WELCOME

Electronic Records Archives

System Design Review

May 9 - 12, 2005

National Archives & Records Administration

Electronic Records Archives System Design Review

Lockheed Martin Transportation & Security Solutions
7615 Ora Glen Drive, Greenbelt, MD 20770
May 9-12, 2005

LOCKHEED MARTIN

ERA SDR – DAY ONE

Opening Remarks

Clyde Relick

May 9, 2005

SDR Objectives

A System Design Review should establish . . .

- Mutual understanding of the architecture and design of the ERA System
- Lockheed Martin Team's approach to realizing the objectives of ERA
- Readiness to proceed to the Product Design phase of ERA

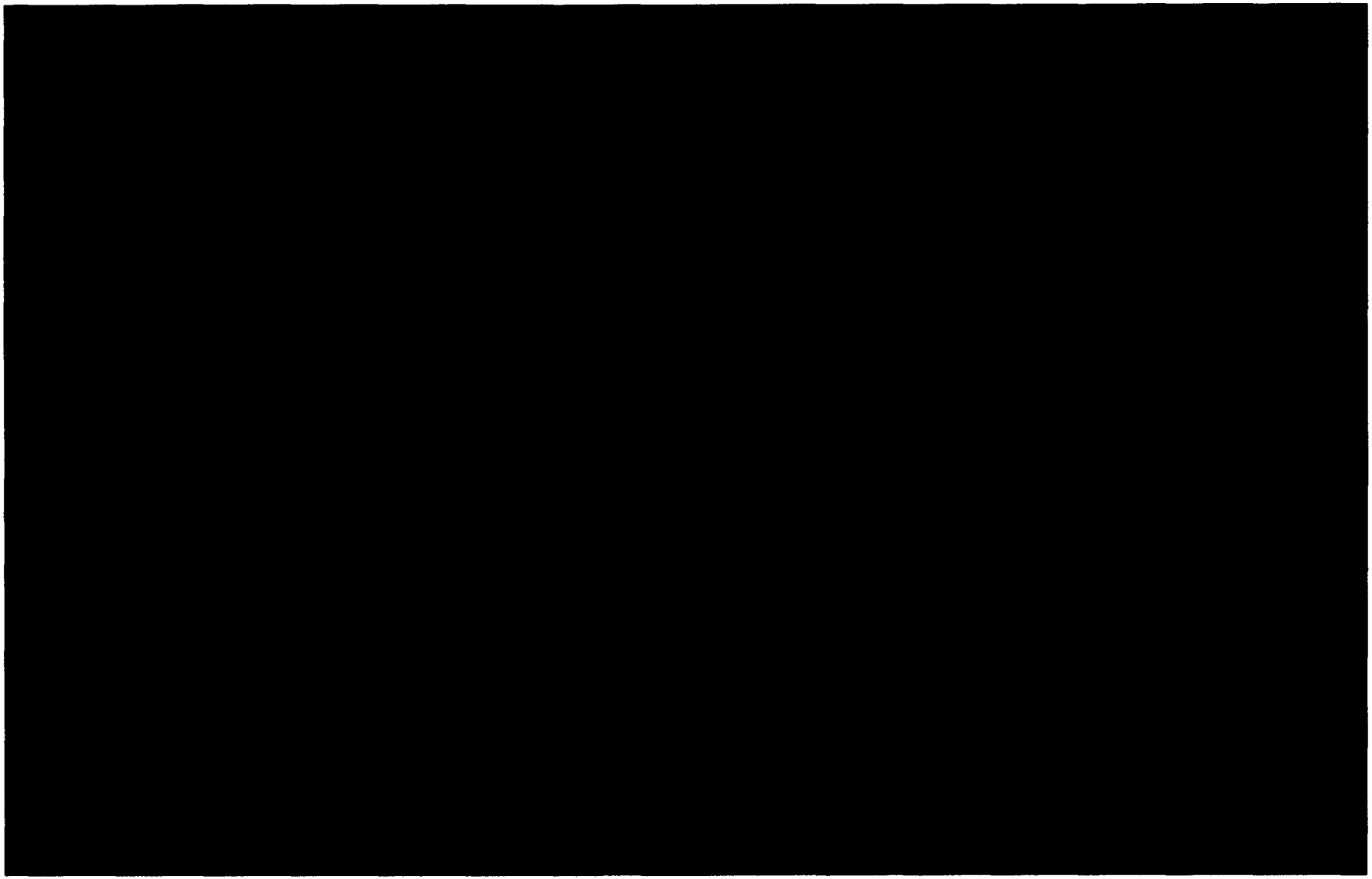
Overview of ERA Architecture and Design to include . . .

- System Design Methodology
- ERA Architecture within NARA's Enterprise Architecture
- System Performance Roadmap

Detailed Review of ERA Architecture and Design to include . . .

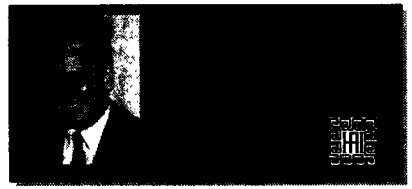
- Functional architecture, service design, design highlights & tradeoffs, performance considerations, physical design
- Answers to Review Item Discrepancies (RIDs) and general questions

Lockheed Martin Team



Lockheed Martin Team for SDR

Legend:
- Key Personnel
- Discipline Leads



Bill Harris
Chief Architect
SDR Co-Chair

Steve Hansen
Chief Engineer

Betty Sorber
SADD Lead, SDR
Moderator

[redacted]

Fred Robinson
Requirements
Management Engineer

[redacted]

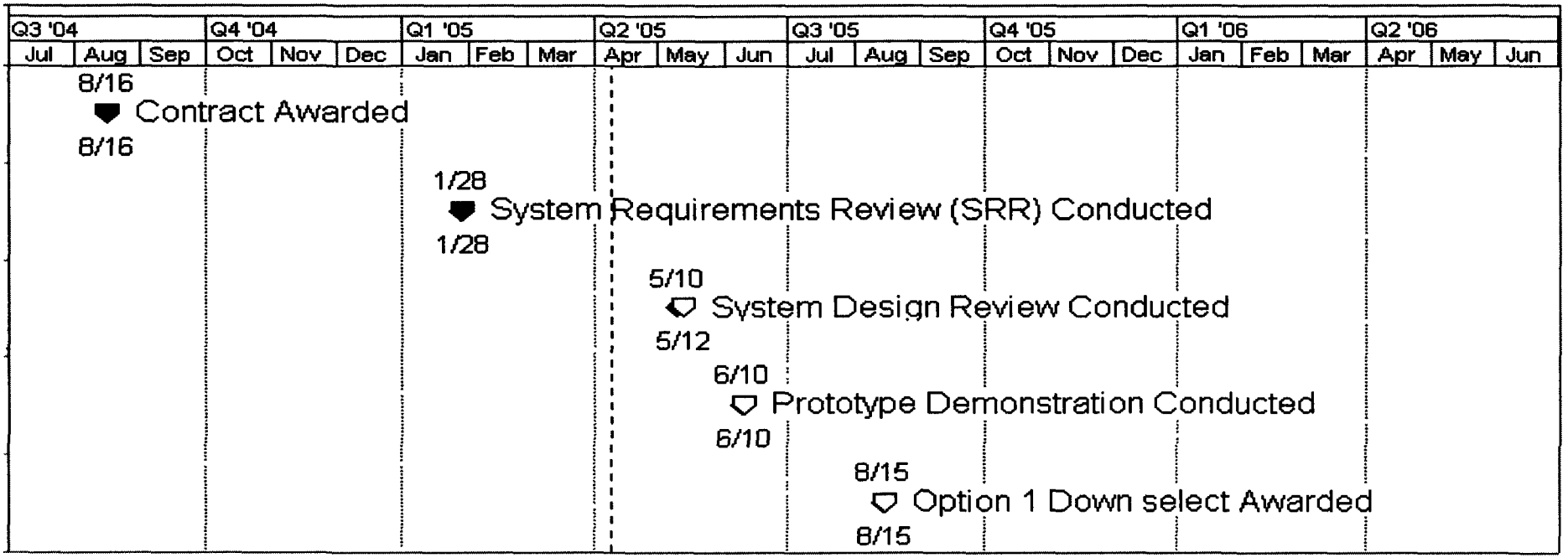
[redacted]

[redacted]

Rick Rogers
Records Management
and Ingest Lead

[redacted]

ERA Program Level 1 Schedule



ERA SDR – DAY ONE

Orientation

Betty Sorber

May 9, 2005

SRR Introduction Agenda

Administration

Entry Criteria & Exit Criteria

SDR Meeting Roles & Responsibilities

Presenters

Daily Agendas

Assumptions and Ground Rules

Comment Review Approach

Escalation Process

Administration

Location	Archives II, Conf. Rooms D & E
Message Delivery	PMO Secretary: Helen Love (Room 1510) Phone No 301-837-1737 FAX Number 301-837-0394
Safety/Emergency Evacuation	Follow Signs to nearest EXIT
Lunchroom / Vending Location	Ground Floor (up one floor)
Cell Phones	Typically inoperable inside building (other than main lobby or outside)
Restrooms	By stairs, or upstairs near lunchroom
Attendance Sheet	Pre-populated for most attendees, with "check block" for days attended
Review Item Discrepancy Form (RID)	Standardized PMO form for submitting comments for SDR consideration
Tracking of SDR Slide Packages	Each is numbered, and must be returned

SDR Entry Criteria

- Approval of SRR
- Delivery of review documentation
  - SADD, ICD, Updated SysRS, updated ConOps, and updated IRS CDRLs delivered no later than 30 calendar days prior to SDR
  - Documents delivered no later than 15 calendar days prior to SDR
    - Facilities Plan (CDRL 5)
    - Operations and Support Plan (CDRL 7)
    - Certification and Accreditation Plan (CDRL 12)
    - Continuity of Operations Plan (CDRL 13)
    - Revised Life Cycle Cost (CDRL 27)
    - ERA Master Test Plan (CDRL L31)
    - Security Risk Assessment (CDRL L36)
    - System Evolution Plan (CDRL L40)
    - Human Factors Specification (CDRL L46)
  - Planned presentations provided on first day of SDR review
- Agreement on Review Item Disposition (RID) forms to be used for SDR comments
- Baselines in place
  - CCB approval of updated SysRS and IRS
  - CCB approval of SADD and ICDs
- Receipt of initial set of ERA PMO comments on SADD and ICDs 4 calendar days prior to the review

SDR Exit Criteria

Completion of all planned presentations

1. SRR Deferred RIDs
2. System Architecture and Design Methodology
3. System Architecture and Design Overview
4. Transition Plan and Increment Allocation
5. Operations, Support and Training
6. Demonstration and User Interface Design
7. Domain Model
8. System-Level Package Architecture & Design
9. Security Design
10. Performance Modeling
11. Availability Modeling and Analysis
12. Integration and Test
13. Trade Study Summary
14. Increment/Release Requirements & Design Reviews

Disposition of all SADD (and ICD) comments

- Draft – Initial state of the RID *before* being dispositioned
- Accepted – Must be addressed and closed before the SDR activity is considered complete
- Deferred – Must be addressed and closed by target resolution date
- Closed – The contractor has responded to the RID sufficiently and the government formally accepts the response
- Rejected – The RID, after review by the appropriate government personnel, is considered to be unnecessary, inappropriate, or a duplicate of an existing RID and is therefore not accepted

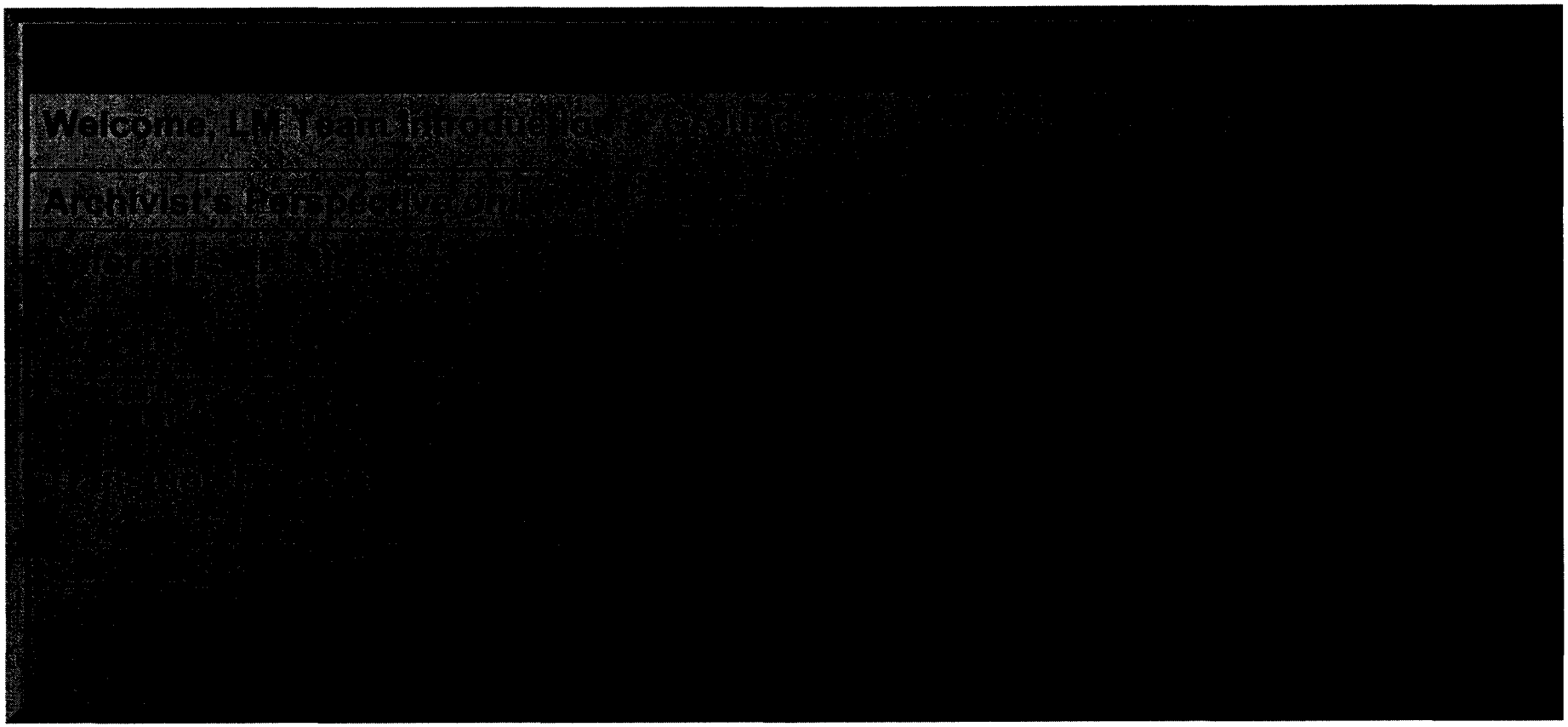
Minutes published

- Includes recording of comments from presentations and all SADD and ICD dispositions

SRR Meeting Roles & Responsibilities

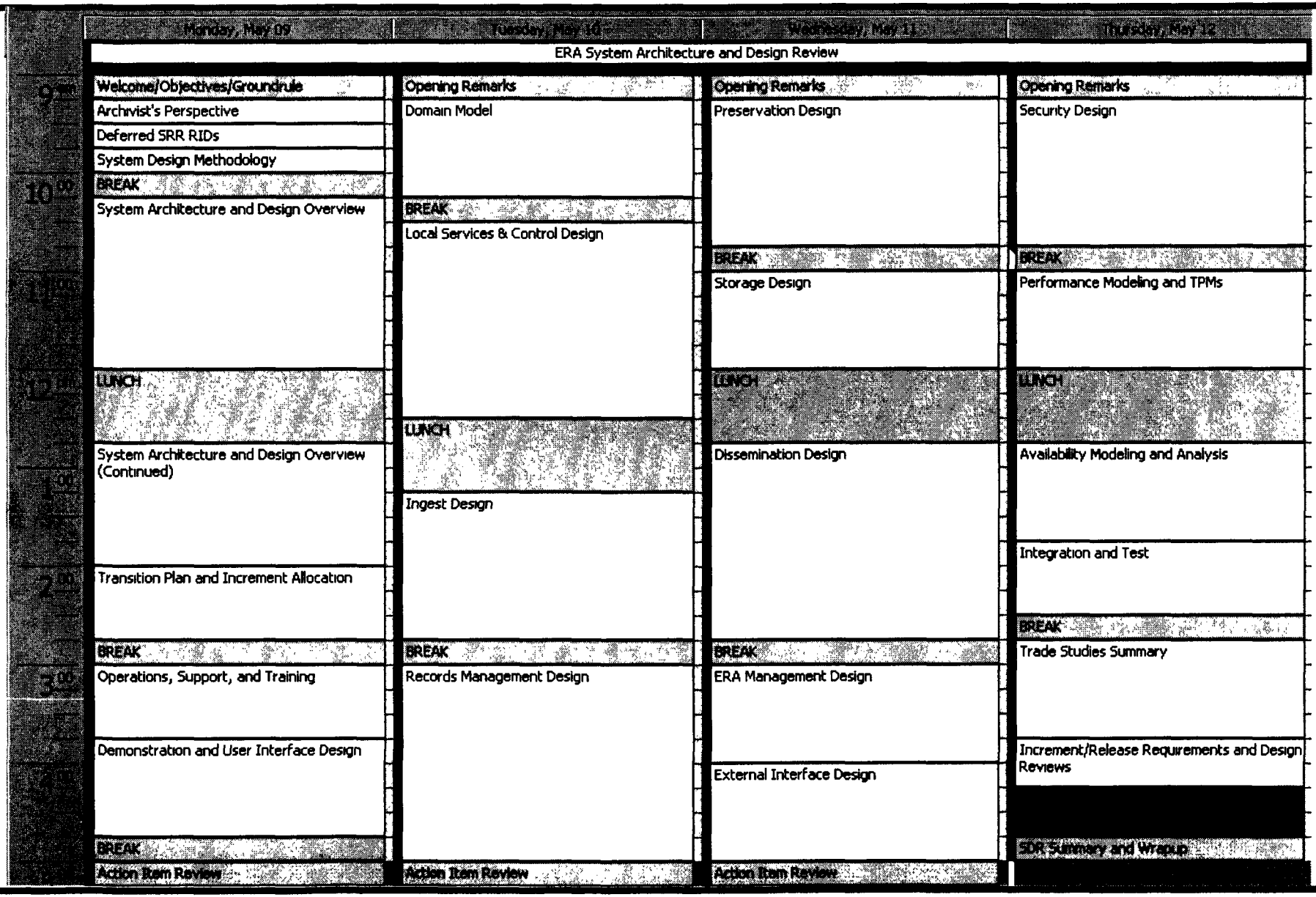
SDR Meeting Moderator	• Introduce the meeting and participants • Provide daily direction for meeting participants	Betty Sorber
SDR Chair and LM Co-Chair (Chief Architect)	• Provide Direction on comment disposition • Authorize final comment disposition • Maintain control of meeting • Determine point of escalation, as required	[illegible] (NARA) [illegible] (LM)
SDR Board	• Control pre-submitted and walk-on submitted RID Forms • Review RID Forms to determine and [illegible] • Provide RID disposition to [illegible]	[illegible]
Program Management	• Arbitrate disagreements on RID [illegible] • Determine when a comment is out of [illegible] • Final escalation point for SDR issue resolution	[illegible]
Attendees	• Officially invited (by NARA) review participants • Direct contributors of RID Forms to the SDR Board for review	[illegible]
Observers	• Invited review spectators, present to witness the proceedings • Possibly indirect contributors of RID Forms (through an Attendee or Board member)	[illegible]
Presenters	• Present approach and/or design summaries • Review (and prepare) comments to SAD and ICD	[illegible]
[illegible]	• Present available comments to SAD and ICD • Work on actions as required to obtain agreement on comment [illegible]	[illegible]
[illegible]	• Track the disposition of all comments through closure • Document meeting minutes, including RID dispositions	[illegible]

