Joint HL7 and OMG Healthcare Services Specification Project

Healthcare SOA Reference Architecture

http://www.omg.org/news/meetings/HC-WS/index.htm

Crowne Plaza Chicago O'Hare

Wed. 16 April 08, Session 3, 1:45 - 3PM

Speaker Code: [16-13]

"*OMG SOA in Healthcare*" Workshop

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OVERVIEW

- **PRESENTATION** - Standards-based Strategic Approach for Interoperability at the Service level

  – Semantically Consistent, Interoperable Enterprise Architectures **(EA**s**)**

- **WORKSHOP OBJECTIVES –**

  - Audience Understanding of components of the Health SOA Architecture Framework and their sources

  - Evaluate Framework Component Through Use Case

  - Promote discussion and maturation of SOA Reference Architecture Contents

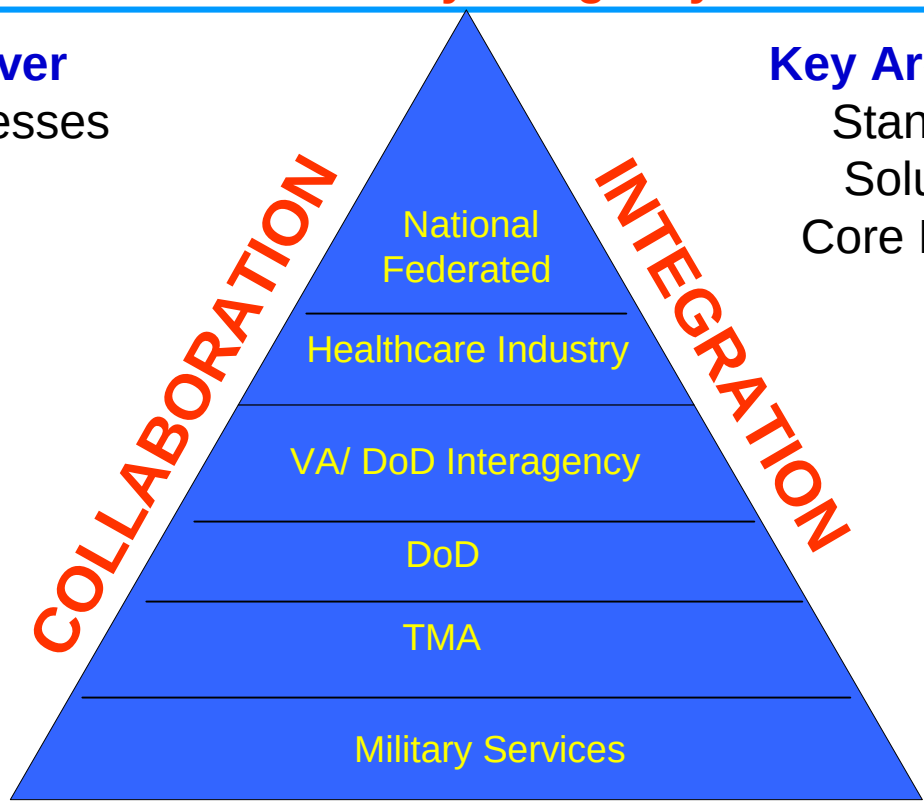
HealthCare SOA Framework
BACKGROUND

- 2004: Executive Order 13335
  - set **objective** for **U.S. National Electronic Healthcare Record (EHR) Interoperability by 2014**
- 2006: Executive Order 13410
  - **mandated U.S. Federal agencies begin transformation to** Healthcare Information Technology Standards Panel (HITSP) conformant **interoperable EHR systems by 2007**
- **Foundations**
  - **Functional**: HL7 EHR System Functional Model (**EHR-S**) -
  - **Technical**: Thomas Erl's **Service Oriented Architecture (SOA) model** to specify a standard Healthcare SOA Reference Architecture (**H-SOA-RA**)
  - This **logical H-SOA-RA** is refined into
    - physical implementations using an Integrated Requirements and Design (**IRD**) Model Driven Architecture (**MDA**) process
    - specification of system components within a Software Description Framework (**SDF**).

Goal: **Healthcare SOA Reference Architecture (H-SOA-RA)**

Identifying Opportunities to Leverage Technology and Alleviate Redundancy or Agency IT Overlap

