Joint DoD-VA HL7 Service Aware Interoperability Framework (SAIF) Implementation Guide

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SAIF Executive Summary & Implementation Guide is at
http://hssp.wikispaces.com/HL7+SAIF
Immunization Management Case Study is at
http://hssp.wikispaces.com/PracticalGuide

Preface

In March 2011, VA Secretary **Eric Shinseki** and DOD Secretary **Robert Gates** agreed on a common EHR technical architecture, data and services and exchange standards for the joint EHR system (aka iEHR), where the joint EHR will include both proprietary and open source software. The secretaries of the Veterans Affairs and Defense Departments met on May 2, 2011 to determine their next steps toward developing a single electronic health record, for the two agencies.

"*VA is developing an open source track to modernize VistA and will incorporate the approach in the joint EHR*", **Shinseki** said. "*One of my objectives is to have minimal disruption in the hospitals as we evolve from VistA to the joint EHR system What I think you will see us do is replace modules, do incremental upgrades*." … "*In five or 10 years, there may not be one line of code left from VistA. And in my ideal world, the users will have no idea that I have made any changes,*" VA Secretary **Eric Shinseki** said.

"*Our goals are to bring in as many private sector modules as possible and selecting the same thing to run between VA and DOD so that we end up with a single, common electronic health record system*," **Roger Baker**, VA CIO said.

This presentation is the start of the journey to implement the vision expressed above.

Introduction

Distributed development without an architectural vision is virtually impossible.

- An **objective** is that VistA's architectural transition maintain interoperability with the legacy VistA MUMPS and the DoD-VA iEHR architectural vision as well as accommodating commercial vendors.
- The **key to success** is standards-based Virtual Service layers that support plug-and-play applications (e.g., the smartphone application market model) and various data repositories.
- **Innovation** is fostered at the component level and is Darwinian.
- The **premise** is that the presented future-state architecture
  - can support **legacy or modern** hardware and software platforms, languages, applications and databases.
  - can support **scalability** from minimal-cost individual-clinician-systems to enterprise-massively-parallel high-performance grids running on commodity-hardware-platforms (e.g., amazon.com, google.com).

Purpose of Presentation

- Peer review of Architectural Vision
- Feedback on Use of HL7 SAIF
- Present an approach to HL7 SAIF Implementation Guide

VistA Architecture
Outline

Conceptual View

- Current VistA Architecture
- Problems Being Addressed
- Goal & Objective
- Future-State Architecture
- Architectural Changes Mapped to Problems
- Notional List of Applications

Getting Started

System Architecture Documentation

Backup

- SOA Approach
- Current VistA Packages

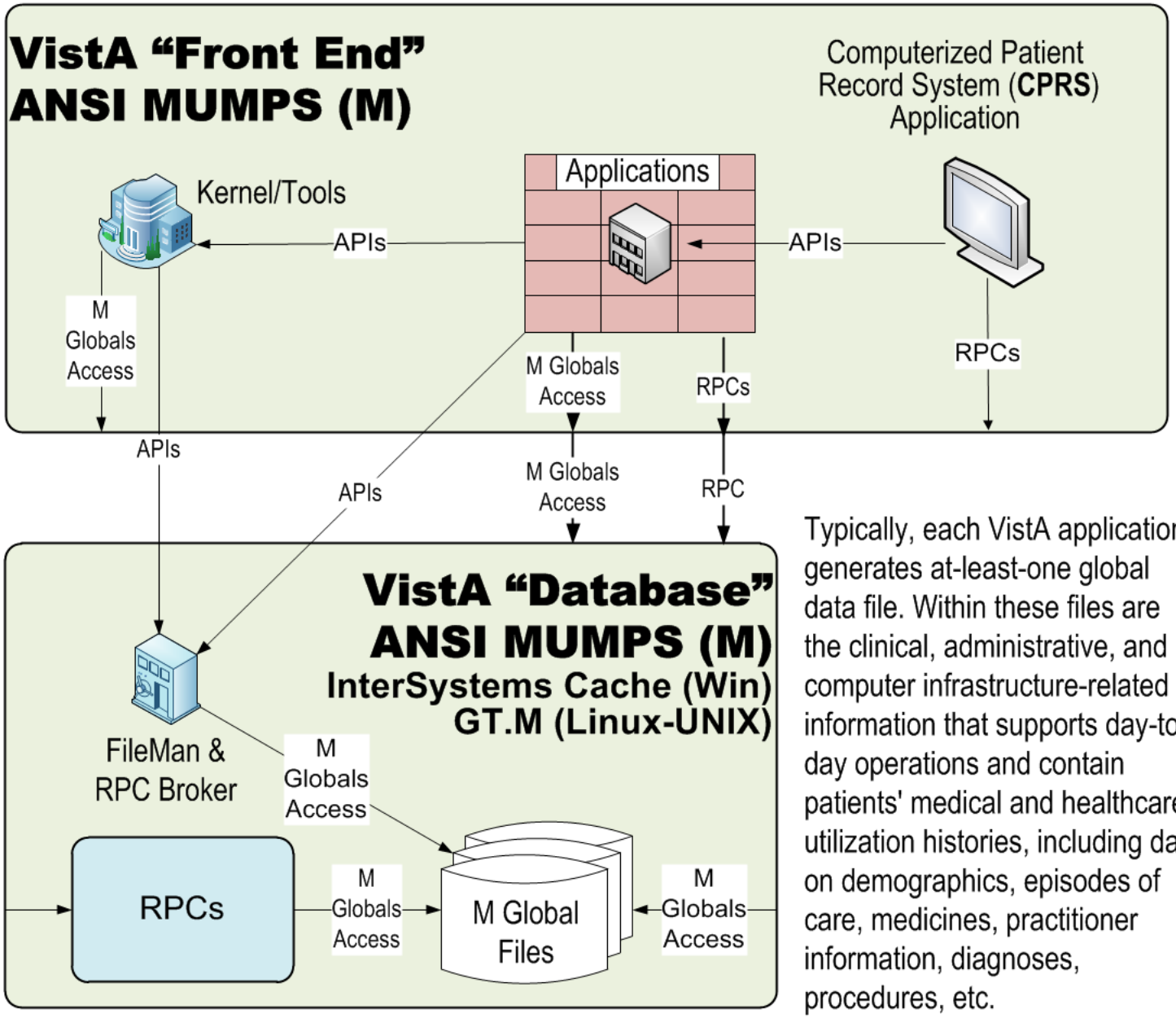
Current VistA Architecture (Conceptual View)

Applications
- Scheduling
- Pharmacy (Rx)
- Laboratory
- Radiology
- ADT
- 100+ other packages

Kernel/Tools
- Security
- Menu Management
- TaskMan, MailMan
- Package Manager, etc.

FileMan
- set of APIs
- search, inquire, edit, print
- utility functions
- data dictionary utilities
- transfer entries, etc.

"Database"
- M global namespaces
- data dictionary
- hierarchical files
  - > Apps., Rx, Lab, Images
  - > Common Data
  - >100+ other files



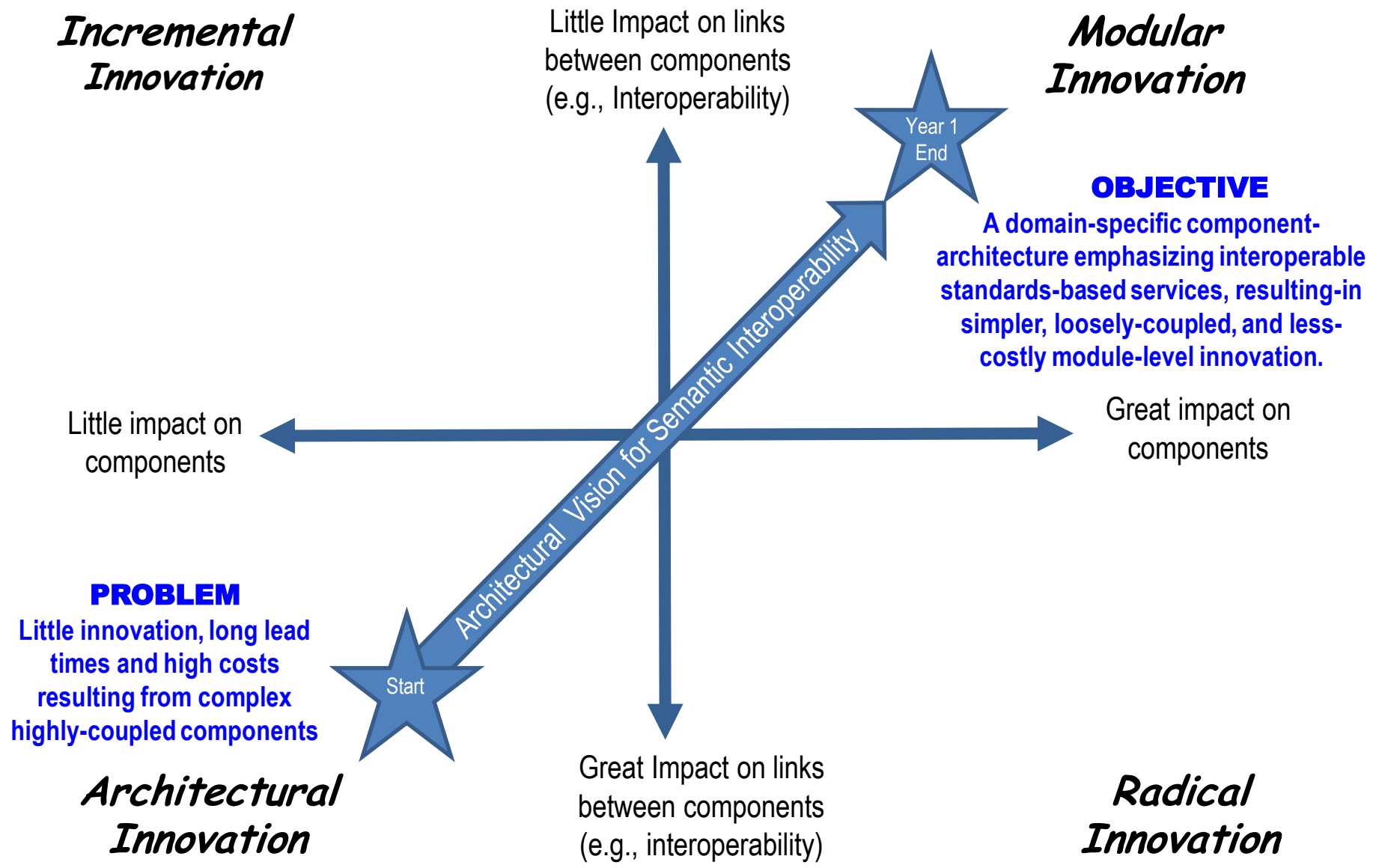
Typically, each VistA application generates at-least-one global data file. Within these files are the clinical, administrative, and computer infrastructure-related information that supports day-to-day operations and contain patients' medical and healthcare utilization histories, including data on demographics, episodes of care, medicines, practitioner information, diagnoses, procedures, etc.

Future State Architecture
Problems Being Addressed

1. *Innovation* to revitalize VistA
2. *Interoperability* among DoD, VA and purchased care partners
3. *Transition* from legacy systems and data to future-state-architecture
4. *Agility* to respond to rapid healthcare change and related legislation
   - ICD 9 → ICD 10
   - ARRA Meaningful Use Objectives and criteria Stage I, II, III
   - HHS Mandated HITSP-constructs and HHS mandated standards
5. *High costs*
   - Separate DoD and VA systems
   - Semantic Interoperability among trading partners (consults and transfers-of-care)
   - Application acquisition or development
   - Commercial Off the Shelf (COTS) Integration
   - Sustainment
   - Test and certification
6. *Patient Safety* issues resulting from software changes.
7. *Open Source Community Enablement (Technical)*

Future State Architecture

GOAL

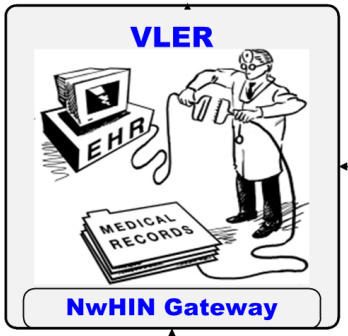


Future-State Architecture (Conceptual View)

Key points:

- VLER wrt iEHR
- NwHIN within VLER
- Applications-database decoupling
- iEHR 3-tier extendible architecture
- Use of Open Health Tools' MDHT(s)
- CIIF is key to semantic interoperability
- CIIF Run-Time environment within iEHR
- CIIF Design-Time environment wrt iEHR Run-Time
- BITE to facilitate performance & payload-data-integrity testing
- NIST 7497 Security Architecture Design Process for Health Information Exchanges (HIEs)
- DoD 8500 (series) Information Assurance Controls

VLER is Virtual Lifetime Electronic Record
NwHIN is Nationwide Health Information Network



Secure Standards-Based Information Exchanges

St Elsewhere

SSA / CMS

...