Presenters - Day One



Presenters - Day Two through Day Four

SDR Schedule



	Monday, May 09	Tuesday, May 10	Wednesday, May 11	Thursday, May 12
	ERA System Architecture and Design Review			
9:00	Welcome/Objectives/Groundrule	Opening Remarks	Opening Remarks	Opening Remarks
	Archivist's Perspective	Domain Model	Preservation Design	Security Design
	Deferred SRR RIDs			
	System Design Methodology			
10:00	BREAK	BREAK	BREAK	BREAK
	System Architecture and Design Overview	Local Services & Control Design	Storage Design	Performance Modeling and TPMs
12:00	LUNCH	LUNCH	LUNCH	LUNCH
1:00	System Architecture and Design Overview (Continued)	Ingest Design	Dissemination Design	Availability Modeling and Analysis
				Integration and Test
2:00	Transition Plan and Increment Allocation			
	BREAK	BREAK	BREAK	BREAK
3:00	Operations, Support, and Training	Records Management Design	ERA Management Design	Trade Studies Summary
	Demonstration and User Interface Design		External Interface Design	Increment/Release Requirements and Design Reviews
	BREAK			SDR Summary and Wrapup
	Action Item Review	Action Item Review	Action Item Review	

Assumptions and Ground Rules

Assumptions

- Review of the Draft SADD was accomplished
  - NARA RID Form comments for SADD provided to LM in advance of SDR
- All changes to the SADD will be based on SDR Board approved actions documented on RID Forms
  - All accepted RID Forms will be addressed and dispositioned as Closed, Rejected, or Deferred
- Presentations will be interactive
- Day One provides an overview of the architecture and design, followed by three days of detailed presentations

Assumptions and Ground Rules

Ground Rules

- NARA provided RID Form will be used to document and facilitate discussions, approvals, baseline change, and audit trail for the SDR meeting

- Meeting co-Chairs and Moderator will assure compliance to the presentation schedule
  - Items may be placed in the "Parking Lot" to facilitate meeting progress
  - "Parking Lot" items may be addressed by "break-out" sessions or during daily wrap-up session, with some nature of closure to be achieved by day's end

Comment Review Approach

- Discuss Comments one at a time, section by section, in the SADD /ICDs
  - All comments prepared using agreed-to Review Item Discrepancy (RID) Form
    - Comments are filtered by the SDR Board
    - RID Form captures agreements, rewords, results of escalation
    - Recorder holds master copy to be initialed by Chairperson(s) as they are approved for each section
    - Provides audit trail of SDR agreements; becomes the minutes of the SDR as well as the basis for changing the SADD / ICD baselines
  - Roles similar to an inspection:
    - Reader/Presenter (author) reads the comment, explains as necessary
    - Co-chairs keep discussion on track, and pace discussion
    - Recorder recaps at end of each topic

Escalation Process

Avoid escalation, if possible

First level is Chairperson level; if that fails, then to the Program level

As necessary, bring comments for escalation to appointed escalation (action item) session each day

- SDR Board (or their designee) presents escalated RID as in review session
- Each side discusses position
- Result of escalation is documented on the RID Form

ERA SDR – DAY ONE

Archivist's Perspective on ERA

Gregory S. Hunter, Ph.D.
Certified Archivist
Certified Records Manager

May 9, 2005

General Thoughts on the Process

SDR is an exciting step for archivists

- As a profession, we've spent years identifying the problems with digital records and communicating the issues to a wider audience
  - For example, the 1997 film, *Into The Future: On the Preservation of Knowledge in the Electronic Age,* talked about problems but offered no solutions
- Now we're finally at the point of seeing a design for a comprehensive solution to the problem

Thoughts about Design

The design process already has led to some significant advances in areas of theoretical interest to archivists

- An asset catalog with virtually unlimited flexibility for hierarchical arrangement
- A template approach that will serve as a foundation for automation strategies
- An authenticity approach flexible enough to meet changing NARA policies while being rigorous enough to withstand procedural challenges
- A description approach that combines preliminary automated data extraction with traditional archival descriptive practices
- A persistence approach that finally achieves the dream of a "self-instantiating archives"

The LM Council of Experts

The Lockheed Martin Council of Experts (COE) is a group of industry leaders providing additional professional advice to the LM Team

The COE is composed of:

The COE met April 19-20 and provided invaluable advice to the LM Team

Comments on the following slides are taken from the meeting notes

General Insights from COE

"This project is an opportunity to define the future, not just to be of service. Information technology is best when it transforms."

"ERA is the first system that will manage electronic records in a comprehensive way. The only competition is from 'Enterprise Content Management Systems,' which are patched-together systems."

"ERA can play a key role in NARA's educational initiatives, thereby increasing the relevance of NARA to the general public."

"'Recordkeeping' has a negative connotation. People associate it with 'red tape' and the 'government being on my back.' People don't equate archives and recordkeeping with benefits. We need to package and sell records to the public in a new way, with a new look and feel. ('Records are a resource to meet my interests'). We need to make records as popular as E-Bay."

Workforce Insights from COE

"The transition of NARA staff cannot be overemphasized... ERA can't perform without good quality people educated for NARA's new needs."

"Technology tends to be optimistic. Workforce transformation tends to be negative. This project will have to keep them in balance."

"LM may want to downplay 'transformation,' since most workforces don't think they need to be transformed. A better theme might be: 'The system will allow you to use what you already know – to do your job better and easier.' NARA staff will be more efficient and more effective."

"LM should emphasize *education* (understanding principles and purposes) rather than *training*. Education deals with the *why* behind the *what.* People need to know why they're pushing buttons. This is *job transformation* not *training for a system."*

Design Insights from COE

"The ability for adaptation and evolution is key, especially in interactions with customers. What will the environment be in 2012? Ten years ago, for example, there was no Google and the Web was in its infancy."

"The 'evolving customer' will be a NARA challenge as well as an ERA challenge."

"We also need to take into account a new audience beyond historians. Plaintiff's counsel will be trying to prove that the *process* used to obtain the evidence is flawed. This raises the threshold to another level and may set a new performance standard for NARA."

"LM should consider hiring an independent third party to try to defeat the 'trustworthiness' of the transfer process."

Conclusion

NARA is facing a challenge of historical proportions similar to its post-World War II experience with paper records

The more I'm involved in this process with this team, the more I'm convinced that a successful Electronic Record Archives is within our grasp.

ERA SDR – DAY ONE

Deferred SRR RIDs

Bill Harris

May 9, 2005

RIDs Deferred at SRR

3 RIDs (out of 111) submitted at SRR were deferred

- LM-RID-00001 "Designation of Verification Method"
- LM-RID-00300 "Contents of a Transfer Agreement"
- LM-RID-00303 "Data Segregation on Ingest (e.g. Title 13)"

LM submitted updated responses to the PMO for these RIDs on April 22, 2005

Received notification from PMO on May 03, 2005 that all SRR generated RIDs are closed

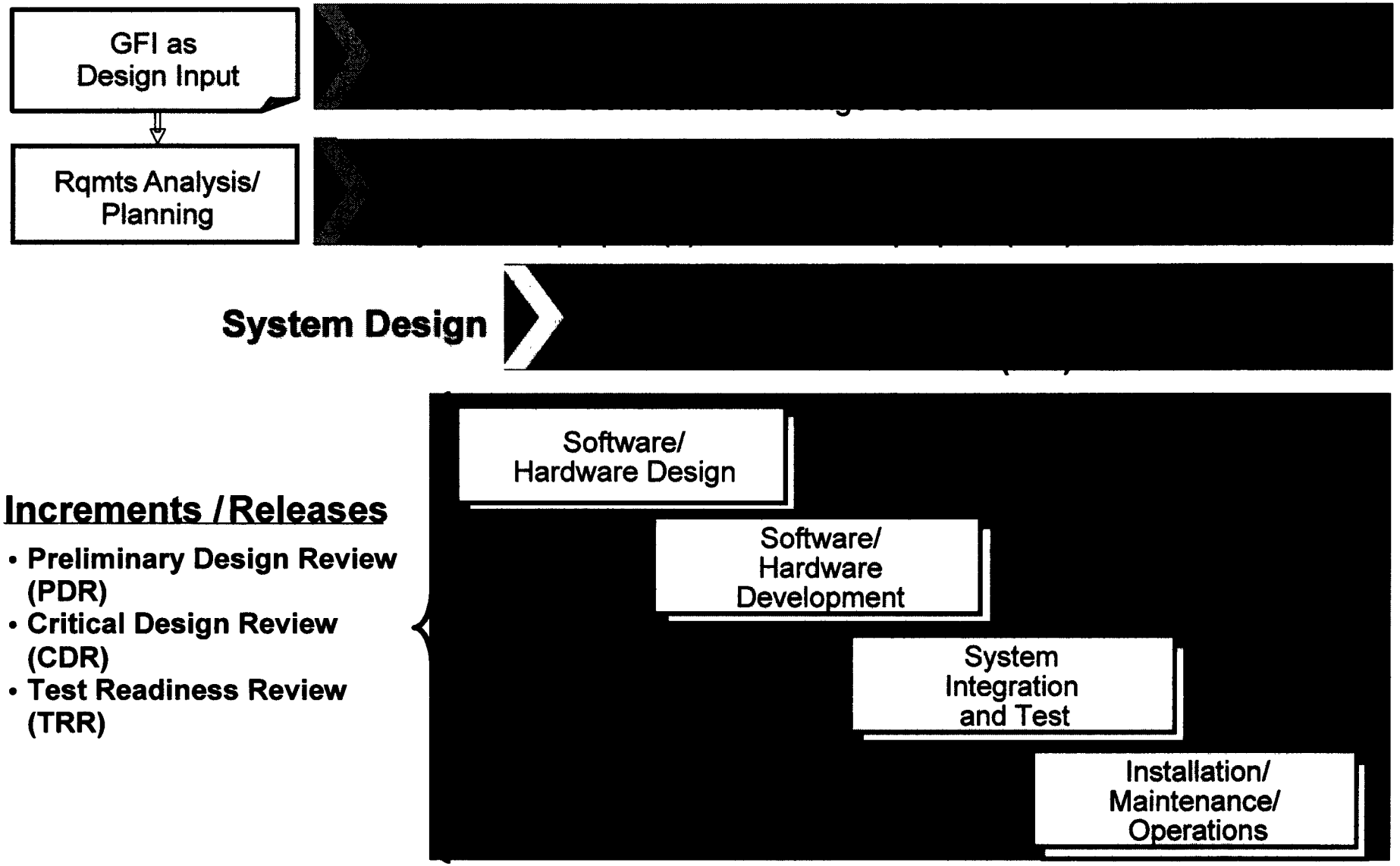
ERA SDR – DAY ONE

System Analysis and Design Methodology

Bill Harris

May 9, 2005

System A&D Methodology: Engineering Overview



Increments /Releases

- **Preliminary Design Review (PDR)**
- **Critical Design Review (CDR)**
- **Test Readiness Review (TRR)**

System A&D Methodology: Definitions

Architecture

- The conceptual, organizational structure of the ERA System from a functional, physical, operational and security perspective

Design

- The collection of hardware, software components, their interfaces and the operational facilities that provide the framework for developing the ERA system

System A&D Methodology: Overview

Approach leverages the best of structured and object-oriented methodologies

- Structured methodology:
  - Used to develop the system architecture
  - Provides a high-level functional decomposition of the ERA System
  - Ensures complete conceptualization at the system-level
- Object Oriented methodology:
  - Used to develop the software and data model design
  - Defines the ERA system services, a representative sample of system threads and the ERA conceptual and logical data models

Approach balances the benefits of a compact and abstract functional view with the more voluminous and concrete object view

System A&D Methodology: Specification Tree

System A&D Methodology: Architecture

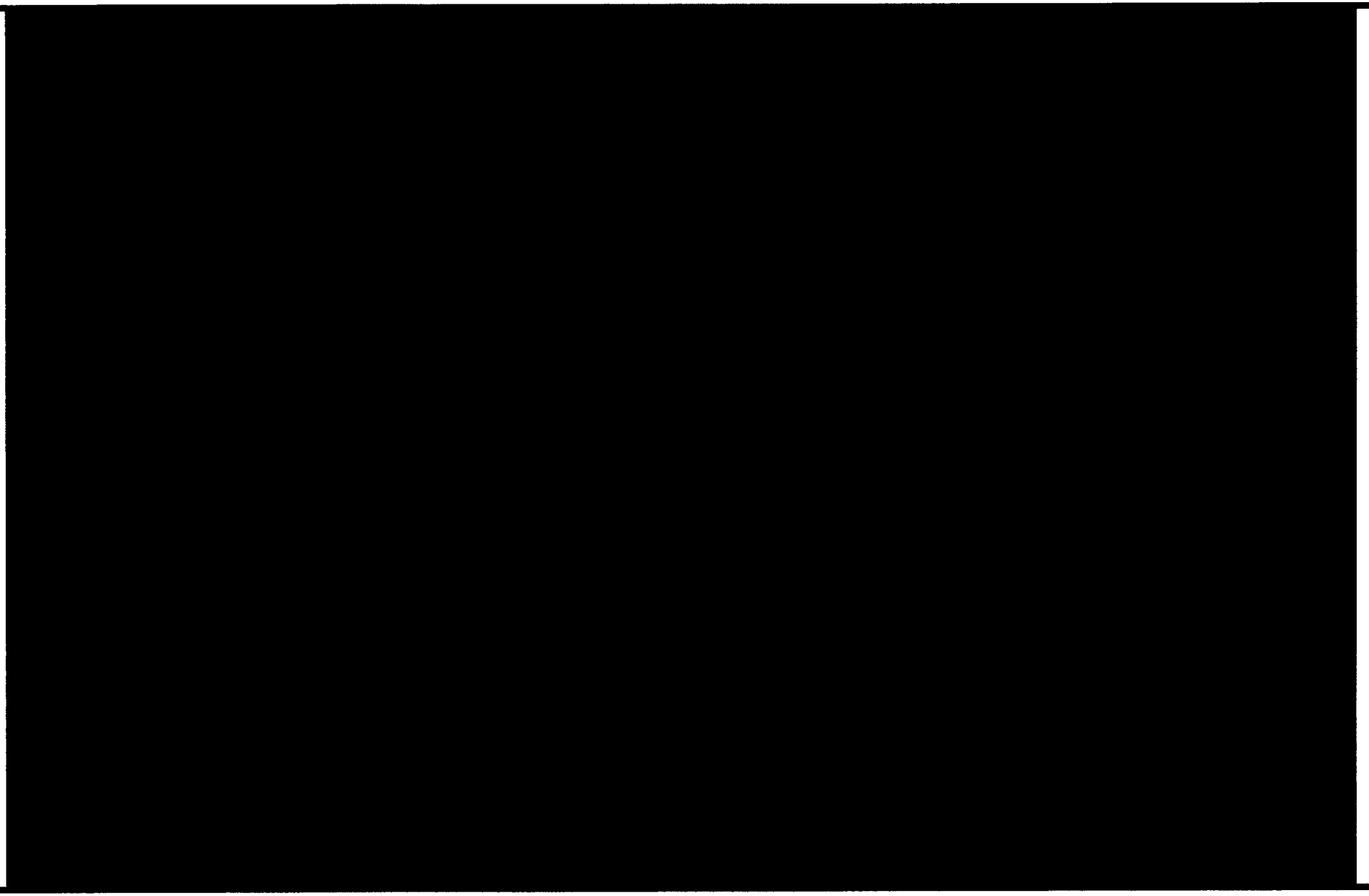
Architecture describes the conceptual integrity of system components and their relationships

Software and physical architecture developed iteratively and in parallel using structured analysis methodology
- Consists of a number of tasks, each with a number of steps
- Yields multiple conceptual views of the system, allowing for multiple potential implementations (i.e. Physical, Functional, Operational, Data)

Data architecture derived from the NARA data architecture
- Describes the conceptual data model from a business perspective
- Represented using UML (Unified Modeling Language) notation

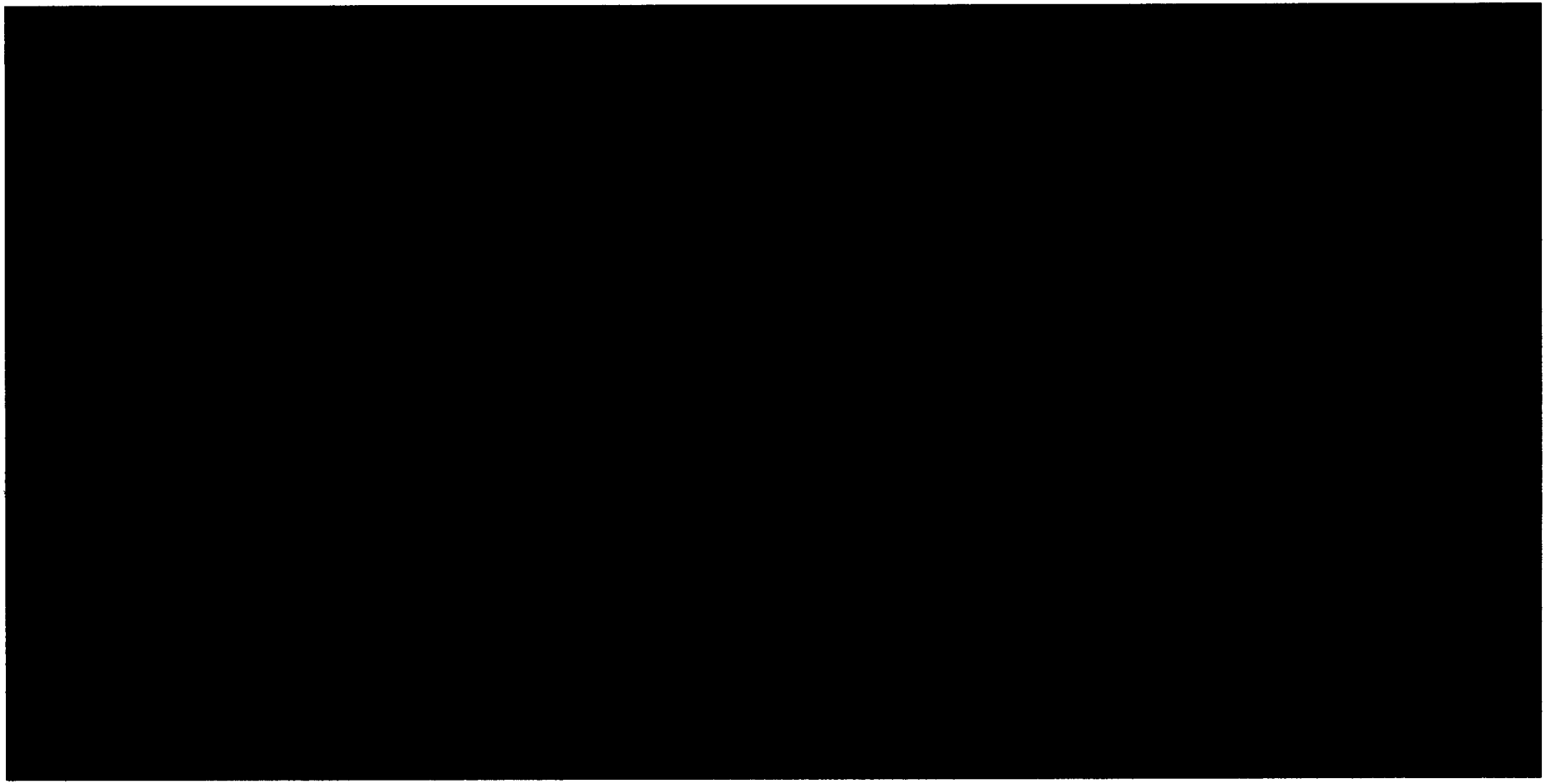
Artifacts
- Partitioning of the ERA system into conceptual components
- Allocation of functionality and data to components
- Identification of connectivity and data flow between components
- Creation of Functional and physical architecture block diagrams
- Creation of Conceptual data model diagrams
- Definition of Operational view

System A&D Methodology: Architecture (continued)



System A&D Methodology: Design

System A&D Methodology: System Design Process



System A&D Methodology: Benefits

System A&D Methodology: Conclusions

System Architecture follows Structured Analysis methodology

Software Design and Data Modeling follow Object-Oriented Design methodology

Hardware Design follows Structured Decomposition methodology

The LM Team's approach ensures the appropriate level of architectural abstraction, while providing traceability into design details

Leverage the Best Practices and methodologies from both a Structure Design and Object-Orientated approach

BREAK

ERA SDR – DAY ONE

System Architecture and Design Overview

Bill Harris & [redacted]