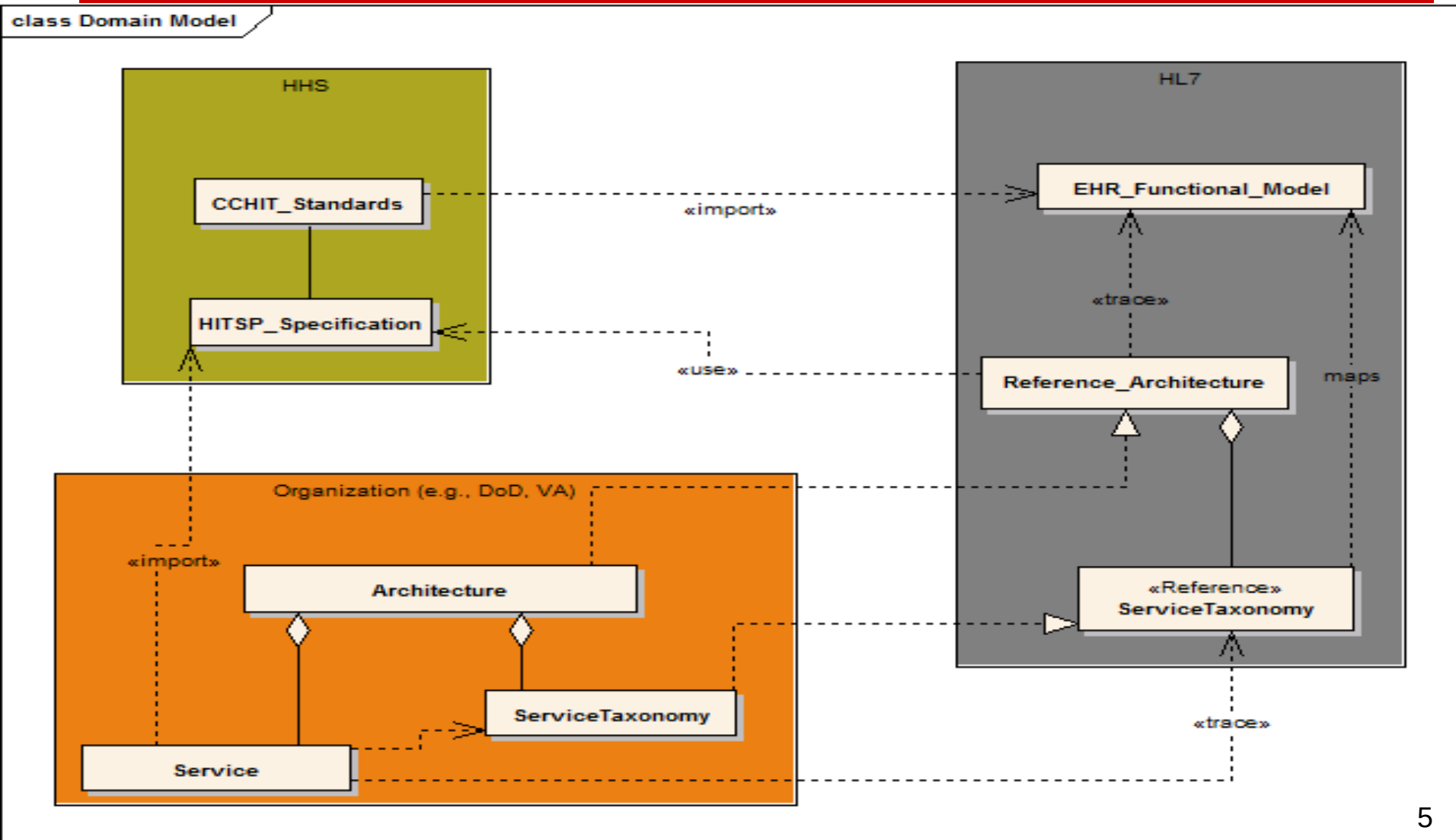
Key Business Driver
Patient Centric Processes