SSA is Social Security Administration
CMS is Center for Medicare and Medicaid Services

iEHR Gateway

iEHR Tier 1
Front End Systems
Presentation/ Business Rules
Applications/ Business Services

Business Services

Applications

Virtualization-Layer of Federated Standards-Based Services

iEHR Tier 2
ESB Broker

Security Controls

Service Registry

Common Services

Performance Caches

CIIF Run Time
Dynamic Translator for Structures, Codes & Versions

Terminology Services

BITE Services

Schema Services

Virtualization-Layer of Federated Standards-Based Services

iEHR Tier 3
Back End Systems
iEHR Common Data (CIIF Schemas)
Federated/Virtual Data
Legacy Data

Data Services

Data Stores

Metadata Services

CIIF Design-Time
Workbench of Model Driven Health Tools (MDHTs)

Metadata Services

MDR

MDR is Meta Data Repository

Information Model

Metadata and rules

Terminolgy Models

SNOMED CT and Extensions, LOINC and RxNorm

Payload = service, message. Document or application-interface information exchange content.

Translation Models

Payload Models
Payload Schemas
BITE Schematron

iEHR is interoperable Electronic Healthcare Record

iEHR Common Data implies the native use of a single logical database, based on the CIIF Information Model and Terminology Models.

ESB is Enterprise Service Bus.

CIIF is Common Information Interoperability Framework

Security Controls support the NIST 7497 Security Architecture Design Process for Health Information Exchanges (HIEs) and DoD 8500 (series) Information Assurance controls.

BITE is Built-In-Test-Environment for performance and payload-data-integrity testing of ad-hoc trading-partners and plug-and-play applications; BITE uses Schematron.

Schematron is a rule-based validation language.

Future State Architecture
Notional List of Applications

Registration	Outpatient Pharmacy	Operating Room Management	Emergency Site/ Mass Casualty Care
Secure Messaging	Disability Evaluation	Blood Management	History, Physical and Readiness
Laboratory	Patient Education	XML Forms Tool	Veterinary
Diagnostic Imaging	Emergency Department Care	Documents Management	Nursing Home
Private Sector Data Access	Dental Care	Registries	Rehabilitative Care
Global Image Access	Inpatient Orders Management	Nutrition Care	Pharmacy Mail Order
Personal Health Record	Alerts and Reminders	Genomics	Long Term Care
Outpatient Orders Management	Immunization	Emergency Department Care	Occupational Health
Neurocognitive Assessment Tool (NCAT)	Patient Questionnaire	Pediatrics	Social Services Outreach
Anatomic Pathology	Document Management	Obstetrics	A Real-Time Order Checking Decision Support System
Patient Consent	Patient Portal	Orthopedics	Clinical Reminder System
Consult and Referral Management	Inpatient Pharmacy	Dermatology	Remote Access
Patient Self Reporting	Barcoding	En-route care	Imaging Data Viewing
Portable and/or Re-configurable user interfaces			

Future State Architecture
Architectural Changes Mapped to Problems

1. *Innovation* to revitalize VistA
   - Services within a standards-based component-architecture encourage lower-cost component innovation without requiring enterprise wide expertise.
2. *Interoperability* among DoD, VA and purchased care partners
   - CIIF canonical information and terminology models can map among heterogeneous system information exchanges. By adopting common data, terminology, and communications standards, data from multiple organizations can be shared more readily.
3. *Transition* from legacy systems and data to future-state-architecture
   - Virtualization-Layers of Federated Standards-Based Services applications, databases and infrastructure, where legacy and new COTS, GOTS and open source software can coexist.
4. *Agility* to respond to rapid healthcare change and related legislation
   - Services within a standards-based component-architecture encourage lower-cost changes within components without requiring enterprise wide expertise.
5. *High costs*
   - Virtualization-Layers of Federated Standards-Based Services make possible applications, databases and infrastructure, which can be treated as commodities and can be tested efficiently. Interchangeable-components can compete based, on black-box functionality, quality, performance vs. cost, usability and supportability. BITE identifies faults early, improving system robustness.
6. *Patient Safety* issues resulting from software changes.
   - BITE identifies faults early, improving system robustness and patient safety.
7. *Open Source Community Enablement (Technical)*
   - Virtualization-Layers of Federated Standards-Based Services make possible applications, databases and infrastructure, which can be a combination of MUMPS, COTS, GOTS and other open source code, which meets the specific-needs of various stakeholder-and-user communities.

Future State Architecture
Outline

Conceptual View

Getting Started

- Security Principles
- Security Services & Standards
- Security Process
- Service Aware Interoperability Framework (**SAIF**)
- SAIF Enterprise Compliance & Conformance Framework (**ECCF**)
- Software Development Kit (**SDK**)

System Architecture Documentation

Backup

- SOA Approach
- Current VistA Packages

NIST 7497 Security Architecture*
Design Principles

1. Perform Information Assurance Risk assessments of shared information;
2. Create "master" trust agreements describing requirements for a trust domain;
3. Separate authentication/credential management and authorization/privilege management;
4. Develop data protection capabilities as plug-and-play services; and
5. Maintain a standards-based, technology-neutral, and vendor-neutral architecture.

* NIST IR 7497, *Security Architecture Design Process for Health Information Exchanges (HIEs)*, Sept. 2010, available at http://csrc.nist.gov/publications/PubsNISTIRs.html

NIST 7497 Security Architecture
Enabling Services

1. **Risk Assessment** is a Security and Privacy Principles, which means to identify security and privacy risks to HIE operations based on threats, assets, vulnerabilities, and likelihood of threat success.
2. **Entity Identity Assertion (Authentication)** is HITSP Construct* SC110 & C19, which ensures that an entity is the person or application that claims the identity provided.
3. **Credential Management** is a Security Principles, which means to manage the life cycle of entity credentials used for authentication and authorization.
4. **Access Control (Authorization)** is HITSP Construct* SC108 & TP20, which ensures that an entity can access protected resources if they are permitted to do so.
5. **Privilege Management** is a Security Principles, which means to manage the life cycle of an entity's authorization attributes (e.g., roles, permissions, rules) for making access control decisions.
6. **Collect and Communicate Audit Trail** is HITSP Construct* SC109 & T15, which defines and identifies security-relevant events and the data to be collected and communicated as determined by policy, regulation, or risk analysis.

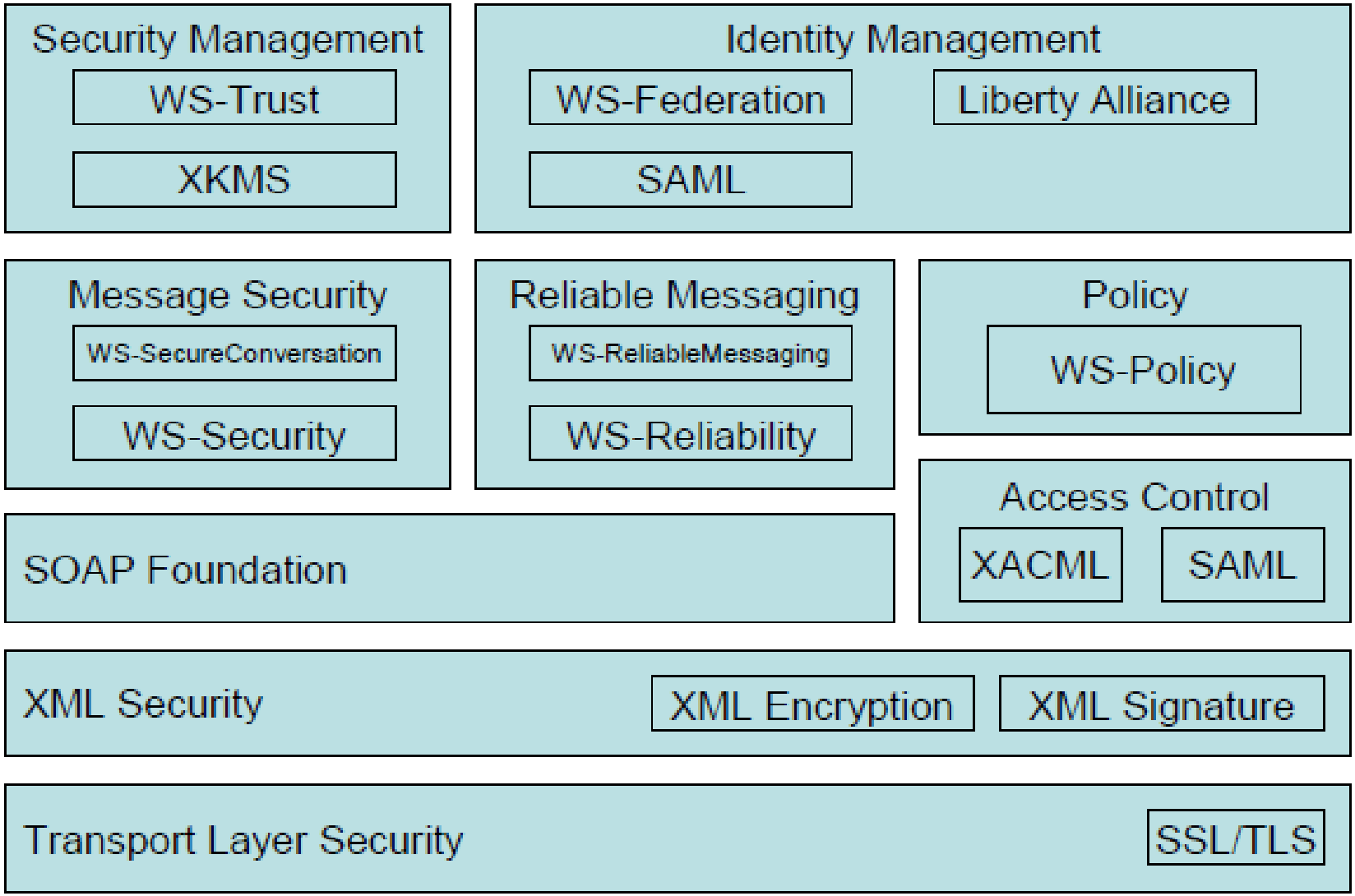
* HITSP constructs are available at www.HITSP.org

