Federal Enterprise Architecture Program Management Office

Status of the Federal Enterprise Architecture

Briefing to the Computer System Security and Privacy Advisory Board
Norman Lorentz, Chief Technology Officer,
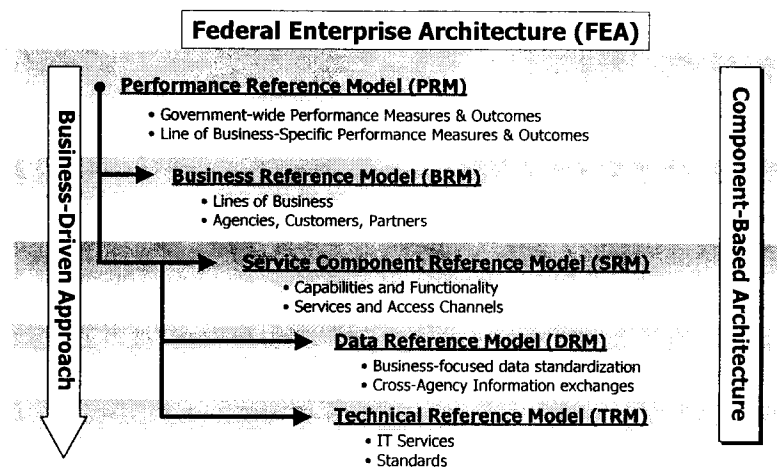Office of Management and Budget

December 3, 2002

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◆ Overview of the Federal Enterprise Architecture (FEA)

◆ FEA Business Reference Model

◆ Draft FEA Performance Reference Model

◆ Additional Draft FEA Reference Models

◆ Use of Component-Based Architectures

◆ Solution Architects Working Group

◆ Next Steps

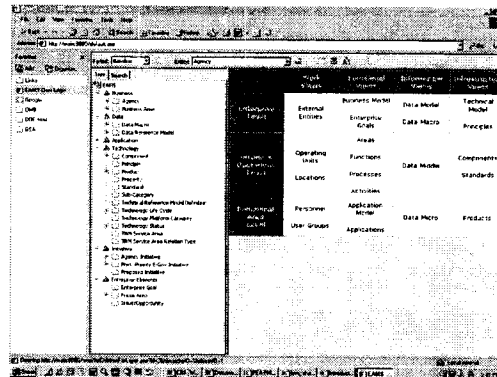# The Federal Enterprise Architecture is a business-focused framework for cross-agency, Government-wide improvement

◆ The Federal Enterprise Architecture (FEA) is providing OMB and Federal agencies with a **new way of describing, analyzing, and improving the Federal Government** and its ability to serve the citizen

◈ The FEA will **eliminate the organizational obstacles** that have historically hindered improvement **without forcing reorganization**

◆ The FEA is a **business-focused approach** and is not just for IT

◈ The FEA provides a **common framework** for improving a variety of key areas:

- Budget allocation
- Horizontal and vertical information sharing
- Performance measurement and budget/performance integration

- Cross-agency collaboration
- Improved service to the citizen
- e-Government
- Component Based Architecture
- and more

The FEA is being constructed through a collection of inter-related "reference models" designed to facilitate cross-agency analysis and opportunities for collaboration

Federal Enterprise Architecture (FEA)

Business-Driven Approach

Component-Based Architecture

Performance Reference Model (PRM)
- Government-wide Performance Measures & Outcomes
- Line of Business-Specific Performance Measures & Outcomes

Business Reference Model (BRM)
- Lines of Business
- Agencies, Customers, Partners

Service Component Reference Model (SRM)
- Capabilities and Functionality
- Services and Access Channels

Data Reference Model (DRM)
- Business-focused data standardization
- Cross-Agency Information exchanges

Technical Reference Model (TRM)
- IT Services
- Standards

The Federal Enterprise Architecture Management System (FEAMS) is being used to house and maintain the FEA and associated reference data

◆ Being constructed using a Component-Based Architecture

◆ Will contain all FEA reference models mapped to Federal agencies' major IT initiatives

◆ Ready to deploy proof-of-concept

◆ Will grant agencies read-only access by mid-November, with full search and reporting capability

◆ Will eventually leverage FirstGov hosting capabilities

◆ FEA-PMO determining appropriate access and level of security required

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The foundation of the FEA is an "architected" view of the government's business operations – the Business Reference Model

The Current Approach ...

with the FEA ...
The FEA Business Reference Model
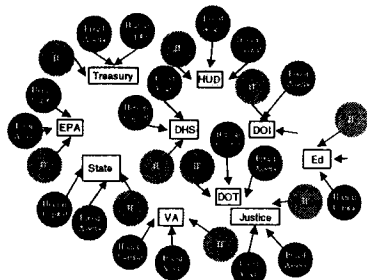
Agency-focused