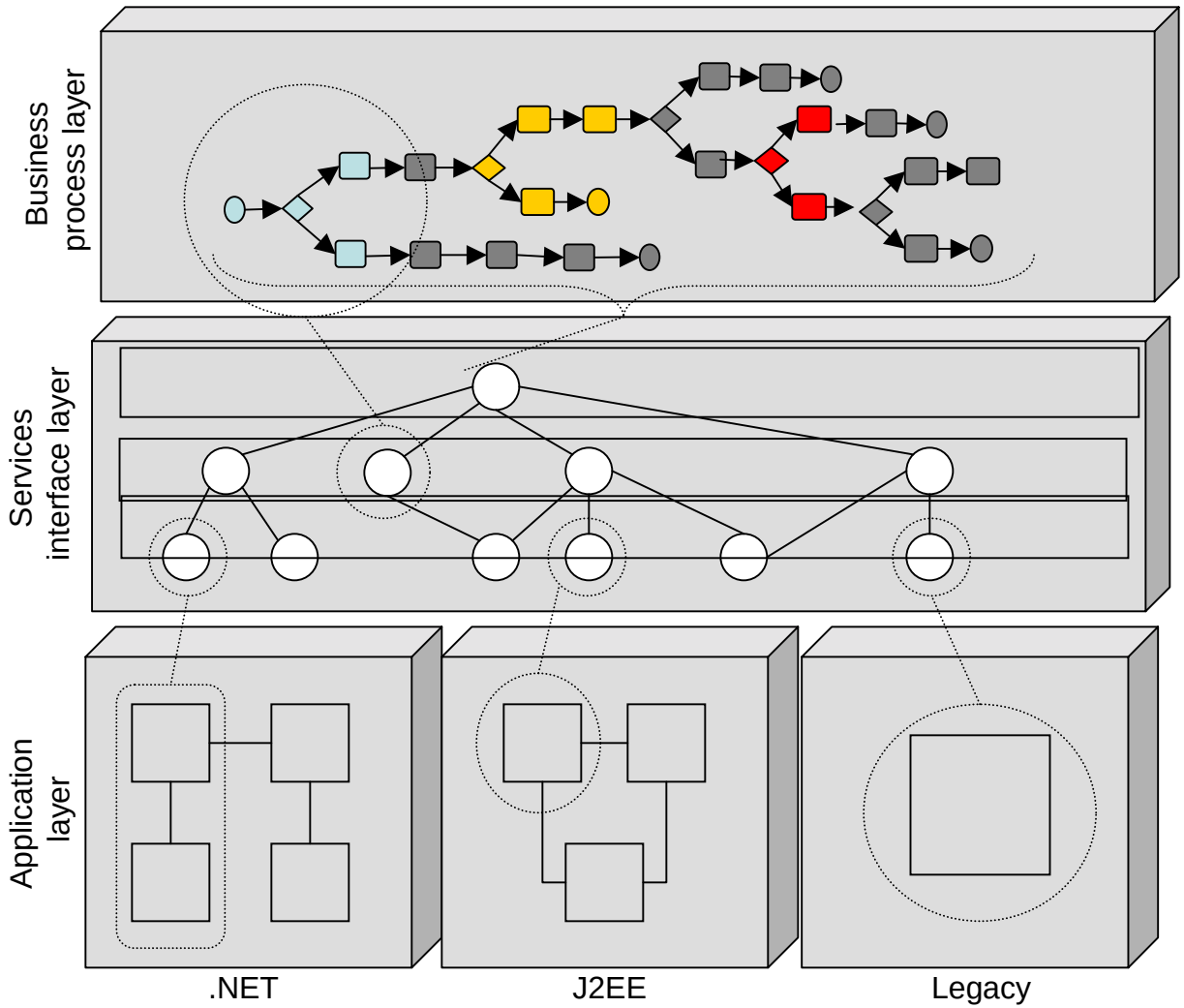
Key Architectural Objective
Standardized Technical Solutions aligned with Core Business Processes.

Joining Forces to Improve Effectiveness, Efficiency, and Service delivery

Service Traceability
EHR-S, HITSP and CCHIT



SOA Layers
Focus on the Business Processes and Services [Thomas Erl]



Business Capabilities and Services

System Components and Services

orchestration service layer

business service layer

application service layer

Source: Service-Oriented Architecture, Thomas Erl

SOA Service Models
Potential Service Layers [Thomas Erl]

Service Model	Description
Application Service	A generic category used to represent services that contain logic derived from a solution or technical platform. Services are generally distinguished as application services when creating abstraction layers.
Business Service	A generic category used to represent services that contain business logic. When establishing specialized service layers, services that fall into the business service layers are collectively referred to as business. However, individually these services are classified as entity-centric (e.g., information) or task-centric business services.
Controller Service	A Service that composes others. Variations of this model exist, depending on the position of the controller in the composition hierarchy. The patent controller service can be classified as the master controller and a service that composes a subset of a larger composition can be labeled as sub-controller.
Coordinator Services	Three service models are derived from the concept of coordination: the coordinator, the atomic transaction coordinator, and the business activity coordinator. All three models are specific to the WS-Coordination specification and related protocols.
Entity-centric Business Service	A business process-agnostic variation of the business service that represents one or more related business entities. This type of service is created when establishing a business service layer.
Hybrid Service	A service that contains both business and application logic. Most services created as part of traditional distributed solutions fall into this category. When organizing services into abstraction layers, hybrid services are considered part of the application service layer.
Integration Service	An application service that also acts as an endpoint to a solution for cross-referencing integration purposes.
Process Service	A service that represents a business process as implemented by an orchestration platform and described by a process definition. Process services reside in the orchestration service layer.
Task-Centric Business Service	A business process-specific variation of the business service that represents an atomic unit of process logic. Task-centric services are different from process services in that the process logic is provided by the underlying service logic, not by a separate process definition.

Federated Services [1]

Federation is a state achieved by extending SOA into the realm of service-oriented integration. A number of key WS-* extensions provide feature-sets that support the attainment of federation. Most notable among these are the specifications that implement the concepts of orchestration and choreography.

Establishing SOA within an enterprise does not necessarily require that you replace what you already have. One of the most attractive aspects of this architecture is its ability to introduce unity across previously non-federated environments. While web-services enable federation, SOA promotes this cause by establishing and standardizing the ability to encapsulate legacy and non-legacy application logic and by exposing it via a common, open, and standardized communications framework.

