USPTO Enterprise Architecture, Solution Architecture And Component Based Development Approach and Strategic Reuse

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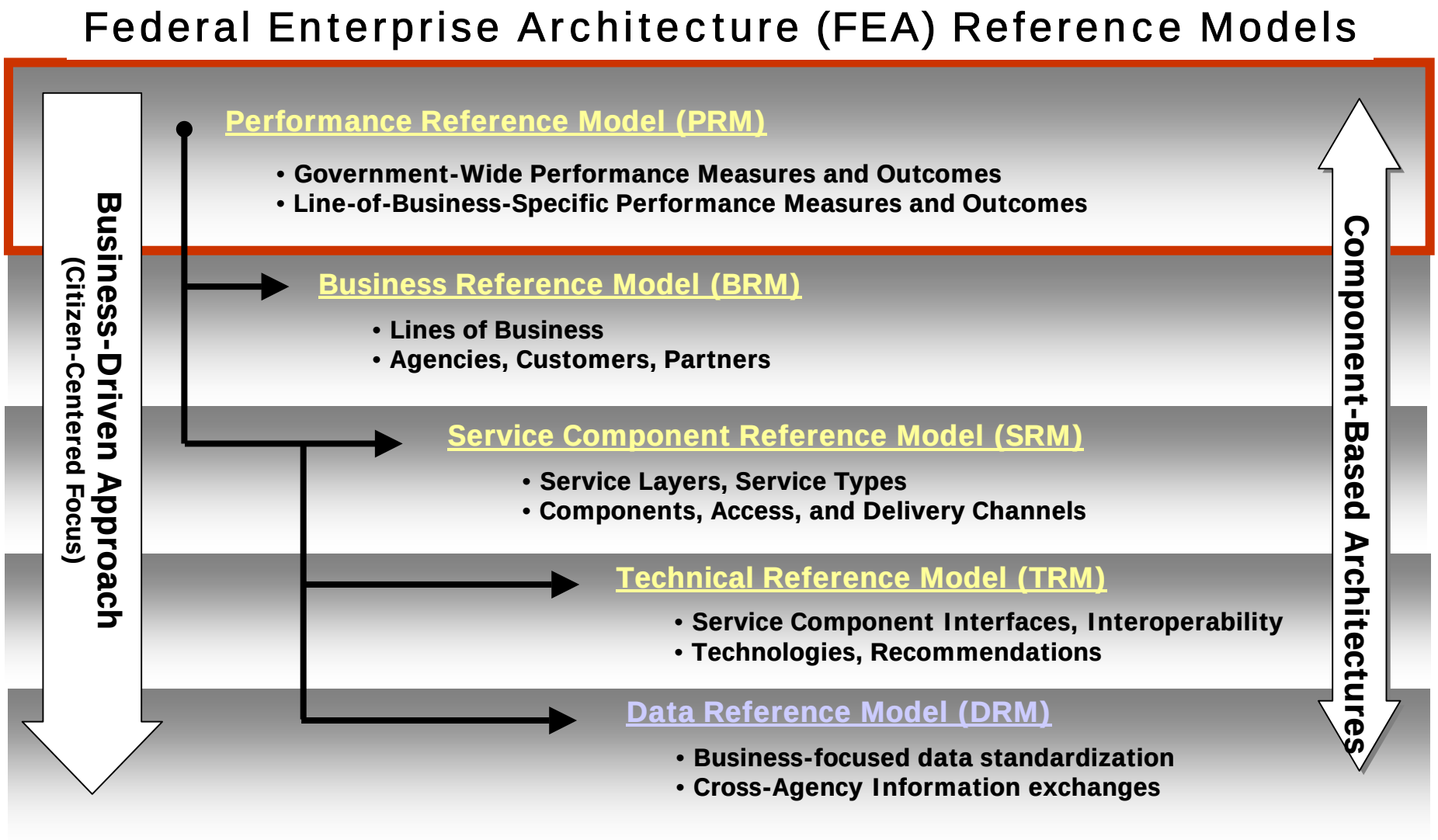
Agenda

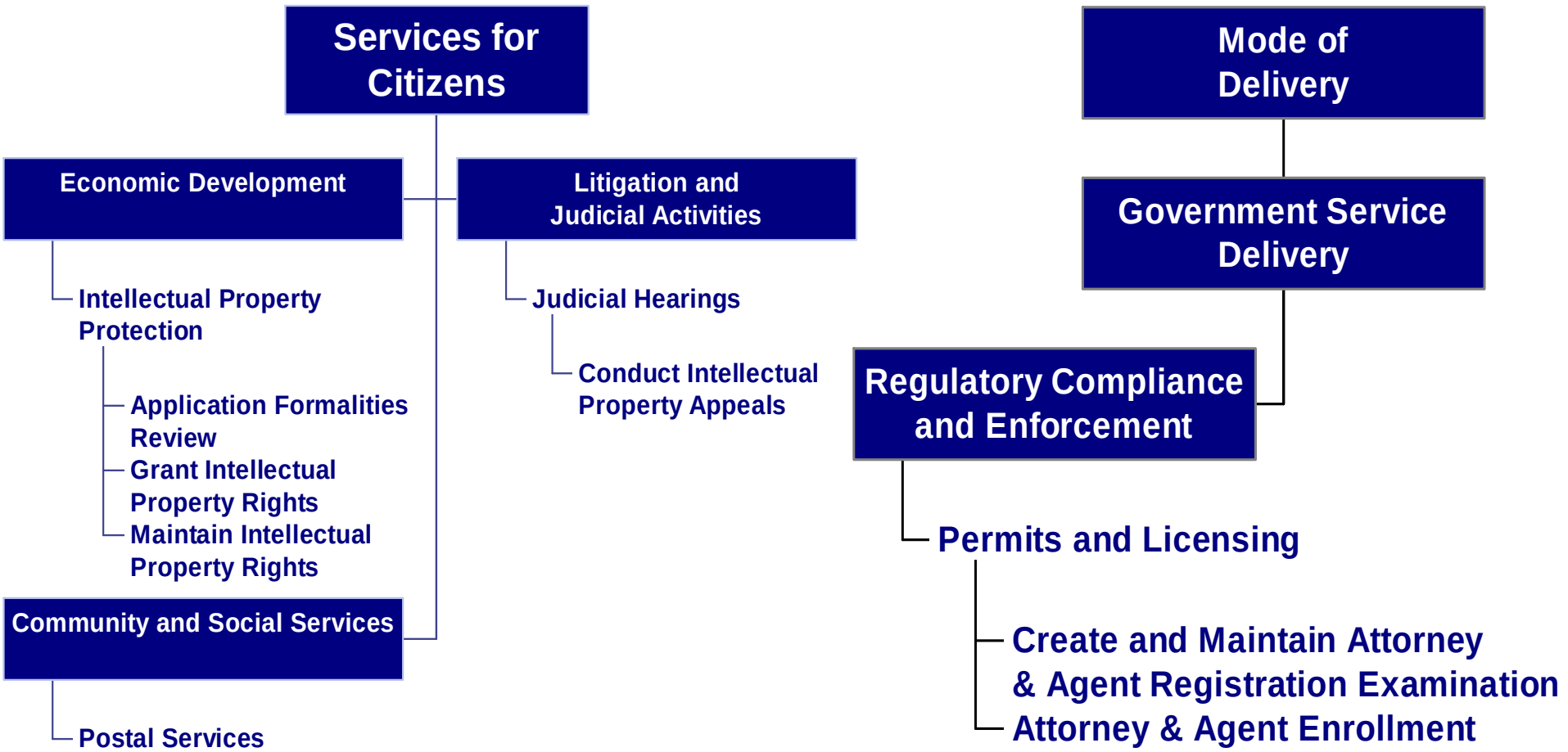
- **FEA Reference Model**
- **USPTO Enterprise Architecture (UEA)**
- **UEA Pilot**
- **UEA Component Based Architecture**
- **UEA Strategic Reuse**