May 9, 2005

System Architecture and Design: Agenda

- Introduction
- Design Considerations
- Integration into Enterprise Architecture
- Performance View
- Business View
- Service View
  - Service Oriented Architecture
  - High level Functional Architecture
- Data View
  - Data Architecture
  - Persistent Data Stores
- Physical View
  - Network Topology
  - Facility Layout and Locations
- System Modeling Roadmap

System Architecture and Design: Introduction

ERA is intended to:

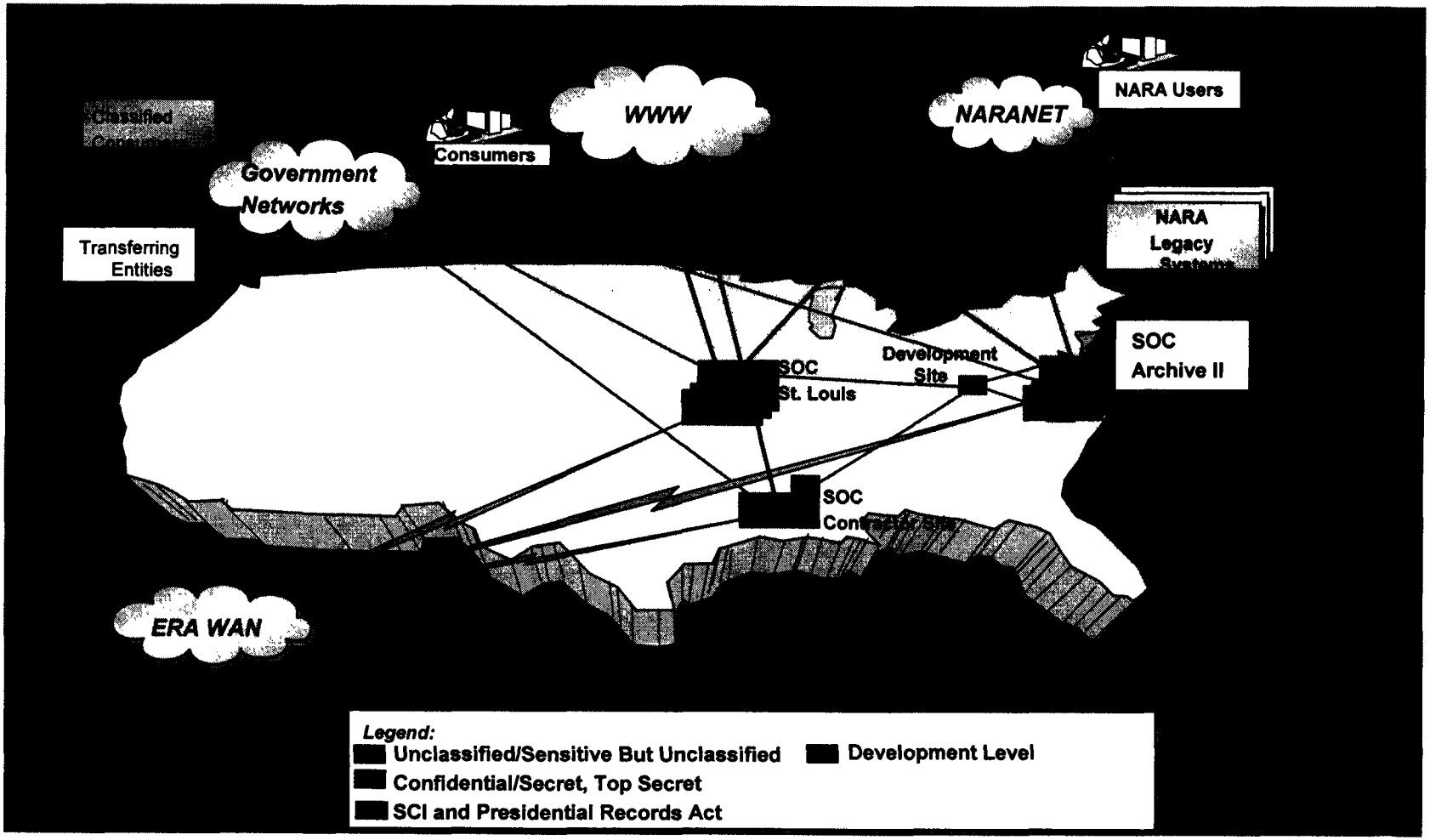
- Authentically preserve any kind of electronic record free from dependence on any specific hardware or software now and for the life of the republic
- Provide electronic record discovery and delivery to anyone with an interest and legal right
- Be dynamic and sound, ensuring that electronic records delivered to future generations are as authentic decades in the future as they were when first created
- Support selected archival management tasks for non electronic records such as scheduling and appraisal

Delivered system will:

- Be an integrated system of COTS products where appropriate
- Subsume functionality of specified NARA legacy systems
- Interface with external systems via the ERA System interface specified in the IRS

System Architecture and Design: Introduction

ERA is accessible, with appropriate access controls, to users on NARANET, Government networks and the public Internet



System Architecture and Design: Principal Design Considerations

Evolvability

- **Allow ERA to change over time, Policy Neutral**

Scalability

- **Scale up or down, with volume and usage**

Extensibility

- **Easily modified to add additional features in the future without major modification**

Availability

- **No single point of failure and maximized "up time", but need to balance availability with cost**

Evolvability

- Services are "Policy Neutral", Business Processes are implemented through
  - Workflow
  - Rules Engine
- Service interfaces
  - Encapsulate and abstract interface definitions
  - Replace underlying technology for a business component in isolation from the rest of the system
- Frameworks
  - Build the system to canonical schema
  - Map COTS interfaces to canonical schema

System Architecture and Design: Design Considerations

Scalability accomplished in Three Tiers

- Scale the equipment within an Instance
  - Storage - Additional capacity can be added when required
  - Servers - Expanded horizontally and vertically to match user load
  - Network Bandwidth – Adding additional network capacity
- Scale by adding additional Instances within a Facility
  - Can add more instances to any federation
  - Retain centralized management
- Scale the Enterprise by adding additional Facilities

Enterprise Wide monitoring and management

- Allows for planned technology infusion and scalability enhancements

Extensibility

- Service Oriented Architecture
  - Add new business functionality
  - Incorporate new functionality into orchestrations
- Frameworks
  - Allows new tools to be "Plugged in" with no change to governing protocols
  - Search engines and indices, redaction, digital adaptations, entity extractors
- Principal Standards
  - Extensible Markup Language (XML)
  - Business Process Execution Language (BPEL)
  - Open Archival Information System (OAIS)
  - Metadata Encoding and Transmission Standard (METS)

System Architecture and Design: Design Considerations

Availability

- No "Single point of failure"
- Redundancy of geographically dispersed facilities
- Load balanced facilities
- Redundancy of geographically dispersed System Operation Centers
- Safe-Store of the records
- Clustered servers
- Redundant Telecommunications

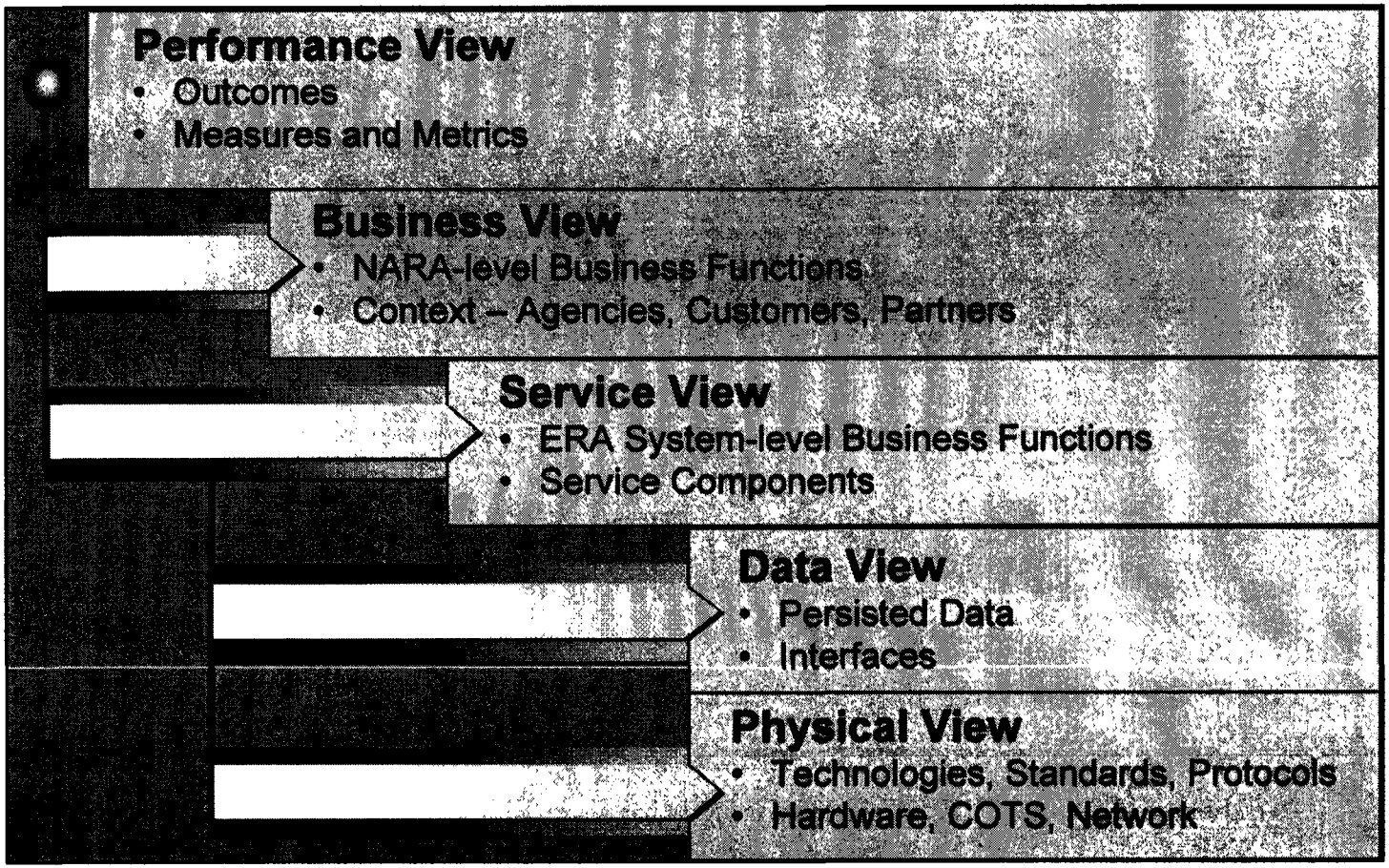
System Architecture and Design: Integration into the EA

- Based upon NARA's Enterprise Architecture definitions of
  - Architectural Principles
  - Architectural Constraints
- Address NARA's Business Process Re-Engineering activities
- Optimize COTS in the Solution
- Optimize Development Activities
- Embrace Standards Implementation & Integration
  - Non proprietary (BPEL, METS)
  - Technology independence (where feasible)
- Emphasize eXtensible Markup Language (XML) and other emerging standards and methods
  - XML archiving standards are being embraced in the public domain
  - Monitoring the "emerging standards" to incorporate when applicable
  - Monitoring academia and industry research efforts for evolving technologies

System Architecture and Design: EA Context

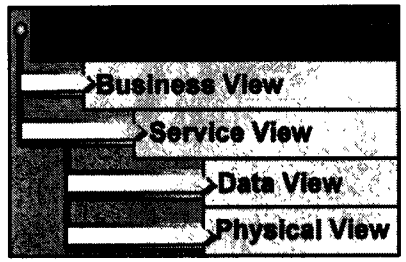
System Architecture Based On

- Federal Enterprise Architecture Network
- NARA Enterprise Architecture



System Architecture and Design: Performance View

NARA Business Performance Goals



ERA Performance Goals (RD Requirements)

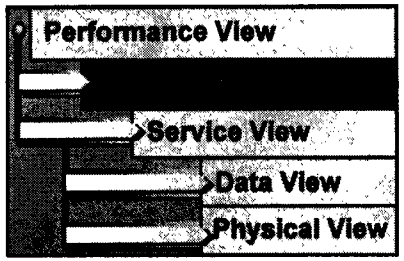
- NARA PGS flowdown to LM Team's ERA Performance Measurement Specification
- LM Team responsible for delivering level-of-service against a defined set of measurable and controllable criteria

ERA System Performance Measures (TPMs/KPPs/PMS)

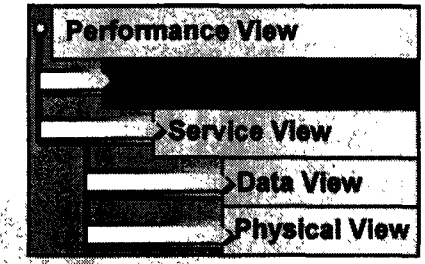
Award Fee Plan

System Architecture and Design: Business View

Business Objectives / ERA Goals



System Architecture and Design: Business View



ERA System Business Services

Agency and NARA Records Scheduling

Use ERA to...
- Authorize Destruction of Paper and eRecords
- Coordinate Submission of Paper and eRecords

Agency Records Creation

- Use Any DOD 5015.2 Compliant Records Application to Create, Retain, Manage, and Destroy Records
- Transfer Physical and Legal Custody to NARA per Schedule

NARA Records Accessioning

Use ERA to...
- Develop Descriptions of Collections
- Organize Records
- Prepare and Deliver to Archival Storage

NARA Records Preservation

Use ERA to...
- Transform Records Into Persistent Object Formats
- Plan and Manage Future Transforms

Public Records Access

Use ERA to...
- Identify and Locate Paper & eRecords
- Access eRecords of All Types
- Submit FOIA and Special Requests
- Respond to FOIA & Special Requests

Donors

Use ERA to...
- Identify Intent
- Plan Deed of Gift

Archives Storage

Use ERA to...
- Manage Temporary and Permanent Storage
- Store eRecords, Finding Aids, Metadata

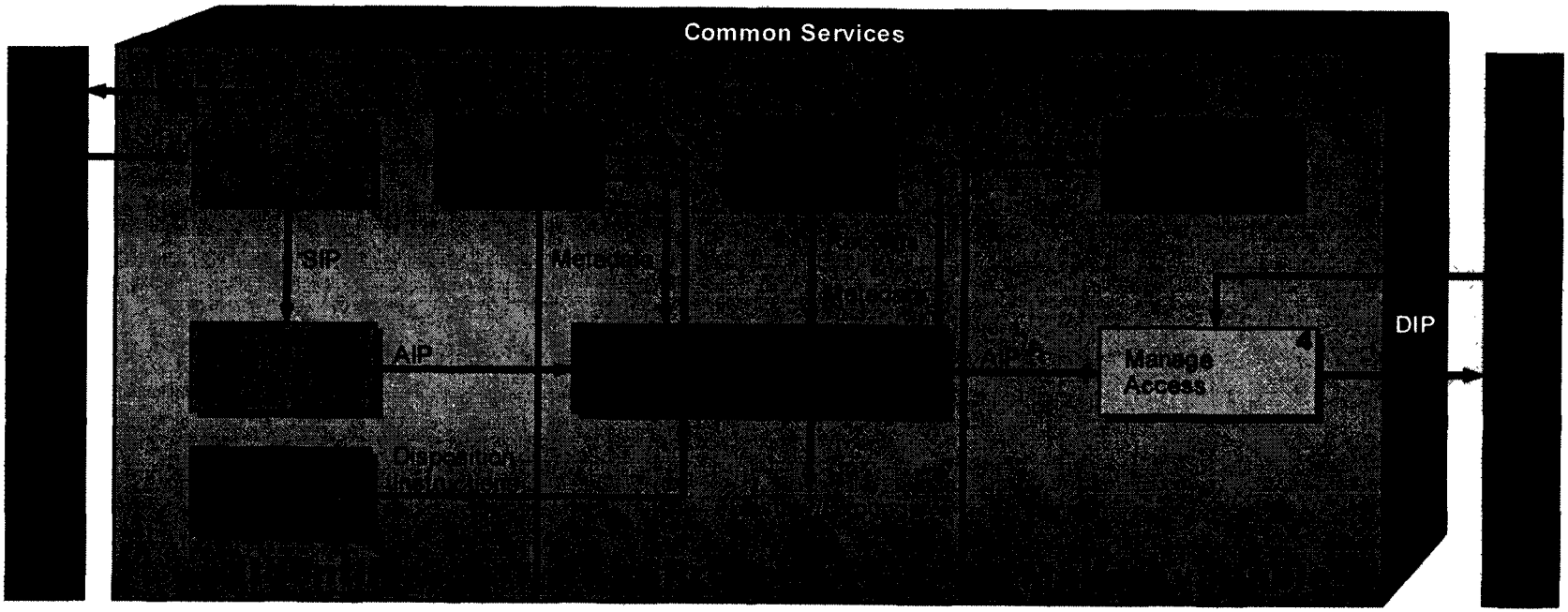
System Architecture and Design: Business View

Mapping of Business functions to ERA System-Level Packages

NARA EA Business Functions	Ingest	Records Mgmt	Preservation	Archival Storage	Dissemination	LS&C	ERA Mgmt
Federal Agency and Presidential Records Management							
Appraisal							
Implementation of Disposition							
Acquisition of Donated Historical Materials							
Documentary Materials Storage							
Accession							
Process							
Preservation							
Access							
Public Programs							

System Architecture and Design: Business View

Notional Record Life Cycle



Legend:	OAIS Functions	ERA System -Level Packages	Service Oriented Architecture
	1- Ingest	Ingest	Business Application Services
	2- Archival Storage	Archival Storage	
	3- Data Management	Records Management	
	4- Access	Dissemination	
	5- Preservation	Preservation	
	6- Common Services	Local Services & Control ERA Management	Common Infrastructure Services

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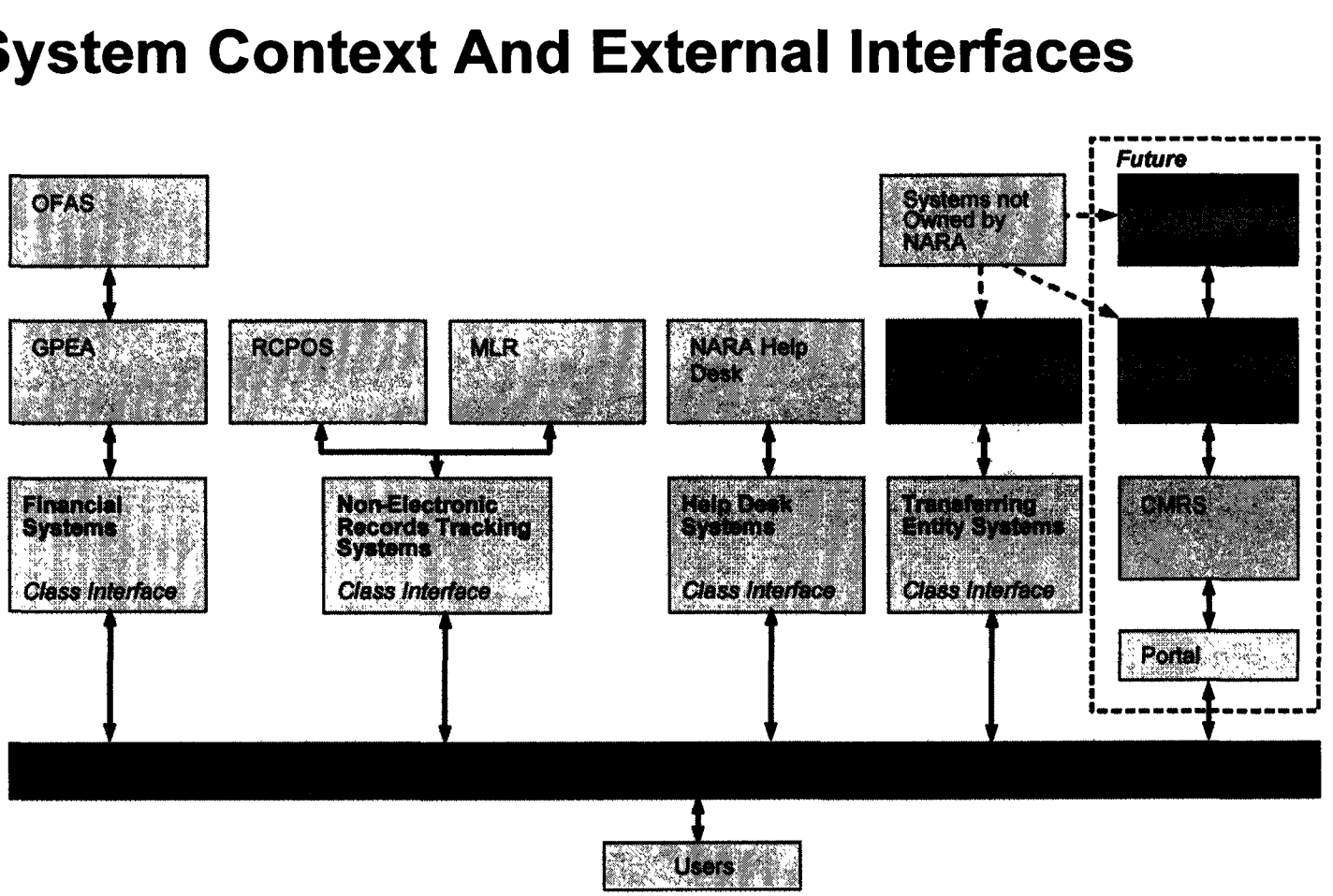
System Architecture and Design: Business View