- WSRP (Web Services for Remote Portals) is the cornerstone of federated services
- SAML (Security Assertions Markup Language) is commonly used
- ALSO: WS-Security, WS-Trust, WS-Policy, WS-Federation

Additional info at: https://www120.livemeeting.com/cc/bea/viewReg

[1] **SOA: Principles of Service Design,** by Thomas Erl, Prentice Hall, July 07

HL7 EHR System Functional Model (EHR-S)

(> 230 System Functions in 4 level categorization

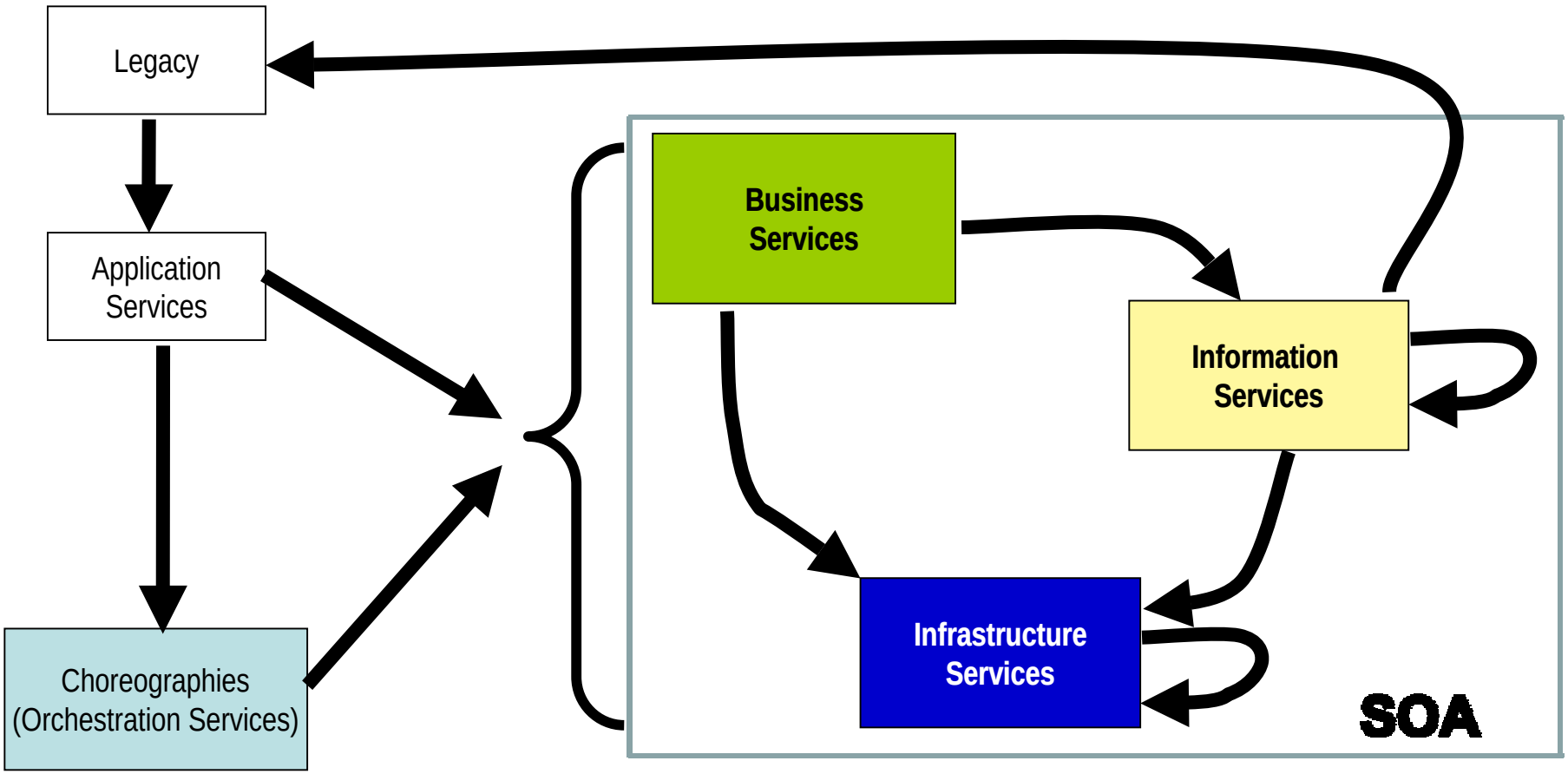
(see attached spreadsheet for full enumeration)

System Functions

			Service Types
Direct Care	DC.1	Care Management	Business
	DC.2	Clinical Decision Support	Choreography
	DC.3	Operations Management and Communication	Choreography
Supportive	S.1	Clinical Support	Business
	S.2	Measurement, Analysis, Research and Reports	Entity (Information)
	S.3	Administrative and Financial	Business
Information Infrastructure	IN.1	Security	Infrastructure
	IN.2	Health Record Information and Management	Entity (Information)
	IN.3	Registry and Directory Services	Infrastructure
	IN.4	Standard Terminologies & Terminology Services	Infrastructure
	IN.5	Standards-based Interoperability	Infrastructure
	IN.6	Business Rules Management	Business
	IN.7	Workflow Management	Choreography
Other	O-1	Electronic Resource Planning (ERP)	
	O-2	Finances	
	O-3	Other	