NIST 7497 Security Architecture
Enabling Services

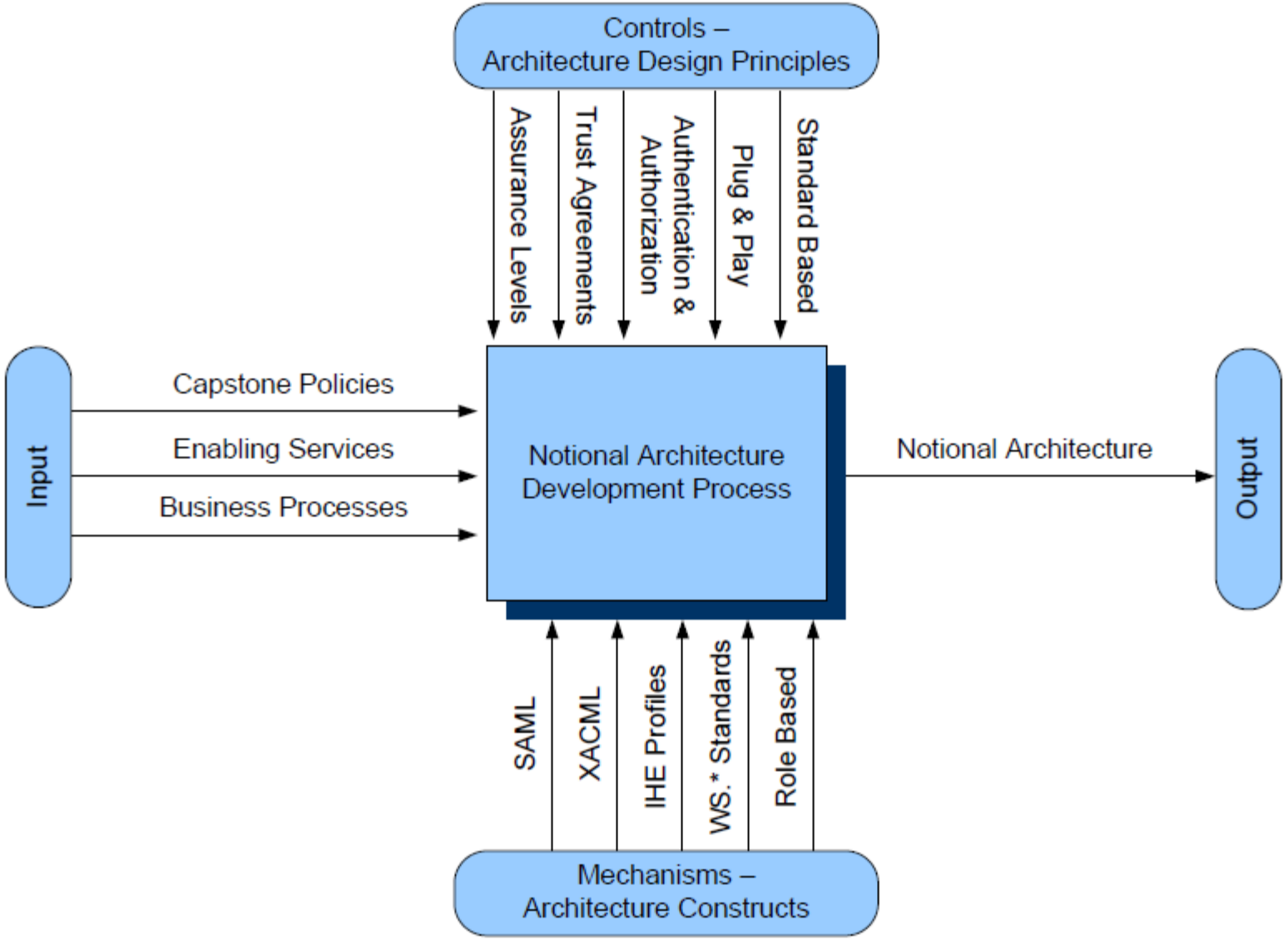
7. **Document Integrity** is HITSP Construct* T31, which validates that the contents of a document have not been changed in an unauthorized or inappropriate manner.
8. **Secured Communication Channel** is HITSP Construct* SC109 & SC112, which ensures that the mechanism through which information is shared or transmitted appropriately protects the authenticity, integrity, and confidentiality of transactions to preserve mutual trust between communicating parties.
9. **Document Confidentiality** is a Security Principles, which means to prevent the unauthorized disclosure of a document that is exchanged or shared.
10. **De-identification** is a Privacy Principles, which means to remove individual identifiers from a health record, or replace them with other information such as pseudonyms, so that it cannot be used to identify an individual.
11. **Non-Repudiation of Origin** is HITSP Construct* C26, which provides the proof of the integrity and origin of data in an unforgettable relationship which can be verified by any party.
12. **Manage Consent Directives** is HITSP Construct* TP30, which ensures that individually identifiable health information is accessed only with an individual's consent.

* HITSP constructs are available at www.HITSP.org

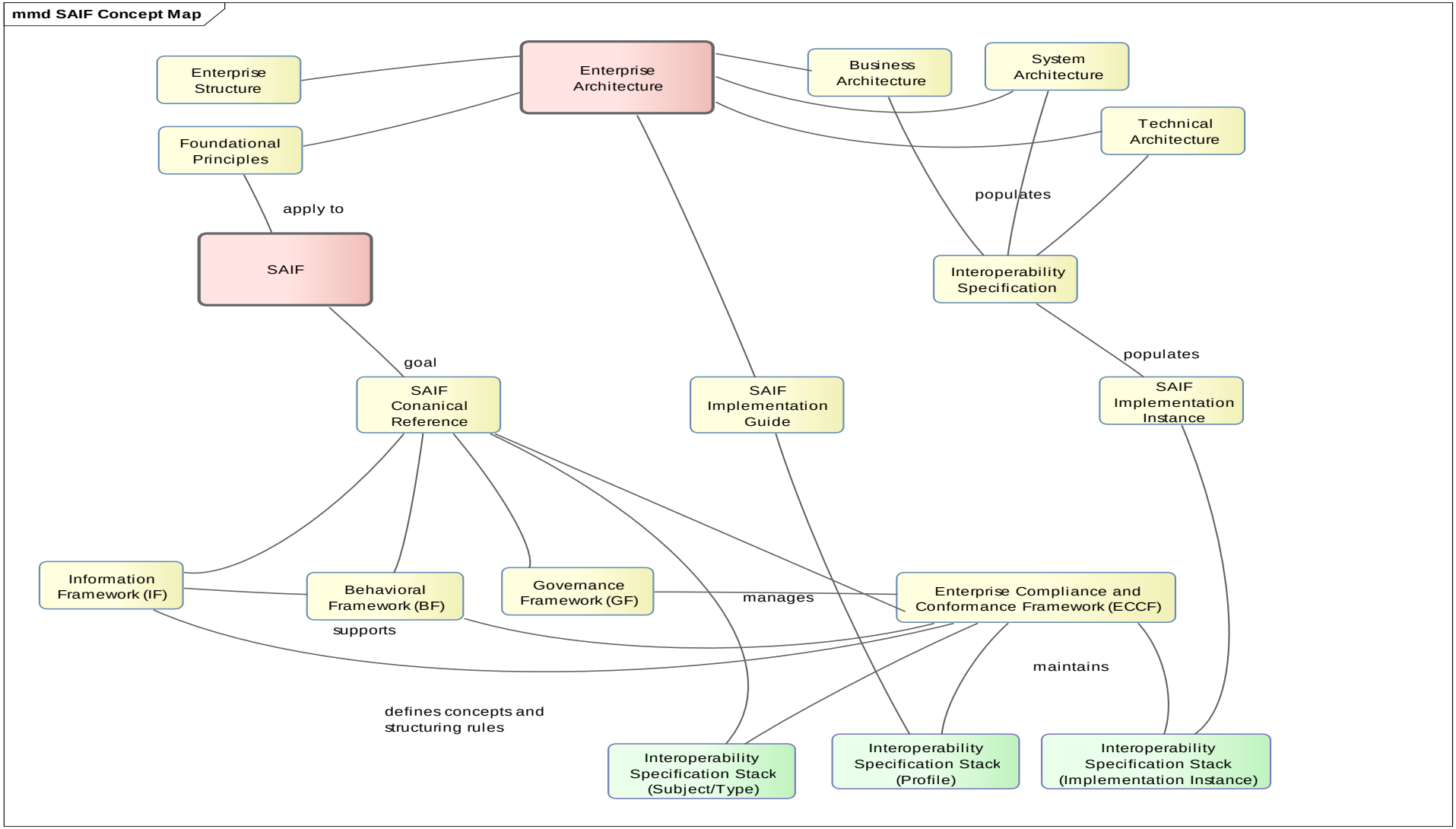
NIST 7407 Security Architecture
Web-Service Security-Standards



NIST 7497 Security Architecture
Notional Development Process



HL7
Service Aware Interoperability Framework (SAIF)



HL7 Service Aware Interoperability Framework (SAIF)

Enterprise Compliance and Conformance Framework (ECCF)

ECCF	Enterprise Dimension "Why" - Policy	Information Dimension "What" - Content	Computational Dimension "How" - Behavior	Engineering Dimension "Where" - Implementation	Technical Dimension "Where" - Deployments
Conceptual Perspective	✓ Inventory of • User Cases, Contracts • Capabilities ✓ Business Mission, Vision, Scope	✓ Inventory of • Domain Entities • Activities • Associations • Information Requirements • Information Models ○ Conceptual ○ Domain	✓ Inventory of • Functions-services ✓ Requirements • Accountability, Roles • Functional Requirements, Profiles, Behaviors, Interactions • Interfaces, Contracts	✓ Inventory of • SW Platforms, Layers • SW Environments • SW Components • SW Services • Technical Requirements • Enterprise Service Bus ✓ Key Performance Parameters	✓ Inventory of • HW Platforms • HW Environments • Network Devices • Communication Devices ✓ Technical Requirements
Logical Perspective	✓ Business Policies ✓ Governance ✓ Implementation Guides ✓ Design Constraints ✓ Organization Contracts	✓ Information Models ✓ Vocabularies ✓ Value Sets ✓ Content Specifications	✓ Specifications • Use Cases, Interactions • Components, Interfaces ✓ Collaboration Participations ✓ Collaboration Types & Roles ✓ Function Types ✓ Interface Types ✓ Service Contracts	✓ Models, Capabilities, Features and Versions for • SW Environments • SW Capabilities • SW Libraries • SW Services • SW Transports	✓ Models, Capabilities, Features and Versions for • HW Platforms • HW Environments • Network Devices • Communication Devices
Implementable Perspective	✓ Business Nodes ✓ Business Rules ✓ Business Procedures ✓ Business Workflows ✓ Technology Specific Standards	✓ Schemas for • Databases • Messages • Documents • Services • Transformations	✓ Automation Units ✓ Technical Interfaces ✓ Technical Operations ✓ Orchestration Scripts	✓ SW Specifications for • Applications • GUIs • Components ✓ SW Deployment Topologies	✓ HW Deployment Specifications ✓ HW Execution Context ✓ HW Application Bindings ✓ HW Deployment Topology ✓ HW Platform Bindings

Five (5) Categories: Capability | Mission | Business Process | Infrastructure/Enterprise Architecture | Interoperability

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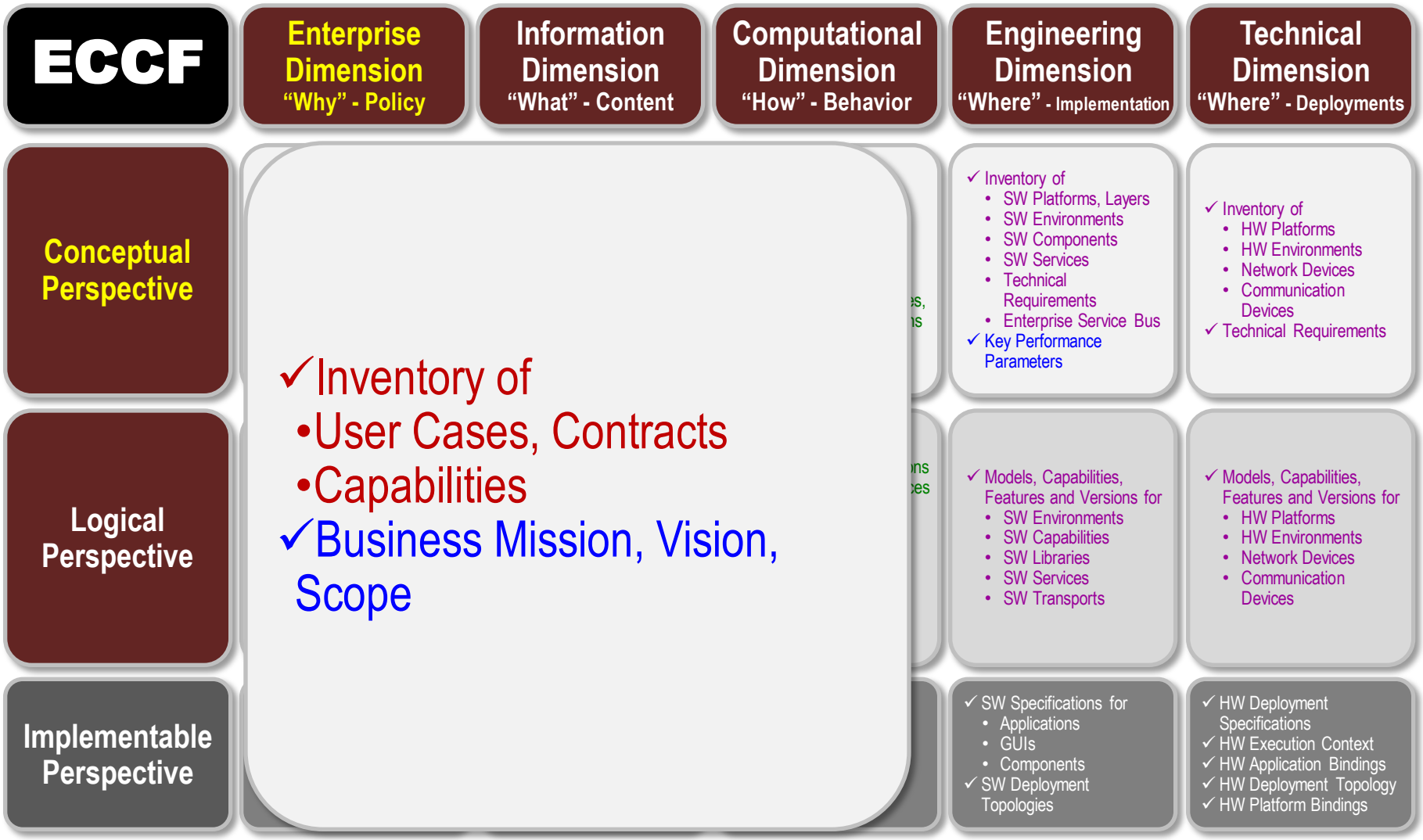