Federal Enterprise Architecture Reference Model

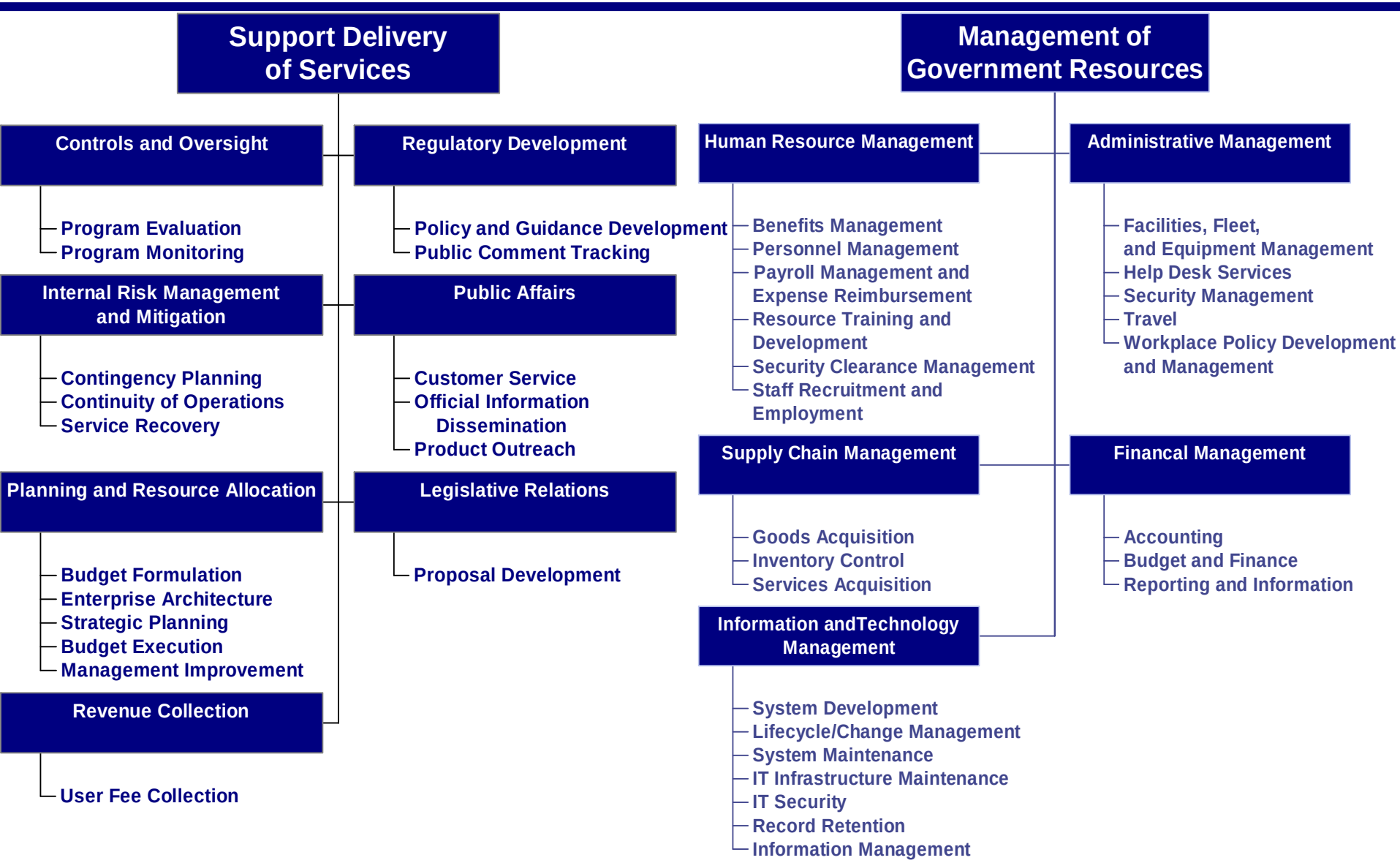
The Five FEA Reference Models



Example Decomposition of USPTO Functional Services mapped to BRM



Example Decomposition of USPTO Functional Services mapped to BRM - continue



Example UEA SRM Mapping
E-Filing Service for Patent Business Area

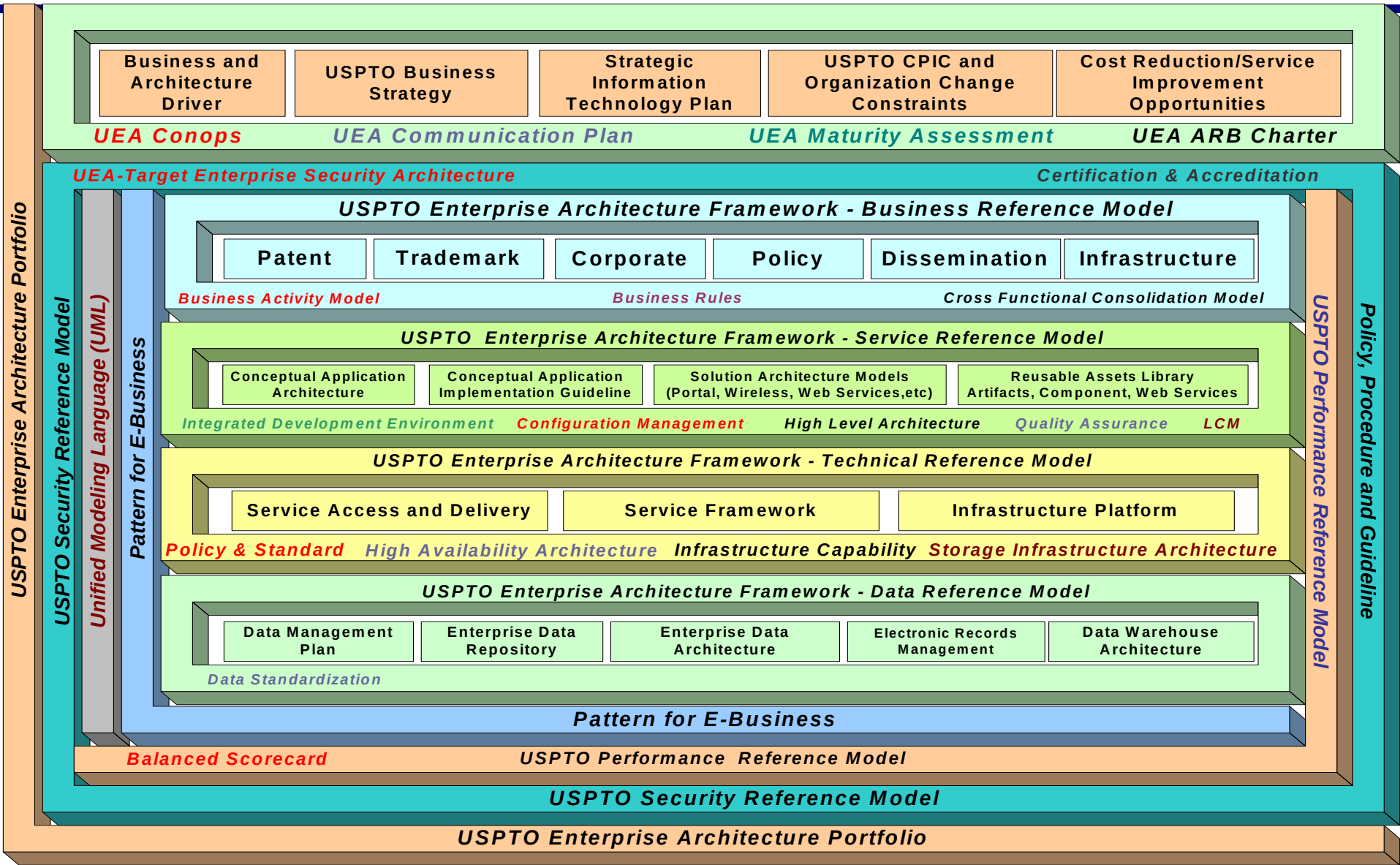
Description	Service Layer	Service Type	Service Component	Technology	Access Channel	Delivery Channel
Online Patent Application **Electronic Filing System (EFS)**						
• Electronic Filing System (EFS) provides applicants to file patent applications online with USPTO through Electronic Patent Business Center. EFS supports the **authoring, preparation, secure submission, receipt, validation, and processing** of patent applications electronically via Internet. EFS uses **public key infrastructure** (PKI) services for secure electronic communications with applicants and their representatives and accepting credit payment via internet. • EFS allows 3rd party authoring and submission software adhered to **WIPO e-filing standard and DTD**. • http://www.uspto.gov/ebc/efs/index.html	• Digital Asset Services	• Content Management	• Content Authoring	• TSA XML authoring • i4i (XML conversion tool) • Alterna TIFF Image Format • Xerces (Java code parser) • DynaZIP • Microsoft Word • WordPerfect • Oracle, Digital Liner Tape, EMC Storage • Java Servelet, Java Server Page, Java • IPlanet Web • Entrust Public Key Infrastructure (USPTO Direct) • VFind Security Toolkit • Virtual Vault • Ravline Switch • HP-UX Server	• Web Server - Internet Explorer 5.x • HP Communicator	• Internet (HTTP) (HTTPS)
			• Tagging			
		• Document Management	• Document Conversion			
		• Knowledge Management	• Knowledge Capture			
	• Customer Services	• Customer Initiated Assistance	• Online Help			
			• Online Tutorials			
	• Back Office Services	• Financial Management	• Credit / Charge			
	• Common Services	• Security Management	• Identification • Access Control • Encryption • Verification • Digital Signature • Intrusion Detection • Privilege Management			

TRM V7.0 Product Life Cycles

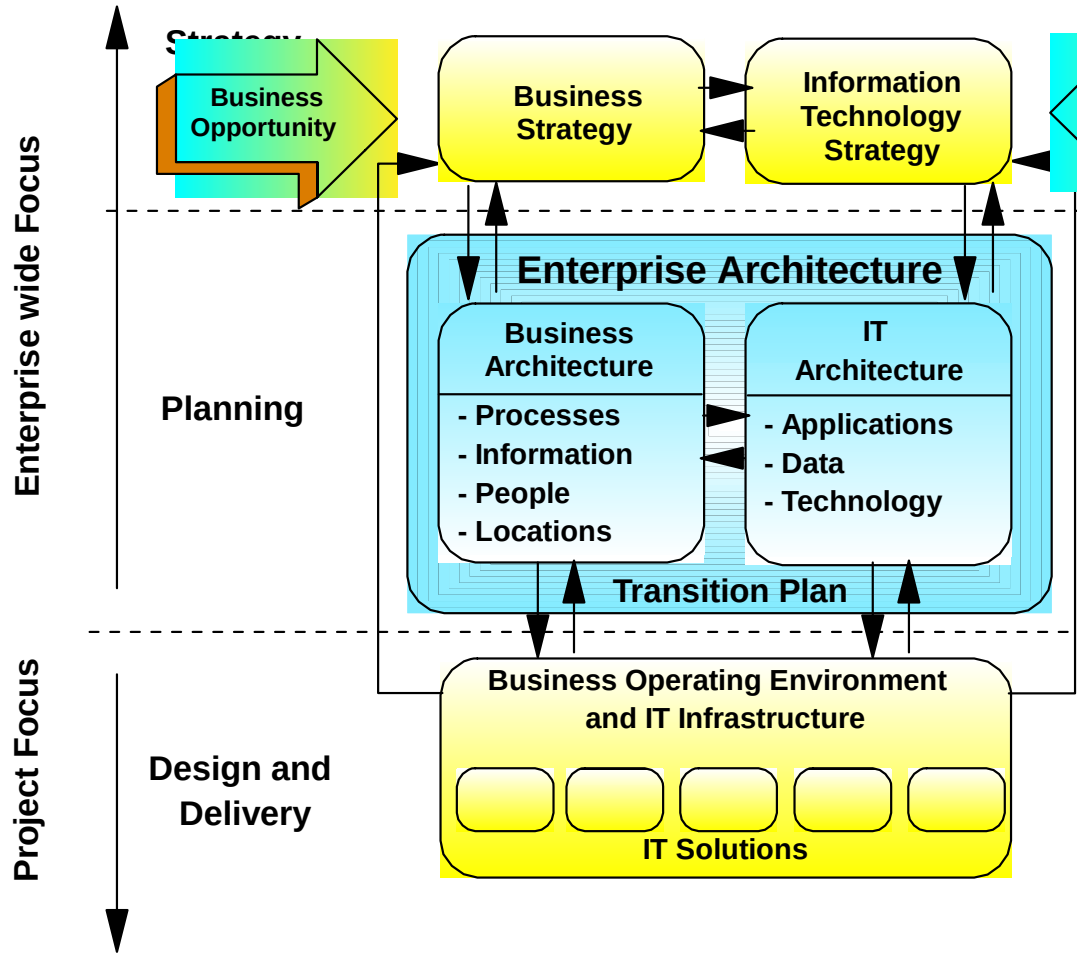
Current Environment	Next 18 Months Near-Term Deployment	Containment Target	Retirement Target
• Blackberry	• --	• Blackberry (infringed on patents held by NTP Inc.)	• No further procurement
• Visual Basic 6	• --	• --	• --
• Visual Basic 4	• Microsoft .NET suite (e.g. Visual Basic .NET; Visual C++ .NET or Visual Studio .NET) • Or • J2EE Suite (with Java 2 SDK 1.2 or higher)	• Visual Basic 4	• Visual Basic 4 • (Retired by 30-June 2003)
• Visual Basic 5		• Visual Basic 5	• Visual Basic 5 • (Retired by 30-June- • 2003)
• Visual C++ 4		• Visual C++ 4	• Visual C++ 4
• Visual C++ 5		• Visual C++ 5	• Visual C++ 5
• Visual C++ 6		• Visual C++ 6	• Visual C++ 6 • (Retired by 30-Sep- • 2003)
• Cold Fusion (IDE) • Visual Café (IDE)	• Rational Rose (UML) • Or • Web Sphere Studio Application Developer v4.0	• --	• --
• COOL::Gen v5.1	• Advantage Gen v6.5	• COOL:Gen v5.1	• COOL:Gen v5.1 (after complete migration)
• Crystal Info	• Crystal Enterprise	•	•
• HP Netserver with NT 4.0 Operating System	• Microsoft will terminate Windows NT support by June 2003. NT servers will migrate to	• HP Netserver with NT 4.0 Operating System	• HP Netserver with NT 4.0 Operating System will retire after complete migration

UEA pilot using Enterprise Architecture, Solution Architecture and Component Based Architecture

USPTO EA Reference Model



Enterprise Architecture vs. Solution Architecture

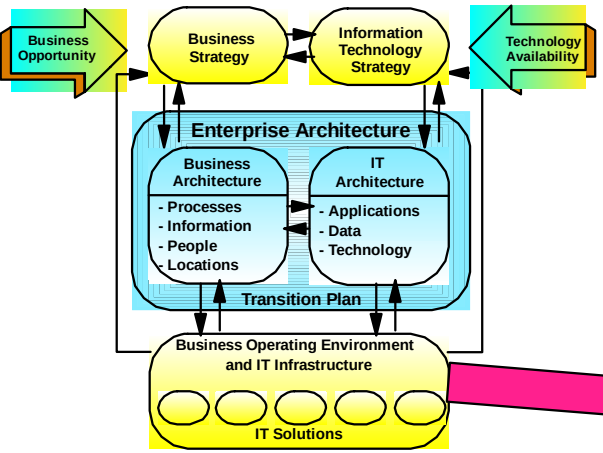


Enterprise architecture
"the city plan"

Solution architecture
- Functional aspects
- Operational aspects

"the infrastructure and single building design"

Enterprise Architecture vs. Solution Architecture - continue



Enterprise architecture

Characteristics

- An Enterprise Architecture (EA) is an enterprise-wide framework to guide investment and design decisions
- An EA defines an infrastructure that will meet the current and future needs of a diverse user population and will adapt to changing business requirements and technology.