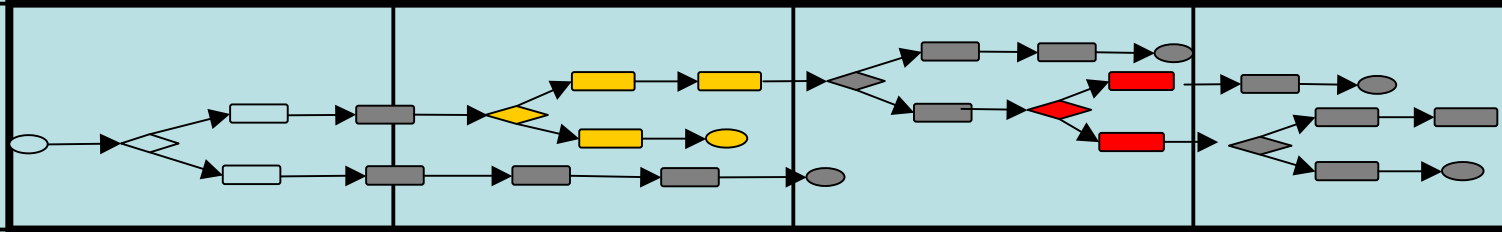
NOTE: **"Other" Category** - The EHR-S model does NOT include Electronic Resource Planning (ERP) / Logistics and Financial components, which are needed for completeness of a military EHR.

Leveraging SOA Processing in the Enterprise



Healthcare SOA Framework

Based on HL7 EHR System Functional Model & Thomas Erl's SOA Layers

HL7 System Functions →	Direct Care	Supportive	Information Infrastructure	Other
Business Process Value Chains				
Composite Services	Federated Composition (e.g., Choreograph or Orchestration) Within and Across Business Areas			
Core Business Services	Functional Areas + Focal Classes	Functional Areas + Focal Classes	Functional Areas + Focal Classes	Functional Areas + Focal Classes
Entity Services	Information Management	Information Management	Information Management	Information Reporting and Management
Agnostic Services	Cross Technical "Common Services" (e.g., Security, Privacy, Auditing, Logging…)			
Application Services	Ambulatory Care Systems, In Patient Care Systems	Logistics Systems Financial Systems Decision Support Systems	Data Marts Repositories	Business Objects
Implementation Profiles	Integrated Healthcare Enterprise (IHE) Profiles	Analysis Profiles	Communications Profiles/Stacks	Implementation Profiles