System Context And External Interfaces



Legend: OFAS= Order Fulfillment & Accounting System
GPEA= Government Paperwork Elimination Act
RCPOS= Records Center Program Operations System
MLR= Master Location Registry
DPRIS= Defense Personnel Records Image Retrieval System
CMRS= Case Management Reporting System

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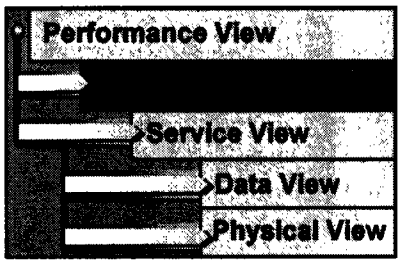
System Architecture and Design: Business View

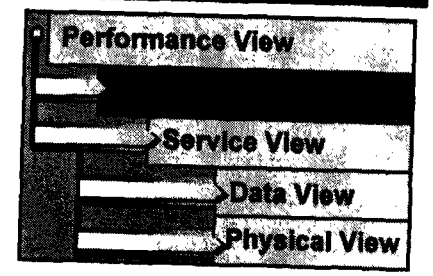
Operational Concept



- ERA has one operational mode
  - Training available in the Customer Acceptance Test lab
  - Maintenance performed on scheduled downtimes
  - Operational in degraded levels (i.e. Search)
- ERA system employs a web-based configurable "workbench" concept for its primary user interface
  - Tailored for a particular user role
  - Provides access to business processes
  - Includes user interface components, workflow components and other services required to complete operational tasks
- Users log into the ERA system via Web based portal
  - Presented with their configurable workbench
- Users can register and request additional ERA capabilities and privileges

System Architecture and Design: Business View

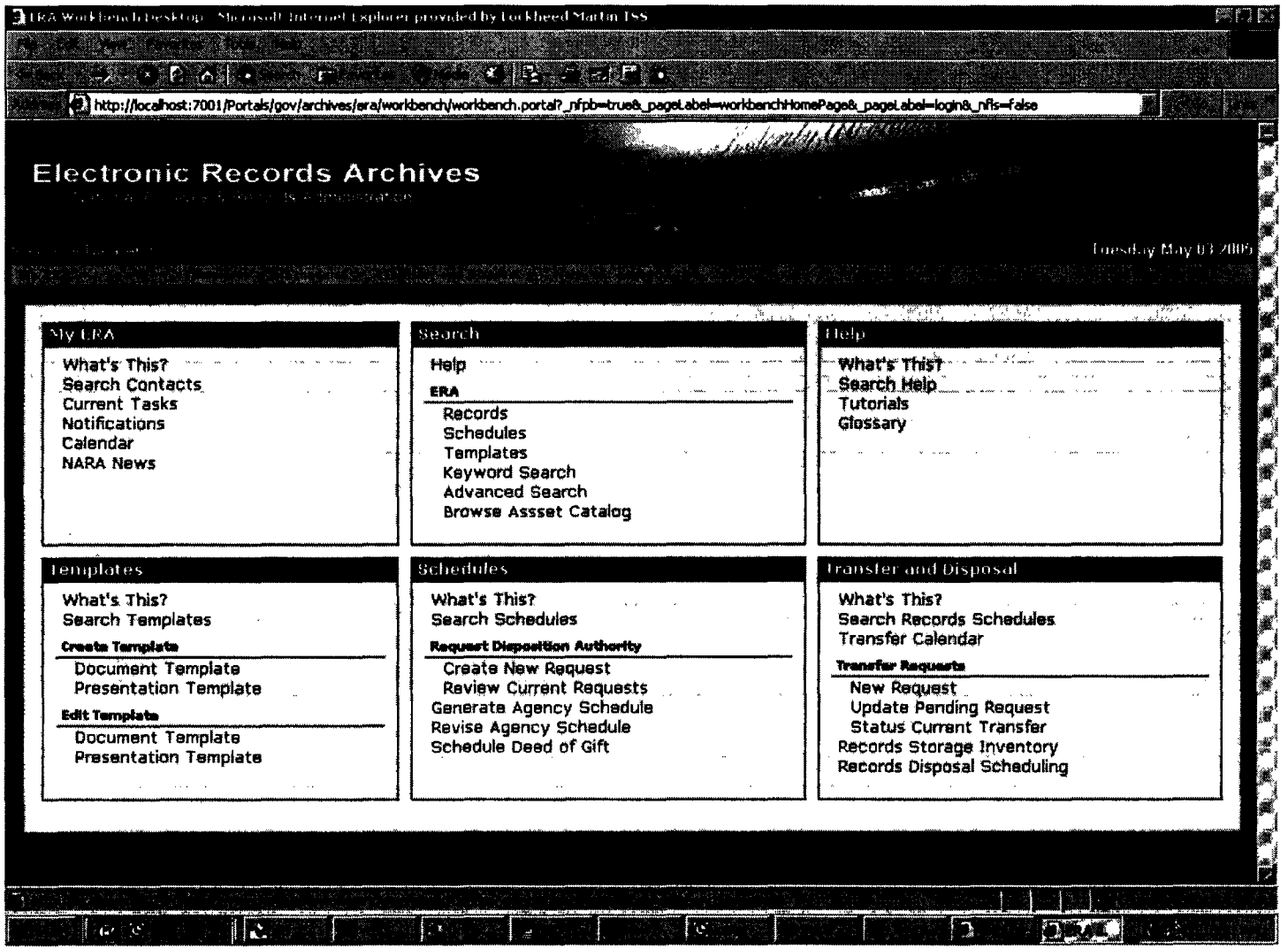
Examples of Role Based Workbenches

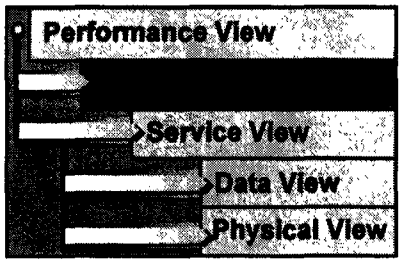


This is a candidate list of Workbenches that the LM Team and NARA will refine during Increment 1

System Architecture and Design: Business View

Example workbench





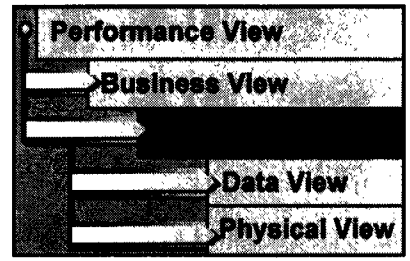
Key Features

- Tailored for specific roles
- Allows new features to be added incrementally
- Delivered as a web portal

LUNCH

System Architecture and Design Overview (Continued)

System Architecture and Design: Service View

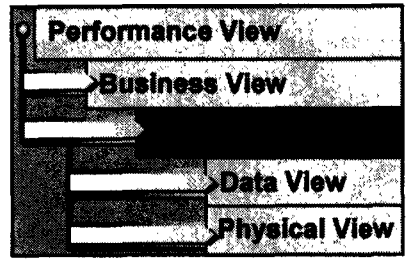


Architectural Decision:

Implement ERA using a Service Oriented Architecture

- Services
- Orchestrations
- SOA for Portals
- Governance
- Security within SOA

System Architecture and Design: Service View

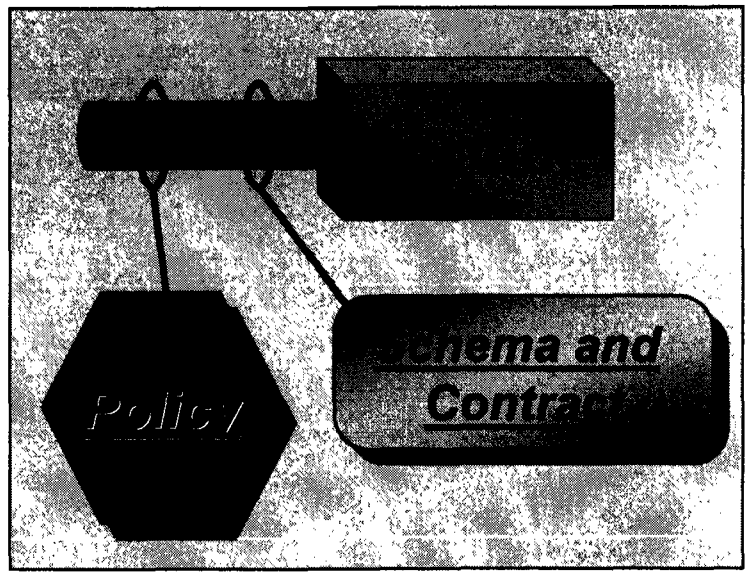


Services provide components of Business Functionality

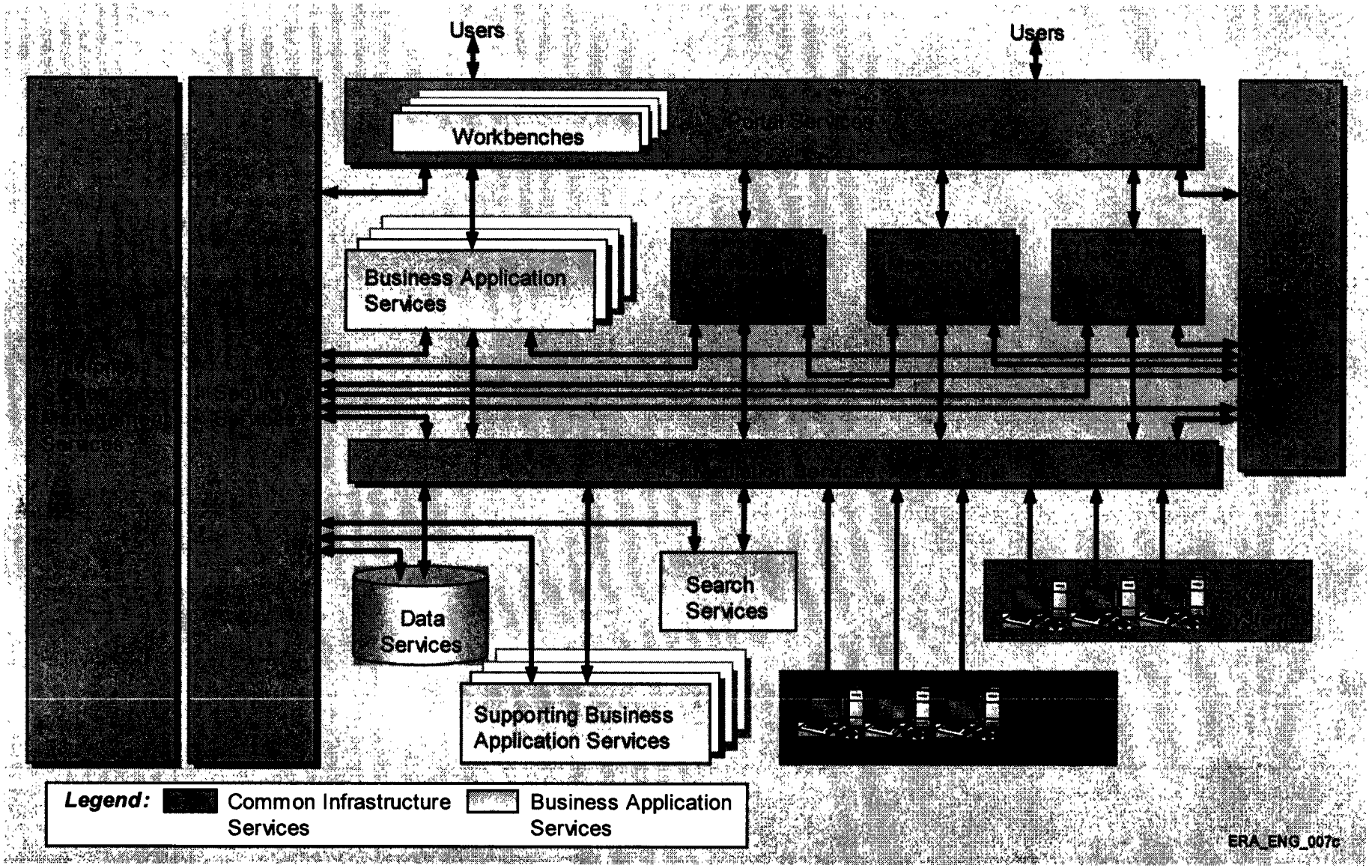
Four basic tenets of Service Orientation

- Boundaries are explicit
- Services are autonomous
- Services share schema and contract
- Service compatibility is based on policy

Interactions between services identify user roles, key methods and parameters

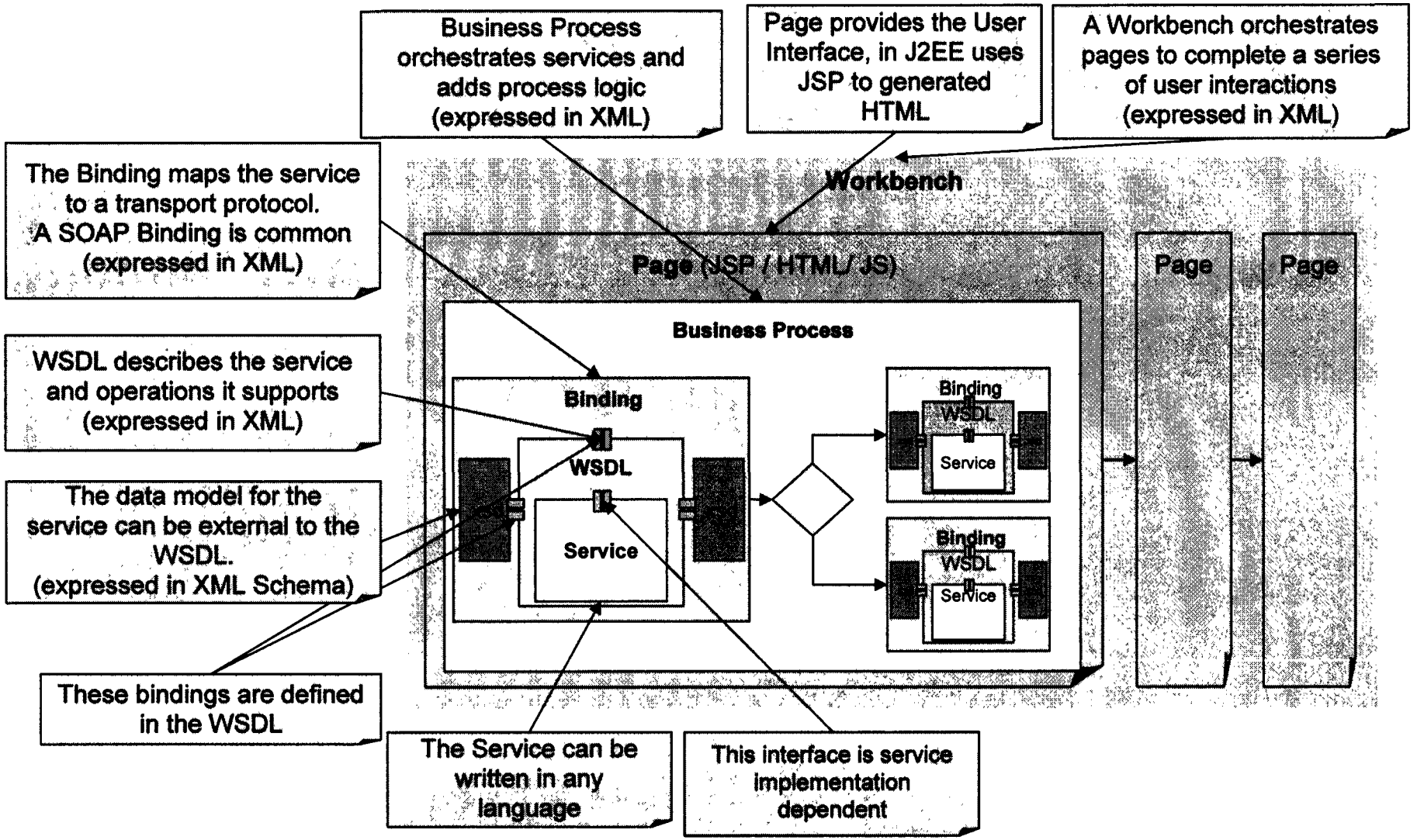


System Architecture and Design: Service View - SOA

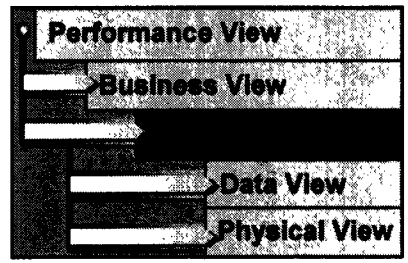


System Architecture and Design: Service View

Orchestrations Invoke Services and Controls to Codify a Business Process

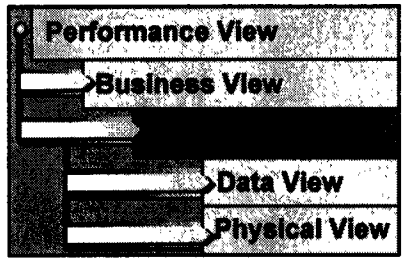


System Architecture and Design: Service View - Portals



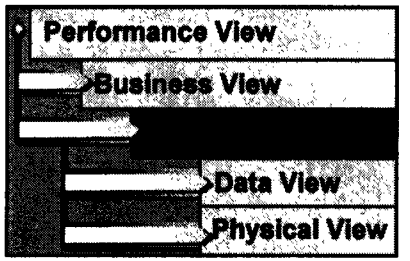
- Portals and SOA
  - Loose coupling but high integration of components
  - User interface needs of SOA are driving Portal standards (WSRP, JSR 168)
- Provides a configurable user workbench capability
  - Web browser access
  - Specialized "branding" for NARA stakeholders such as Federal Records Centers and Presidential Libraries
  - Decentralization of administration of content, users, and privileges
- Systematically organizes the large volume of information
  - Consistent and context sensitive Navigation
  - Multi-dimensional Taxonomies
- Many COTS products include pre-built portlets
  - Enterprise Content Management
  - Collaboration
  - User tasks
  - Search

System Architecture and Design: Service View - Governance



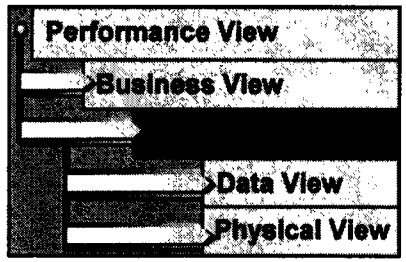
- Authoritative ownership of data
- Service registry
- Service prioritization
- Security policies
- Service level agreement management
- Configuration management control of
  - Services
  - Controls
  - Orchestrations

System Architecture and Design: Service View - Security



- Implements and enforces NARA's security policies
- Portal framework provides a security container
  - Portlets inherit security from the container
  - Single sign-on across the portlets, back-end applications, services
- Orchestrations are security-aware
  - Require authentication and authorization to access services, assets, queues, and messages
  - Security services can be invoked at two layers:
    - Communications layer for a request/response type interface,
      - Include authentication and authorization as part of the interface
    - Message layer for message-passing interfaces
      - Security imbedded inside each message