Typically performed by

- IT strategy consultants with EA specialization

Solution architecture

Characteristics

- Defines the structure of an IT solution (IT infrastructure or single system) to specific system requirements
- Defines functional and operational aspects of the solution
- Applies the latest technology to the EA framework, based on current financial constraints

Typically performed by

- IT architects with skills in various disciplines and/or solution areas

High-Level of Business Functions That Provide the Business Services

USPTO Staff
Patent Examiners

Business Partner

Patent Practitioners, Applicants, & General Public

Authoring and Submission of Patent Applications and Follow on papers	Patent Apps Information	EFS
	Patent Data & Image	ePhoenix
Electronic access to Official Application Content & Status – Pre Publication	Patent App Biblio Data	PALM
	Pre-Publication Data	PAIR
	Patent Image Data	PACR
Electronic Receipt of USPTO Office Correspondence	Office Corres. Data	OACS
Access Published Patents Online	Inquires Patent Pubs.	East/West
Order Published documents online	Document Orders	OEMS
Make Payments online	Payment Data	RAM
Electronic access to Official Application Content & Status - Post Publication	Publication Issue Data	RTIS

High-Level View of Business Services for e-Gov Initiatives

Users

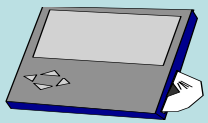
USPTO Staff
Patent & Trademark Examiners

Business Partner

Patent Practitioners, Applicants, & General Public

Access & Delivery Channels

Internet/ Intranet Browser



E-Book

Pervasive/ Wireless Devices

Application Services Component

- Filling Services
- Payment Services
- Update Services
- Inquiry Services
- Authentication and Authorization Services
- Messaging & Collaboration Services
- Reporting Services
- Administration Services
- Pre-Exam Services
- Exam Services
- Post-Exam Services
- Scanning Services

Resources

- Directory Services
- AIS Applications
- System Monitoring
- Customer Relationship Management
- Internal Enterprise Systems
- External Enterprise Systems

External Customer Services
Common Services for both external and internal
Internal Customer Services

Patterns for E-Business Enable Reusability

Customer Requirements

Business Patterns:
- Establish the primary business purpose for the solution
- Identify the high-level participants who interact with the solution
- Describes the nature of interaction among participants
- Business pattern types: **Self-Service, Collaboration, Information Aggregation, Extended Enterprise**

Business Patterns

Integration Patterns

Composite Patterns

Composite Patterns:
- Involve several applications
- Express the complexities of real systems

Integration Patterns:
- Used within a business pattern to integrate apps and databases
- Links individual business patterns to deliver a complete solution
- Types: **Access Integration** and **Application Integration**

Application Patterns

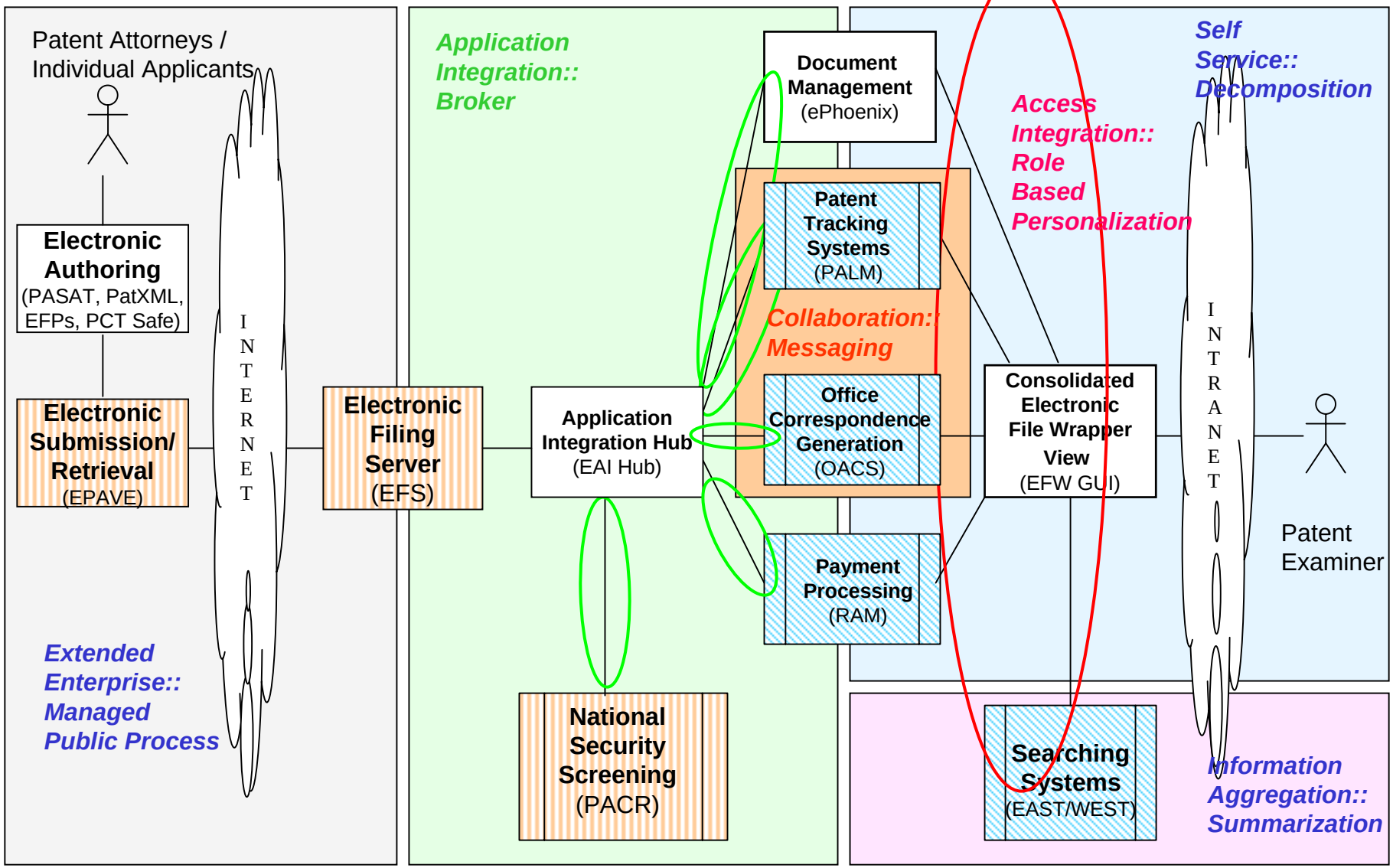
Application Patterns:
- Provide an architectural view of how the presentation, application, and data layers interact
- Refine the business patterns so they can be implemented
- Partition application logic and data and define interaction between logic tiers

Runtime Patterns

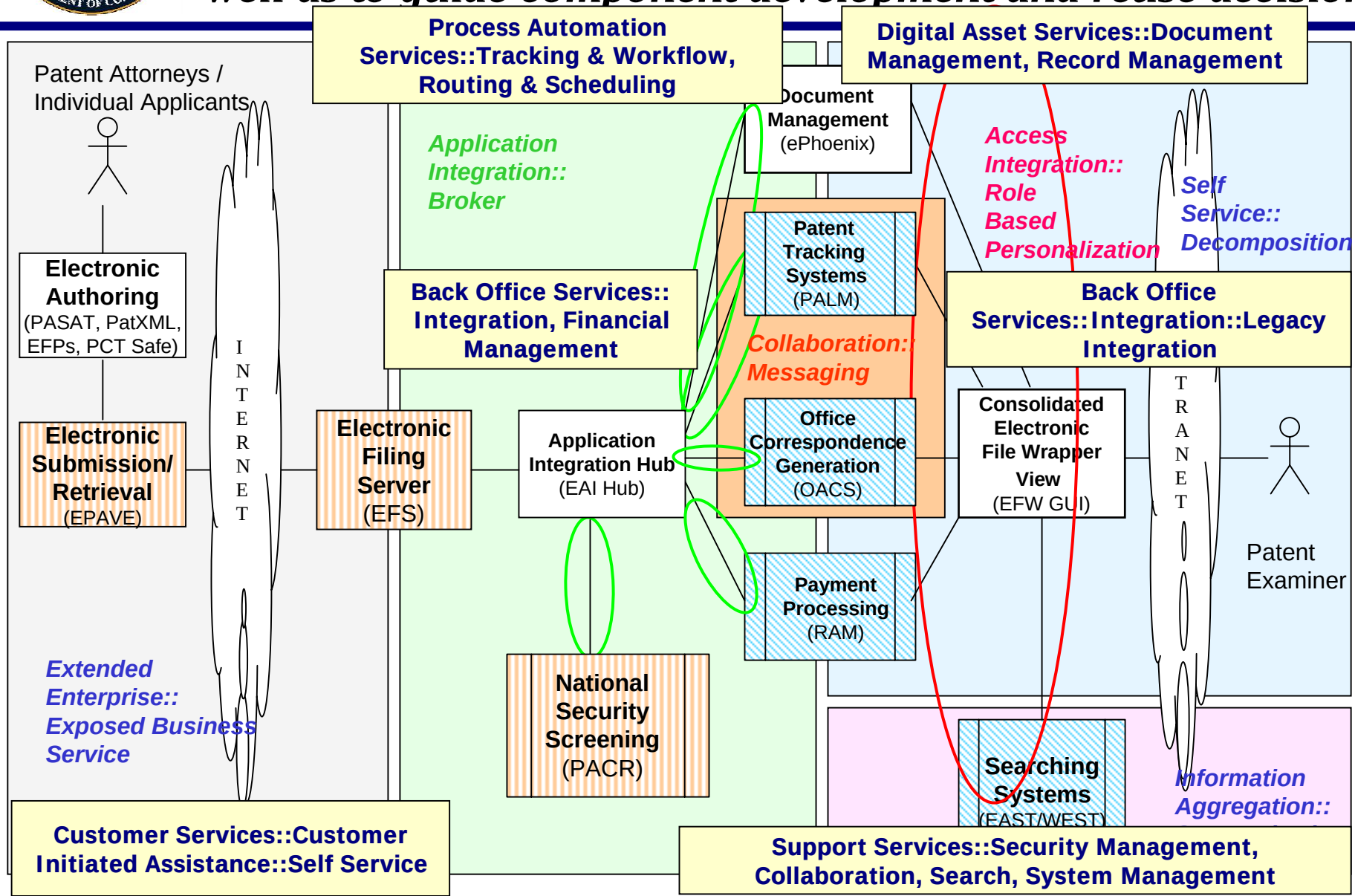
Runtime Patterns:
- Detail the logical middleware architectures needed within a solution
- Specify the runtime technologies (not products) needed to make the application patterns work
- Technology types (not products) are specified at this stage