EHR DATA REUSE THROUGH H-SOA-RA ACROSS EPISODES OF CARE

Previous Episode Of Care EHR

Current Episode Of Care EHR

Data Must Be Verified And Updated

Reusable Services

IDENTITY

- Patient Demographics
- Provider Demographics
- Insurer Demographic

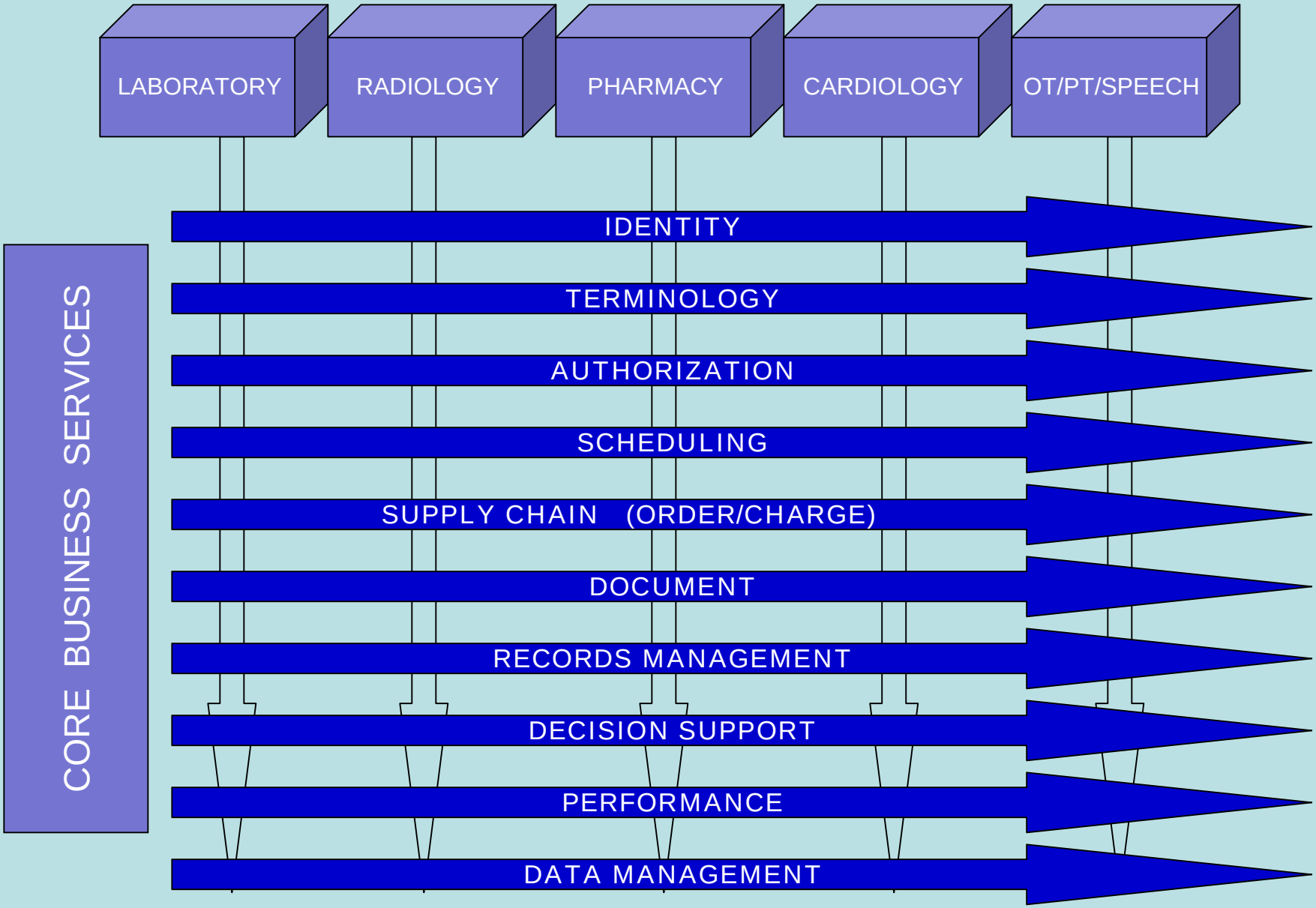
Terminology

- Chronic Diagnoses
- Procedure History

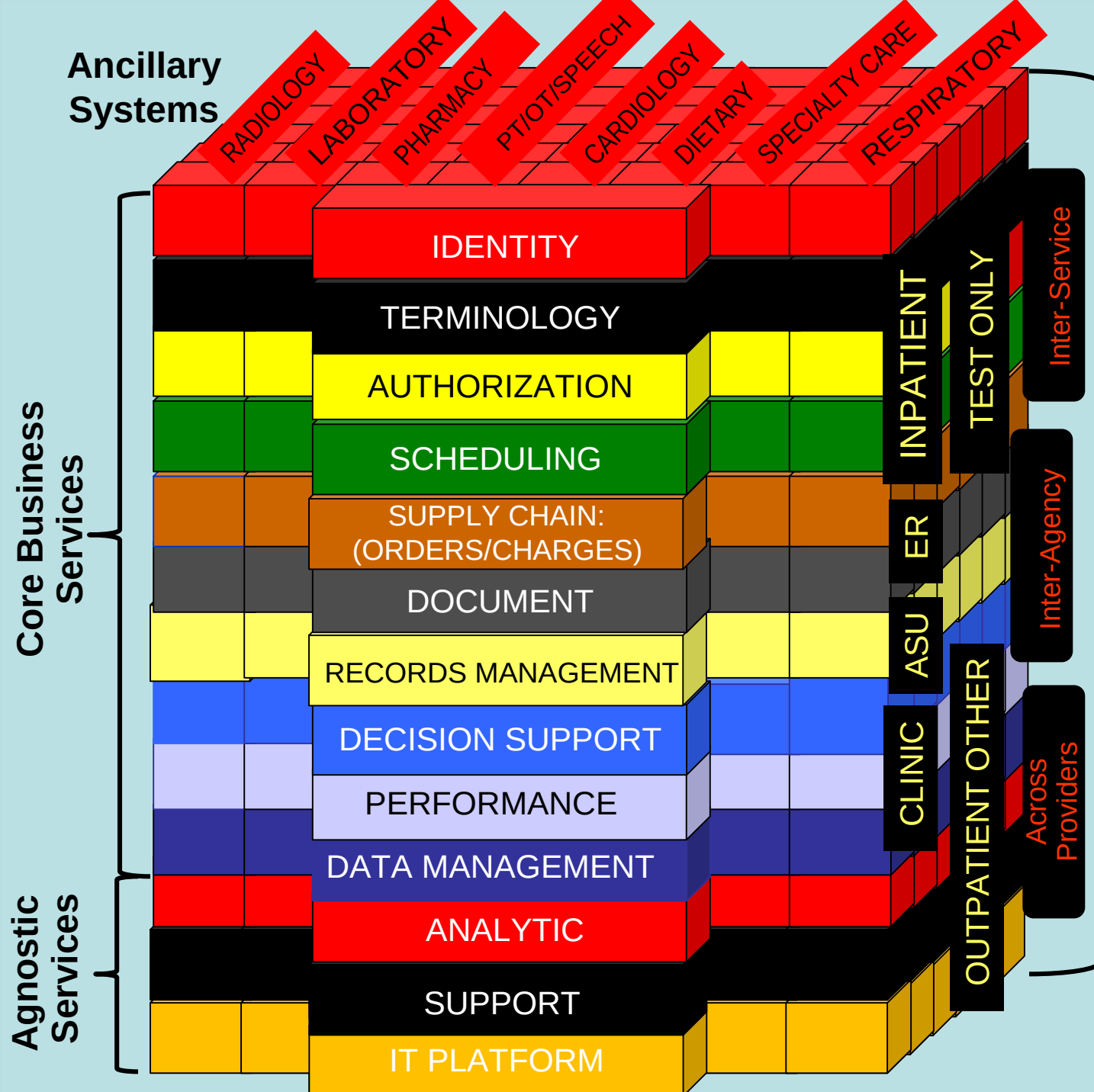
Document