System Architecture and Design: Service View



Functional Architecture Overview

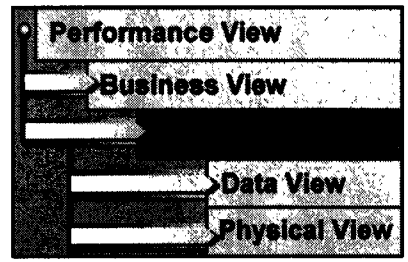
Describe the software architecture and design elements

Describe the high level functional architecture

- **Components of an instance**
- **Federation of instances**

Mapping of the architecture to OAIS model

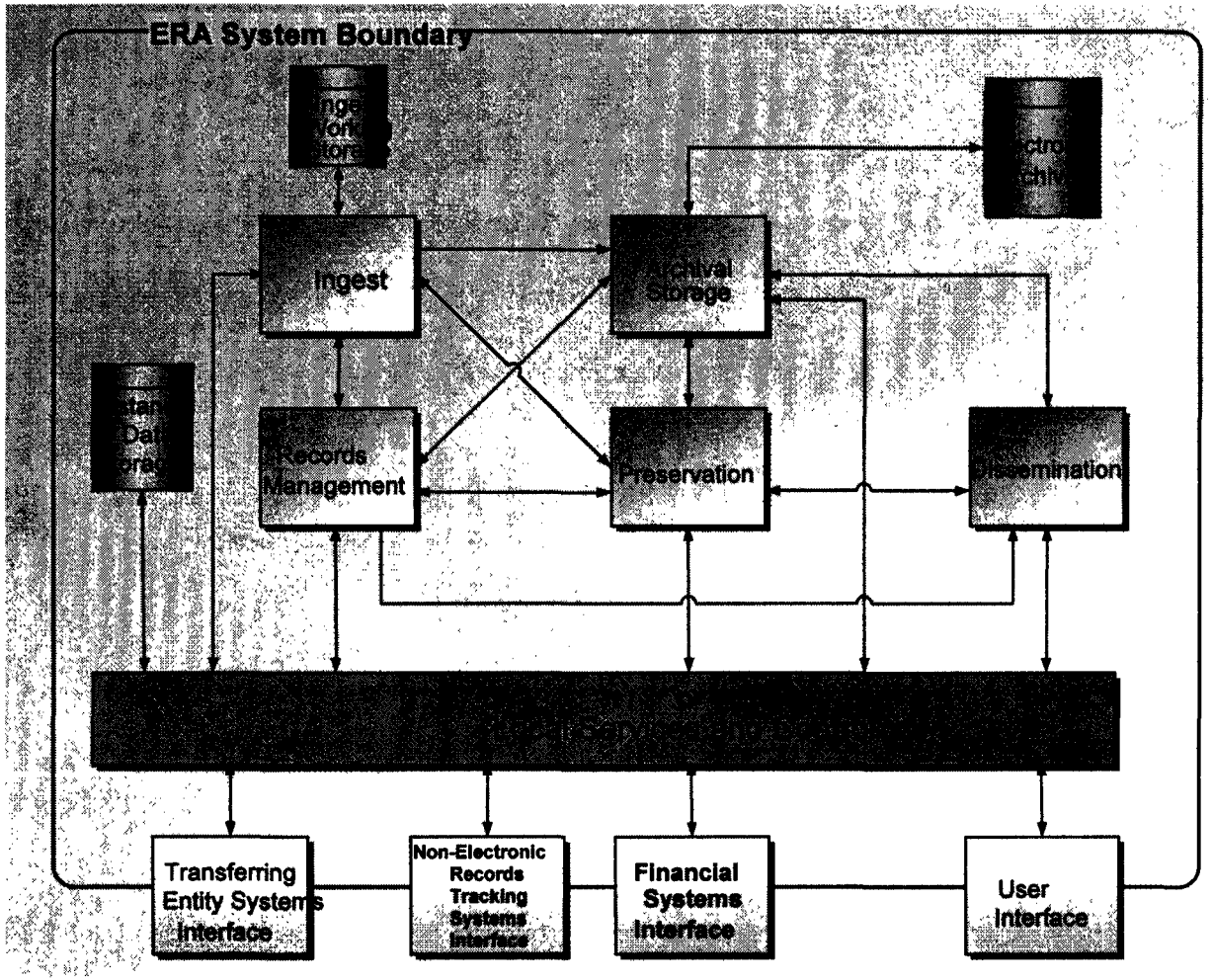
System Architecture and Design: Service View



Architecture And Software Design Elements

System Architecture and Design: Service View

Top level functional architecture: Instance



System Level Packages:

- Ingest
- Records Management
- Preservation
- Archival Storage
- Dissemination
- Local Services and Control

Primary Data Stores:

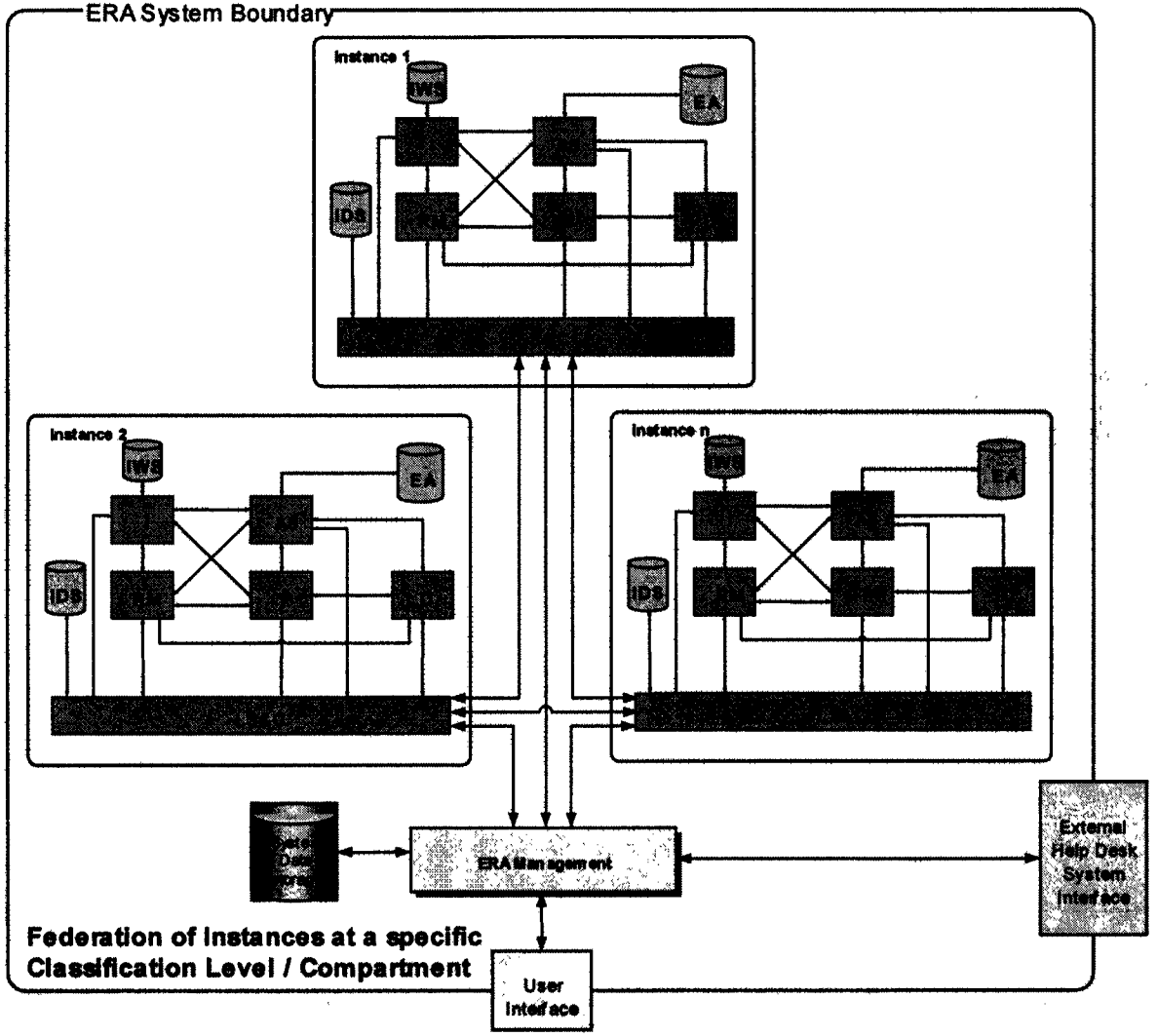
- Ingest Working Storage
- Electronic Archives
- Instance Data Storage

External Interfaces:

- Non-Electronic Records Tracking Systems
- Transferring Entity Systems
- Financial Systems

System Architecture and Design: Service View

Federation of Instances



Features:

- Scalable
- Extensible
- Evolvable

System Level Package:

- ERA Management

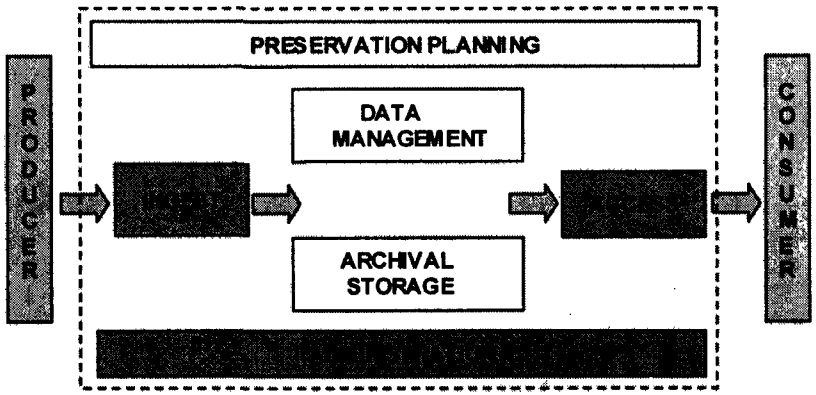
Data Stores:

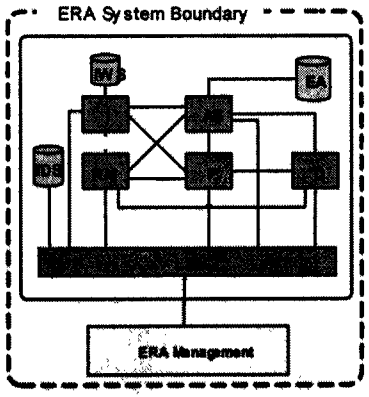
- System Data Storage

External Interfaces:

- External Help Desk

System Architecture and Design: Service View - Mapping to OAIS

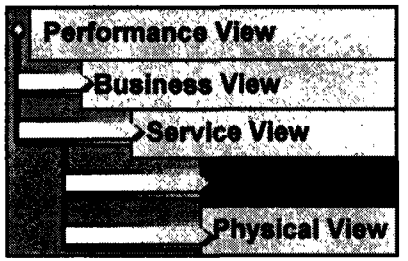




OAIS Model	ERA System Model	Features
Ingest	Ingest Records	
Archival Storage	Archival Storage	
Data Management	Records	
Administration		
Preservation Planning		

System Architecture and Design: Data View

Modeling Approach

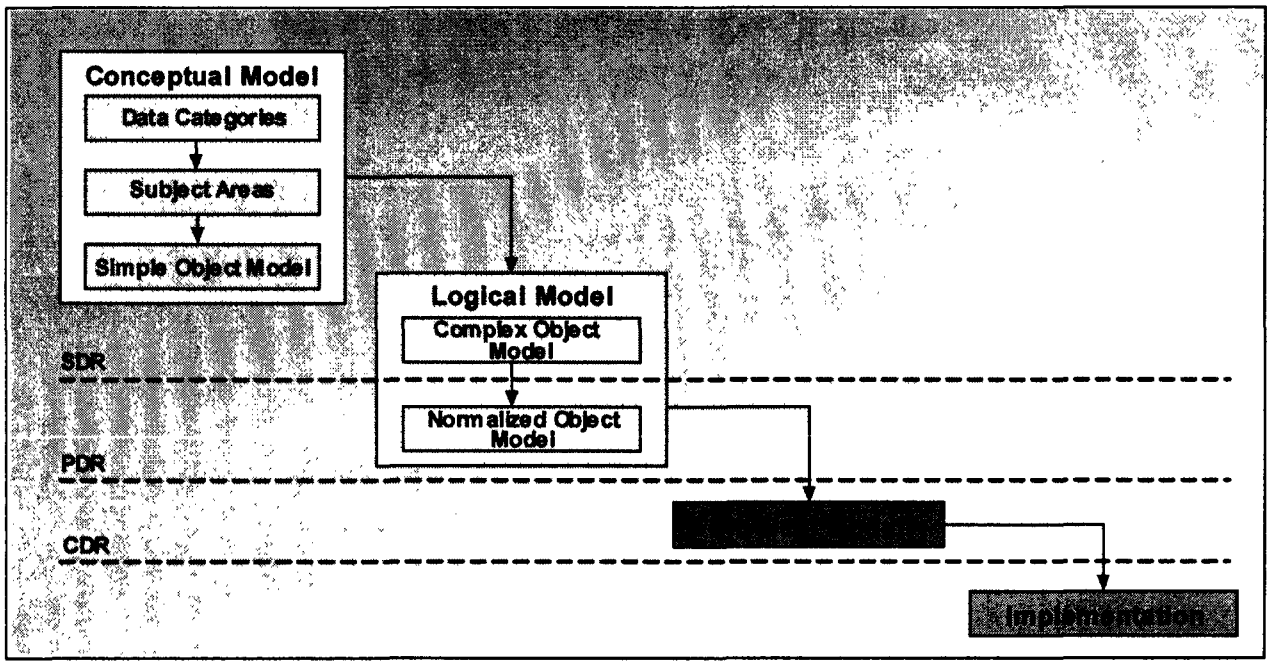


Consists of a hierarchy of modeling steps

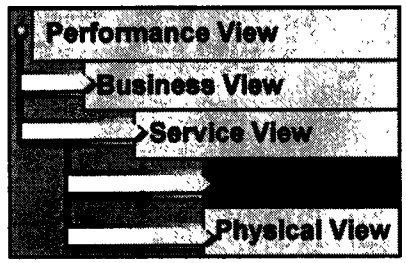
- Conceptual Model – Business perspective
- Logical Model – System design perspective
- Physical Model – Implementation perspective

Inputs from the NARA Domain model and design efforts

The LM Team will collaborate with NARA in the definition of the logical data model

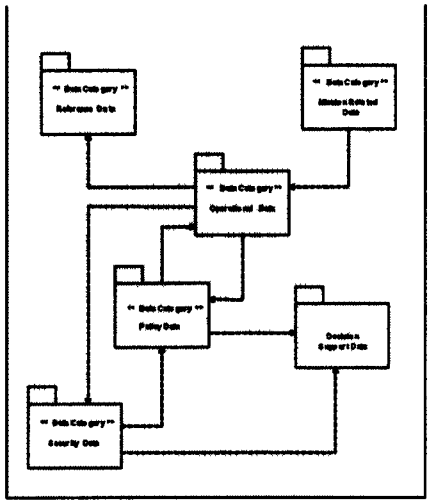


System Architecture and Design: Data View – Data Model Notation



UML Notation used throughout the data architecture and design

- UML suited to represent hierarchical nature of the data model
- UML Packages used to represent groups of objects and NARA constructs
- UML Packages are stereotyped (classified) to identify their hierarchical level

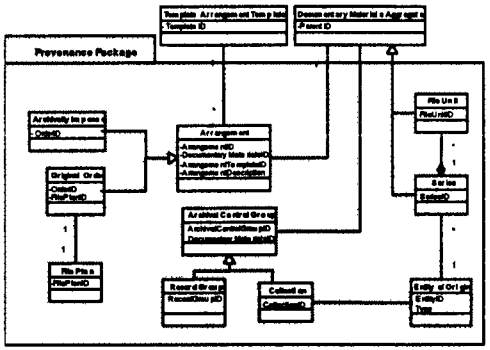


Conceptual Model

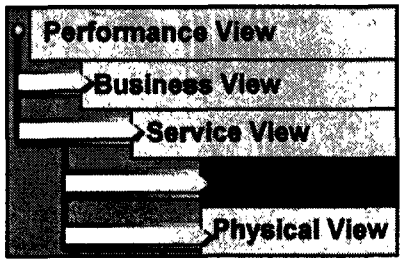
- Data Categories represented by UML packages
- Subject Areas represented by UML packages
- Simple Object Model represented by UML classes

Logical Model

- Complex object model represented by UML classes
- Complex objects contain key attributes
- Complex objects have no operations (These are confined to services, which in turn are stateless)
- Identifies relationships between objects

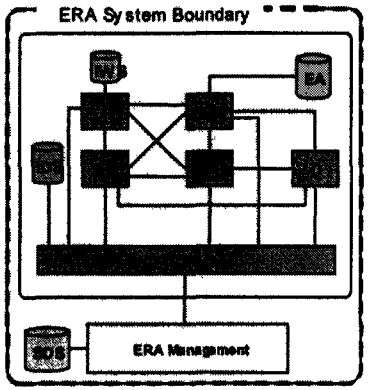


System Architecture and Design: Data View - Data Stores



Electronic Archives

- Contains electronic records and other assets
- Serves as the repository for an instance
- Safe-Store repository for another instance



Ingest Working Storage

- Contains electronic records transfers undergoing ingest processing
- Prevents potential system contamination of viruses and mis-classified records

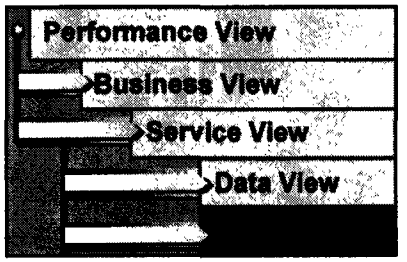
Instance Data Store

- A set of relational and object databases containing:
  - Records catalog, search indices and instance operational data
  - Assets (excluding the records themselves)
- Several orders of magnitude smaller than the electronic archives
- Can be regenerated from self-described persistent Electronic Archives

System Data Store

- Contains system management data such as logs, inventory data, etc

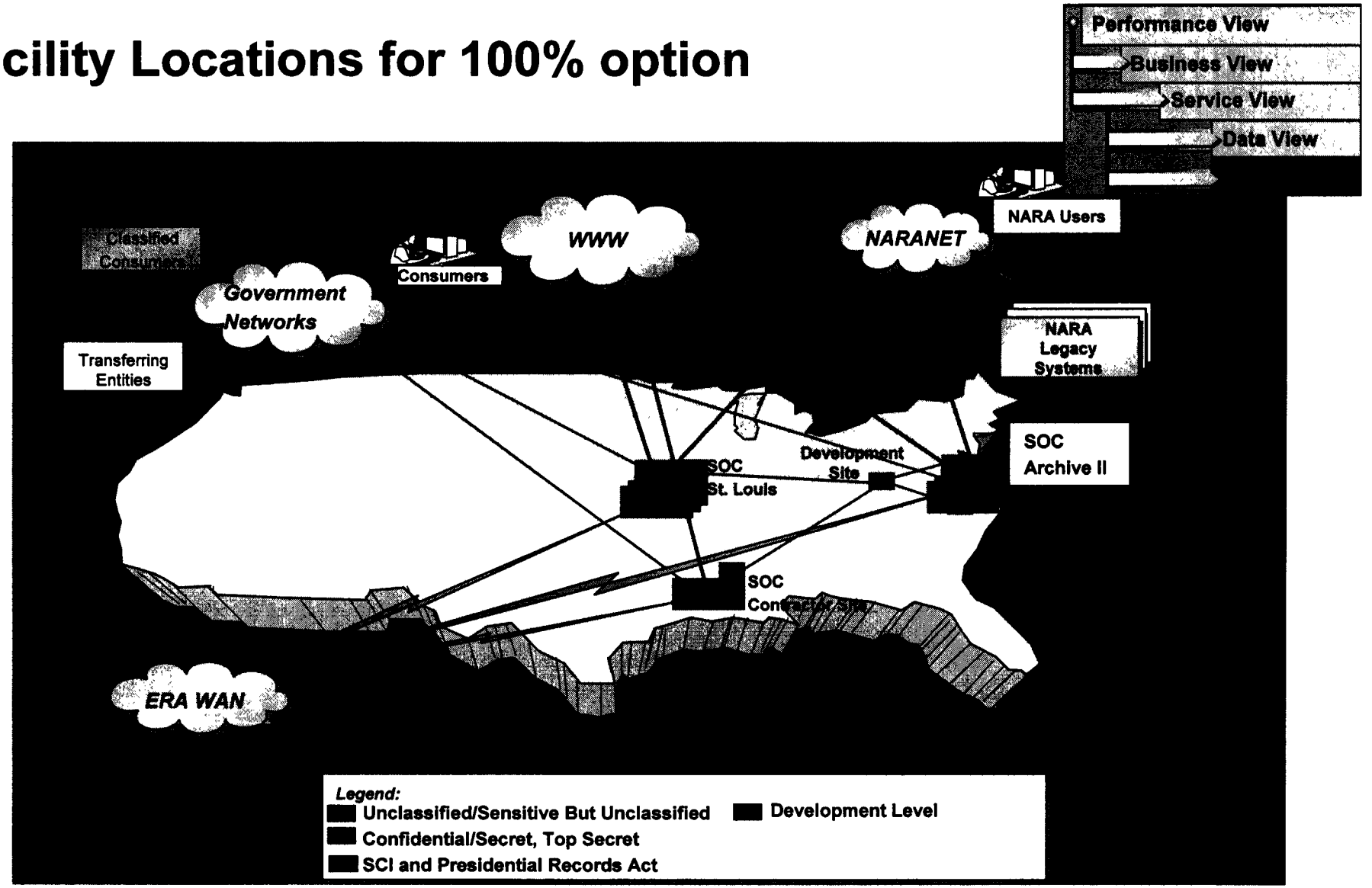
System Architecture and Design: Physical View - Overview