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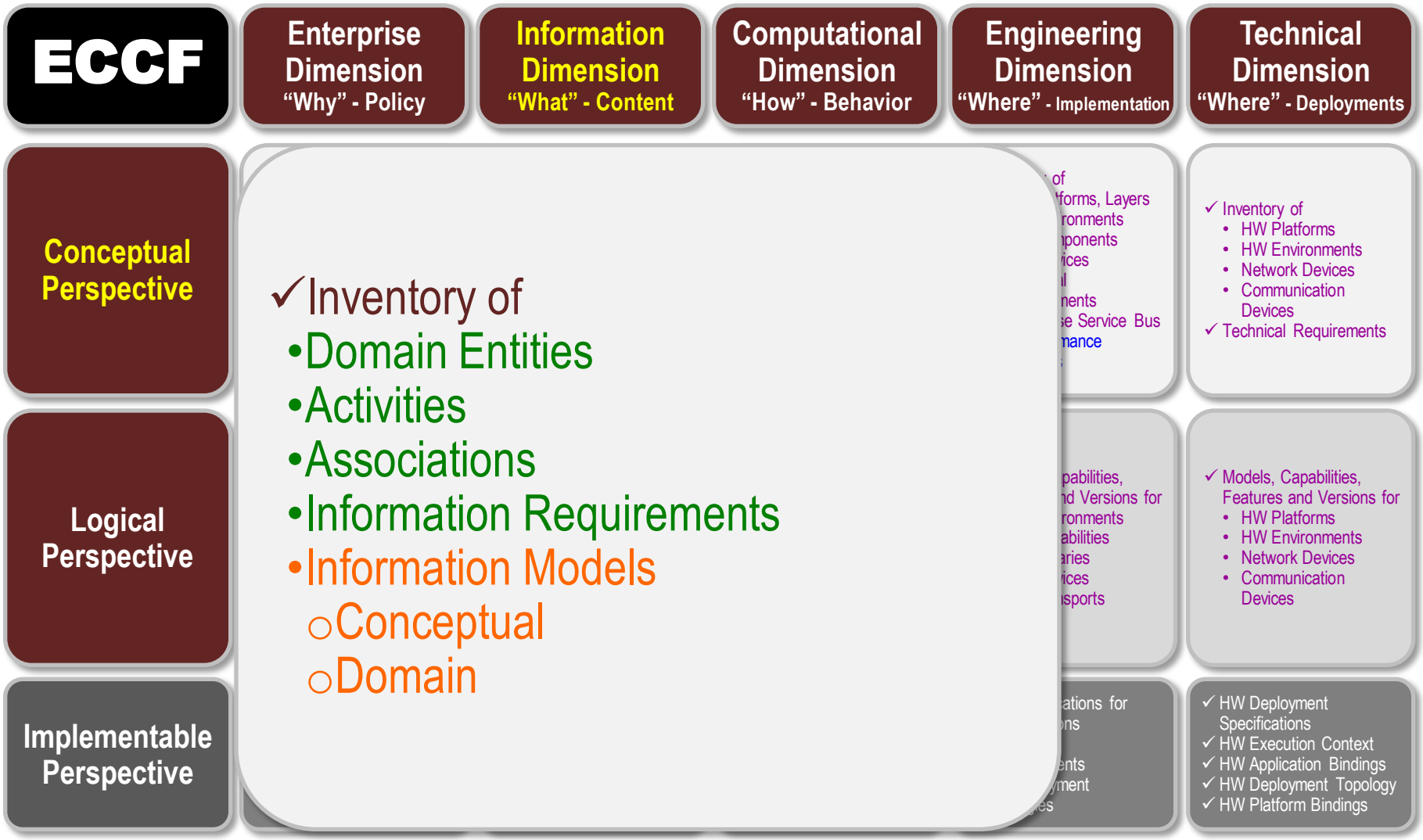

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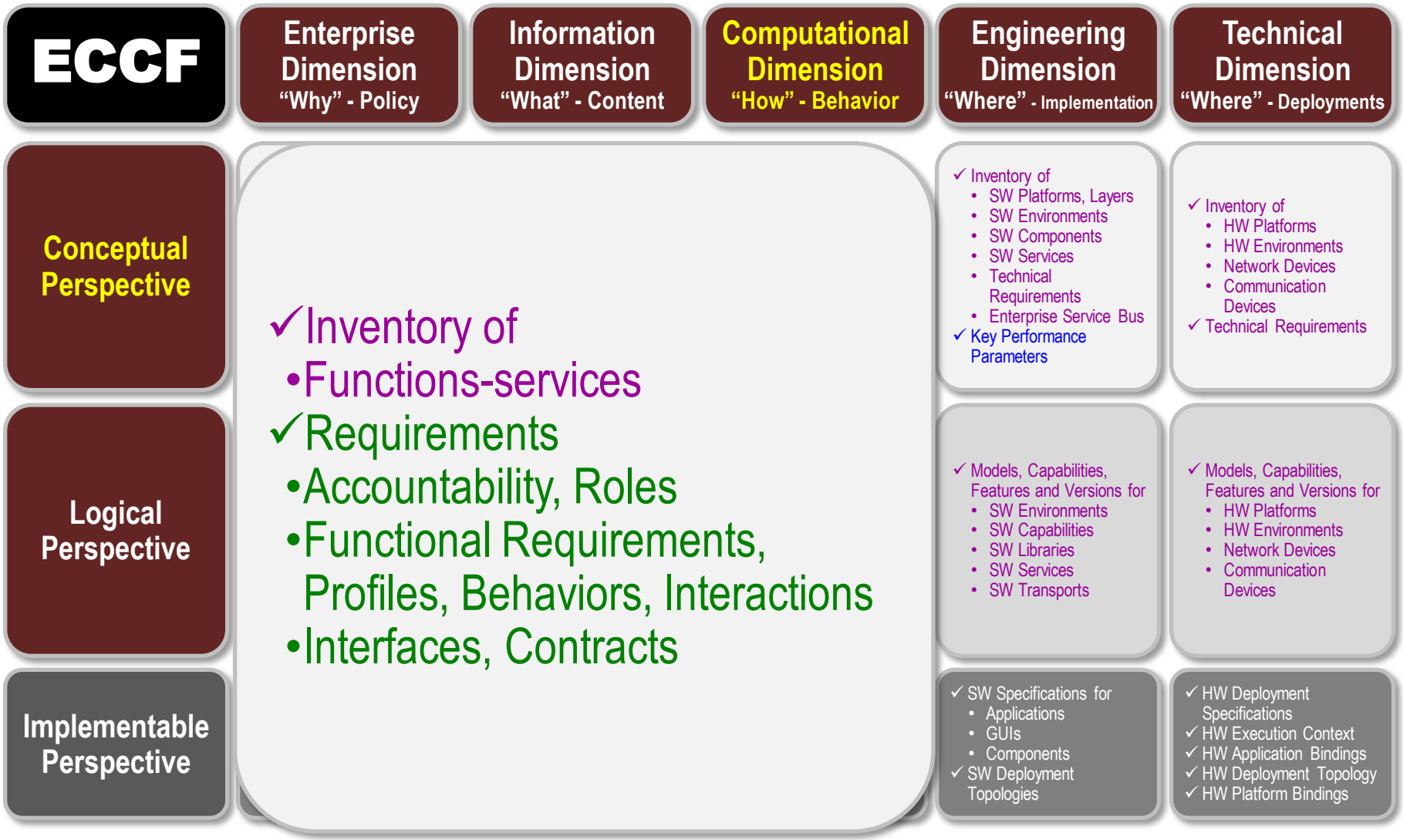

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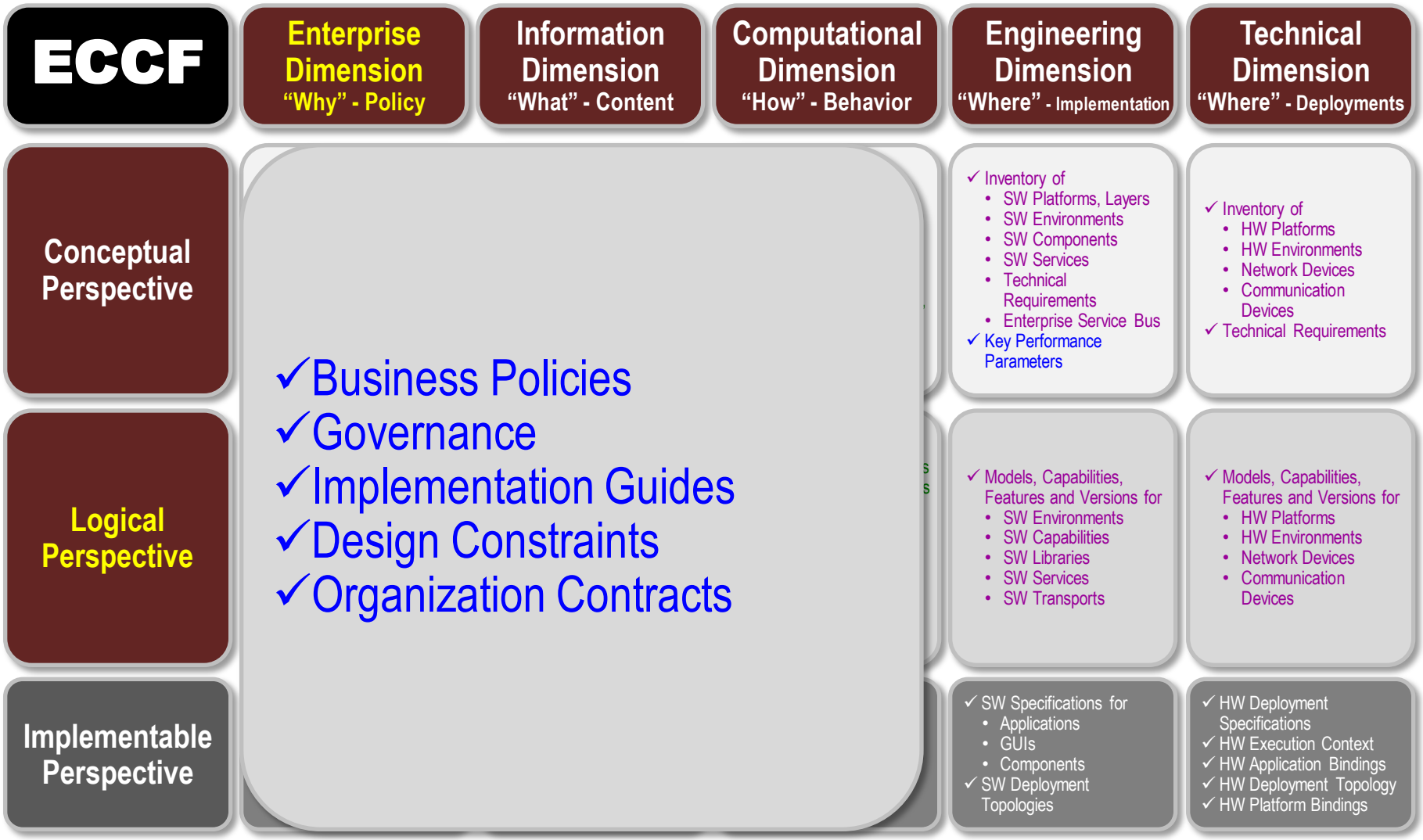