X **Citizen Service:** Many agencies and offices; not one government

X **Performance:** No common framework for performance measurement across agencies; minimal budget-performance integration

X **IT:** Redundancy within and across agencies

X **Budget Allocation:** Allocation of funds by Agency; minimal cross-Agency analysis
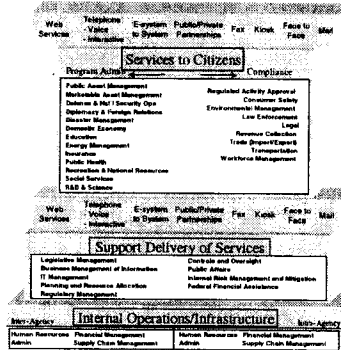
Mission-focused

☑ **Citizen Service:** One government

☑ **Performance:** Common performance measurement framework for OMB and all agencies; robust budget-performance integration

☑ **IT:** Minimal redundancy in IT spending; component-based architecture promotes reuse

☑ **Budget Allocation:** Budget analyses take business lines into consideration; funds allocated to support cross-agency collaboration

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The FEA Business Reference Model is organized as a functional hierarchy with Business Areas at the highest level followed by Lines of Business and Business Sub-Functions
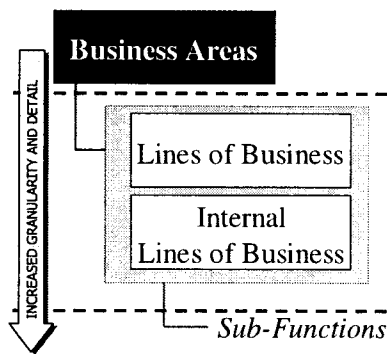
Three Business Areas provide a high-level view of the types of operations the Federal Government performs.

The three Business Areas decompose into two sub-areas and **35 Lines of Business** and **Internal Lines of Business**. These Lines of Business describe more specifically the services and products the Government provides to its stakeholders, while the Internal Lines of Business describe the inter- and intra-Agency back office and support activities that enable the Government to operate.

There are **137 Sub-Functions** which form the final level of decomposition within the FEA BRM and communicate the specific activities that Federal Agencies perform within each Line of Business and Internal Function.

The FEA Business Reference Model (BRM)

Government-to-Citizen Access Channels

Web Services | Telephone -Voice -Interactive | E-system to System | Public/Private Partnerships | Fax | Kiosk | Face to Face | Mail

Services to Citizens

Program Admin ← → **Compliance**

Public Asset Management
Marketable Asset Management
Defense & Nat'l Security Ops
Diplomacy & Foreign Relations
Disaster Management
Domestic Economy
Education
Energy Management
Insurance
Public Health
Recreation & National Resources
Social Services
R&D & Science

Regulated Activity Approval
Consumer Safety
Environmental Management
Law Enforcement
Legal
Revenue Collection
Trade (Import/Export)
Transportation
Workforce Management

Lines of Business

Internal Lines of Business

Sub-Functions (pictured on following pages)

Employee-to-Employee Access Channels

Web Services | Telephone -Voice -Interactive | E-system to System | Public/Private Partnerships | Fax | Kiosk | Face to Face | Mail

Support Delivery of Services

Legislative Management
Business Management of Information
IT Management
Planning and Resource Allocation
Regulatory Management

Controls and Oversight
Public Affairs
Internal Risk Management and Mitigation
Federal Financial Assistance

Inter-Agency | **Internal Operations/Infrastructure** | **Intra-Agency**

Human Resources, Financial Management Admin
Supply Chain Management | Human Resources, Financial Management Admin
Supply Chain Management

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Services to Citizens:
Lines of Business and Sub-Functions

Services to Citizens

Public Asset Management
- Cultural Archives and Artifacts
- Public Funds
- Public Facilities
- Public Records/Data Management

Defense & National Security Ops
- Anti-Terrorism
- Border Control
- Intelligence Gathering
- Military Operations
- Weapons Control

Public Health
- Illness Prevention
- Immunization Management
- Public Health Monitoring

Energy Management
- Energy Distribution
- Energy Production
- Energy Resource Management

Domestic Economy
- Business/Industry Development
- Monetary Control

Social Services
- Burial Services
- Community Development
- Food Assistance
- Housing Benefits
- Medical Services
- Monetary Benefits

Marketable Asset Management
- Financial Asset Management
- Personal Property Management
- Real Property Management

Diplomacy & Foreign Relations
- Conflict Resolution
- Foreign Socio-Economic and Political Development
- Treaties and Agreements