- Number and location of ERA facilities for 100% option
- Concepts
- Data classifications
- Active Safe-Store
- Network topology
- Logical representation of a facility
- Physical architecture of an instance

System Architecture and Design: Physical View – 100% Option

Facility Locations for 100% option



Alternate Designs – 40% & 70% Options

Providing visibility into range or architectural scalability in LM 40% and 70% designs

- **Utilizing a two facility approach**
- **Utilizing partial storage-only Instance**
- **Reducing sizing of processing and storage hardware elements**

Utilized system models to develop 40% and 70% data volume designs to support proposal effort

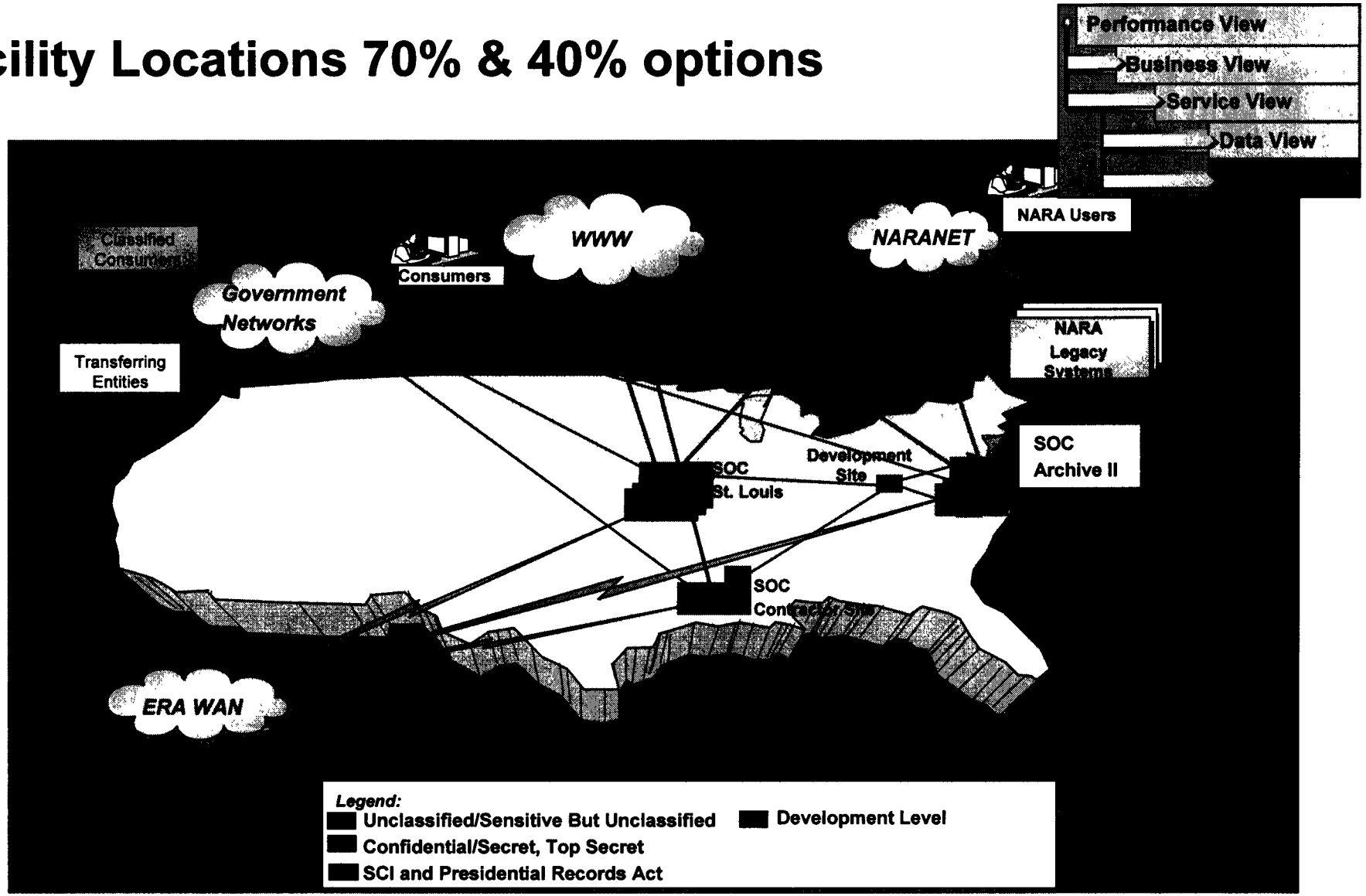
- **Models demonstrated their flexibility, providing updates in a matter of days**

Would expect NARA to expand partial Instances to full Instances and add a third site over time

- **Improve continuity of operations strategy**
- **Improve overall performance**

System Architecture and Design: Physical View – 40 & 70% Options

Facility Locations 70% & 40% options



System Architecture and Design: Physical View - Concepts

Architectural Concepts

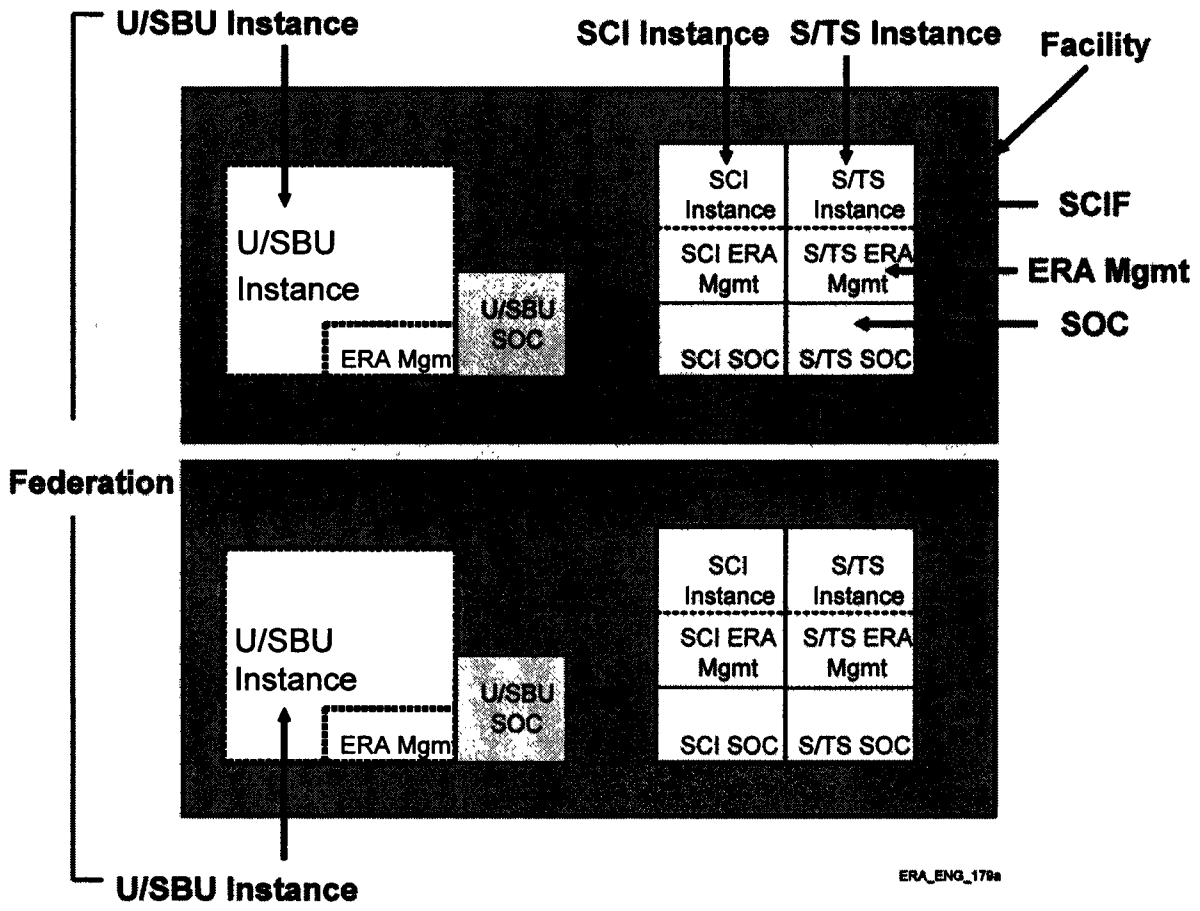
- Instance
- Federation
- ERA Management

Operational Concepts

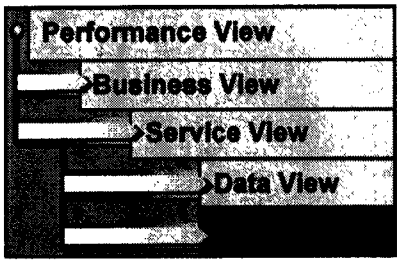
- Facility
- SOC
- SCIF

Key Features

- Scale equipment, Instance, facility
- Redundancy of facilities & SOC
- Safe-Store of records



System Architecture and Design: Physical View – Data Classifications



SCI Data (1)

SCI Data (n)

PRA Classified Data

Top Secret layer includes compartments
Uses restrictions to control access to assets

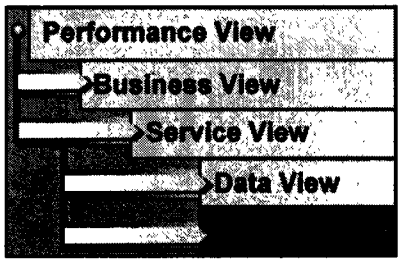
Secret layer includes compartments
Uses restrictions to control access to assets

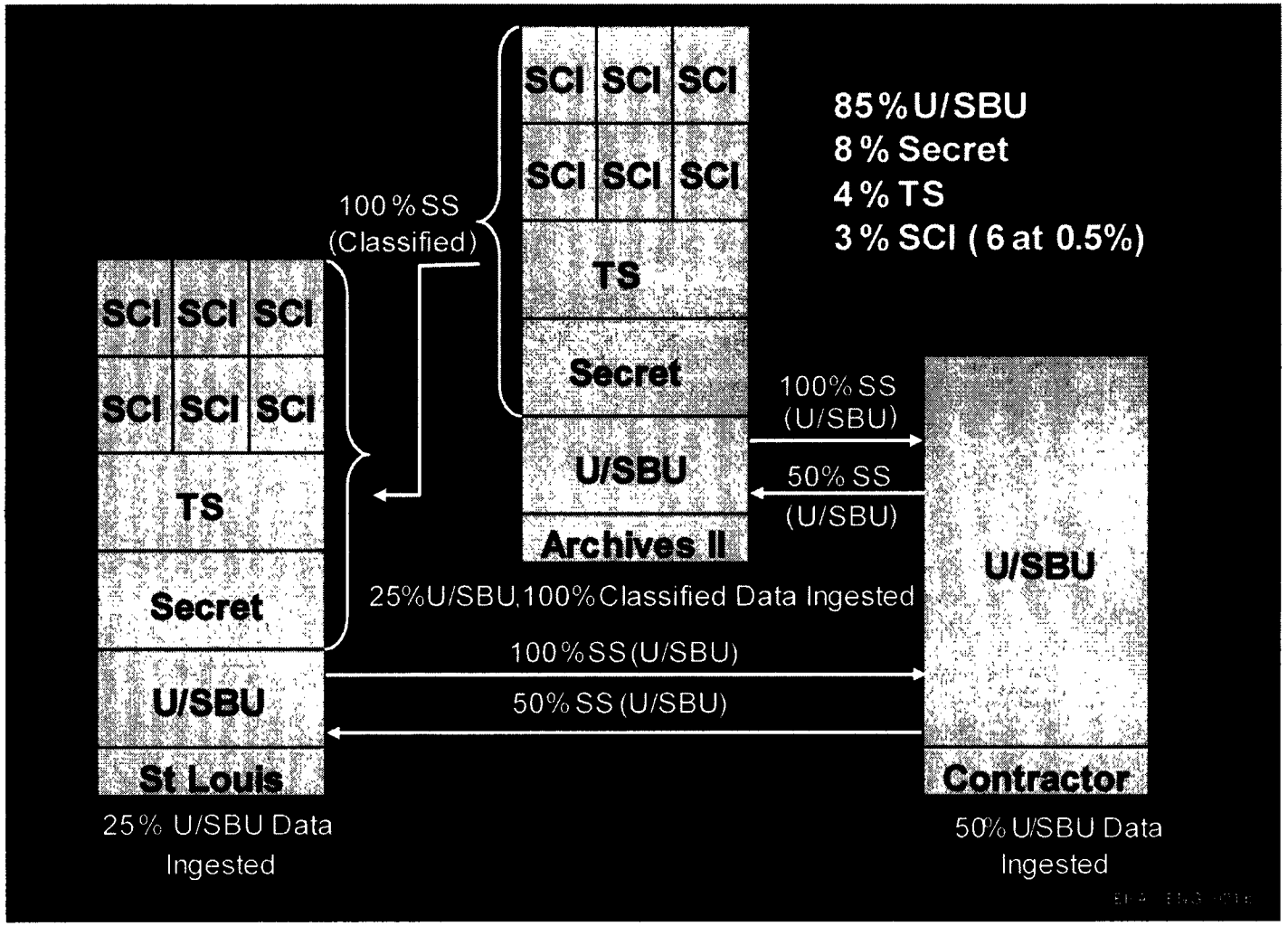
Unclassified Title13 data
Uses restrictions to control access to assets

Unclassified PRA layer
Uses restrictions to control access to assets

Unclassified layer includes SBU
Uses restrictions to control access to assets

System Architecture and Design: Physical View – Active Safe-Store



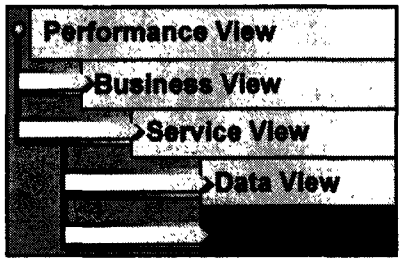


Key Features

- Scalable
- Flexible
- Security segregation
- Classified records controlled at Archives II
- Large Ingest & Dissemination facility

System Architecture and Design: Physical View – Network Architecture

System Architecture and Design: ERA System Physical Architecture



ERA System Physical Components

ERA Instance consists of:

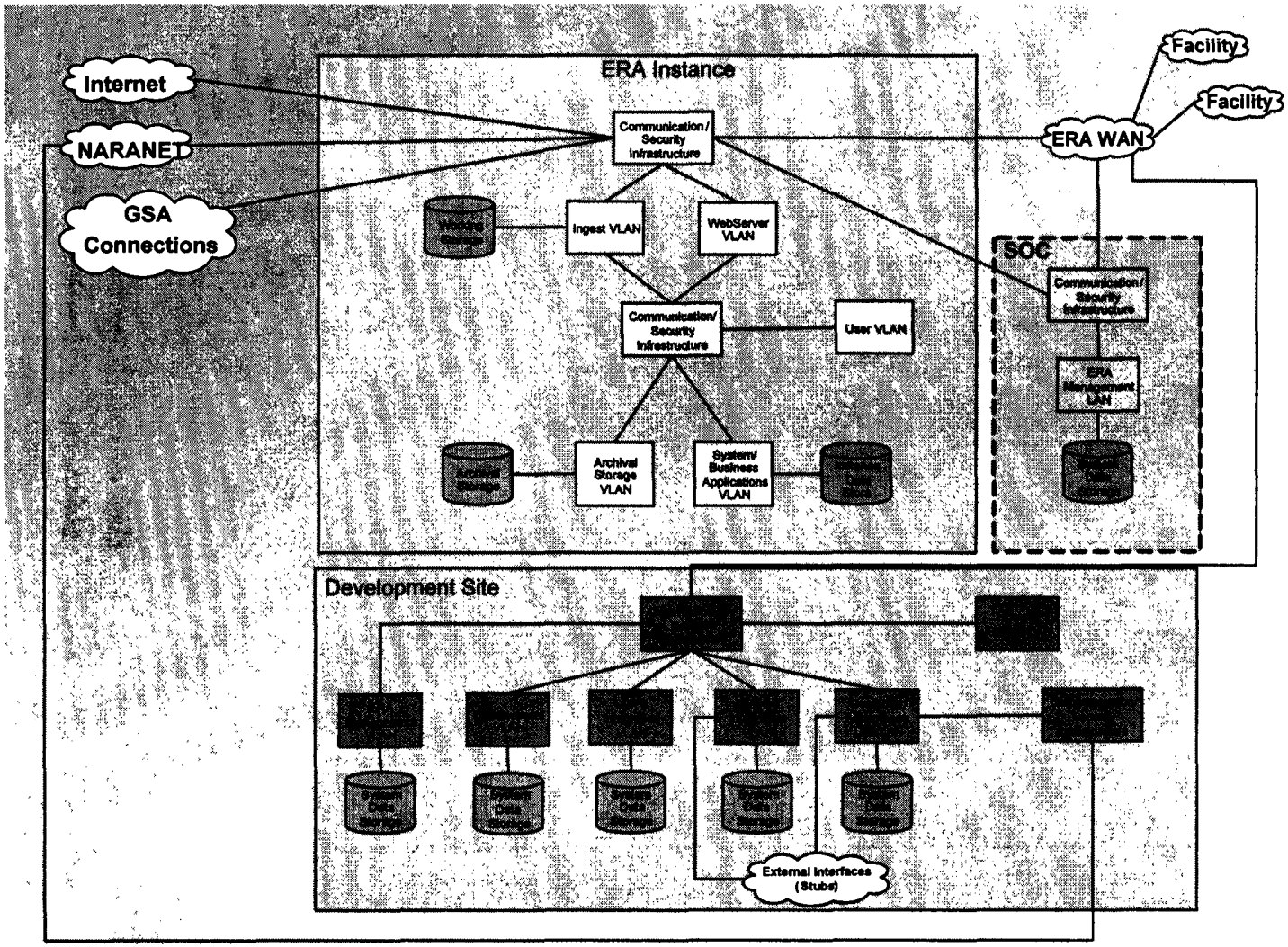
- Ingest VLAN
- WebServer VLAN
- Archival Storage VLAN
- System Business Applications VLAN
- User VLAN

