implementation Guide for CDA Release 2 – Continuity of Care Document (CCD.05March2006.DRAFT-1.doc)*. Retrieved from HL7 website: <http://www.hl7.org>

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

None

#### **Lecture 4f Images**

Slide 11: Dolin, R. H., Alshuler, L., Boyer, S., Beebe, C., Behlen, F., Biron, P. V., & Shvo, A. S. (2006). HL7 Clinical Document Architecture, Release 2. *J Am Med Inform Assoc*, 13, 30-39.

#### **Unit Required Readings**

None

#### **Student Application Activities**

1. ISO TC 215 [http://www.iso.org/iso/iso\\_technical\\_committee?commid=54960](http://www.iso.org/iso/iso_technical_committee?commid=54960)
2. Health Level 7 <http://www.hl7.org>
3. CDISC <http://www.cdisc.org>
4. CEN <http://www.cen.eu/cen/Sectors/Sectors/ISSS/Committees>
5. GS1 <http://www.gs1.org>
6. NCPDP <http://www.ncpdp.org>
7. ASC X12N <http://www.x12n.org>

\*Indicates this link is no longer functional.



8. ASTM E31 <http://www.astm.org/COMMIT/COMMITTEE/E31>
9. IHE [http://www.himss.org/ASP/topics\\_ihe\\*](http://www.himss.org/ASP/topics_ihe*)
10. DICOM <http://medical.nema.org/>
11. IHTSDO <http://www.ihtsdo.org>
12. ONC [http://healthit.hhs.gov/portal/server.pt?open=512&objID=1200&mode=2\\*](http://healthit.hhs.gov/portal/server.pt?open=512&objID=1200&mode=2*)

### **Student Application Activities**

Comp9\_unit4\_activity.doc  
Comp9\_unit4\_activity\_key.doc  
Comp9\_unit4\_self\_assess.doc  
Comp9\_unit4\_self\_assess\_key.doc

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\*Indicates this link is no longer functional.

## Component 9/Unit 5

### Unit Title

#### EHR Functional Model Standards

### Unit Description

This unit explores the functional requirements and standards for electronic health records (EHRs).

### Unit Objectives

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

1. Understand linking and aggregating data at all levels,
2. Understand how data may be interchanged among heterogeneous settings without loss of information,
3. Understand HL7 v2.x messaging communication standards,
4. Understand HL7 v3.0 messaging standards, and
5. Understand other data interchange standards including DICOM for imaging standards, NCPDP for prescriptions and medication reimbursement, IEEE for device interface standards, ASC X12N for claims and reimbursement standards, ASTM for document exchange, and IHE for profiles and registry standards.
6. Explain how model-based standards are created,
7. Define the methodology development framework,
8. Describe HL7 v3.0 messaging standards,
9. Imaging standards,
10. Standards for pharmacy services,
11. Interface standards for medical devices,
12. Claims and reimbursement standards,
13. Concept of profiling , and
14. Use and value of implementation guides.

### Unit Topics / Lecture Titles

- 5a Health Data Interchange Standards
- 5b Health Data Interchange Standards
- 5c Health Data Interchange Standards

### Unit References

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

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\*Indicates this link is no longer functional.

## Lecture 5a

Acknowledgement: Material used in this lecture comes from the web pages of the various Standards Developing Organizations.

### Lecture 5a Charts, Tables and Figures

None in this lecture.

### Lecture 5a Images

Slide 12: Source: W. Ed Hammond, PhD  
Slide 14: Source: W. Ed Hammond, PhD  
Slide 15: Source: W. Ed Hammond, PhD  
Slide 16: Source: W. Ed Hammond, PhD  
Slide 17: Source: W. Ed Hammond, PhD  
Slide 18: Source: W. Ed Hammond, PhD  
Slide 19: Source: W. Ed Hammond, PhD  
Slide 20: Source: W. Ed Hammond, PhD  
Slide 21: Source: W. Ed Hammond, PhD  
Slide 22: Source: W. Ed Hammond, PhD  
Slide 25: Source: W. Ed Hammond, PhD

## Lecture 5b

1. Beeler, G.W. Version 3 Intermediate Tutorial – Working the HL7 Version 3 Methodology. [PowerPoint Slides].

Acknowledgement: Material used in this lecture comes from the following source

1. *Introduction to HL7 Standards*. (n.d.). Retrieved January 18, 2012, from Health Level Seven International website: <http://www.hl7.org/implement/standards/index.cfm>

### Lecture 5b Charts, Tables and Figures

None in this lecture.