Disaster Management
- Disaster Monitoring and Prediction
- Disaster Preparedness/Planning
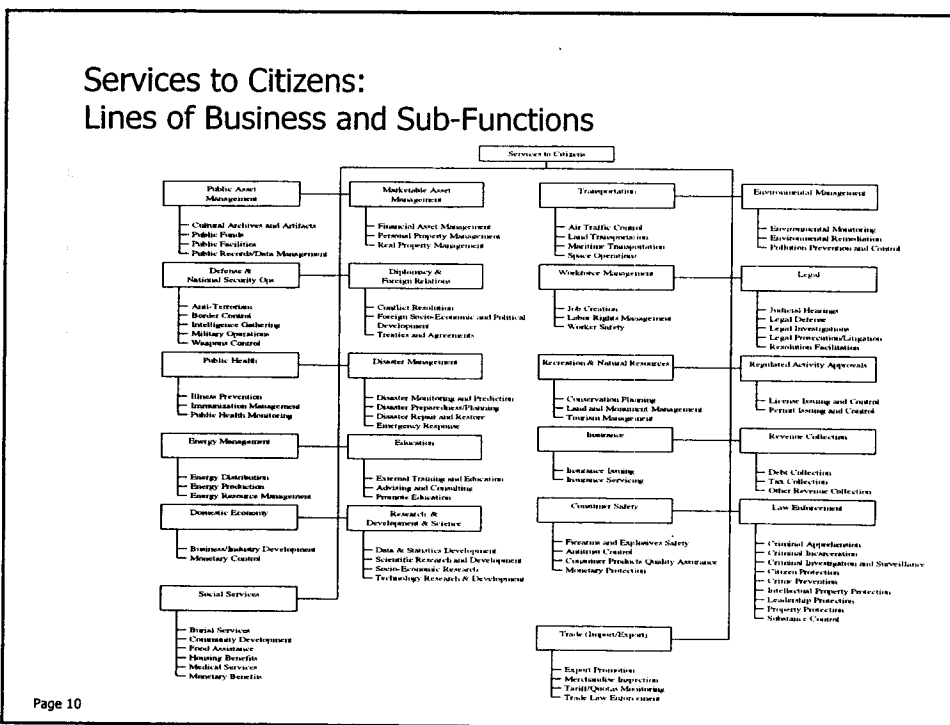- Disaster Repair and Restore
- Emergency Response

Education
- External Training and Education
- Advising and Consulting
- Private Education

Research & Development & Science
- Data & Statistics Development
- Scientific Research and Development
- Socio-Economic Research
- Technology Research & Development

Transportation
- Air Traffic Control
- Land Transportation
- Maritime Transportation
- Space Operations

Workforce Management
- Job Creation
- Labor Rights Management
- Worker Safety

Recreation & Natural Resources
- Conservation Planning
- Land and Monument Management
- Tourism Management

Insurance
- Insurance Issuing
- Insurance Servicing

Consumer Safety
- Firearms and Explosives Safety
- Aviation Control
- Consumer Products Quality Assurance
- Monetary Protection

Trade (Import/Export)
- Export Promotion
- Merchandise Inspection
- Tariff/Quotas Monitoring
- Trade Law Enforcement

Environmental Management
- Environmental Monitoring
- Environmental Remediation
- Pollution Prevention and Control

Legal
- Judicial Hearings
- Legal Defense
- Legal Investigation
- Legal Prosecution/Litigation
- Resolution Facilitation

Regulated Activity Approvals
- License Issuing and Control
- Permit Issuing and Control

Revenue Collection
- Debt Collection
- Tax Collection
- Other Revenue Collection

Law Enforcement
- Criminal Apprehension
- Criminal Incarceration
- Criminal Investigation and Surveillance
- Citizen Protection
- Crime Prevention
- Intellectual Property Protection
- Leadership Protection
- Property Protection
- Substance Control

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Support Delivery of Services: Lines of Business and Sub-Functions

```
                        ┌──────────────────┐
                        │ Support Delivery │
                        │   of Services    │
                        └──────────────────┘
```

Business Management of Information	Controls and Oversight
– Information Collection – Record Retention – Information Sharing	– Corrective Action – Program Evaluation – Program Monitoring

Regulatory Management	Public Affairs
– Policy and Guidance Development – Public Comment Tracking – Regulatory Creation – Rule Publication	– Customer Service – Communications and Outreach – Product Marketing – Public Relations

Planning and Resource Allocation	Internal Risk Management and Mitigation
– Budget Formulation – Capital Planning – Enterprise Architecture – Project Planning – Strategic Planning – Budget Execution	– Contingency Planning – Continuity of Operations – Service Recovery

Federal Financial Assistance	Legislative Management
– Grants Assistance – Loans Assistance – Subsidies	– Legislation Tracking – Legislation Testimony – Proposal Development