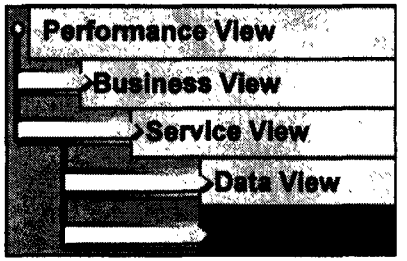
ERA Management VLAN

System Operations Center

Development Sites

System Architecture and Design: Physical Architecture

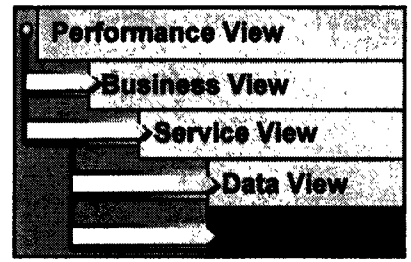


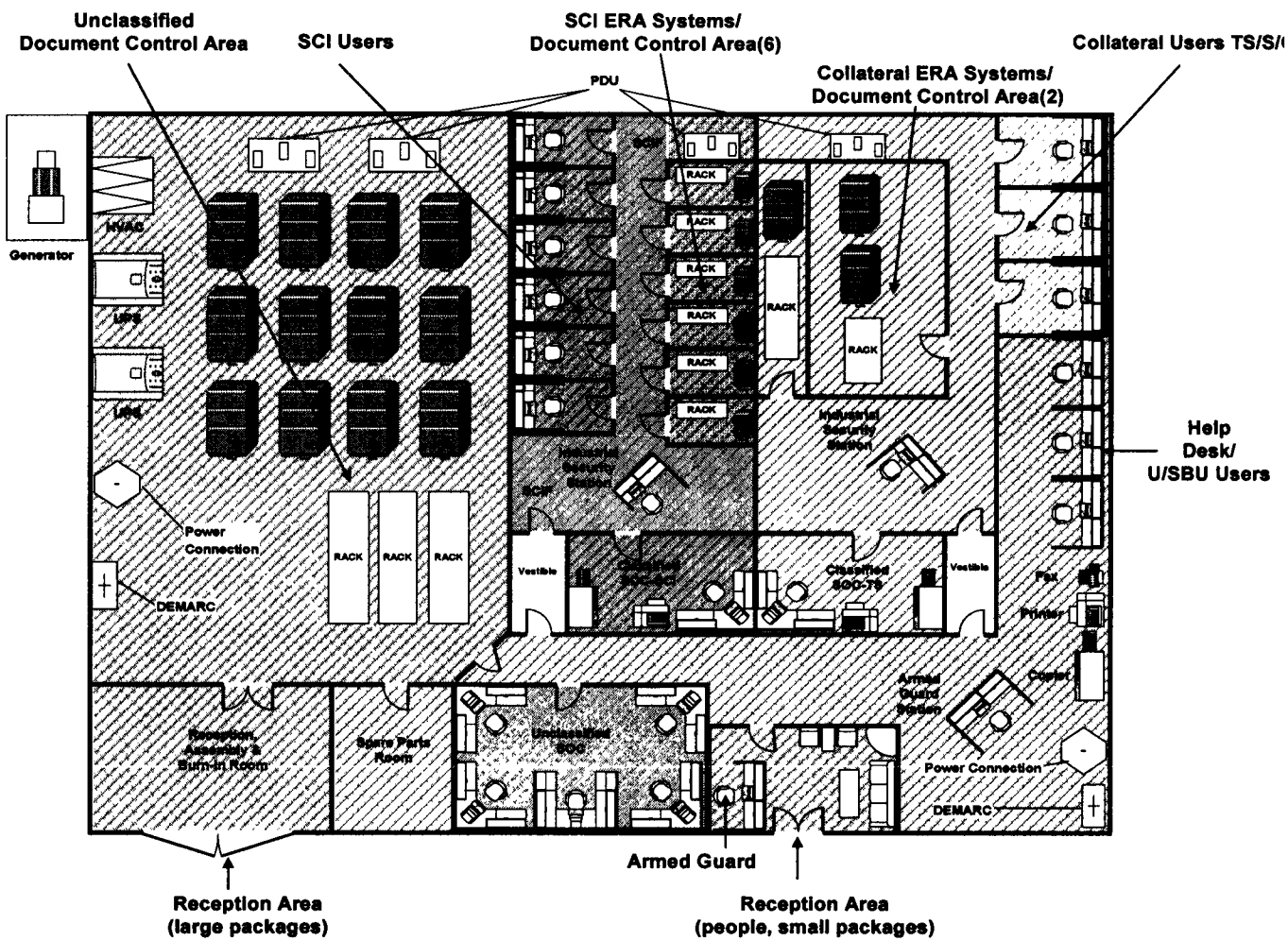


Key Features

- Partial Instance deployment
- Instance scalability (equipment)
- Scale with additional Instances within a Facility
- Scale by adding additional Facilities
- Security via Domain Isolation (VLAN partitioning)

System Architecture and Design: Physical View – Example Facility





Key Features

- Scalable Facility
- Separate SCIFs (S/TS verses SCI)
- Multiple SOCs
- Infrastructure redundancy

System Architecture and Design: Instance / Facility limits

Natural limit to the size of a data center
- Dependent on many parameters
- Beyond limit can encounter
  - Diseconomies of scale
  - Logistical considerations

Natural limit is technology and timeline dependent
- Ever increasing storage and processing densities
- Increasing automation of administrative tools

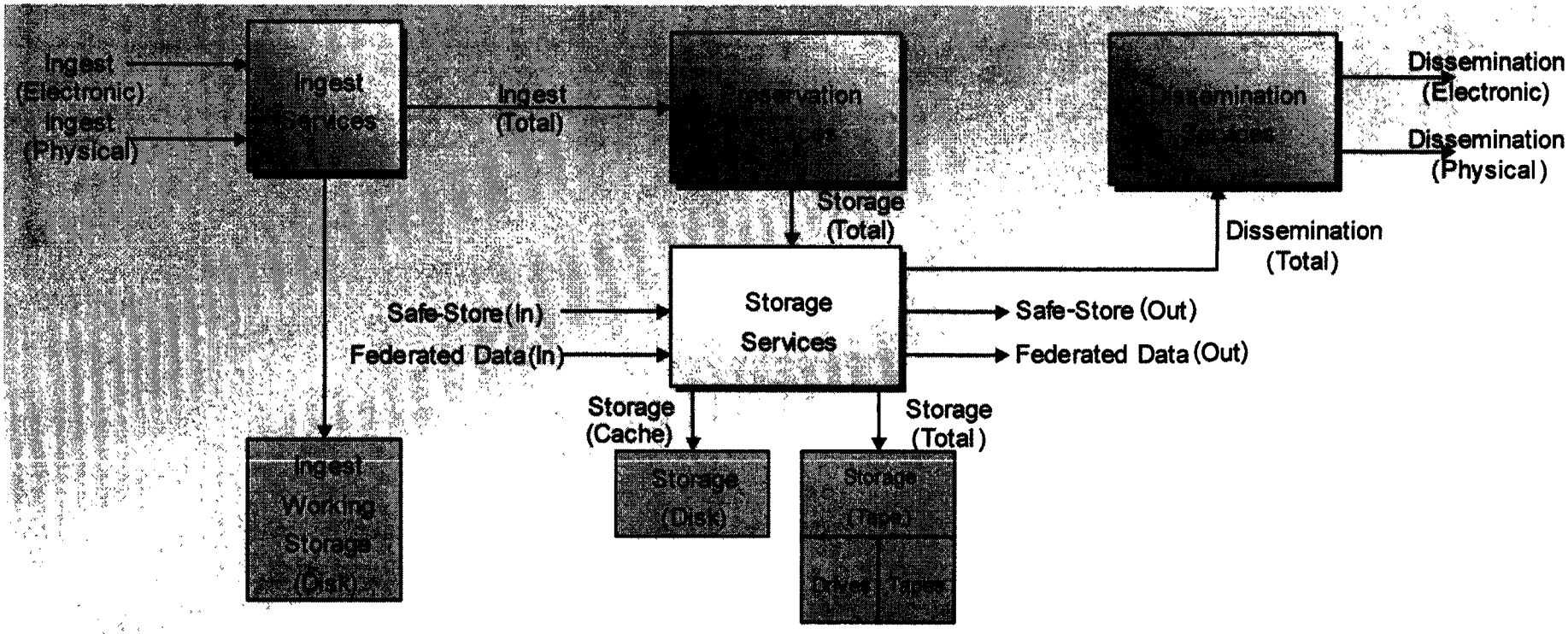
Optimal size will eventually be met
- Initial physical design includes three facilities based on an analysis of efficiency and size
- Enterprise monitoring and management will be utilized to optimize

Both the ERA System Architecture and Design supports the addition of Instances and Facilities over time for scalability
- Meet the ever increasing storage and processing needs
- Federated instances over geographically diverse facilities provides flexibility

Establish the upper bound during Increment 1
- Finite size provides specific limits to verify during testing

System Architecture and Design: System Modeling Roadmap

Modeling supports the physical design and identifies
- Bottlenecks
- Storage scalability issues
- Server requirements
- Bandwidth requirements



System Architecture and Design: Conclusions

System Architecture is . . .

- Designed within context of NARA Enterprise Architecture and Federal Enterprise Architecture
- Supports external interfaces to four defined classes of external systems
- Partitions the system to promote simplicity, cohesion, loose coupling, layering, and domain isolation
- Evolvable, Scaleable, Extensible, and Available

System Design is . . .

- Based on a service-oriented framework
- Centered on Web Services and Web Portal technologies
- Consistent with "best practice" design patterns
- Driven by NARA's business processes
- Flexible and policy neutral

System Architecture and Design RIDs

RID-LMC00135 Safe Store Load Balancing

ERA SDR – DAY ONE

Transition Plan and Increment Allocation

[redacted]

May 9, 2005

Transition – Legacy Systems

Phases:

Phase I – Initiated during A&D Phase

- Establish transition team
- Conduct due diligence on legacy system status and operations
- Plan workforce transformation
- Develop transition metrics

Phase II – Initiated during Increment 1

- Transition operations from legacy systems to ERA System
- Transition legacy permanent data into the ERA System

Transition: Legacy Systems - Goals

Provide uninterrupted service to legacy system users

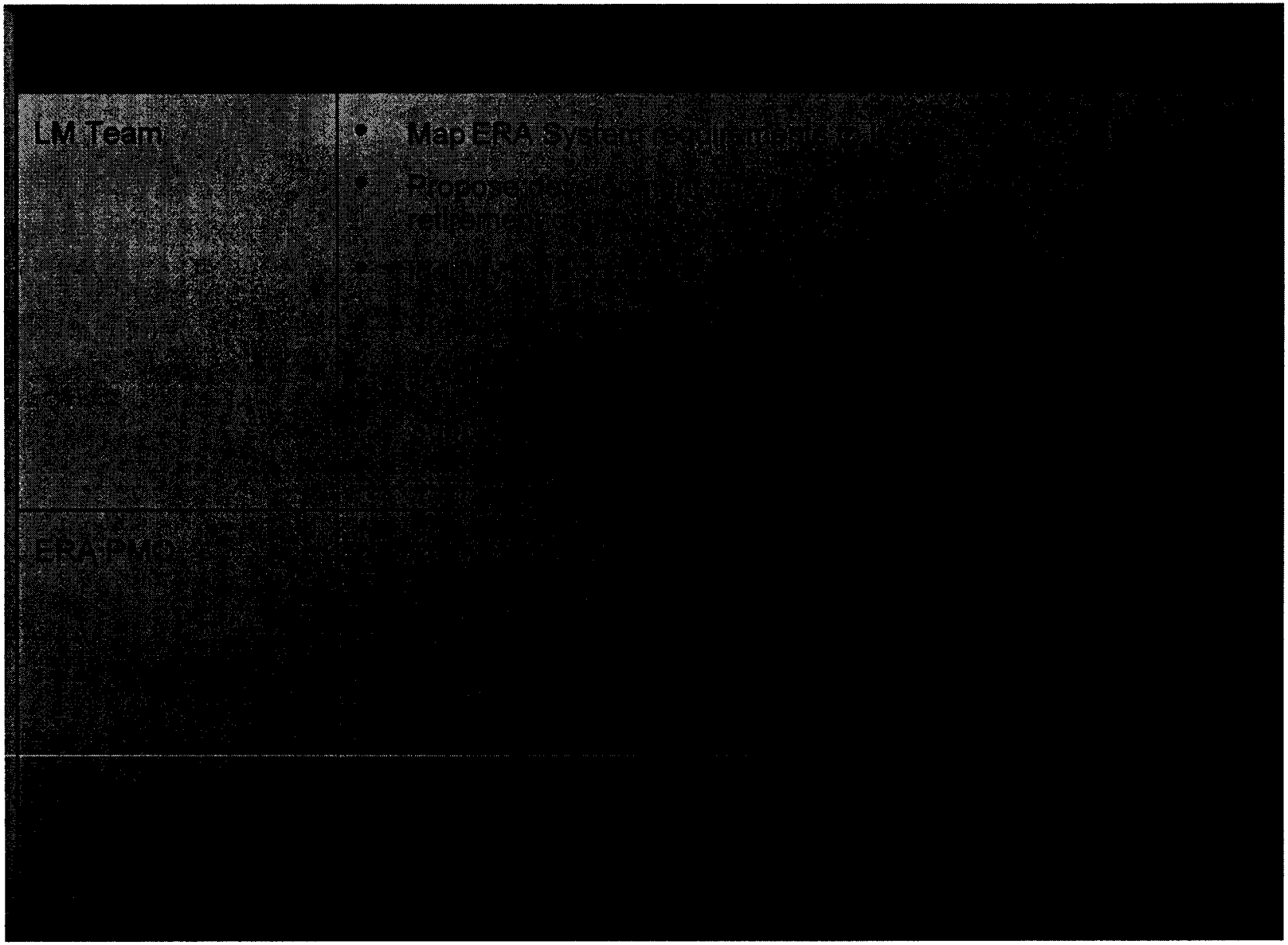
Provide equivalent ERA functionality

Ensure legacy system owners and users are informed of ERA System transition plans

Support a successful transition with ERA System training and user support

Support appropriate retirement plans for legacy systems

Transition Team



Transition Schedule

Legacy System	ERA Increment	Number of ERA SyRS Shalls Mapped
[redacted]		

Based On

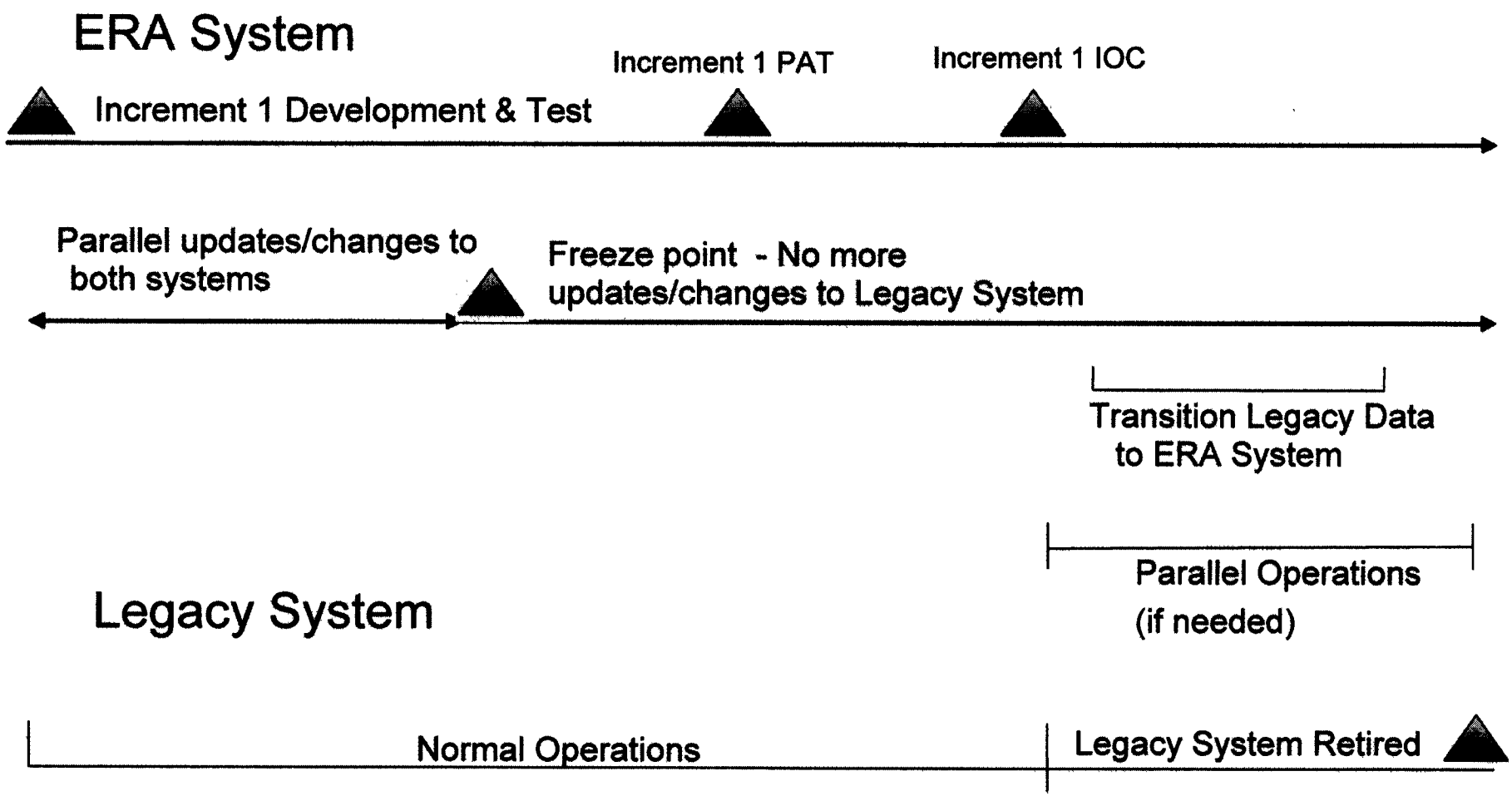
- Target Release Paper (TAR)
- Legacy Transition Plan (LTP)
- Rollout of strongly related features and functions
- Infrastructure integration

Transition Timeline

Define Transition Timeline within Increment Development Timeline

- Period of Dual Updates/Changes
  - Both legacy system and ERA System
- Freeze Point
  - No updates/changes to legacy system after this point
- Period of Concurrent Operations if needed
  - After Increment IOC, initiate new work on ERA System
  - Legacy system provides risk contingency as fallback system
- Transition of Legacy System Data
- Retire Legacy System

Transition of Operations and Data: Timeline



Transition – Forward Plan

Assess legacy data within context of ERA System data model

Define transition timeline for each legacy system within ERA System development timeline

Assess legacy system users' training needs

Develop ERA System training materials

Work with ERA PMO to communicate transition plans

Support workforce transformation activities

Transition – Conclusions

Transition and workforce transformation planning initiated during A&D Phase

Transition schedule is based on NARA's Legacy Transition Plan and the LM Team's requirements analysis and design

Transition of legacy systems and data performed in close collaboration with NARA during Increment 1 and beyond

BREAK

ERA SDR – DAY ONE

Operations, Support, and Training

[redacted]

May 9, 2005

O&S Description

Operations and Support (O&S) provides facilities to:

- Monitor real-time system health, performance, and component status
- Provide a Help Desk to resolve problems
- Ensure operational performance levels
- Perform system maintenance
- Collect and assess metrics

O&S – Monitoring Status

Performed continuously to collect data and evaluate the state of the system

Monitored elements include:

- Computing device and operating systems
- Storage devices
- Application processes and databases
- Network elements
- Environmental characteristics such as air conditioning and electrical power supply

ERA Management services present performance status data in a consolidated manner

System administrators/engineers have pre-planned resolution processes and procedures in response to status alerts

O&S – Provide Help Desk

Design includes three Help Desk tiers
- Problems are escalated to the appropriate tier
- Higher level tiers have specialized – highly trained staff