### Lecture 5b Images

Slide 7: Hammond, W. E. (n.d.). Image based on the HL7 International RIM standard information retrieved from Health Level Seven International website: <http://www.hl7.org>

Slide 10: W Ed Hammond, PhD.

Slide 22: Hammond, W. E. (n.d.). Image based on the HL7 v3 standard and other HL7 documentation retrieved from Health Level Seven International website: <http://www.hl7.org>

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\*Indicates this link is no longer functional.

Slide 23: Beeler, G.W. *HL7 Version 3 Basics: RIM to Message Design*. [PDF document]. Retrieved from <http://www.cas.mcmaster.ca/~yarmanmh/Recommended/HL7V3Basics.pdf>

### **Lecture 5c**

Acknowledgement: Material used in this lecture comes from the web pages of the various Standards Developing Organizations.

### **Lecture 5c Charts, Tables and Figures**

None in this lecture.

### **Lecture 5c Images**

Slide 23: W Ed Hammond, Derived from ASC X12N documentation. <http://www.x12.org>.

### **Unit Required Readings**

None in this lecture.

### **Student Application Activities**

1. *Heath Level Seven International*. Read more about HL7 including standards and how to implement. <http://www.hl7.org/index.cfm>
2. *Ascend HL7 Interface Specification*. Describes HL7 message standards for Hann's On Software (HOS). [http://www.hosinc.com/Products/Interfaces/interface\\_documentation.htm](http://www.hosinc.com/Products/Interfaces/interface_documentation.htm)
3. *HL7 ADT Message Overview*. This article provides a simple overview of HL& ADT messages. <http://knol.google.com/k/hl7-adt-message-overview#>\*
4. *DICOM*. Digital Imaging and Communications in Medicine homepage. <http://medical.nema.org/>
5. *IHE*. Integrating the Healthcare Enterprise homepage. <http://www.ihe.net/>
6. *Standardization of Terminology*. This article talks about the importance of creating a standard for terminology so that different healthcare organizations can share information. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2526413/?tool=pubmed>\*
7. *Information Week – Healthcare*. Articles about information systems and security in the healthcare field. <http://www.informationweek.com/healthcare/index.jhtml>" **MACROBUTTON HtmlResAnchor** <http://www.informationweek.com/healthcare/index.jhtml>

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## **Student Application Activities**

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## Component 9/Unit 6

### Unit Title

#### Health Data Interchange Standards

### Unit Description

This unit emphasizes the importance of adhering to health data interchange these standards in order to ensure compatibility between systems.

### Unit Objectives

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

1. Understand the definition(s) of an Electronic Health Record
2. Understand architecture for an EHR
3. Identify and understand key standards for the EHR
4. Understand the HL7 EHR Functional Model Standards
5. Understand functional profiles
6. Understand the standards for Functional Models for the PHR
7. Understand the certification requirements for the EHR, PHR and functional profile

### Unit Topics / Lecture Titles

- 6a EHR Functional Model Standards
- 6b EHR Functional Model Standards
- 6c EHR Functional Model Standards

### Unit References

(All links accessible as of 2/21/2012)

### Lecture 6a

1. Dick, R. S., Steen, E. B., & Detmer, D. E. (Eds.). Committee on Improving the Patient Record, Institute of Medicine. (1997). *Computer-Based Patient Record : An Essential Technology for Health Care* (Rev ed.). Washington, D.C.: The National Academy Press.
2. ASTM. (1996, Feb). Standard Guide for Properties of Electronic Health Records and Record Systems. E1769-95.

### Acknowledgement:

1. The material presented in this lecture was taken from the web sites of the various standards. Details of the standards listed here can

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\*Indicates this link is no longer functional.

be obtained from the various SDOs. There may be a membership cost or other cost associated with the standards.

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

None used in this lecture

### **Lecture 6a Images**

Slide 6: Photo of book by W. Ed Hammond, PhD.