Runtime Product Mappings

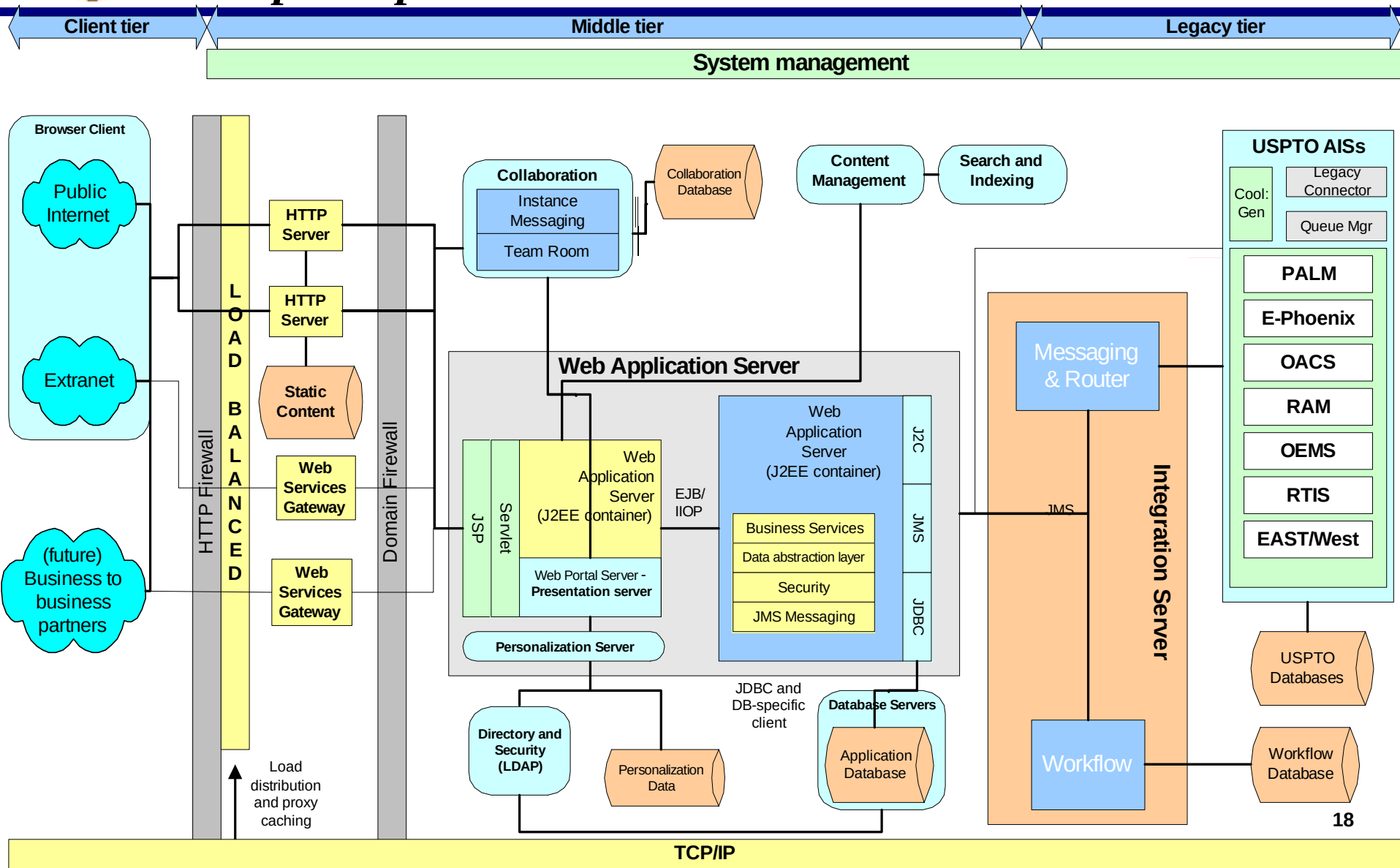
This Solution Overview Diagram for the Patents Electronic Government strategic initiative consists of a composite set of reusable architecture patterns.



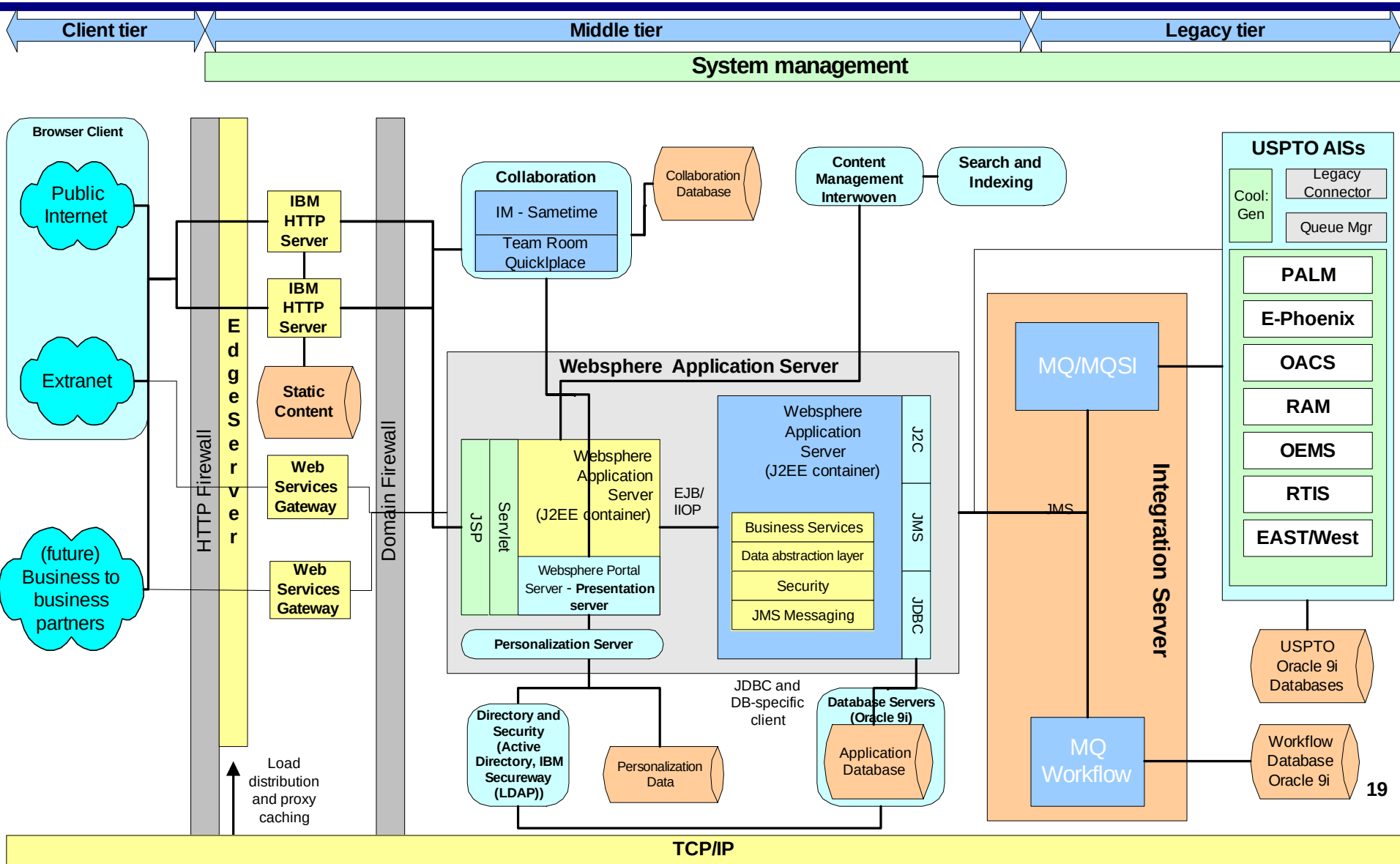
The reusable architecture patterns can be mapped back to the FEA SRM to indicate clear alignment and integration as well as to guide component development and reuse decisions.



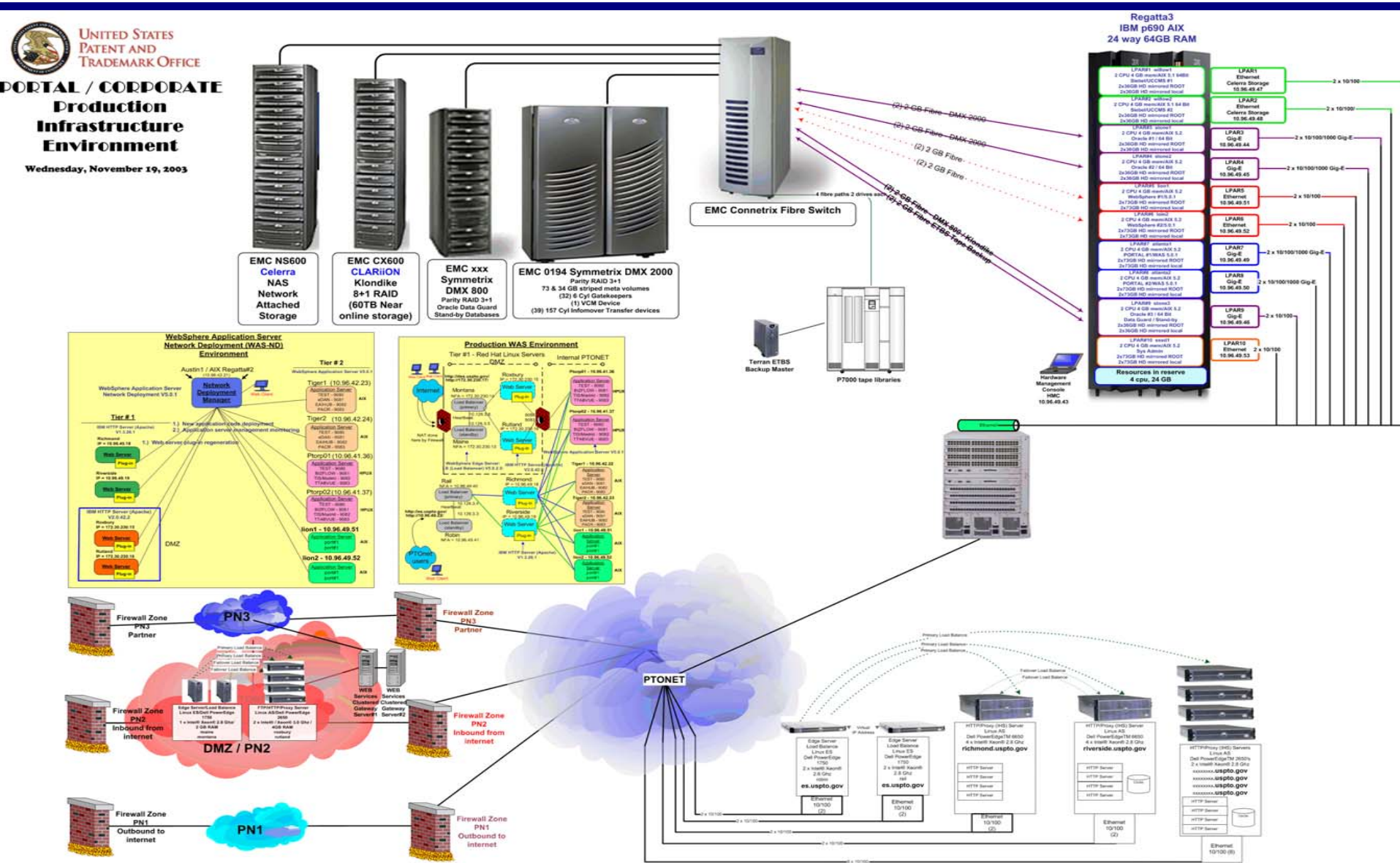
This view depicts the logical run-time topology, which provides a complete solution architecture that adheres to the composite patterns.