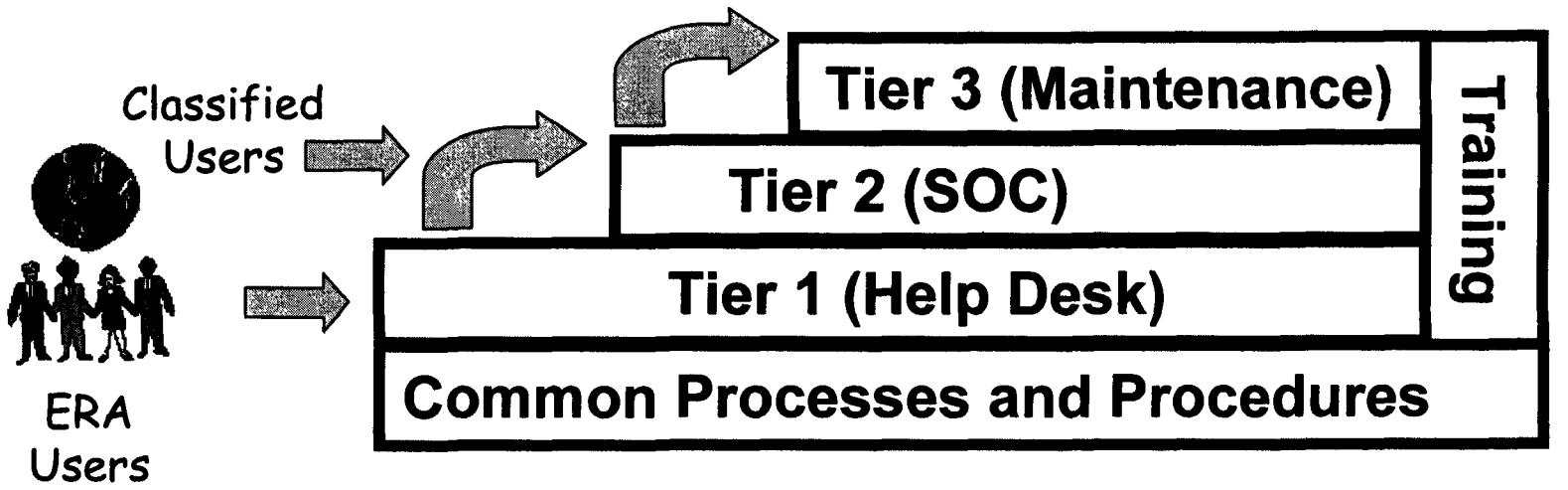
Provides the initial user entry point into maintenance and problem resolution services

Generates and manages "tickets" to track and report service and maintenance actions

Ticket status is monitored, updated, and reported to the user until the issue is resolved and the ticket is closed

Interfaces to other NARA Help Desks, providing a "warm-handoff" of trouble tickets

Help Desk

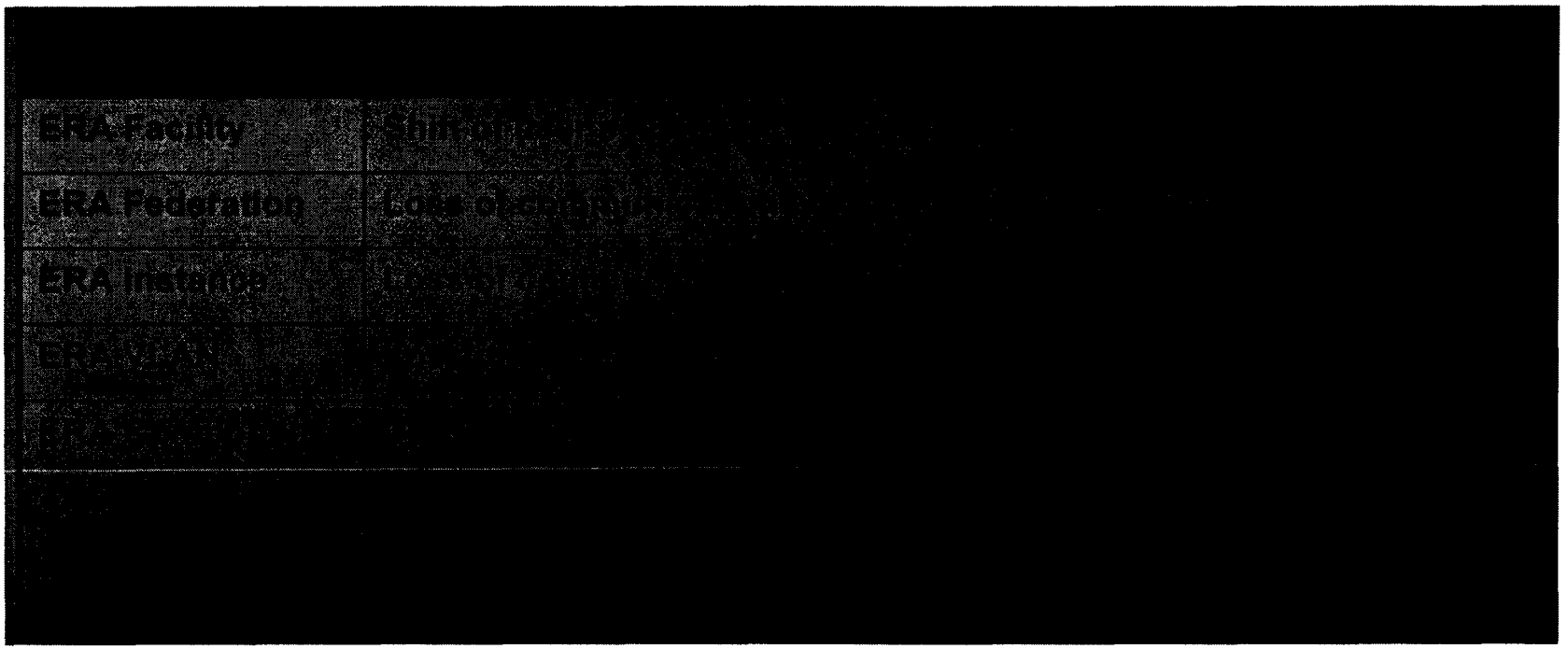

Classified Users
ERA Users
Tier 3 (Maintenance)
Tier 2 (SOC)
Tier 1 (Help Desk)
Common Processes and Procedures
Training

O&S - Levels of Operational Performance

The ERA System operates in a normal production level or in various degraded performance levels

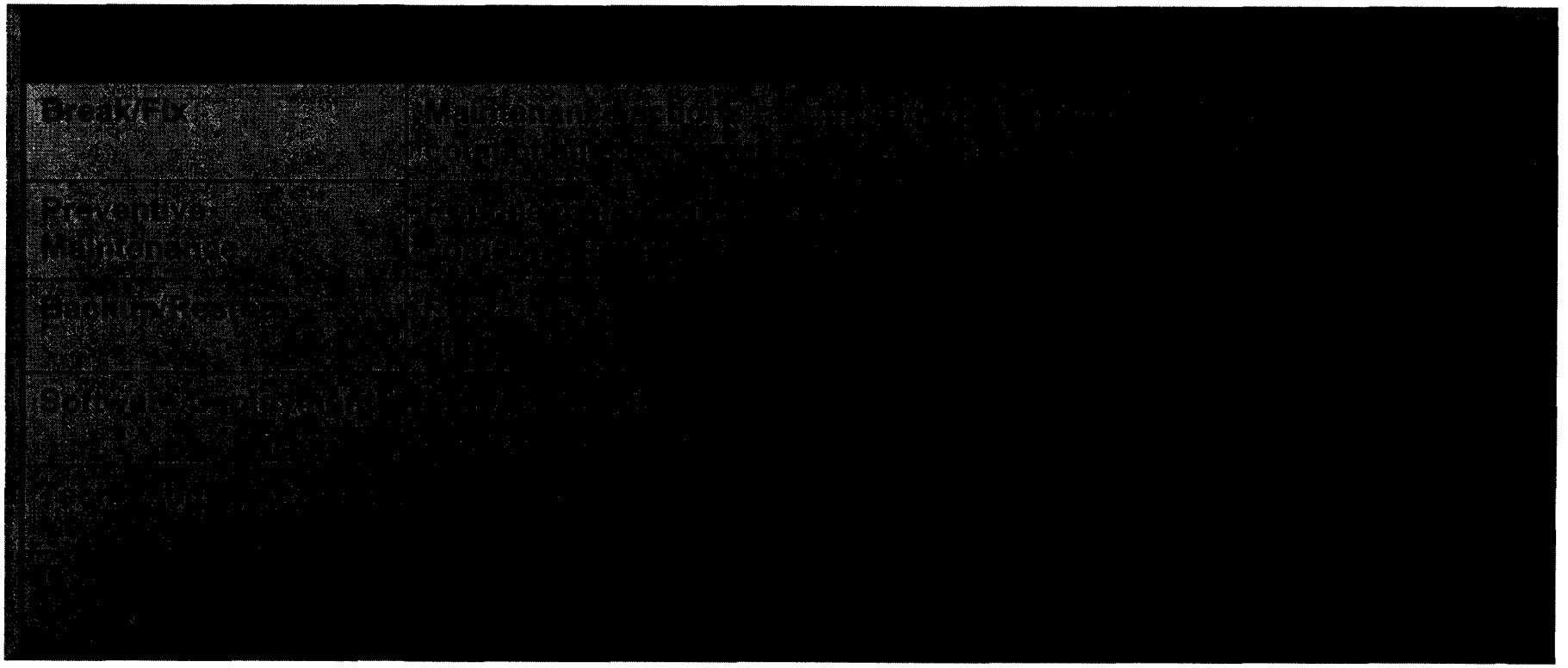
Normal production level is a state wherein all components of the ERA System are performing within system specifications

Degraded performance levels include:



O&S – Perform Maintenance

Maintenance activities include:



O&S – Collect and Assess Metrics

Weekly and monthly ERA System metrics are reported and assessed

The following categories of metrics are captured and reported:

- Help Desk Response
- System Performance
- System Availability
- Security Incidences
- Hardware Failures
- Software Defects
- Preventive Maintenance

Apply quantitative process management techniques to establish thresholds and tolerances

Data is used to generate upper and lower control limits at three standard deviations above and below the expected value of a given metric

Training Description

System acceptance by ERA users is a critical success factor for the ERA System implementation

Computer-Based Training

- Available to ERA users 24x7 via the Internet and NARANET
- Simulation-based
- Includes email confirmation of completed CBT courses to employee management or to a NARA training coordinator

Classroom Training

- Shares an ERA Instance from the development facility with testing, as a cost-effective way to meet both requirements
- Mirrors the production environment, includes data check-pointing functions to restore training data state
- Includes scenarios and annotated handouts

O&S – Forward Plan

Develop detailed processes and procedures for operations and maintenance

Develop Service Level Agreements for Help Desk

Develop training material for end users and operations staff

Operations, Support, and Training – Conclusions

Operations and Support is vital for monitoring and ensuring real-time system performance

Approach includes a 3-Tier Help Desk with "warm hand-offs" to NARA's Help Desk

Approach includes both computer-based training and classroom training

RID-LMC00137 Location of Ops Personnel

ERA SDR – DAY ONE

Demonstration and User Interface Design

[redacted]

May 9, 2005

Demonstration and User Interface Design Agenda

Scope and Objectives

Understanding the ERA Domain

Software Design Methodology

User Interface Design Methodology

Demonstration's Impact on the SADD

Demonstration: Scope and Objectives

Demo's Scope includes:

- Records scheduling (required)
- Templates management (required)
- Collaboration
- Ingest and Transfer
- Appraisal
- Preservation planning and processing
- Search and access

Objectives for Demo:

- Understanding of ERA domain and key archival processes
- Feasibility of candidate design concepts
- Capability to integrate candidate COTS products in target environment
- Illustration of key features, such as disposition agreements, workbenches, and templates

Prototyping Confirms Understanding of Key Technical Challenges and Reduces Program Risk

Understanding the ERA Domain

High degree of coverage of the key NARA processes

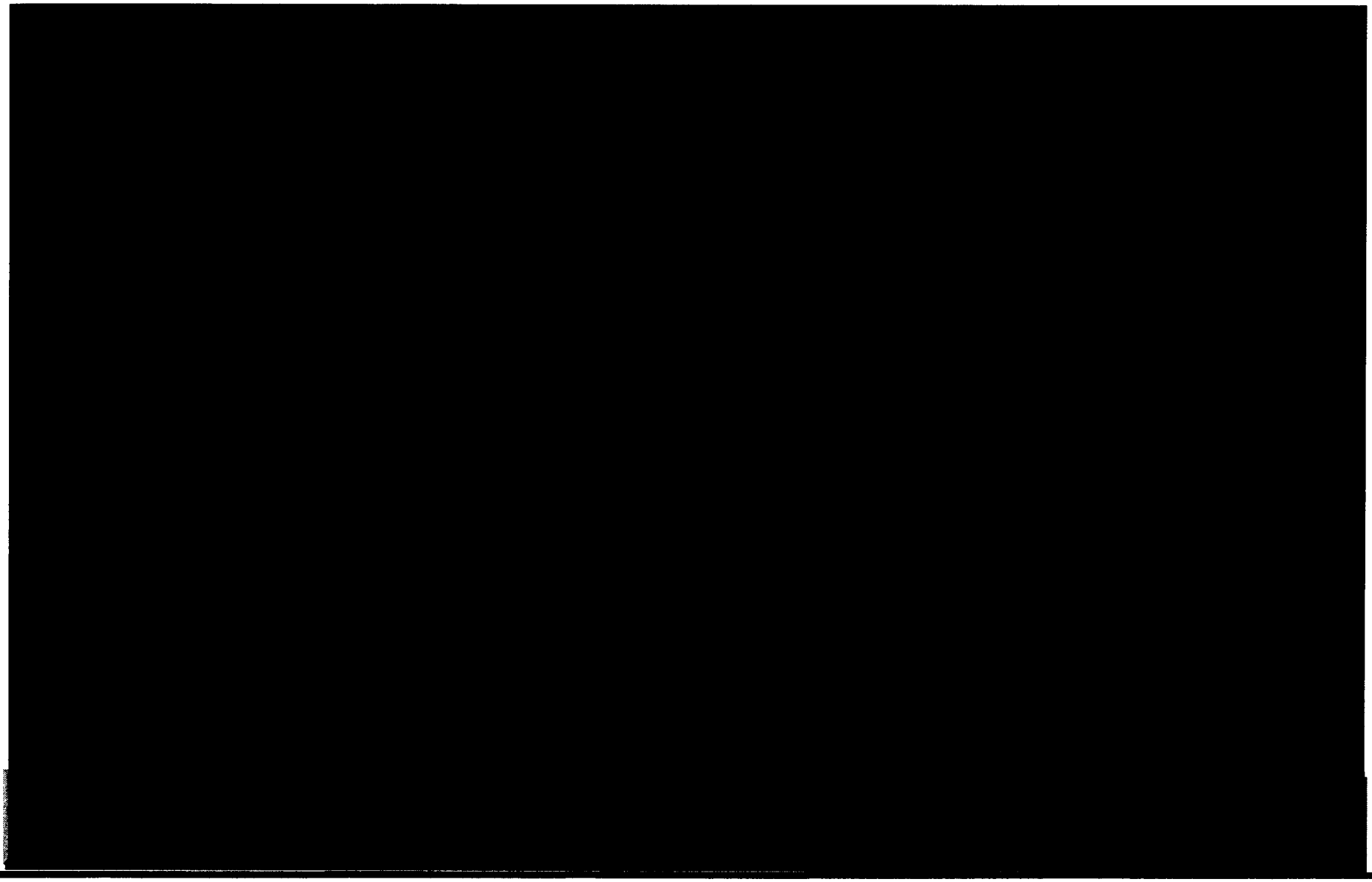
- **Reflects the NARA Business Process Reengineering (BPR) activity**
- **Captures knowledge gained from LM Requirements and Design Team, and NARA Subject Matter Experts**
- **Captures knowledge gained through discussions with Agency Records Managers**
- **Continuing review of storyboard and user-interfaces with NARA staff ensures that our design reflects a "reasonable reality"**

The LM Team Probed Technical Concepts Across a Wide Cross-Section of the ERA Functional Domain

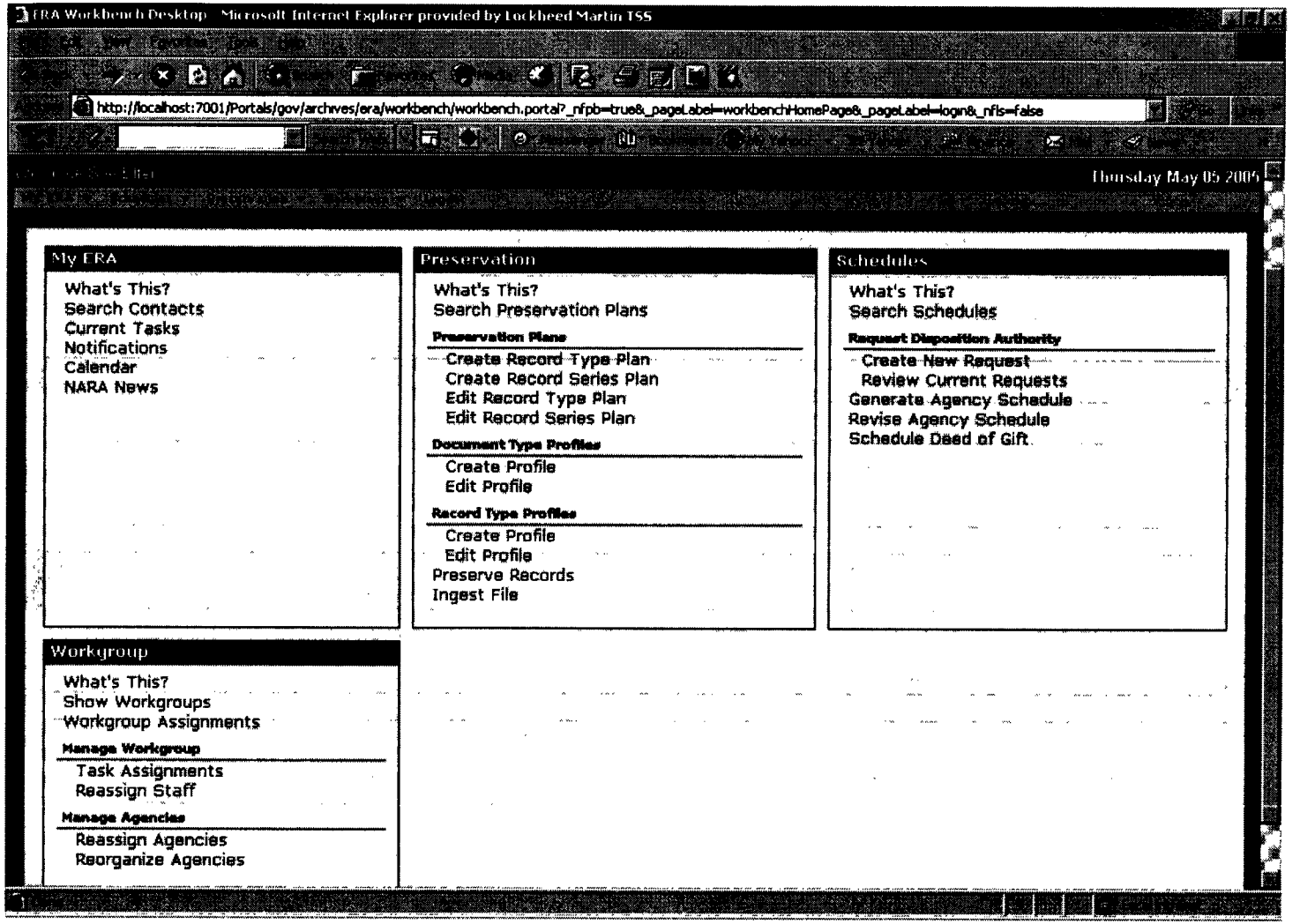
Software Design Methodology

User Interface Design Methodology

User Interface – Iterative Process



User Interface – Example Workbench



Key Features

- Tailored for specific roles
- Allows new features to be added incrementally
- Delivered as a web portal

Demonstration's Impact on SADD

The collaboration between Lockheed Martin's Demo Team and Design Team benefited the LM design by:

- Enhancing the LM Team's understanding of the ERA Domain
- Confirming key design decisions and considerations
- Uncovering previously unknown design challenges
- Demonstrating the viability of key design concepts
- Improving the LM Team's knowledge on integrating key COTS products
- Reducing the engineering risk for Increment 1

Demonstration – Conclusions

Collaboration between the Design and the Demonstration have made both much stronger

Experience gained from addressing the "tough" engineering issues in the Demonstration positions us for implementation success in Increment 1

END DAY ONE