IT Management
– System Development
– Lifecycle/Change Management
– System Maintenance

Internal Operations/Infrastructure: Lines of Business and Sub-Functions
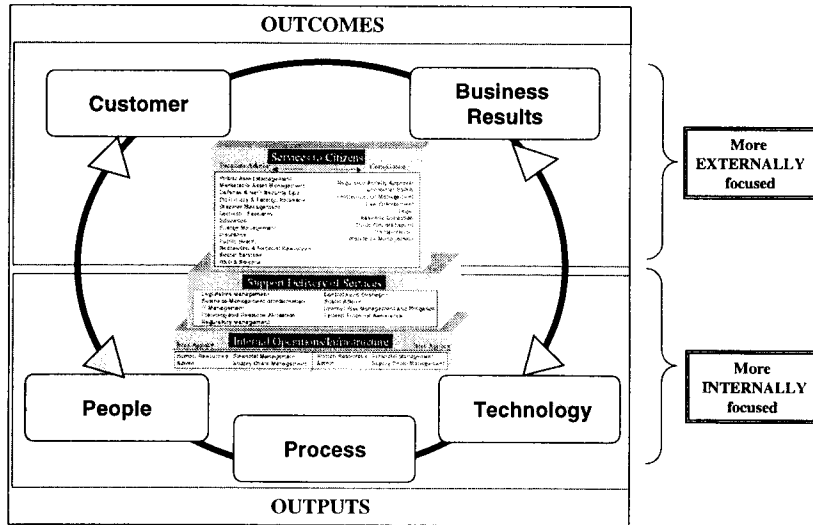
6

Other models build upon the BRM to define desired goals for the Government's business lines and help agencies determine how to best allocate resources to meet those goals

DESIRED OUTCOMES {

OUTCOMES	Common measures across agencies and programs	The Performance Reference Model (PRM)
• Citizen Service • Mission Performance • Internal efficiency		

BUSINESS NEEDS {

Services to Citizens

The Business Reference Model (BRM)

Programs tied to outcomes

Support Delivery of Services

Business support and administrative opportunities

Internal Operations/Infrastructure

Resource distribution

RESOURCE ALLOCATION {

Information Technology	Human Capital	Other Capital Assets	Resource reference models: - Service Components - Facilities - Workforce, etc.
Service Components, Technology & Data	Workforce	Equipment, Fleet & Facilities	

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The Performance Reference Model consists of five measurement categories that address cross-cutting drivers of performance and span internal/external perspectives and outputs and outcomes

OUTCOMES

Customer

Business Results

More EXTERNALLY focused

People

Process

Technology

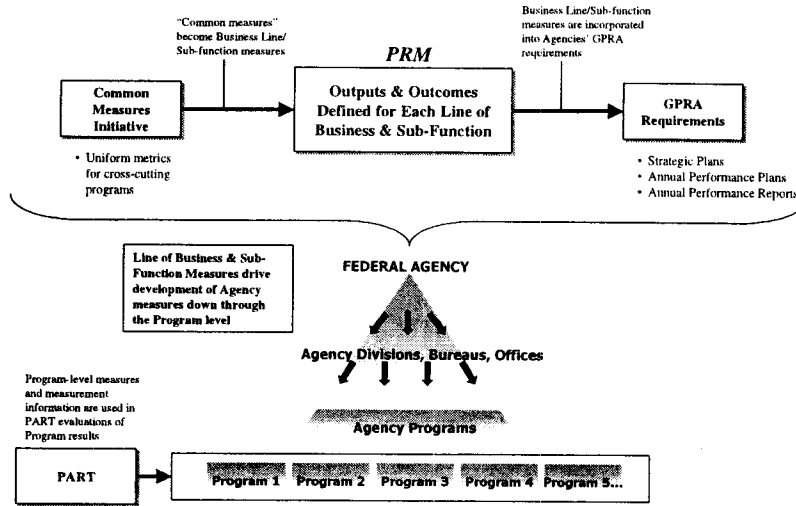More INTERNALLY focused

OUTPUTS

Each performance measurement category includes standard measures that can be operationalized for the Lines of Business and Sub-Functions within the Business Reference Model

PEOPLE	PROCESS	TECHNOLOGY	CUSTOMER	BUSINESS RESULTS
◆ Employee Satisfaction and Quality of Work Life ◆ Recruitment & Retention ◆ Employee Development ◆ Management Ratios	◆ Productivity & Efficiency ◆ Quality ◆ Financial ◆ Cycle Time & Resource Time ◆ Infrastructure ◆ Innovation & Learning	◆ Quality & Efficiency ◆ Reliability & Availability ◆ Security ◆ User Satisfaction ◆ Core Management Processes ◆ Technology Infrastructure & Costs	◆ Customer Satisfaction ◆ Service Coverage ◆ Timeliness & Responsiveness ◆ Quality ◆ Accessibility ◆ Customer Benefit	◆ Mission Achievement / Outcomes* ◆ Financial Value