### **Lecture 6b**

1. Committee on Data Standards for Patient Safety Board on Health Care Services. (2003). *Key Capabilities of an Electronic Health Record System: Letter Report..* Retrieved from INSTITUTE OF MEDICINE OF THE NATIONAL ACADEMIES website: [http://www.nap.edu/catalog.php?record\\_id=10781](http://www.nap.edu/catalog.php?record_id=10781)

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

None used in this lecture

### **Lecture 6b Images**

Slide 10: Dickinson, G., Fischetti, L., & Heard, S. (eds). (2004, July). *HL7 EHR System Functional Model Draft Standard for Trial Use*. Retrieved from Health Level Seven website: [http://www.providersedge.com/ehdocs/ehr\\_articles/HL7\\_EHR\\_System\\_Functional\\_Model-DSTU.pdf](http://www.providersedge.com/ehdocs/ehr_articles/HL7_EHR_System_Functional_Model-DSTU.pdf)

### **Lecture 6c**

None used in this lecture

Acknowledgements

1. Much of the material in this lecture is derived from the following websites:
2. <http://onc-chpl.force.com/ehrcert>
3. <http://www.hl7.org>
4. [http://www.Source.CCHIT.org\\*](http://www.Source.CCHIT.org)

### **Lecture 6c Charts, Tables and Figures**

None used in this lecture

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\*Indicates this link is no longer functional.

## Lecture 6c Images

Slide 14: Ritter, J. (2008, May). *HL7 Personal Health Record System Functional Model and Standard* [PowerPoint slides].

Retrieved from website: <https://http://www.himss.org/content/files/OverviewEHealthEnabledHealthcare.pdf>\*

## Unit Required Readings

None

## Student Application Activities

1. Read more about HL7 including standards and how to implement. <http://www.hl7.org/index.cfm>
2. Info and news concerning EHR. [http://www.himss.org/ASP/topics\\_ehr.asp](http://www.himss.org/ASP/topics_ehr.asp)
3. An article about choosing an EHR. [http://www.ahraonline.org/Downloads/onlineinstitute/quickcredit/oigc\\_elechealthrecord.pdf](http://www.ahraonline.org/Downloads/onlineinstitute/quickcredit/oigc_elechealthrecord.pdf)\*
4. Information about EHR certification. <http://www.cchit.org/>
5. A resource for information regarding all aspects of health data management including HER, EDI, HIE and data security. <http://www.healthdatamanagement.com/>.
6. Information about openEHR <http://www.openehr.org/home.html>\*

## Student Application Activities

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## Component 9/Unit 7

### Unit Title

### Supporting Standards for EHR Applications

### Unit Description

This unit presents a set of standards that support the application layer of the OSI and extend EHR functionality

### Unit Objectives

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

1. Understand the clinical decision support standard Arden Syntax,
2. Understand standards for clinical guidelines,
3. Understand object-oriented expression language for clinical decision support – GELLO,
4. Understand the clinical decision support standard Infobutton,
5. Understand disease management, and
6. Understand other clinical decision support applications.
7. Understand other standards that help to support networking and reporting requirements as well as functionality to optimize the connectivity among heterogeneous systems deployed within a single enterprise,
8. Understand single sign-on standards and the HL7 Clinical Context Object Workgroup (CCOW) standard,
9. Understand regulatory standards, and
10. Understand issues relating to person identifiers, master patient indices, and record locator services.

### Unit Topics / Lecture Titles

- 7a Supporting Standards for EHR Application
- 7b Supporting Standards for EHR Application
- 7c Supporting Standards for EHR Application
- 7d Supporting Standards for EHR Application

### Unit References

(All links accessible as of 2/24/2012)

### Lecture 7a

Acknowledgement:

1. Material for this lecture was synthesized from HI7 International Arden Syntax Standard. <http://www.hl7.org>

\*Indicates this link is no longer functional.

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

None in this lecture.

## **Lecture 7a Images**

Slide 7: Source: W. Ed Hammond

## **Lecture 7b**

Acknowledgement:

These slides were derived from documentation in HL7 standards and ASTM standards.

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

None in this lecture.

## **Lecture 7b Images**

Slide 12: *National Guideline Clearinghouse*. (n.d.). Retrieved 2012, from US Department of Health & Human Services, Agency for Healthcare Research and Quality website: <http://www.guideline.gov/>

Slide 24: HL7 International documentation and other material.

## **Lecture 7c**

1. Slide 17: Source: Courtesy of Dr. Clem McDonald

Acknowledgment:

Some of the material in This unit was taken from HL7 at <http://www.hl7.org>

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

None in this lecture.

## **Lecture 7c Images**

Slide 8: *What are Infobuttons?* (n.d.). Retrieved February 24, 2012, from NIH Laboratory for Informatics Development, National Library of Medicine, University of Utah Department of Biomedical Informatics, and Columbia University Department of Biomedical Informatics website: <http://www.infobuttons.org/>

Slide 9: Source: Slide set from W. Ed Hammond (original source unavailable)

Slide 10: Source: Courtesy of Dr. James Cimino

Slide 12: Source: Dr. W. Ed Hammond

Slide 15: Source: Courtesy of Dr. William W. Stead of Vanderbilt CPOE System

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\*Indicates this link is no longer functional.