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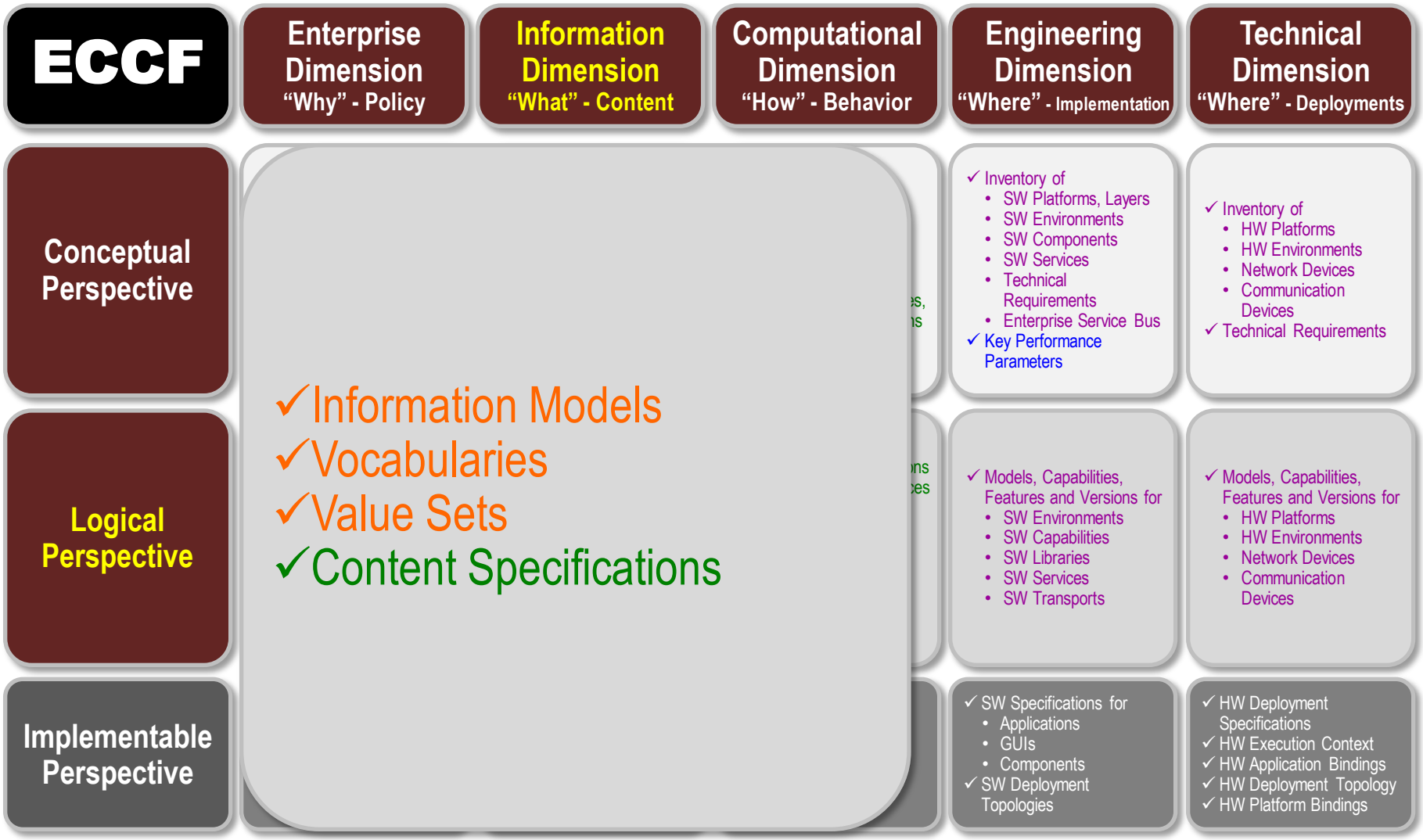

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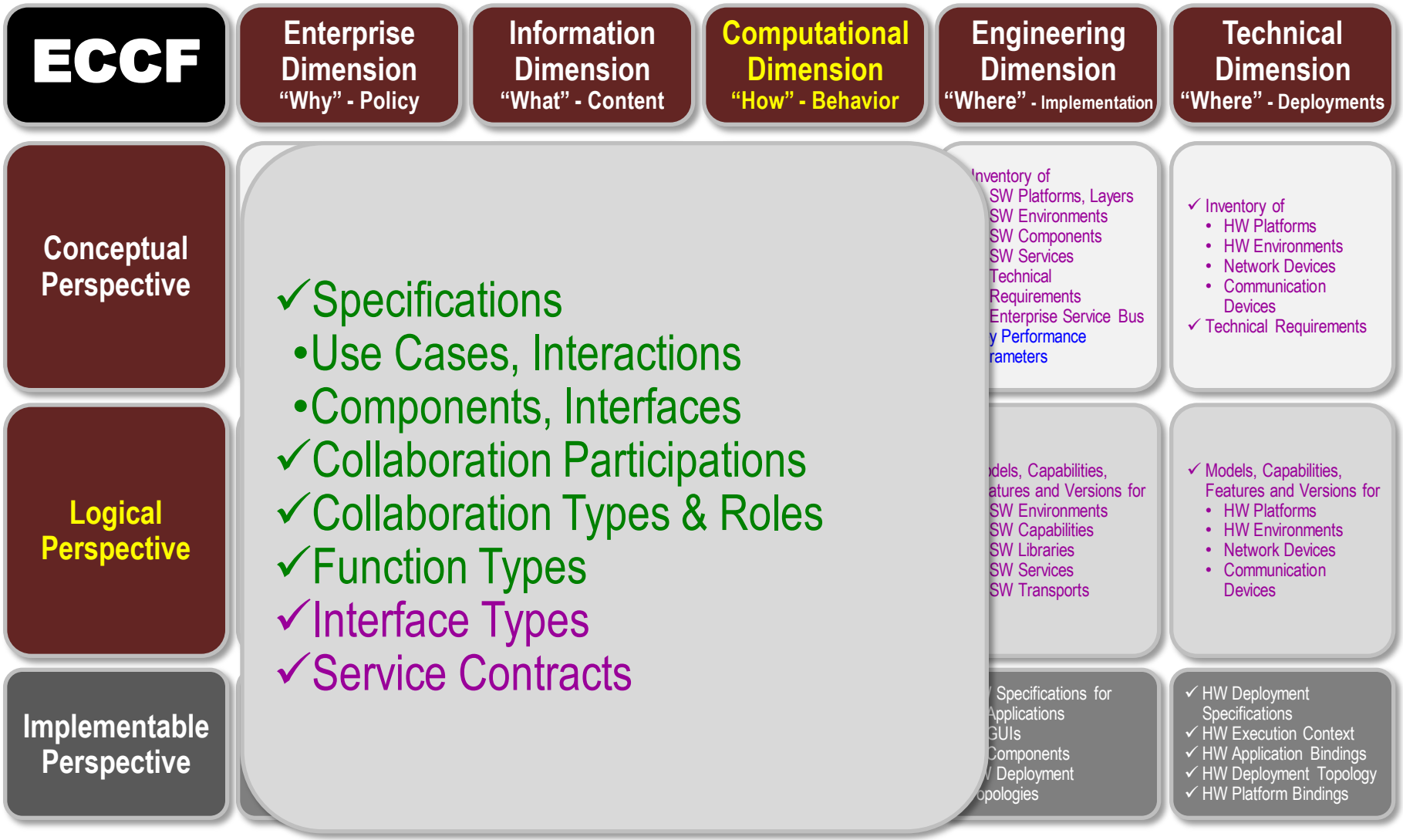

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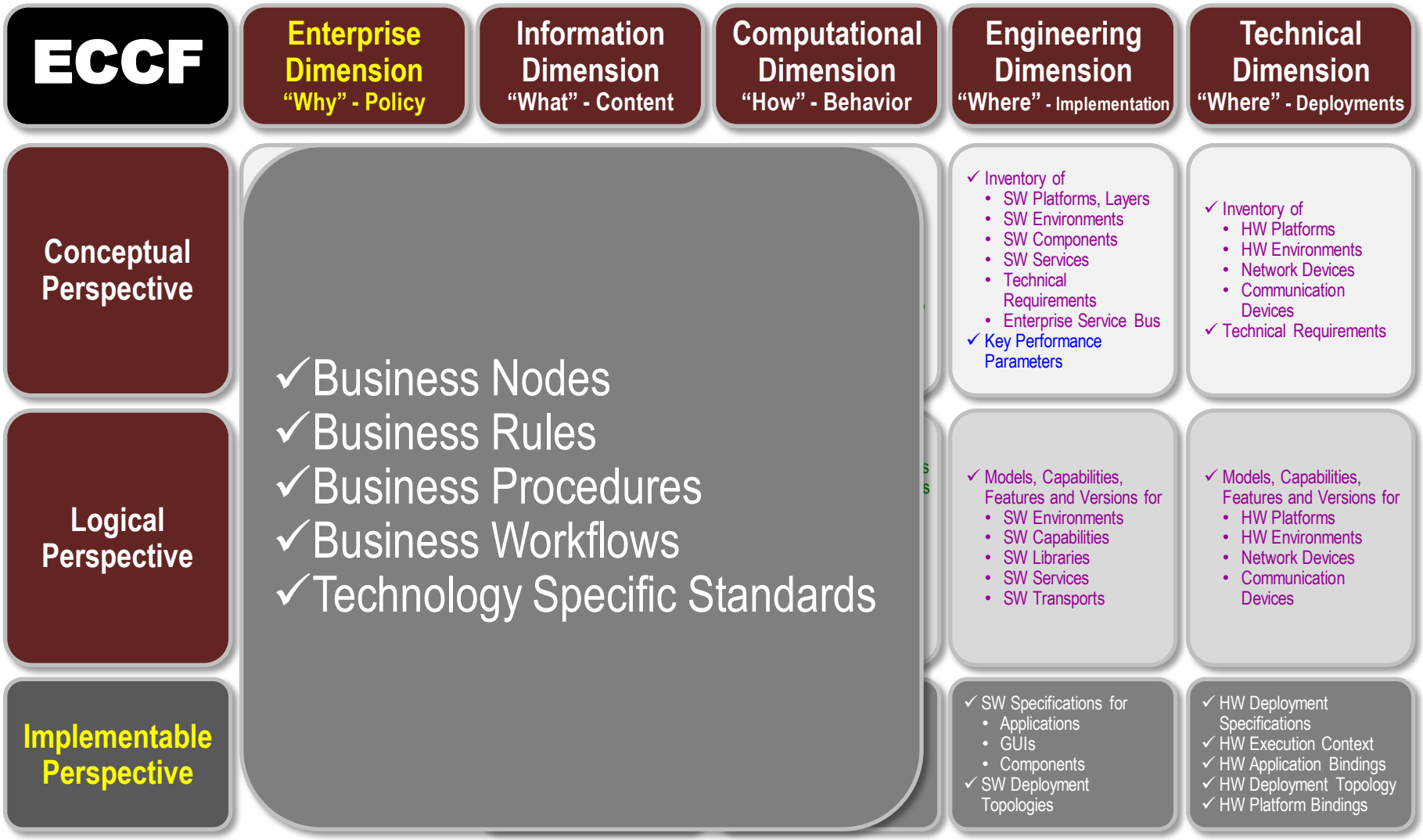

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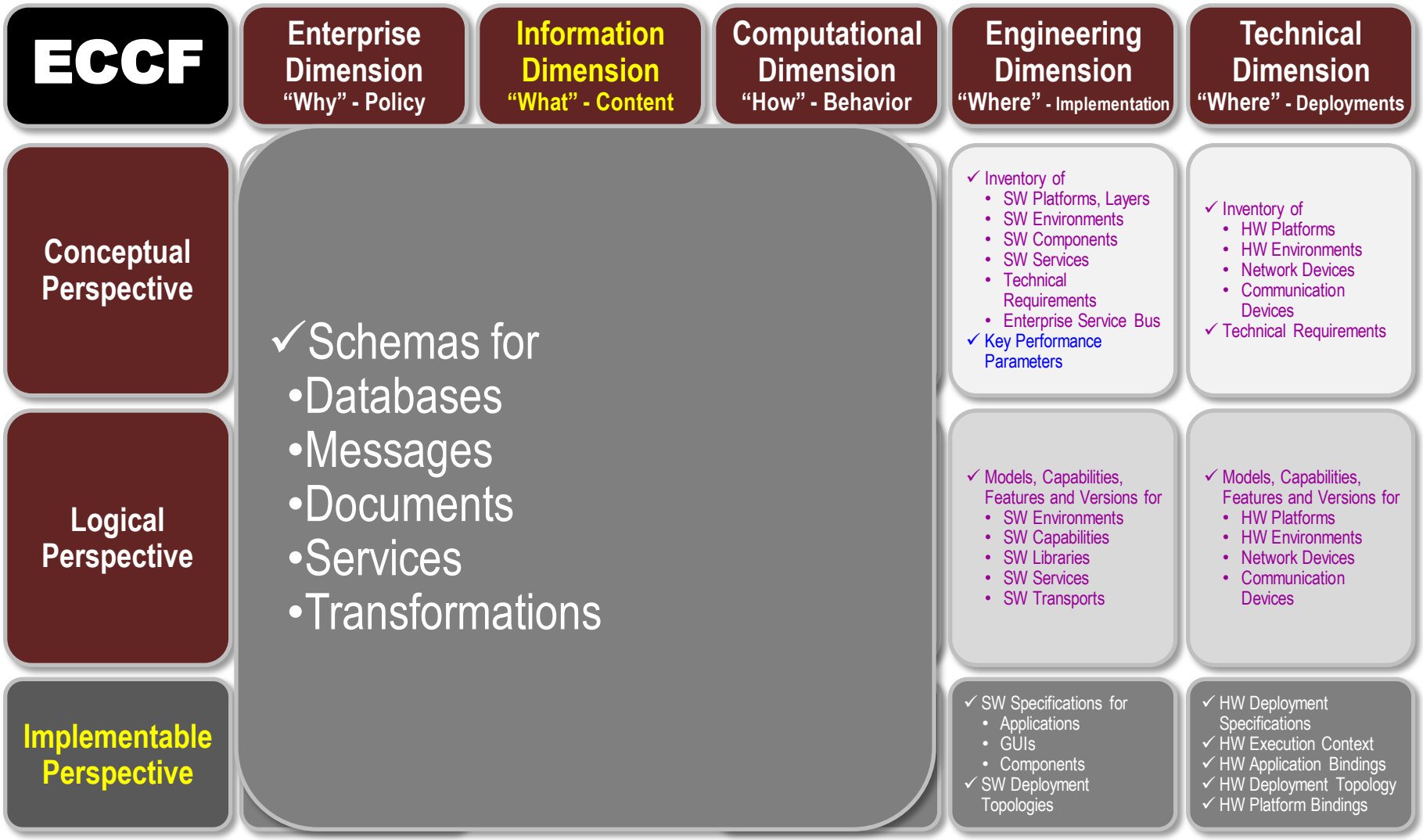