* Each Line of Business and Sub-Function will have a set of mission-specific outcomes that must be defined.
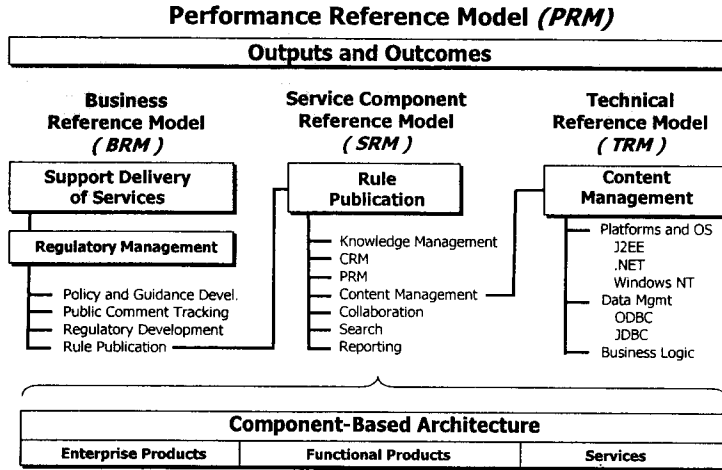
The Performance Reference Model will complement OMB's Program Assessment Rating Tool (PART) and Common Measures Initiative, as well as GPRA requirements, by defining output and outcome measures for each Line of Business and Sub-Function

"Common measures" become Business Line/ Sub-function measures

Business Line/Sub-function measures are incorporated into Agencies' GPRA requirements

PRM

| Common Measures Initiative | → | Outputs & Outcomes Defined for Each Line of Business & Sub-Function | → | GPRA Requirements |

• Uniform metrics for cross-cutting programs

• Strategic Plans
• Annual Performance Plans
• Annual Performance Reports

Line of Business & Sub-Function Measures drive development of Agency measures down through the Program level

FEDERAL AGENCY

Agency Divisions, Bureaus, Offices

Program-level measures and measurement information are used in PART evaluations of Program results

Agency Programs

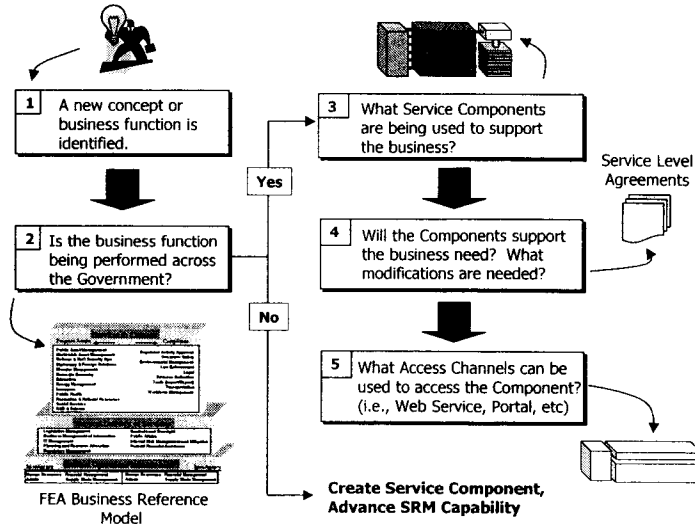PART → Program 1 Program 2 Program 3 Program 4 Program 5...

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The FEA reference models can be easily integrated along business lines, providing a foundation for Component-Based Architecture design

Performance Reference Model *(PRM)*

Outputs and Outcomes

Business Reference Model (BRM)	Service Component Reference Model (SRM)	Technical Reference Model (TRM)

Support Delivery of Services

Regulatory Management

- Policy and Guidance Devel.
- Public Comment Tracking
- Regulatory Development
- Rule Publication

Rule Publication

- Knowledge Management
- CRM
- PRM
- Content Management
- Collaboration
- Search
- Reporting

Content Management

- Platforms and OS
  - J2EE
  - .NET
  - Windows NT
- Data Mgmt
  - ODBC
  - JDBC
- Business Logic