Slide 16: Source: Courtesy of Dr. William W. Stead of Vanderbilt CPOE System

Slide 18: Source: Slide set from W. Ed Hammond (original source unavailable)

Slide 19: *Stroke After Atrial Fibrillation*. (n.d.). Retrieved February 24, 2012, from Framingham Heart Study website: <http://www.framinghamheartstudy.org/risk/strokeatrial.html>\*

Slide 21: Source: W. Ed Hammond

Slide 22: Source: Slide set from W. Ed Hammond (original source unavailable)

Slide 24: Source: Slide courtesy of Dr. Suzzane Bakken (original source unavailable)

Slide 25: *Browse Databases and Tools*. (n.d.). Retrieved February 24, 2012, from Essential Evidence Plus website: <http://www.essentialevidenceplus.com/content/poems>

Slide 26: Source: Courtesy of Suzzane Bakken, Columbia University

Slide 27: *Welcome to the Risk Assessment Toolkit*. (n.d.). Retrieved October 2, 2006, from MD Anderson Cancer Center website: <http://www.cra.developerlabs.net>\*

Slide 28: *Cancer Risk Toolkit, My Diet*. (n.d.). Retrieved October 2, 2006, from MD Anderson Cancer Center website: <http://www.cra.developerlabs.net>\*

Slide 29: *Your ten-year and lifetime chance of developing colon cancer*. (n.d.). Retrieved October 2, 2006, from MD Anderson Cancer Center website: <http://www.cra.developerlabs.net>\*

## Lecture 7d

Acknowledgement: Material in this section was derived from HL7 and IHE standards.

## Lecture 7d Charts, Tables and Figures

None in this lecture.

## Lecture 7d Images

Slide 9: Source: Dr. Mike Russell, Duke University and HL7

Slide 11: Source: Dr. Mike Russell, Duke University and HL7

Slide 19: Source: Courtesy of Ammon Shabo, co-chair Genomic WG, HL7

## Unit Required Readings

None

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\*Indicates this link is no longer functional.

## Student Application Activities

1. *Using Features of Arden Syntax with Object-Oriented Medical Data Models for Guideline Modelin*. This article contains information about many of the clinical decision support standards. <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.24.5737>
2. *Arden Syntax*. A table showing information about Arden syntax. [http://www.openclinical.org/gmm\\_ardensyntax.html](http://www.openclinical.org/gmm_ardensyntax.html)
3. *GELLO: An Object-Oriented Query and Expression Language for Clinical Decision Support*. This is a paper that discusses the format of GELLO and its use. <http://www.openclinical.org/docs/int/docs/gello.pdf>
4. *HL7 Infobutton Product Information*. This link provides HL7's product brief about Infobuttons. [http://wiki.hl7.org/index.php?title=Product\\_Infobutton](http://wiki.hl7.org/index.php?title=Product_Infobutton)
5. *Infobuttons at Intermountain Healthcare: Utilization and Infrastructure*. This article "describes the infobuttons infrastructure at Intermountain Healthcare and assesses their use after 4 years of their initial release." [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1839474/\\*](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1839474/*)
6. *Getting Patients to Meaningful Use: Using the HL7 Infobutton Standard for Information Prescriptions*. This article explains the usefulness of Infobuttons and a particular company's implementation. <http://thehealthcareblog.com/blog/2010/01/28/the-info-button-standard-bringing-meaningful-use-to-the-patient/>
7. *HL7 CCOW standard*. This page is HL7's CCOW standard page providing information about CCOW. <http://www.hl7.org.au/CCOW.htm>
8. *CCOW Information for the Healthcare Industry*. This site provides information about CCOW including what it is, how it works and its benefits. [http://www.cryptlib.orion.co.nz/\\*](http://www.cryptlib.orion.co.nz/*)
9. *Effect of clinical guidelines on medical practice: a systematic review of rigorous evaluations*. This article discusses the effects of clinical guidelines of medical practices. <http://www.wicancer.org/documents/Grimshaw1993Effectofclinicalguidelinesonmedicalpract.pdf> Registration is required to read the article but is free.
10. *National Guideline Clearinghouse*. NGC is a public resource for evidence-based clinical practice guidelines. <http://www.guideline.gov/>

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\*Indicates this link is no longer functional.