This view depicts the solution architecture mapped to the specific products and standards from the USPTO TRM.



This view depicts the solution architecture mapped to the Infrastructure Architecture.



USPO Component Based Development Approach & Strategic Reuse

Component Based Development Approach

Federal Enterprise Architecture Reference Model

Software Architecture Development Life Cycle

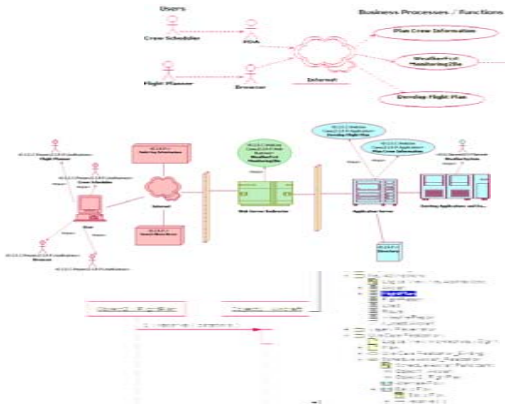
Understand – apply patterns		Provision	Assemble	Implement	
Business Model	Component Architecture	Acquire Subscribe Modify Wrap Build	Application /Component Assembly	Execution	Deployment

Inventory Management

Process Management

Manage

Component Based Development Approach - continue

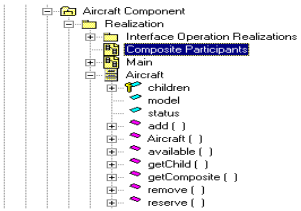


1. Business Process Modeling

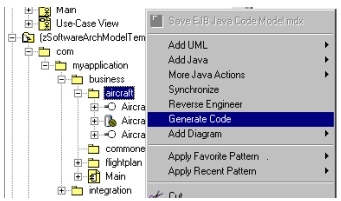
2a. Business Process / Solution Architecture Mapping
2.b. Operational Model

3. Application Use-Case Modeling

4. Application Behavioral Modeling



5. Component Specification (platform independent)

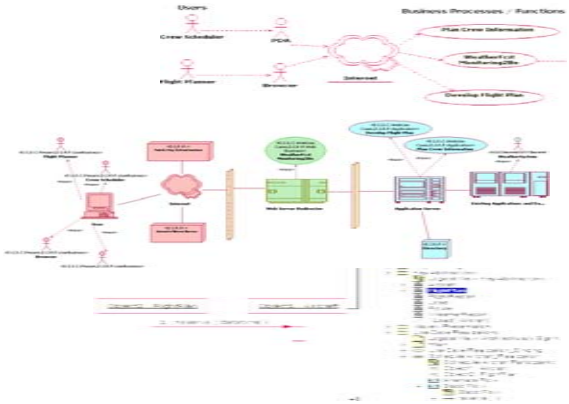


6. Component Design (platform-specific)

7. Component Creation (platform-specific)

8. Code Generation (platform-specific)

Component Based Development Approach - continue



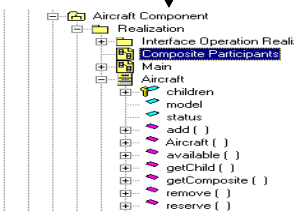
1. Business Process Modeling

2a. Business Process / Solution Architecture Mapping
2b. Operational Model

3. Application Use - Case Modeling

4. Application Behavioral Modeling

Acquire component

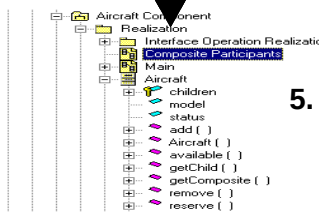


5. Component Specification
(Integration Specification)

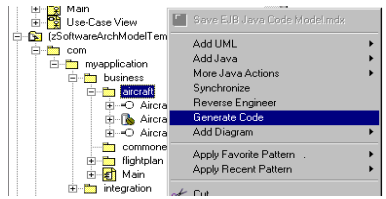
6. Component Design
(none for acquired components)
7. Component Creation
(none for acquired components)

8. Code Generation
(none for acquired Components)

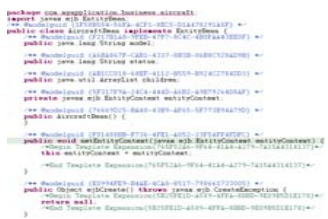
Make component



5. Component Specification

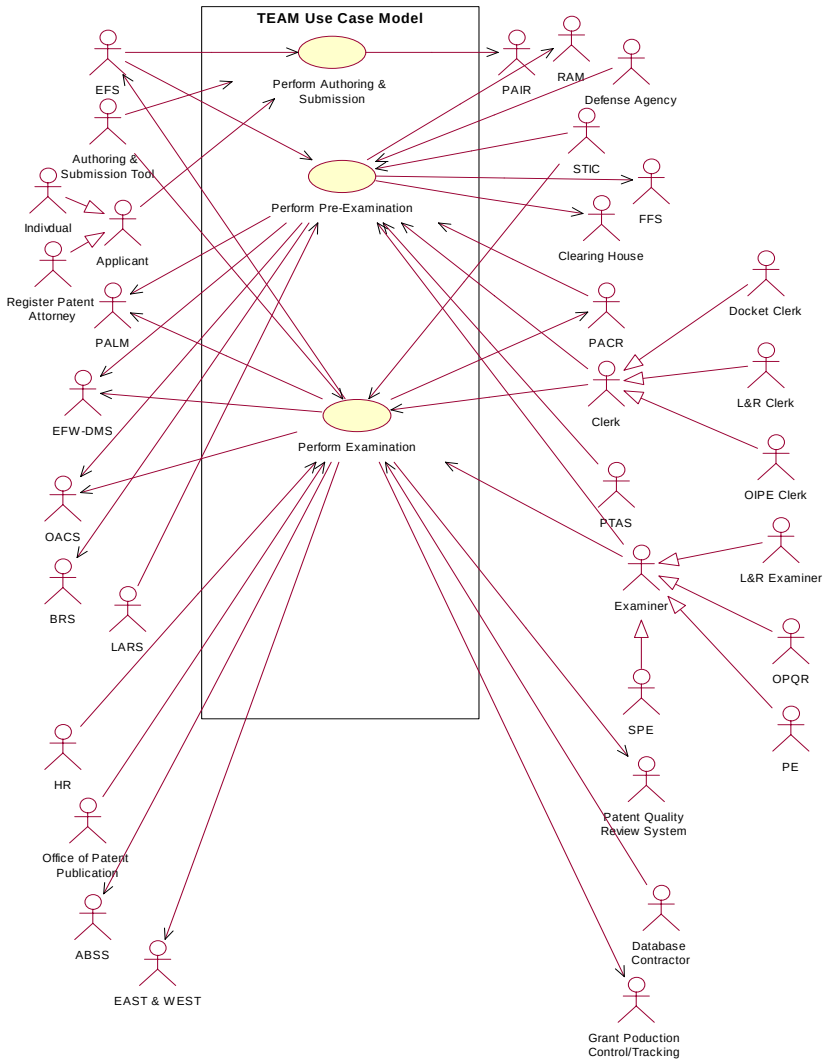


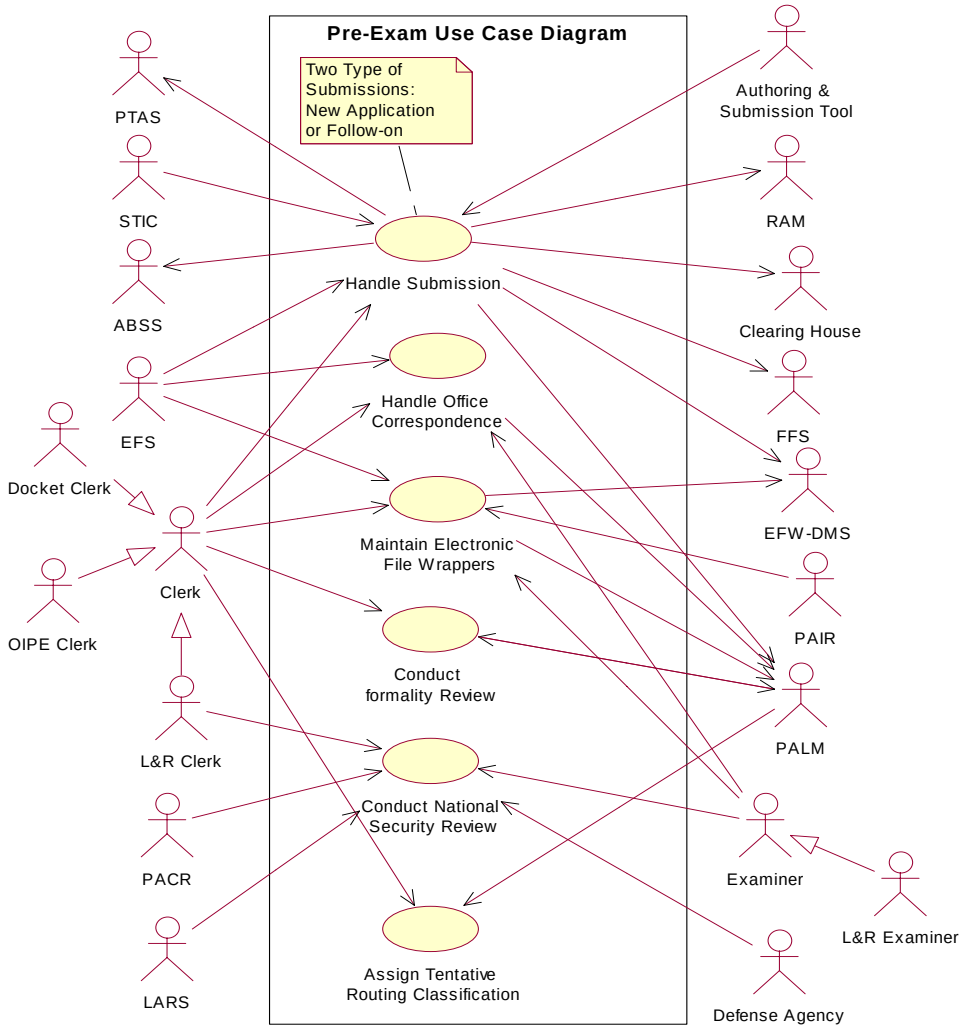
6. Component Design
7. Component Creation