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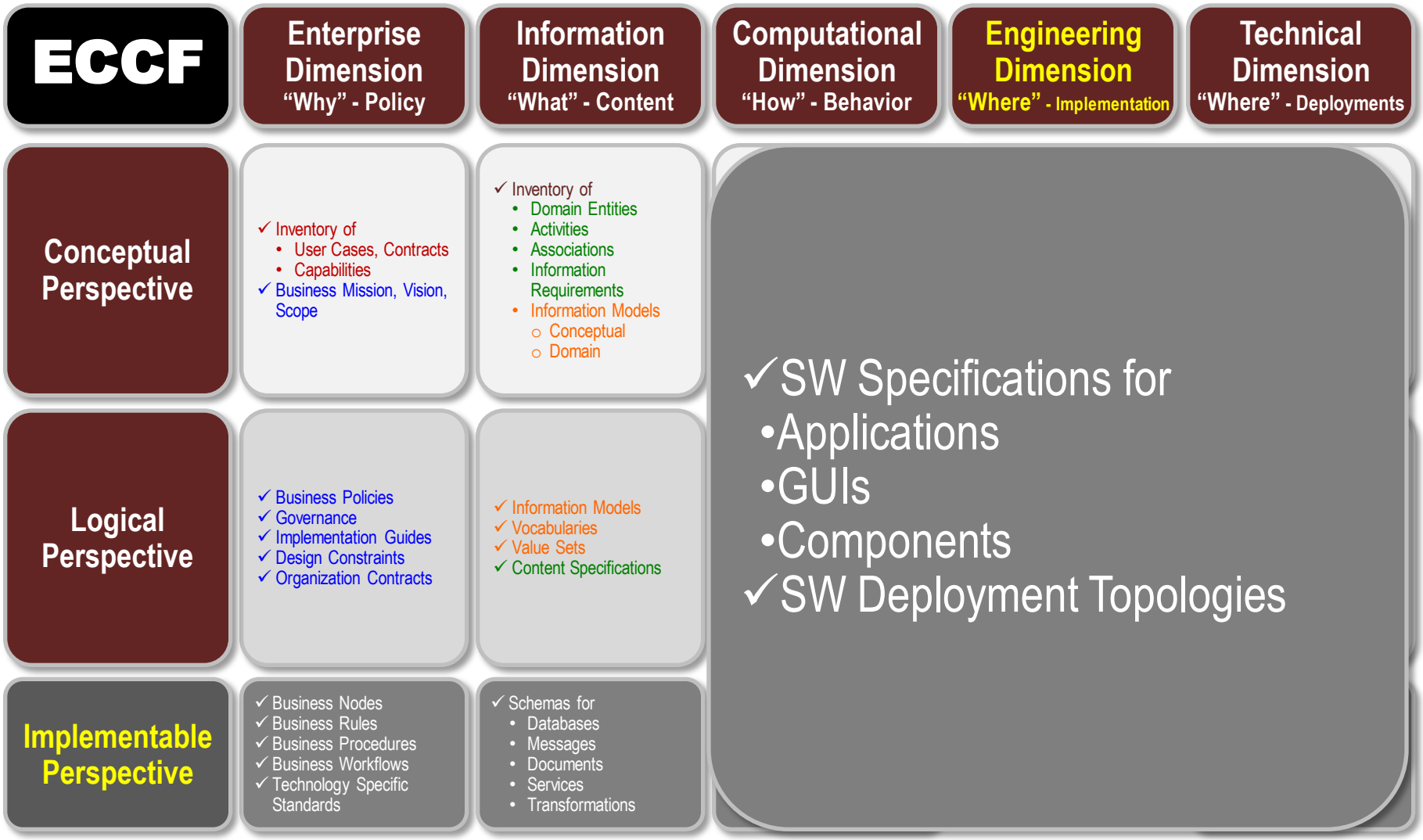

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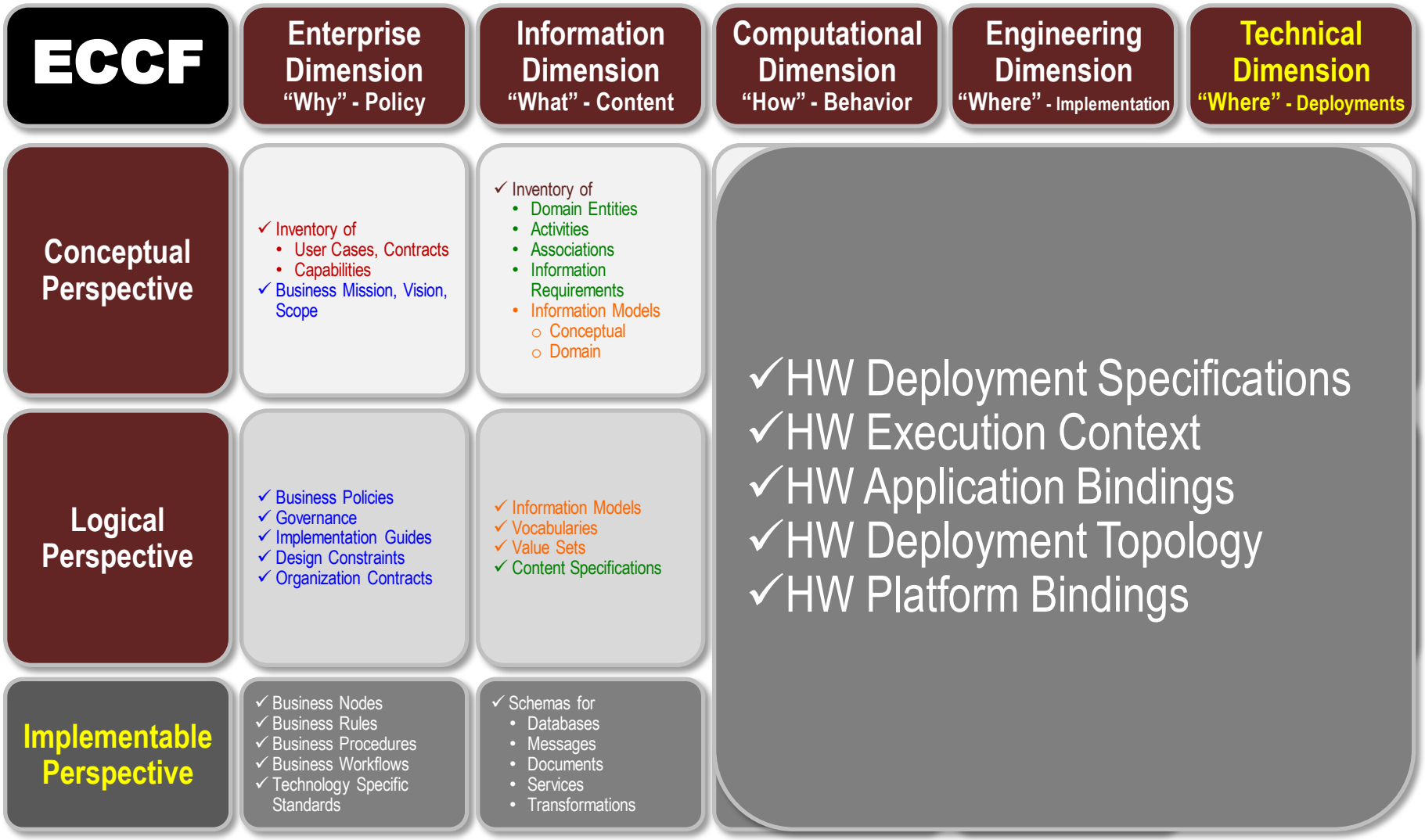


Five (5) Categories: Capability | Mission | Business Process | Infrastructure/Enterprise Architecture | Interoperability

Future-State Architecture
Software Development Kit (SDK)
Draft Specifications needed in first 120 days

1. *Built-In-Test-Environment (BITE) Service Specification* to support automated fault-detection of distributed ad-hoc partners & plug-and-play application.
   - *Model-Driven Health-Tool*, which defines schemas and schematron test fixtures.
   - *Cross Reference Tool Specification* to map module dependencies, which will support automated BITE software quality standards (**SQS**) testing and certification.
   - *Pretty Printer Tool Specification* BITE to check syntax and reformat each program module to conform to SQS and standards of presentation.
   - *Performance Monitoring Component Service Specification* BITE to trace execution pathways and measure latency, which will support , system tuning, automated testing and certification.
   - *Code Coverage Regression Test and Stress Test Tool Specification*, which will support automated BITE testing and certification of fault recovery pathways.
2. *SAIF ECCF Implementation Guide (IG)* for documenting component Interoperability Specifications, which will support new development, repurposing, reimplementation, automated testing and certification.
   - *SAIF ECCF Tool Specification* to manage module Interoperability Specifications, which will support new development, repurposing, reimplementation, automated testing and certification.
3. *ESB Services Specification* of Tier 1-2 Application Virtualization-Layer of federated standards-based services.
4. *Database Services Specification* of Tier 2-3 Database Virtualization-Layer of federated standards-based services.

Future State Architecture
Outline

Conceptual View

Getting Started

System Architecture Documentation

- Manage EHR System Architecture

Backup

- SOA Approach
- Current VistA Packages

Manage EHR System Architecture

TASK: Provide a clear and accessible definition of the components of the codebase, how they function, and how they interact.

Approach: VistA System Architecture (**SA**) model. The VistA SA model will be based-on and include links-to the online VistA documentation library*. The VistA SA tool will contain HL7 SAIF ECCF (see Slide 19) Interoperability Specifications (**IS**s) including but-not-limited to:

- components modeled as UML classes, showing
  - component-component dependencies
  - component-data dependencies
  - deployment-configurations
- Component definitions
- Component functional-descriptions
  - based on HL7 EHR System Functional Model (**EHR-S FM**)
  - Including EHR-S FM conformance criteria to support test and certification
  - ARRA Meaningful use objectives and criteria
  - Applicable HHS mandated HITSP-constructs and other HHS mandated standards.
- Application Program Interfaces (APIs)

* The VistA Documentation Library is available at http://www.va.gov/vdl/

- **RESULT**: SA-tool-generated report of Interoperability Specifications and
- SA-tool-generated HTML-navigable VistA SA model, appropriately linked to the VistA Documentation Library*

Future State Architecture
Outline

Conceptual View

Getting Started

Approach to As-Is System Architecture

Backup

- **SOA Approach**
  - EHR data reuse across encounters
  - Encounter within a Case Management Scenario
  - Hl7 EHR System Functional Model (EHR-S FM)
  - SOA Layers
  - SOA Service Model
  - Healthcare SOA Reference Architecture (**H-SOA-RA**)
  - Anatomy of an Ancillary System
  - INTEGRATED REQUIREMENTS DESIGNS: Putting the H-SOA-RA Pieces Together
  - Addressing Real Business Issues Through H-SOA-RA based Integrated Requirements-Design
- Current VistA Packages

