

#### Component 9 - Networking and Health Information Exchange

Unit 8 Enterprise Architecture Models

#### Slide 2

#### Objectives

- · Explain regional healthcare networks policy and
- implementation strategies
   Explain the concept of a Nationwide Healthcare Information network
- Explain the significance of Service Oriented Architecture in networking and health information exchange networks
- Explain the value of an Enterprise Architecture in
- networking and health information exchange networks

  Describe key elements of various service oriented architecture platforms and infrastructure options

#### Slide 3

#### Who Needs Interoperability?



Two or more groups interested in collaborating and sharing healthcare / life sciences data / information using computer systems and electronic sciences data / information using interchange

No assumption of any scale
Nations
Enterprises
Individuals

Services

- No assumption of what is being exchanged, how it is exchanged, or why


### Service Oriented Architecture (SOA)

- · Is an automation of common services
- Ensures functional consistency across applications
- · Minimizes duplication across applications
  - Reuse
- Messages can be either payloads in or infrastructure beneath services
- Is an accepted industry best practice
- Is used in many key products
  - But interfaces are not exposed

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#### What is SOA?

- · Flexible set of design principles
- Used during the phases of system development and integration
- SOA based architecture provides a looselyintegrated suite of services that are reusable
  - These services function similarly to subroutines in computer programs
- SOA becomes more important with the availability of web services

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#### Defining SOA

- SOA interface is defined in terms of protocols and functionality
- SOA separates functions into distinct services
  - Accessible over a network
  - Permits users to combine and reuse them in different applications
- Data is passed in a well-defined format
- · SOA service is self-contained
- It makes no calls out of its service package

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#### **Understanding Services**

- Perform specific tasks
- Have a well-defined interface
- May use different implementation languages
- · XML is commonly used for interfacing with SOA
- services
   SOA contrasts with API approach
  - · Provides flexibility
  - Modules can be updated
     Or even exchanged simply

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#### SOA

- Integration of diverse classes of information
- Distribution across a distributed heterogeneous research and care community
- Enables
  - Coordination of functionality between inter-enterprise information systems
  - Collaborative data processing and work flow execution
- Services

  - Can be implemented standalone fashionRapid creation of composite applications

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#### Services

- XML is typically used to structure data that is wrapped in a nearly exhaustive descriptioncontainer
- Web Services Description Language (WSDL) describes the services
- Simple Object Application Protocol (SOAP) describes the communication protocols


#### Usage

- SOA permits developers to string together large chunks of functionality to build applications
- Building an application is like taking a set of blocks, each representing a service, and stringing them together to create the application

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#### Value Component

- SOA relies on service-orientation as its fundamental design-principle
- Simple interface can abstract away the underlying complexity
- Users can access independent services without knowledge of the service's platform implementation

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#### What SOA Buys

- Can use any Master Patient Index (MPI) without re-integrating
- Can painlessly integrate data from new clinical systems into a patient's health summary
- Heterogeneous systems can be accessed consistently from an installed application base
- Standards support ability to redeploy or distribute hardware and software without breaking things

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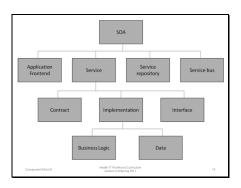
#### Requirements to Use SOA

- Interoperability between different systems as the basis for integration between applications on different platforms through a communication protocol. Messages are used across channels for communication and transfer of data.
- Create a federation of resources. Data flow is established and maintained in a federated database allowing new functionality developed to reference a common business format for each data element.

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#### **Guiding Principles**

- Service encapsulation
- · Service loose coupling
- Service contract
- · Service abstraction
- Service usability
- Service composabilityService autonomy
- · Service optimization
- Service discoverability
- · Service relevance

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#### Service Contract

- Header
  - Name of service
  - Version
  - Owner
- Responsibility assignment
- Type (presentation, process, business, data, integration)

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#### Service Contract

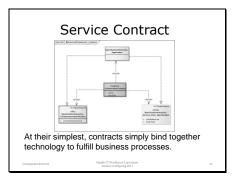
- Functional
  - What the service accomplishes
  - Service operations
  - How to invoke service (SOAP, event triggers)

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#### Service Contract

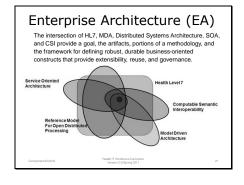
- Non-Functional
  - Security constraints
  - Quality of service
  - Translational
  - Service level agreement
  - Semantics
  - Process


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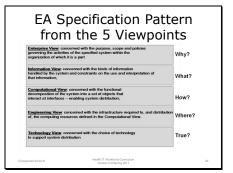


# Behavioral Framework Differences Between Services, Documents, and Messages Seeclification Services Documents Adjac, Blaupoint Codeminancy Adjactation field, Business Interaction, Trigger Event, Message Types are common to all neceptural Design (Pottlems Independent Conferences) Conferences Conferences) Conferences Conferenc