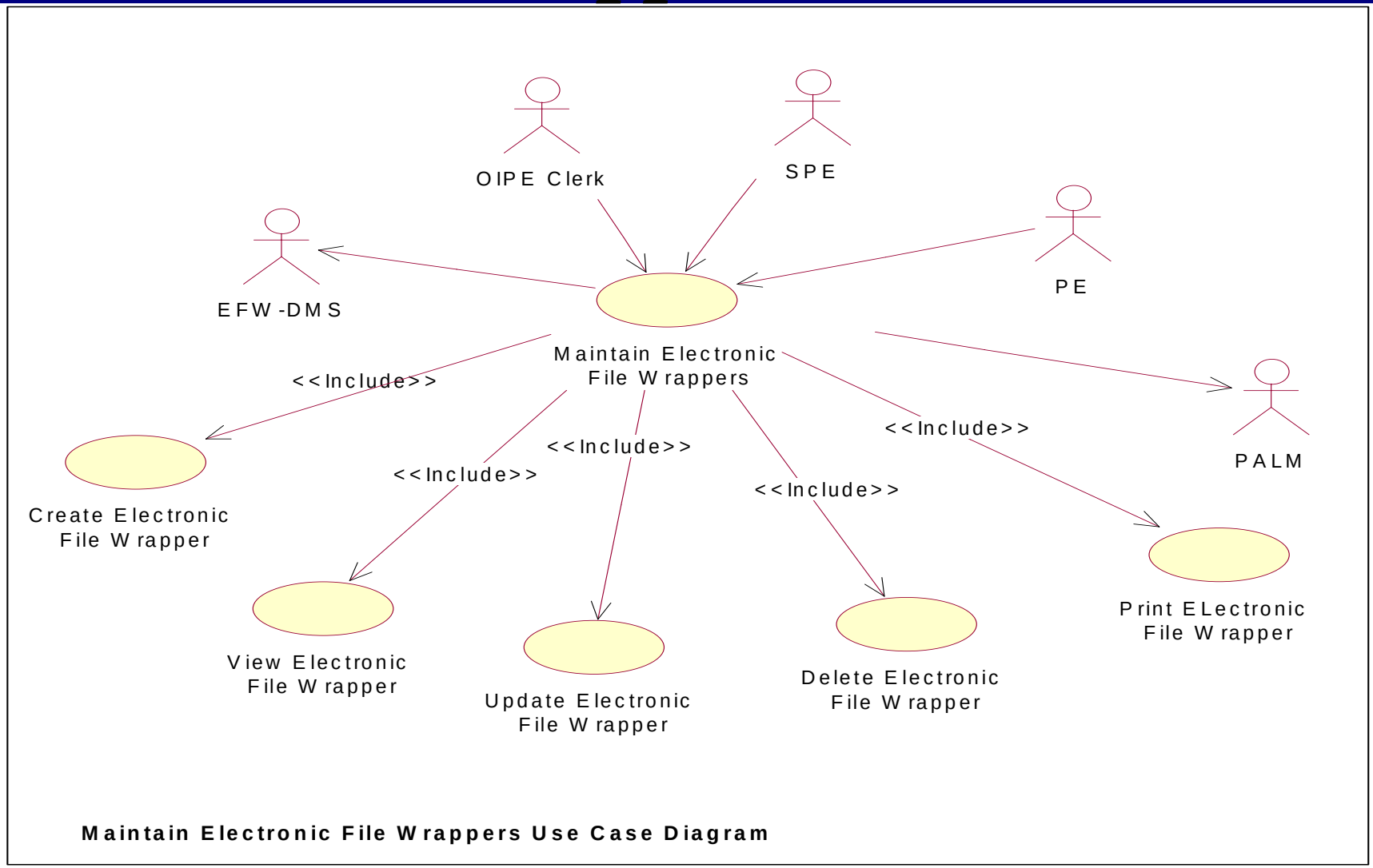
8. Code Generation

Patent High Level Use Cases



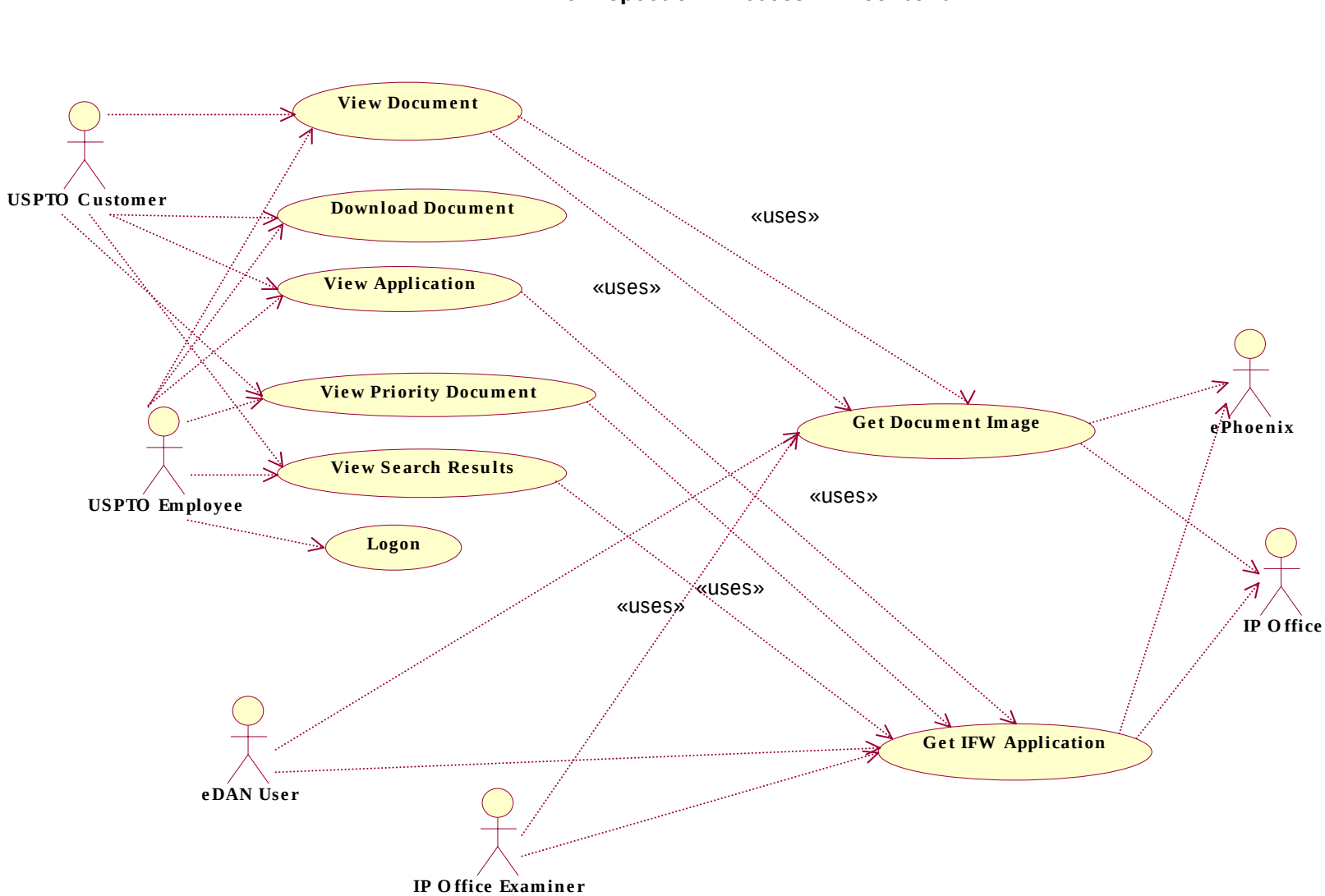


Maintain Electronic File Wrapper Use Cases

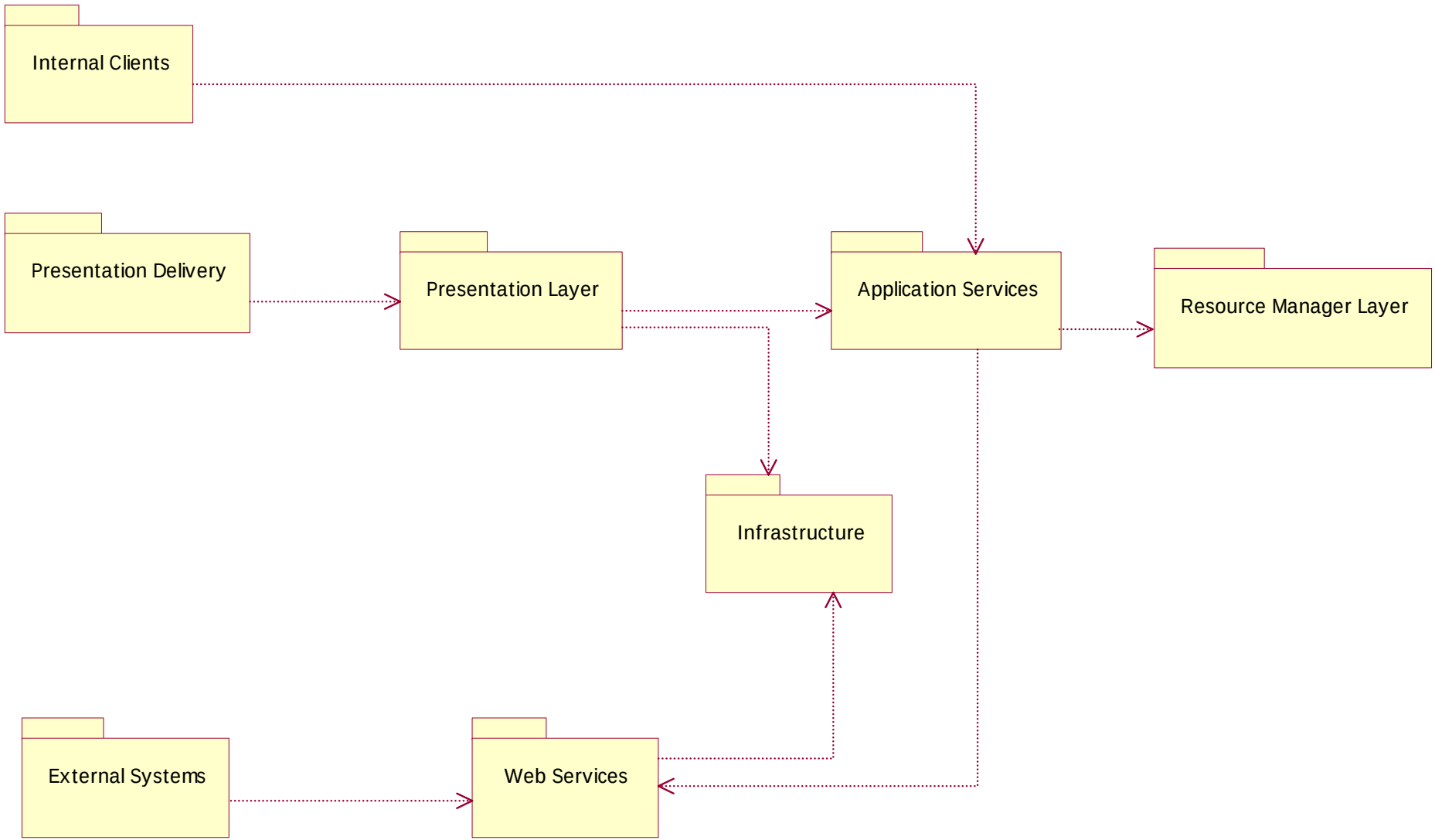


Maintain Electronic File Wrappers Use Case Diagram

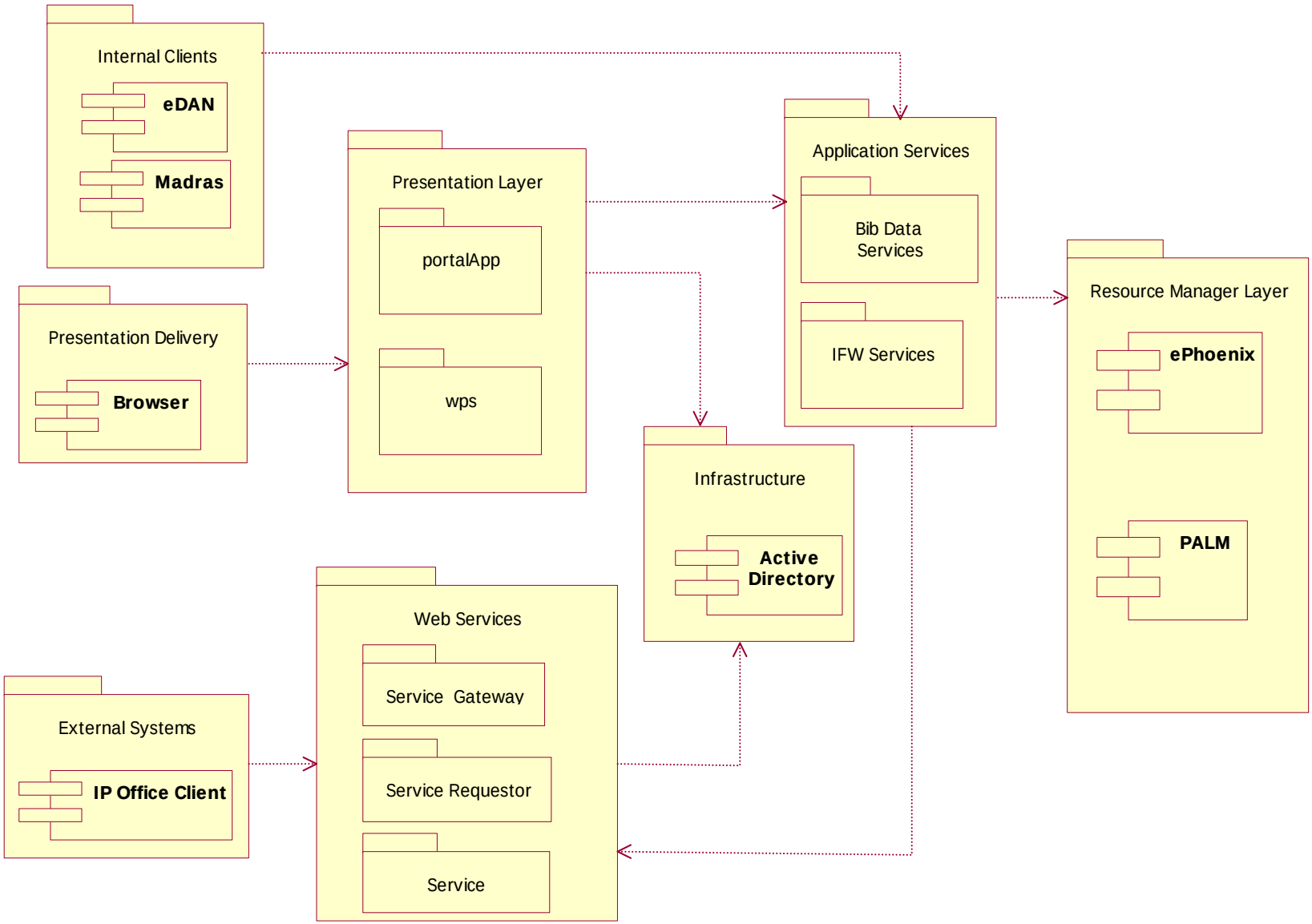
Use Cases for Viewing Electronic File Wrapper (IFW)



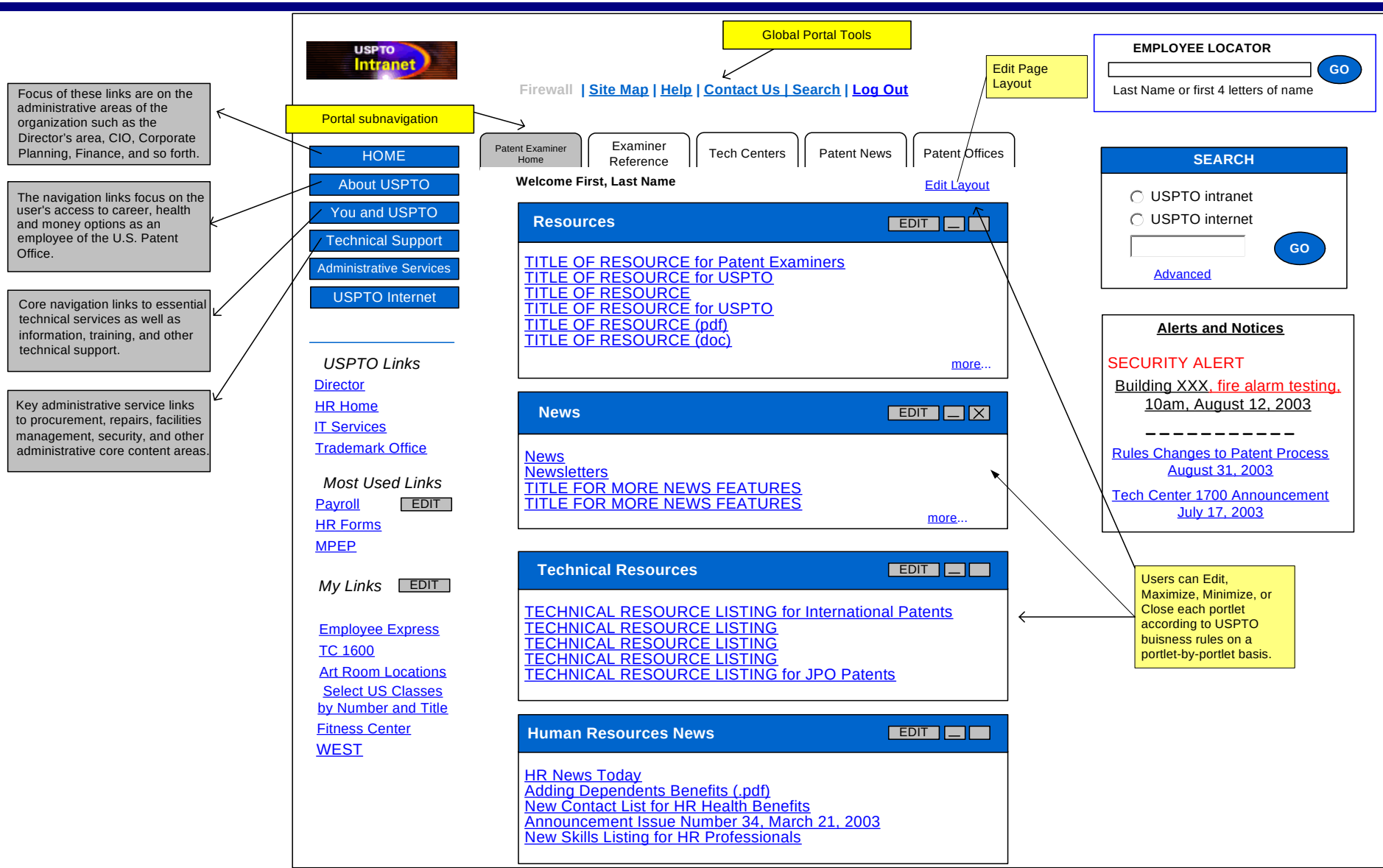
Component Interaction Diagram



Component Interaction Diagram - continue



User Experience Patent Examiner Browser



USPO Strategic Reuse