## **Student Application Activities**

Comp9\_unit7\_activity.doc

Comp9\_unit7\_activity\_key.doc

Comp9\_unit7\_self\_assess.doc

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\*Indicates this link is no longer functional.

## **Component 9/Unit 8**

### **Unit Title**

#### **Enterprise Architecture Models**

### **Unit Description**

This unit addresses different enterprise architecture models that provide an infrastructure for healthcare networks.

### **Unit Objectives**

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

1. Explain regional healthcare networks – policy and implementation strategies
2. Explain the concept of a Nationwide Healthcare Information network
3. Explain the significance of Service Oriented Architecture in networking and health information exchange networks
4. Explain the value of an Enterprise Architecture in networking and health information exchange networks
5. Describe key elements of various service oriented architecture platforms and infrastructure options

### **Unit Topics / Lecture Titles**

8 Regional health care networks

8 National health care networks

### **Unit References**

(All links accessible as of 2/22/2012)

### **Lecture 8**

No referenced used in this lecture.

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

None in this lecture.

### **Lecture 8 Images**

None in this lecture.

### **Unit Required Readings**

None in this lecture.

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\*Indicates this link is no longer functional.

## Student Application Activities

1. *OMG Healthcare Domain Task Force*. This site contains information about the Healthcare Service Specification Project. <http://healthcare.omg.org>\*
2. *Health Information Sharing Environment*. Information about creating a framework for sharing personal medical information. [http://www.cisco.com/web/about/ac79/docs/pov/Health\\_Information\\_Sharing\\_Environment\\_0526FINAL.pdf](http://www.cisco.com/web/about/ac79/docs/pov/Health_Information_Sharing_Environment_0526FINAL.pdf)\*
3. *NIHN Enterprise Architecture Overview*. This document from ONC provides an overview of EA. [http://healthit.hhs.gov/portal/server.pt/gateway/PTARGS\\_0\\_11673\\_910398\\_0\\_0\\_18/NHINEnterpriseArchitectureOverview.doc](http://healthit.hhs.gov/portal/server.pt/gateway/PTARGS_0_11673_910398_0_0_18/NHINEnterpriseArchitectureOverview.doc)\*
4. *SOA Solutions*. This article from IBM describes how to develop SOA solutions for health care organizations using business-driven development. <http://www.ibm.com/developerworks/webservices/library/ws-soa-bddhealth/>
5. *Network for Regional Healthcare Improvement*. This site is home to The Network for Regional Healthcare Improvement (NRHI), a National coalition of Regional Health Improvement Collaboratives. <http://www.nrhi.org/>
6. *Nationwide Health Information Network*. This site developed by ONC covers information about HIN. <http://www.healthit.gov/policy-researchers-implementers/nationwide-health-information-network-nwhin>
7. *A Service Oriented Architecture based Medical Grid Application*. This article presents a case of using SOA for different medical entities to share mammogram images. <http://arxiv4.library.cornell.edu/ftp/cs/papers/0405/0405074.pdf>

## Student Application Activities

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## **Component 9/Unit 9**

### **Unit Title**

**Privacy, Confidentiality, and Security Issues and Standards**

### **Unit Description**

This unit explores issues related to creating an environment in which to transport data in a secure manner that ensures privacy and confidentiality.

### **Unit Objectives**

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

1. Explain the concepts of privacy and confidentiality requirements and policies and learn how to implement the requirements
2. Describe how to secure data storage and transmission using data encryption, signatures, validation, non-repudiation, and integrity (PKI, certificates, and security protocols)
3. Define access control methods
4. Analyze access restrictions to data storage and retrieval (physical and software)

### **Unit Topics / Lecture Titles**

- 9a Privacy, Confidentiality, and Security Issues and Standards
- 9b Privacy, Confidentiality, and Security Issues and Standards

### **Unit References**

(All links accessible as of 2/16/2012)

#### **Lecture 9a**

References were not used for this lecture.

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

None in this lecture.

#### **Lecture 9a Images**

Slide 10: Encryption. Courtesy Michele Parrish. Used with permission.

Slide 18: Certificate. Courtesy Michele Parrish. Used with permission.

Slide 19: Certificate Info. Courtesy Michele Parrish. Used with permission.

#### **Lecture 9b**

References were not used for this lecture.

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## Lecture 9b Charts, Tables and Figures

None in this lecture.

## Lecture 9b Images

Slide 7: ACLs. Courtesy Michele Parrish. Used with permission.