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TI	he Speci	ficatio	n Cons	straint I	Patterr			
	Specification	Enterprise / Business Viewpoint	Information Viewpoint	Computational Viewpoint	Engineering Viewpoint			
	Reference	Reference	Reference Artifacts, Models, Patterns, and Templates from HL7					
	Analysis	Conformance Ass	Conformance Assertions that are Computationally Independent, Conceptual, Business Oriented					
	Conceptual Design	Conformance Ass	Conformance Assertions that are Logically consistent, computable, verifiable					
	Implementable Design	Conformance a		directly implementable form or technology	e, often related			
onent	SUnit 8		Worldorce Curriculum on 2.0/Spring 2011					

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Enterprise / Business Viewpoint	Information Viewpoint	Computational Viewpoint	Engineering Viewpoint	Conformance Level	
EHR-FM, Clinical Statements	BRIDG, LS DAM, HL7 ADTs	EHR-FM		Domain	
Business Context, Reference Context	Project- oriented DIM	Dynamic Blueprint, Functional Profile(s)	N/A	Blueprint	
Business Governance	CIM, LIM	Dynamic Model, Interface Specification	N/A	Logical	
N/A	Transforms, Schema	Orchestration, Interface Realization	Execution Context, Specification Bindings, Deployment Model	Platform	


#### Service Oriented Architecture

- Appears in the design of loosely connected inter-organization HIT networks
  - Desired way to interconnect widely distributed systems
- · Particularly attractive when no one organization owns/controls all of the applications and platforms

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#### SOA vs. Web Services

		SOA	Web Services
Is a technology platform		No	Yes
Is a transport protocol		No	Yes
Primary ownership is business li	ne owned	Yes	No
Affects workflow and business p	rocesses	Yes	No
Enables business and IT transfor	mation	Yes	Yes
Is an industry standard		No	Yes
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#### How Is SOA Different From Messaging?

- A common practice in healthcare, just not yet in healthcare IT

  Many key products use them but do not expose interfaces

  Ensures functional consistency across applications

  Accepted industry best practice

  Furthers authoritative sources of data

  Minimizes duplication across applications, provides reuse

  Messages can be either payloads in or infrastructure beneath services

  Service-oriented architecture provides the framework for automation of common services

  Sill, SOA has to be done well. It is cheaper and easier than ever to create badly designed applications and spaghetti integration

  Fits well with Open Source


#### **HL7 Services-Aware Enterprise** Architecture Framework (SAEAF)

- Interoperability Framework for Enterprise Architecture
- Uses v3/RIM artifacts and expertise
- Supports measurable, testable conformance and compliance
- Provides directly implementable solutions

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#### **SAEAF**

- · Services:
  - This is about "services enabling" HL7's Standards
- Awareness:
- This is about making our standards "aware" of both services and an Enterprise Architecture
- Enterprise Architecture:

   When adopted and imbedded in our development methodologies, SAEAF becomes our Enterprise Architecture
- Framework:
  - This is a "framework" in which we will "place" our standards so that we can see how they relate to each other and they relate to other standards and becomes part of our users' Integration Architectures.

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#### SAEAF Core Components

- · Information Framework
- · Behavioral Framework
- Enterprise Conformance and Compliance Framework
- · Governance Framework
- · Implementation Guide


#### What Is Being Specified?

- · Standards are being developed for:
  - Entity Identification (to manage and maintain identities within and across domains, localities, or products)
  - Record Location & Retrieval (to discover, retrieve,
  - Decision Support Services (to support evaluation nical decision support)
  - Terminology Service (to retrieve, maintain, and navigate [clinical] terminologies and ontologies)

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#### Where Would Specifications Be Used?

- Inter-Enterprise (such as National Health Information Network, Regional Health Information Organizations)
   By functionally specifying behavior, roles between applications and products are claffled, and the technologies supporting them can be profiled and sharpened
- Intra-Enterprise
  Standardization on functionality allows for better integration of off-the-shelf and custom development environments, and promotes more of a "plug and play" environment
  Intra-Product
- Facilitates vendors ability to integrate third-party value-add components and speed design phase with higher confidence Custom-Implementation
- - Affords organizations wishing to custom-develop the opportunity to later integrate off-the-shelf

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#### Services In Particular Are

- More coarsely granulated than messages are more readily traceable to business, clinical capabilities, and requirements
- traceable to business, clinical capabilities, and requirements Specifications for a service are of the form: Functional Profile (collection of operations offered by a service) + Semantic Profile (static semantics utilized by operations in FP) + Conformance Profile (testable (automated or human) conformance standards against which an
- implementation may make pair-wise conformance assertions)

  Combination of these two points above provides a foundation for both intra- and inter-enterprise durable services interfaces

## Healthcare Service Specification Project (HSSP) • Effort to create common "service interface specifications" trackable within Health IT • Joint standards development project by HL7 and Object Management Group (OMG)

- Object Management Group (OMG)
   Objectives:
   To create useful, useable healthcare standards that address functions, semantics and technologies
   To complement existing work and leverage existing standards
   To focus on practical needs and not perfection
   To capitalize on industry talent through community participation

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#### SAIF

S = ServicesA = AwareI = Interoperability F = Framework