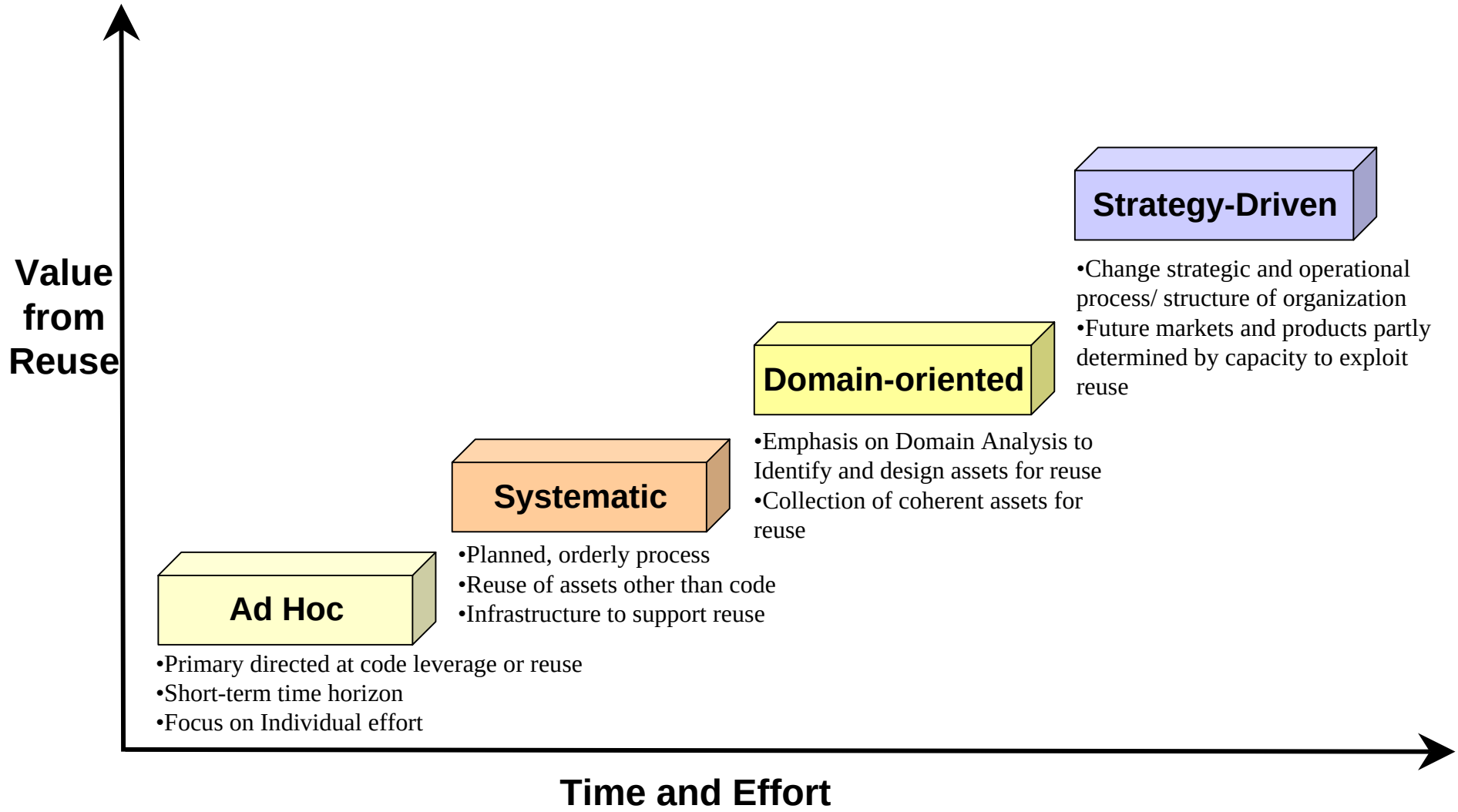
Example of Reuse Vision and Mission Statement

- US DoD – “The vision of the DoD Software Reuse Initiative is to drive the DoD software community from its current ‘re-invent the software’ cycle to a process-driven, domain-specific, architecture-centric, library-based way of constructing software. The strategy to realize this vision is based on systematic reuse: where opportunities are predefined an process for capitalizing on those opportunities is specified.” (J.Piper, “DoD Software Reuse Vision and Strategy 1992”.)