Slide 8: Time Restrictions. Courtesy Michele Parrish. Used with permission.

Slide 15: Single Sign-On. Courtesy Michele Parrish. Used with permission.

## Unit Required Readings

None in this lecture.

## Student Application Activities

1. *Microsoft – The Latest in Computer Security*. This site contains information about security products, updates, tools and news. <http://www.microsoft.com/security/default.aspx>
2. *Orange Book Certification*. This site contains the criteria for obtaining Orange Book certification. They also explain the different levels of Orange Book certification. <ftp://ftp.all.kernel.org/pub/linux/libs/security/Orange-Linux/refs/Orange/Orangel-II.html#toc5>
3. *Encryption*. This article contains information about encryption, symmetric and asymmetric. <http://www.encryptionanddecryption.com/encryption/>
4. Tutorial: An introduction to Public Key Infrastructure (PKI).
5. This video is a tutorial about PKI. It explains the different pieces of the infrastructure including certificates and keys. 9 minutes and 34 seconds long. <http://www.youtube.com/watch?v=EizeExsarH8>
6. *How to Choose a Good Password (And Why You Should)*. This article contains information about what you should do and what you shouldn't do with passwords. It also includes information about why you should do these things.
7. <http://www.mit.edu/afs/sipb/project/doc/passwords/passwords.html>
8. *Guidelines for Strong Passwords*. This article discusses how to create strong passwords along with examples of weak passwords. [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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9. *Security Policies*. These sites discuss the use of security policies in an organization. The SANS site includes policy templates. <http://www.sans.org/security-resources/policies/> <http://www.symantec.com/connect/articles/introduction-security-policies-part-one-overview-policies>
10. *HIPPA*. Information about HIPPA including who must follow the law, what information is protected, what rights does the law provide to consumers and who can look at your health information. <http://www.hhs.gov/ocr/privacy/>
11. *Assuring the Privacy and Security of Transmitting Sensitive Electronic Health Information*. This article discusses concerns about the security of transferring health information. Includes case studies. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2815468/?tool=pubmed> \*
12. *Social Networking and the Medical Practice: Guidelines for Physicians, Office Staff and Patients*. These guidelines were produced by the Ohio State Medical Association. <http://www.osma.org/files/documents/tools-and-resources/running-a-practice/social-media-policy.pdf>\*
13. *2009 Global Life Sciences & Health Care Security Study*. Findings from a 2009 study on cyber security, privacy and data protection. [http://it.ouhsc.edu/services/infosecurity/documents/WP\\_ERS\\_SP\\_GSS\\_LSHC\\_final\\_low.pdf](http://it.ouhsc.edu/services/infosecurity/documents/WP_ERS_SP_GSS_LSHC_final_low.pdf)
14. *Proposed HIPPA Rule Change*. On July 8, 2010 HISS announced a proposed change to HIPPA that would affect the privacy, security and enforcement rules. This pdf is the proposed change. [http://www.himss.org/handouts/20100714\\_ProposedRegsHHS.pdf](http://www.himss.org/handouts/20100714_ProposedRegsHHS.pdf)\*

### **Student Application Activities**

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## **Component 9/Unit 10**

### **Unit Title**

**Health Information Exchange**

### **Unit Description**

This unit explores the networking standards and the standards required for interoperability to enable the creation of Health Information Exchanges.

### **Unit Objectives**

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

1. Understand the purpose and importance of a Health Information Exchange strategy,
2. Understand what an HIE is,
3. Understand the components of an HIE, and
4. Explore some examples of HIEs.

### **Unit Topics / Lecture Titles**

10 Health Information Exchange

### **Unit References**

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

### **Lecture 10**

References were not used for this lecture.

### **Lecture 10 Charts, Tables and Figures**

None in this lecture.

### **Lecture 10 Images**

Slide 5: Source – W. Ed Hammond, PhD., 2012.

Slide 6: Source – W. Ed Hammond, PhD., 2012.

Slide 7: Source – W. Ed Hammond, PhD., 2012.

Slide 17: Source –W. Ed Hammond, PhD., 2012.

### **Unit Required Readings**

None in this lecture.

### **Student Application Activities**

None in this lecture.

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\*Indicates this link is no longer functional.

## **Student Application Activities**

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Comp9\_unit9\_activity\_key.doc

Comp9\_unit9\_self\_assess.doc

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## Component Acronym Glossary

DCHI Acronym Guide (January 2011)

Acronym	Name
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
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
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 Medcomp 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
RHIOs	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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