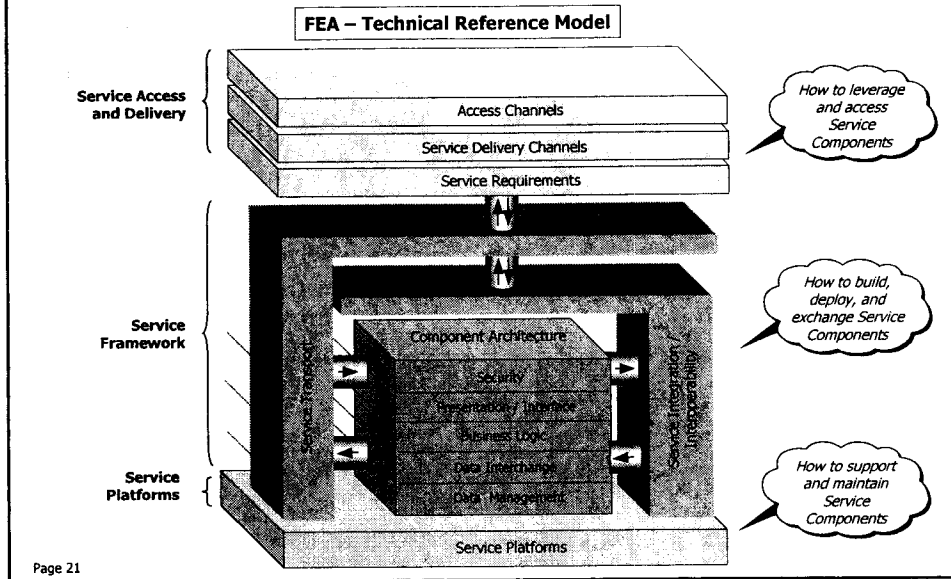| Component-Based Architecture		
Enterprise Products	Functional Products	Services

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The FEA Service Component Reference Model will support investment planning by providing a framework by which agencies can leverage existing services and components

1 A new concept or business function is identified.

2 Is the business function being performed across the Government?

Yes

No

FEA Business Reference Model

3 What Service Components are being used to support the business?

4 Will the Components support the business need? What modifications are needed?

Service Level Agreements

5 What Access Channels can be used to access the Component? (i.e., Web Service, Portal, etc)
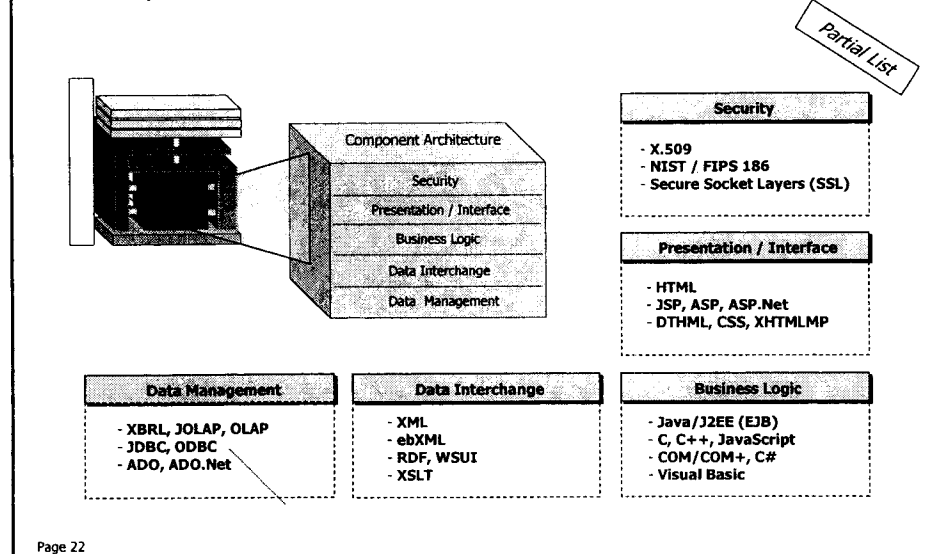
Create Service Component, Advance SRM Capability

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The FEA Technical Reference Model provides an effective means by which Service Components can be leveraged, built, and deployed across the Federal Government

FEA – Technical Reference Model

Service Access and Delivery

Access Channels

Service Delivery Channels

Service Requirements

How to leverage and access Service Components

Service Framework

Component Architecture

Security

Presentation / Interface

Business Logic

Data Interchange

Data Management

How to build, deploy, and exchange Service Components

Service Platforms

Service Platforms

How to support and maintain Service Components

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The FEA Technical Reference Model also provides guidance and technology recommendations supporting the development and implementation of Service Components that embrace a Component-Based Architecture

Partial List

Component Architecture

Security

Presentation / Interface

Business Logic

Data Interchange

Data Management

Security
- X.509
- NIST / FIPS 186
- Secure Socket Layers (SSL)