- Patient History
- Summary Lists
  - Medication List
  - Allergy/Adverse Reaction List
  - Immunization

ANATOMY OF AN ANCILLARY SYSTEM



INTEGRATED REQUIREMENTS DESIGNS: Putting the H-SOA-RA Pieces Together



Federated Services, may be categorized by:

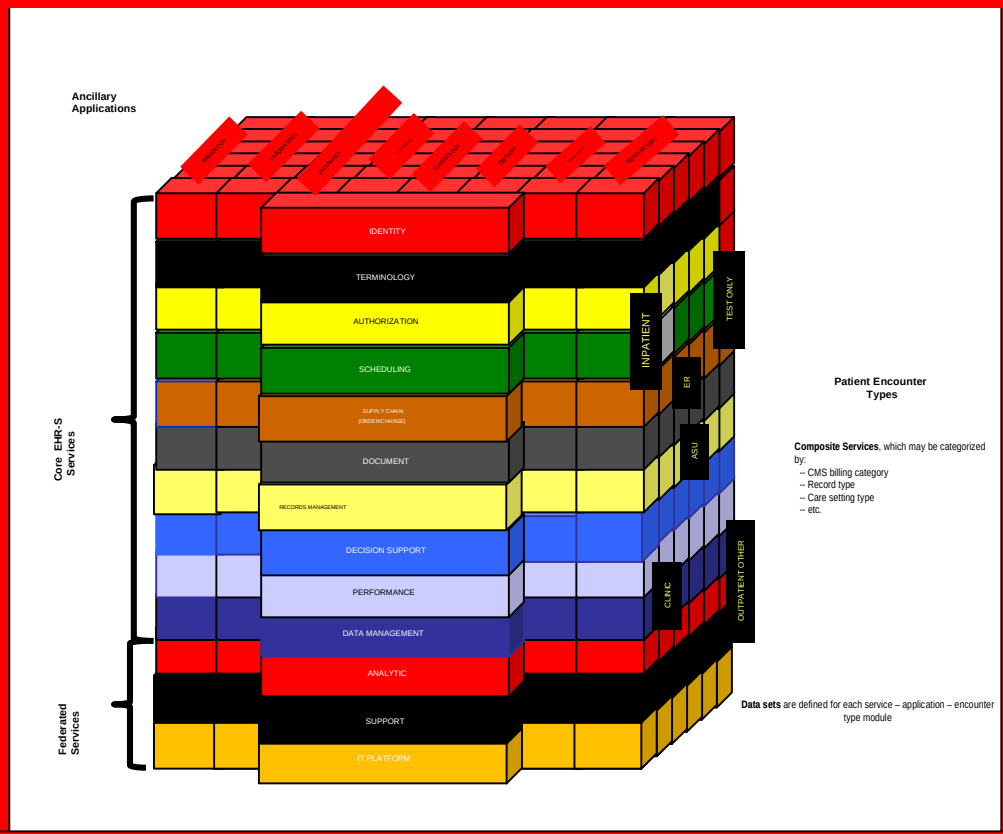
- -- Encounter Types
- -- CMS billing category
- -- Record type
- -- Care setting type
- -- etc.