PROVIDERS' EHR DATA REUSE
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

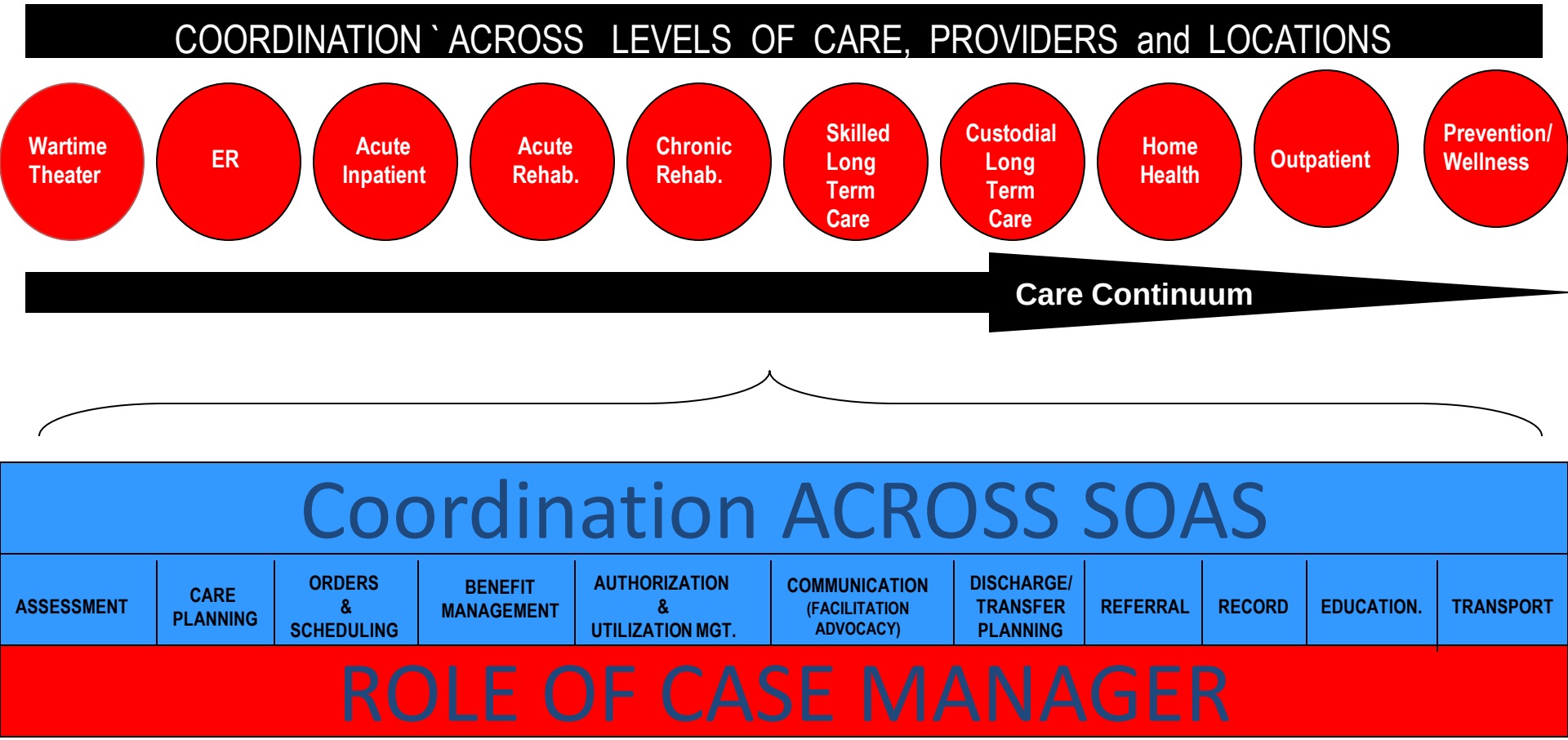
Terminology

- Chronic Diagnoses
- Procedure History

Document

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

Case-Managers' EHR Data Reuse
Across the Continuum of Care



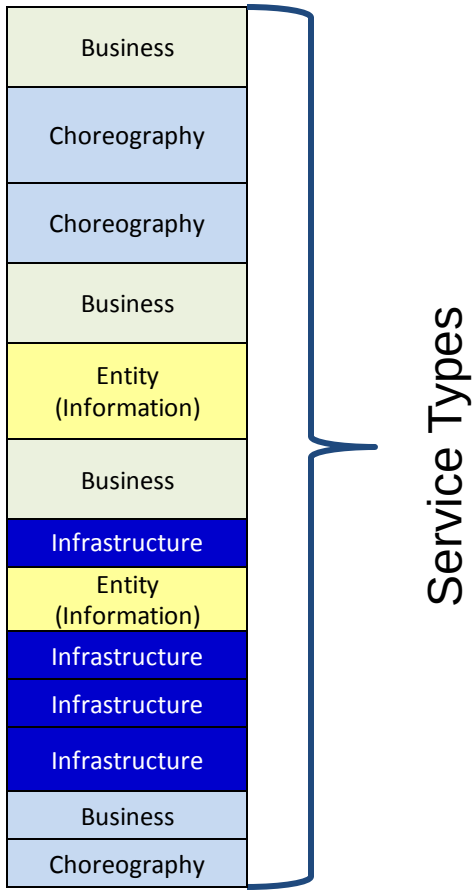
HL7 EHR System Functional Model (EHR-S)

(> 230 System Functions in 4 level categorization

(see attached spreadsheet for full enumeration)

System Functions

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



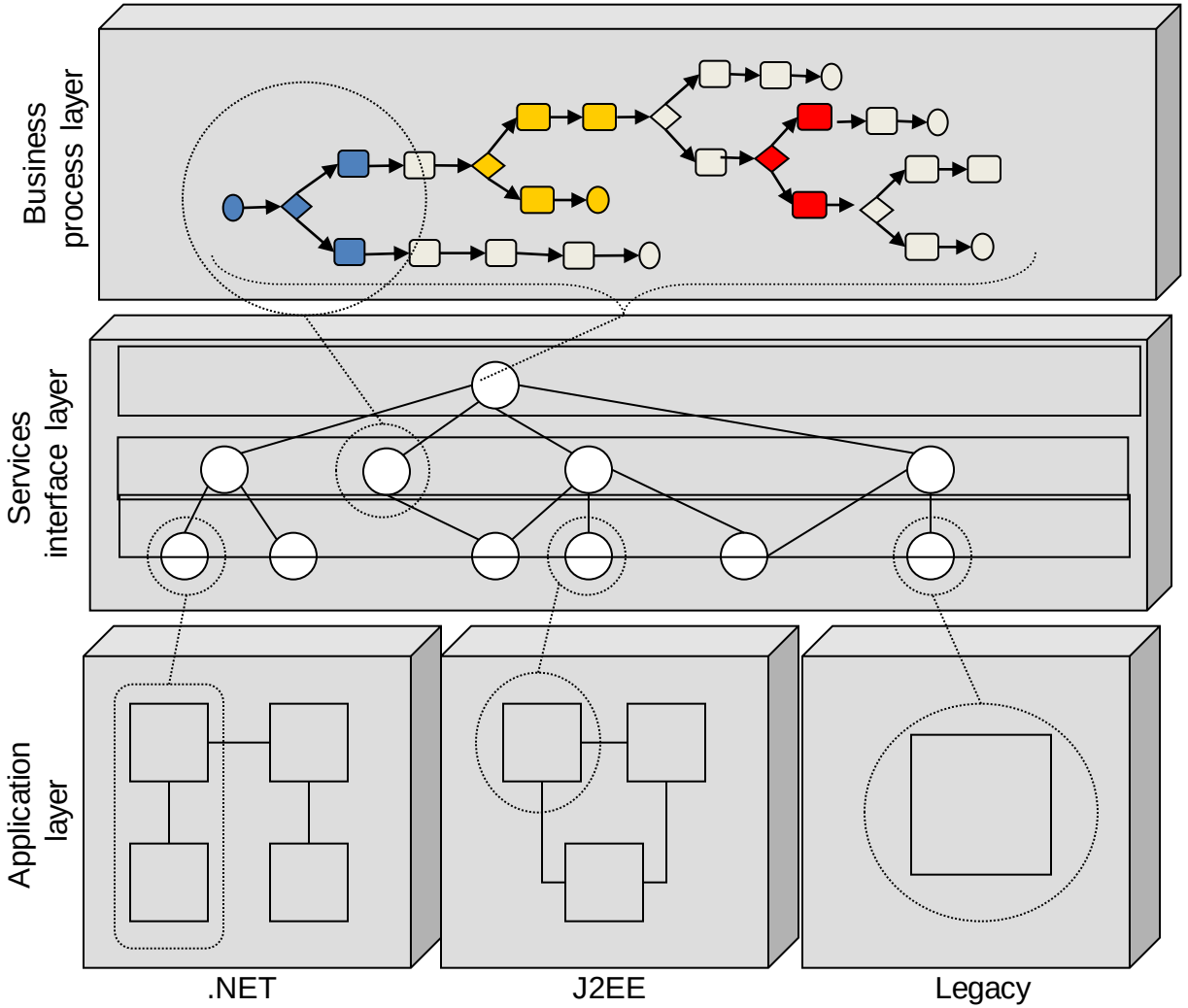
NOTE: **"Other" Category** - The EHR-S model does NOT include Electronic Resource Planning (ERP) / Logistics and Financial components, which are needed for completeness of a military EHR.

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

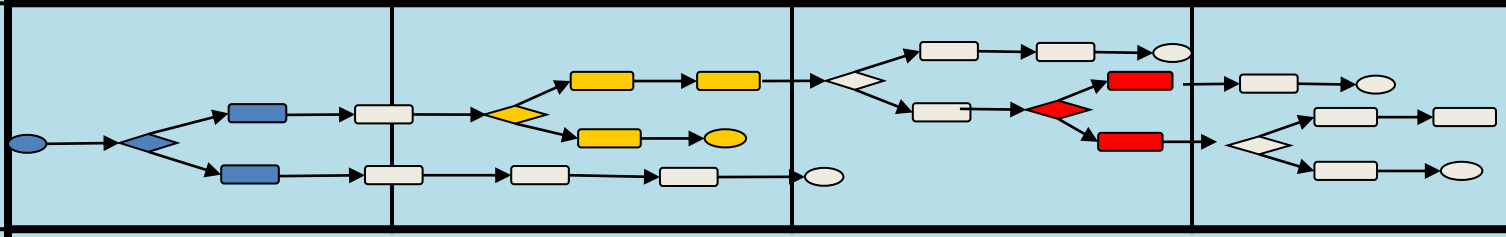
SOA Service Models

Potential Service Layers [Thomas Erl]

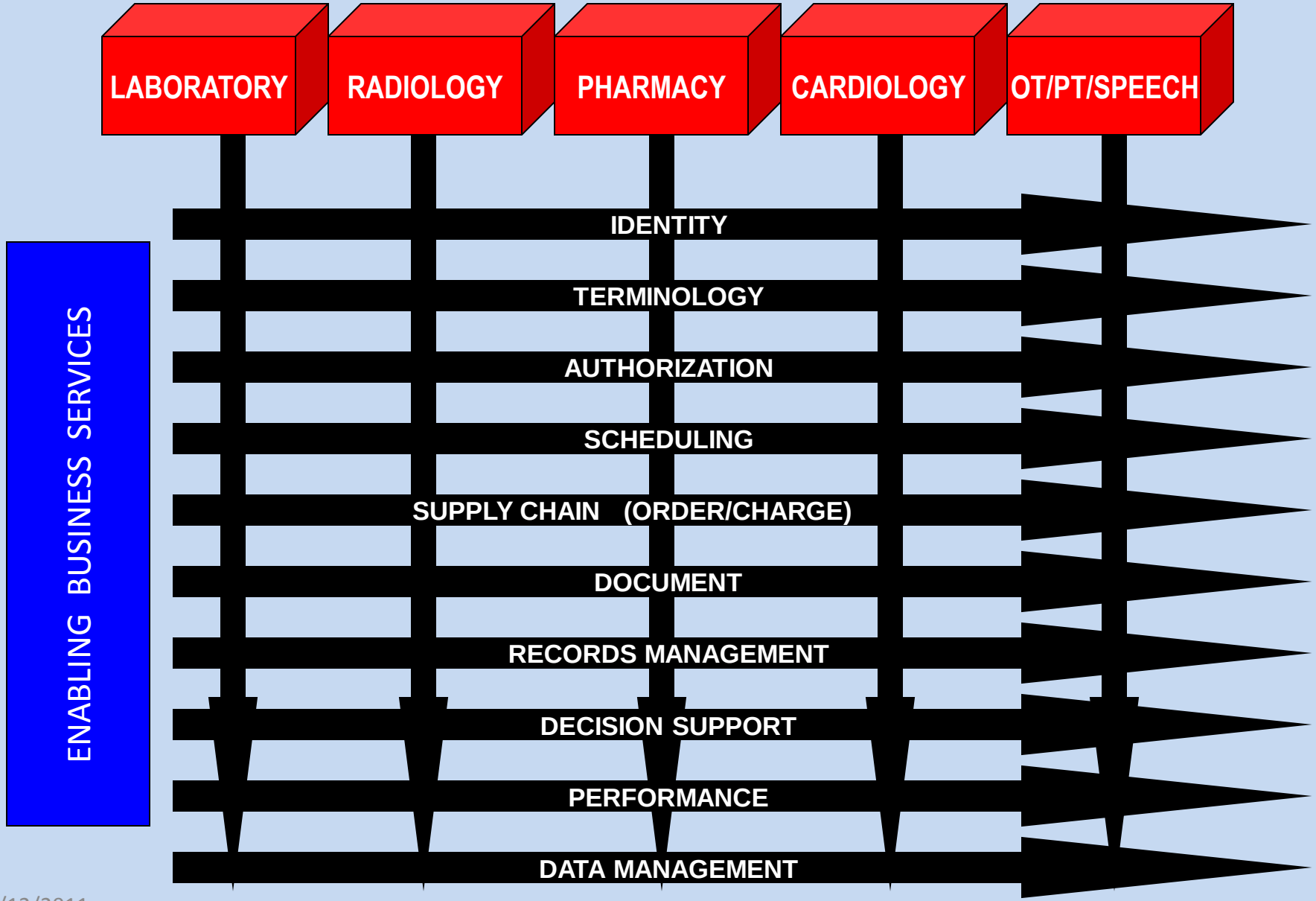
Service Model	Description
Application Service	A generic category used to represent services that contain logic derived from a solution or technical platform. Services are generally distinguished as application services when creating abstraction layers.
Business Service	A generic category used to represent 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.