Presentation / Interface
- HTML
- JSP, ASP, ASP.Net
- DTHML, CSS, XHTMLMP

Data Management
- XBRL, JOLAP, OLAP
- JDBC, ODBC
- ADO, ADO.Net

Data Interchange
- XML
- ebXML
- RDF, WSUI
- XSLT

Business Logic
- Java/J2EE (EJB)
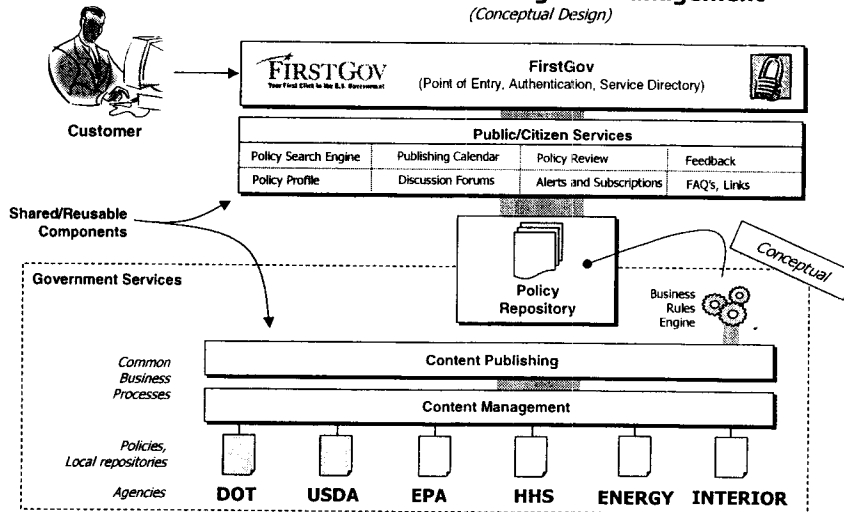- C, C++, JavaScript
- COM/COM+, C#
- Visual Basic

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Component-Based Architectures, and our ability to embrace them, can support the rapid assembly of E-Gov solutions

◆ The E-Gov Initiatives are positioned to transform existing thinking in how the Federal Government leverages technology to satisfy complex business objectives

◆ Priority funding consideration will be provided to IT investments that *leverage technology purchases across multiple entities**

◆ Component-Based Architectures (CBA) will:
  ▪ Support reusability, portability, and interoperability
  ▪ Leverage existing cross-agency investments
  ▪ Leverage emerging and industry-proven technologies
    • J2EE, .NET, XML, SOAP, Web Services, UDDI
  ▪ Reduce costs and risks associated with legacy integration, technology selection, maintenance and support
  ▪ Improve:
    • Quality and consistency of services
    • Customer support (citizen and intra-governmental)
    • Delivery and speed to market

Page 24   *OMB Circular A-11, Section 53

Component-Based Architectures can provide the basis for cross-Agency collaboration and E-Gov transformation

- Online Rulemaking and Management -
(Conceptual Design)

Customer

FIRSTGOV — **FirstGov** (Point of Entry, Authentication, Service Directory)

Public/Citizen Services

Policy Search Engine	Publishing Calendar	Policy Review	Feedback
Policy Profile	Discussion Forums	Alerts and Subscriptions	FAQ's, Links

Shared/Reusable Components

Government Services

Policy Repository

Business Rules Engine

Conceptual

Common Business Processes

Content Publishing

Content Management

Policies, Local repositories

Agencies DOT USDA EPA HHS ENERGY INTERIOR

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Components - and their supporting architectures - provide a "building block" approach to effectively leverage disparate business services and technologies
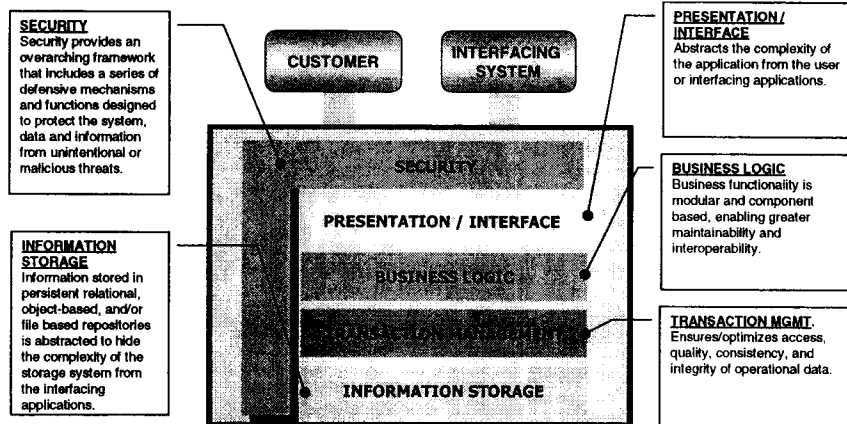
GovBenefits
(Eligibility Assistance Online)

Conceptual

Federal Enterprise Architecture
Sample List

Business Reference Model (BRM)