Data sets are defined for each system functional-capability-service module

USE CASE

CASE MANAGEMENT

ACROSS CARE CONTINUUM

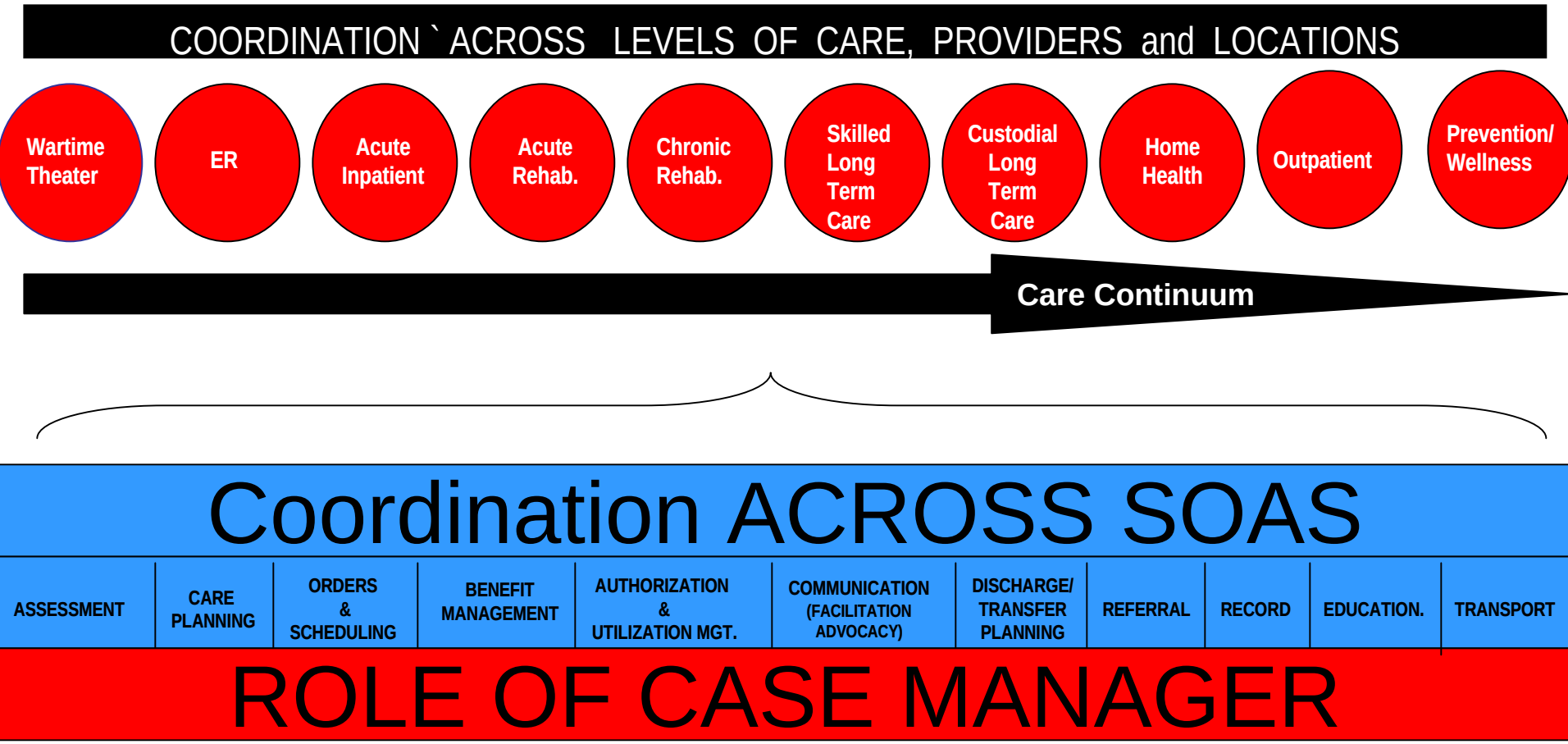


ACROSS SERVICES (SOAs)

COORDINATION

Case Management

Coordination Across SOAs and the Continuum



Potential Benefits from Process Improvement through H-SOA-RA

Elimination of Process Obstacles would result in:

- Length of Stay Reduction
- Improved Patient Outcomes / Reduced Risk
- Revenue Improvement
- Staff Efficiencies
- Improved Patient and Staff Satisfaction
- Reduced IT Expenditure/Maintenance Costs
- Improved Information Accuracy and Availability

ADDRESSING REAL BUSINESS ISSUES THROUGH H-SOA-RA

• Incomplete/Inaccurate Demographic Data	(Identity Service)
• Incomplete/Inaccurate Insurance Information	(Authorization Service)
• Unauthorized Service	(Authorization Service)
• Diagnosis/Procedure Coding Errors	(Terminology Service)
• Service Delays	(Scheduling Service)
• Incomplete and Inefficient Charge Capture	(Supply Chain Service)
• Non-indicated or Contra-indicated Services	(Decision Support/ Authorization Services)
• Delays in EHR Document Production and Provision	(Document Service)
• Billing Delays and Errors	(Supply Chain/ Billing/ Collection Services)
• Not fully coordinated Scheduling	(Scheduling Service)
• Lack of fully integrated Patient Assessment and Treatment Plan	(Document Service/ Decision Support Service)
• Delayed or Lack of Medical Record Access	(Record Service)

NEXT STEPS

- Discussion
- Input
- Mature Model
- “ Socialize” and Gain Acceptance as an Health Industry Reference Framework
  - Via ANSI Ballot; other mechanisms

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