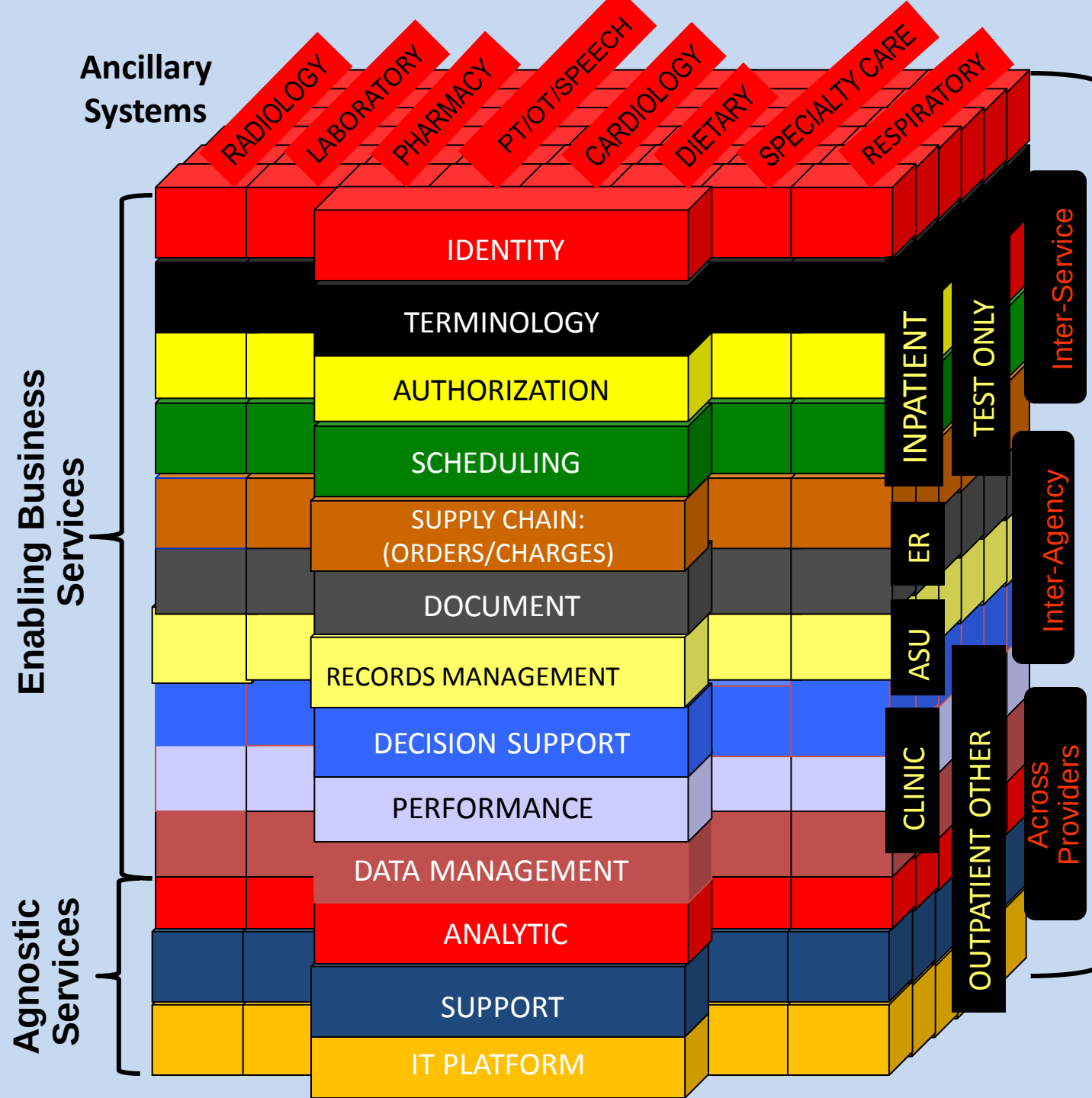
Healthcare SOA Reference Architecture (H-SOA-RA)

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

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

Addressing Real Business Issues Through H-SOA-RA based Integrated Requirements-Design

• 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)

Future State Architecture
Outline

Conceptual View

Getting Started

Approach to As-Is System Architecture

Backup

- SOA Approach
- **Current VistA Packages**
  - Clinical Application Packages
  - Infrastructure Application Packages
  - Administrative-Financial Application Packages
  - HealyheVet Application Packages

Current VistA Clinical Application Packages

http://www.va.gov/vdl/section.asp?secid=1

1. Admission Discharge Transfer (ADT)
2. Ambulatory Care Reporting
3. Anticoagulation Management Tool (AMT)
4. Automated Service Connected Designation (ASCD)
5. Beneficiary Travel
6. Blind Rehabilitation
7. Care Management
8. Clinical Case Registries
9. Clinical Procedures
10. Clinical/Health Data Repository (CHDR)
11. Computerized Patient Record System (CPRS)
12. CPRS: Adverse Reaction Tracking (ART)
13. CPRS: Authorization Subscription Utility (ASU)
14. CPRS: Clinical Reminders
15. CPRS: Consult/Request Tracking
16. CPRS: Health Summary
17. CPRS: Problem List
18. CPRS: Text Integration Utility (TIU)
19. Dentistry
20. Electronic Wait List
21. Emergency Department Integration Software (EDIS)
22. Functional Independence Measurement (FIM)
23. Group Notes
24. HDR - Historical (HDR-Hx)
25. Home Based Primary Care (HBPC)
26. Home Telehealth
27. Immunology Case Registry (ICR)
28. Incomplete Records Tracking (IRT)
29. Intake and Output
30. Laboratory
31. Laboratory: Anatomic Pathology
32. Laboratory: Blood Bank
33. Laboratory: Blood Bank Workarounds
34. Laboratory: Electronic Data Interchange (LEDI)
35. Laboratory: Emerging Pathogens Initiative (EPI)
36. Laboratory: Howdy Computerized Phlebotomy Login Process
37. Laboratory: National Laboratory Tests (NLT) Documents and LOINC Request Form
38. Laboratory: Point of Care (POC)
39. Laboratory: Universal Interface
40. Laboratory: VistA Blood Establishment Computer Software (VBECS)
41. Lexicon Utility
42. Medicine
43. Mental Health
44. Methicillin Resistant Staph Aurerus (MRSA)
45. Mobile Electronic Documentation (MED)
46. Nationwide Health Information Network Adapter (NHIN)
47. Nursing
48. Nutrition and Food Service (NFS)
49. Oncology
50. Patient Appointment Info. Transmission (PAIT)

Current VistA Clinical Application Packages

http://www.va.gov/vdl/section.asp?secid=1

51. Patient Assessment Documentation Package (PADP)
52. Patient Care Encounter (PCE)
53. Patient Record Flags
54. Pharm: Automatic Replenish / Ward Stock (AR/WS)
55. Pharm: Bar Code Medication Administration (BCMA)
56. Pharm: Benefits Management (PBM)
57. Pharm: Consolidated Mail Outpatient Pharmacy
58. Pharm: Controlled Substances
59. Pharm: Data Management (PDM)
60. Pharm: Drug Accountability
61. Pharm: Inpatient Medications
62. Pharm: National Drug File (NDF)
63. Pharm: Outpatient Pharmacy
64. Pharm: Prescription Practices (PPP)
65. Primary Care Management Module (PCMM)
66. Prosthetics
67. Quality Audiology and Speech Analysis and Reporting (QUASAR)
68. Radiology / Nuclear Medicine
69. RAI/MDS
70. Remote Order Entry System (ROES)
71. Scheduling
72. Shift Handoff Tool
73. Social Work
74. Spinal Cord Dysfunction
75. Standards & Terminology Services (STS)
76. Surgery
77. VistA Imaging System
78. VistAWeb
79. Visual Impairment Service Team (VIST)
80. Vitals / Measurements
81. Womens' Health

Current VistA Infrastructure Application Packages

http://www.va.gov/vdl/section.asp?secid=2

1. Capacity Management Tools
2. Duplicate Record Merge: Patient Merge
3. Electronic Error and Enhancement Reporting (E3R)
4. Enterprise Exception Log Service (EELS)
5. FatKAAT
6. FileMan
7. FileMan Delphi Components (FMDC)
8. Health Data Informatics
9. HL7 (VistA Messaging)
10. Institution File Redesign (IFR)
11. KAAJEE
12. Kernel
13. Kernel Delphi Components (KDC)
14. Kernel Toolkit
15. Kernel Unwinder
16. List Manager
17. MailMan
18. Master Patient Index (MPI)
19. Medical Domain Web Services (MDWS)
20. M-to-M Broker
21. Name Standardization
22. National Online Information Sharing (NOIS)
23. National Patch Module
24. Network Health Exchange (NHE)
25. Patient Data Exchange (PDX)
26. Remote Procedure Call (RPC) Broker
27. Resource Usage Monitor
28. Single Signon/User Context (SSO/UC)
29. SlotMaster (Kernel ZSLOT)
30. SQL Interface (SQLI)
31. Standard Files and Tables
32. Statistical Analysis of Global Growth (SAGG)
33. Survey Generator
34. System Toolkit (STK)
35. VistA Data Extraction Framework (VDEF)
36. VistALink
37. XML Parser (VistA)

Current VistA Financial-Administrative Application Packages

http://www.va.gov/vdl/section.asp?secid=3

1. Accounts Receivable (AR)
2. Auto Safety Incident Surv Track System (ASISTS)
3. Automated Information Collection System (AICS)
4. Automated Medical Information Exchange (AMIE)
5. Clinical Monitoring System
6. Compensation Pension Records Interchange (CAPRI)
7. Current Procedural Terminology (CPT)
8. Decision Support System (DSS) Extracts
9. Diagnostic Related Group (DRG) Grouper
10. Electronic Claims Management Engine (ECME)
11. Engineering (AEMS / MERS)
12. Enrollment Application System
13. Equipment / Turn-In Request
14. Event Capture
15. Fee Basis
16. Fugitive Felon Program (FFP)
17. Generic Code Sheet (GCS)
18. Health Eligibility Center (HEC)
19. Hospital Inquiry (HINQ)
20. ICD-9-CM
21. IFCAP
22. Incident Reporting
23. Income Verification Match (IVM)
24. Integrated Billing (IB)
25. Integrated Patient Funds
26. Library
27. Occurrence Screen
28. Patient Representative
29. Personnel and Accounting Integrated Data (PAID)
30. Police and Security
31. Quality Management Integration Module
32. Record Tracking
33. Release of Information (ROI) Manager
34. Veterans Identification Card (VIC/PICS)
35. Voluntary Service System (VSS)
36. Wounded Injured and Ill Warriors

Current VistA HealtheVet Application Packages

http://www.va.gov/vdl/section.asp?secid=4

1. Clinical Information Support System (CISS)
2. Electronic Signature (ESig)
3. HealtheVet Web Services Client (HWSC)
4. My HealtheVet
5. National Utilization Management Integration (NUMI)
6. Occupational Health Record-keeping System (OHRS)
7. Patient Advocate Tracking System (PATS)
8. Person Services
9. Registries
10. Spinal Cord Injury and Disorders Outcomes (SCIDO)
11. VA Enrollment System (VES)
12. Veterans Personal Finance System (VPFS)