Example of Reuse Vision and Mission Statement

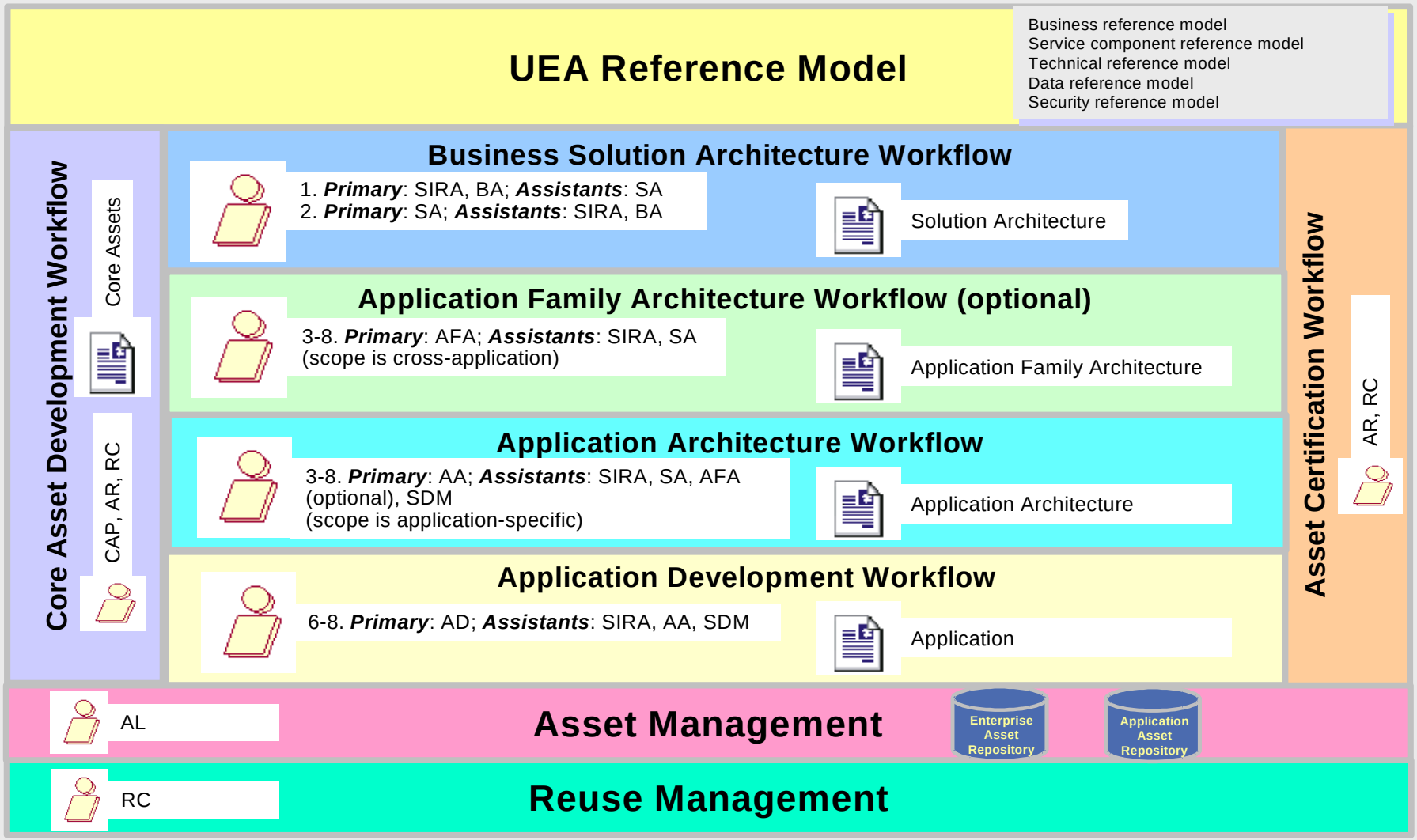
- IBM – “To be the industry leader in providing and applying reuse technology and methodologies by developing tools, processes and parts for internal use with market potential” (IBM Reuse Program Poster, 1992
- US Army Reuse Center – “The mission of the Army reuse Center is to develop, implement, maintain, and administer a total reuse program that will support the entire software development life Cycle” (Army Reuse Center Literature, 1993

UEA Level of Reuse

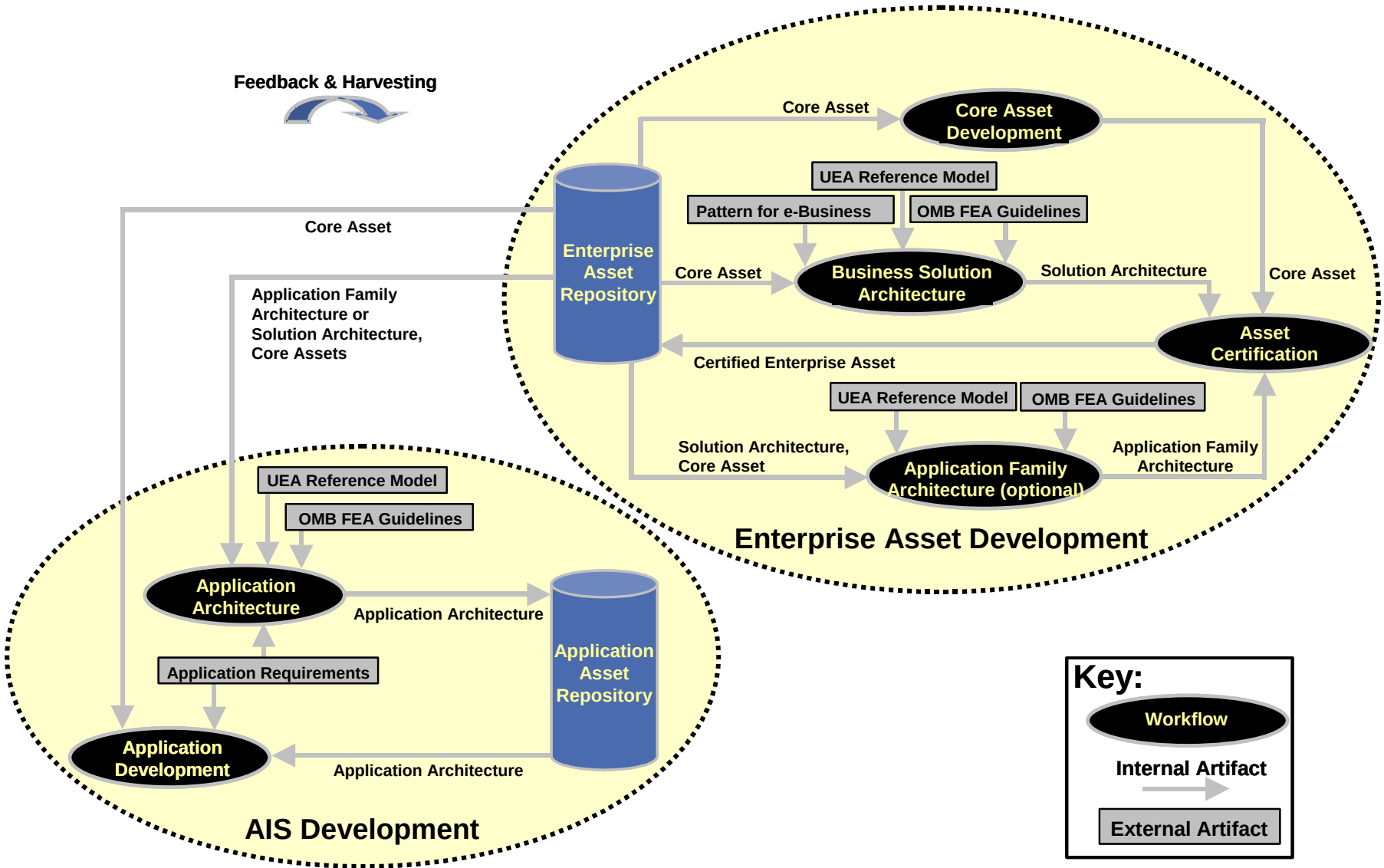


Source: Managing Software Reuse by Wayne C.Lim

UEA Asset Based Development Framework



UEA Artifact Centric Views of the ABD workflow



Description of it's workflow

- *The Application Architecture workflow* takes the OMB's FEA guidelines, the UEA Reference Model, any existing AIS requirements, the Application Family Architecture (if it exists), or the Solution Architecture, and supporting Core Assets from the Enterprise Asset Repository, and produces the architecture for a specific Automated Information System (AIS). Any assets that are produced as part of the Application Architecture workflow, including the Application Architecture, are maintained in the Application Asset Repository. Certification is not required for application assets.
- *The Application Development workflow* takes any existing AIS requirements, the Application Architecture from the Application Assets Repository, and any supporting Core Assets from the Enterprise Asset Repository, and produces an Automated Information System (AIS). Any assets that are produced as part of the Application Development workflow are maintained in the Application Asset Repository. Certification is not required for application assets.

Description of it's workflow - continue

- *The Core Asset Development workflow* produces in Core Assets that are certified in the Asset Certification workflow and then published in the Enterprise Asset Repository.
- *The Business Solution Architecture workflow* takes the current practices and requirements from the OMB's FEA guidelines and UEA Reference Model, applies the Pattern for e-Business, assembles some Core Assets from the Enterprise Asset Repository, and produces a Solution Architecture that is certified in the Asset Certification workflow and then published in the Enterprise Asset Repository.

Description of it's workflow - continue

- *The Application Family Architecture workflow* takes the current practices and requirements from the OMB's FEA guidelines and UEA Reference Model and the Solution Architecture and Core Assets from the Enterprise Asset Repository, and produces an Application Family Architecture that is certified in the Asset Certification workflow and then published in the Enterprise Asset Repository.
  Note: The Application Family Architecture Workflow is optional which means that an Application Family may not be created. An Application Architecture may be instantiated directly from a Solution Architecture. Even if Application Family Architectures are created, they may not be created up front, but instead may be harvested from a set of Application Architectures for which some commonality has been identified.

Questions?

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