Social Services
- Burial Services
- Housing Benefits
- Medical Services
- Monetary Benefits

Application Capability Reference Model (ARM)

- Collaboration
- Data Management
- Commerce
- Search
- Reporting
- Analysis / Logic

- Procurement
- Financial
- CRM
- Human Capital Mgmt
- Logistics
- Content Management

Technology Reference Model (TRM)

- Presentation
- Business Logic
- Data Interchange
- Internet Platforms

- Data Management
- Graphics
- Security

Participating Agencies / Programs
Sample List

150 Federal Benefit Programs

FEMA - Disaster Housing Program
Individual / Family Grants

DOL - Employment Service
WIA Youth Activities

VA - G.I. Bill
Rural Rentals
Beneficiary Travel
Veterans / Survivors

Component-Based Architecture

Content Management   FirstGov.Gov

Business Rules Engine   CRM

Data Management   User Feedback
                           Demographics

Technologies
JRun Application Server
Enterprise Java Beans (EJB)
Java Server Pages (JSP)
Oracle, JDBC

Standards, Specifications
http://www.java.sun...
http://www.javasun...
http://www.java.sun...
SQL 92

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To support development and reuse of components, best practices outline the use of a tiered solution architecture

- Solution Design and Development -
(Conceptual Framework)

SECURITY
Security provides an overarching framework that includes a series of defensive mechanisms and functions designed to protect the system, data and information from unintentional or malicious threats.

INFORMATION STORAGE
Information stored in persistent relational, object-based, and/or file based repositories is abstracted to hide the complexity of the storage system from the interfacing applications.

CUSTOMER   INTERFACING SYSTEM

SECURITY

PRESENTATION / INTERFACE

BUSINESS LOGIC

TRANSACTION MANAGEMENT

INFORMATION STORAGE

PRESENTATION / INTERFACE
Abstracts the complexity of the application from the user or interfacing applications.

BUSINESS LOGIC
Business functionality is modular and component based, enabling greater maintainability and interoperability.

TRANSACTION MGMT.
Ensures/optimizes access, quality, consistency, and integrity of operational data.
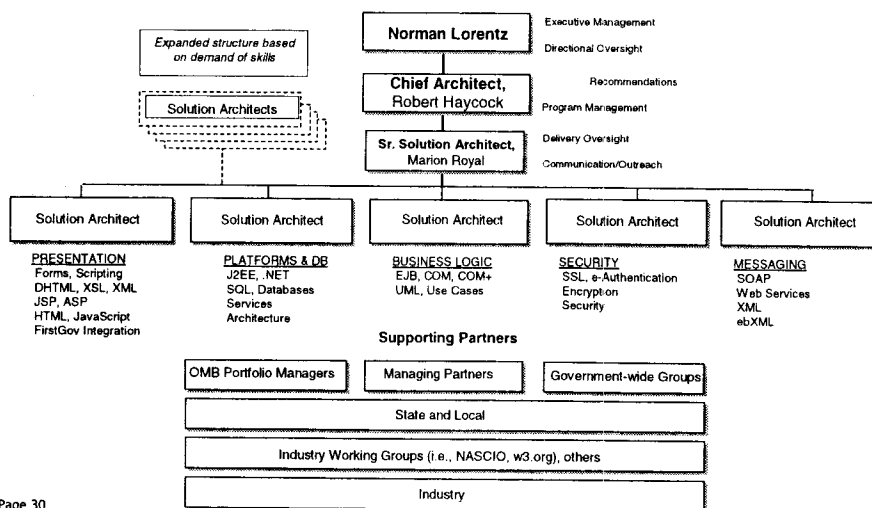
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The Solution Architects Working Group (SAWG) is focused on assisting the 24 Presidential Priority E-Gov Initiatives in areas related to:

◈ **Solution Architecture Planning**
  ▪ Review and / or creation of supporting documentation
  ▪ Forward-thinking approaches – aimed at risk mitigation
  ▪ Conveyance of best practices and lessons learned based on years of knowledge and expertise

◈ **Architecture Design**
  ▪ Identification of components, buy vs. build methodologies
  ▪ Component-Based implementations – leveraging existing capabilities across the Federal Government (i.e., Pay.Gov, FirstGov.gov, etc)
  ▪ Rapid Development and Enterprise Architecture methodologies – what are the critical successes, minimize stranded investments

◈ **Expertise and Knowledge**
  ▪ XML, Web Services (what's the right approach)
  ▪ Security, Authentication (what you need to plan for now)
  ▪ Hosting and Platforms (leveraging what's available now)

◈ **Relationships with other Federal, State and Industry Working Groups**
  ▪ XML Working Group, Federal Architecture Working Group (FAWG)
  ▪ NASCIO
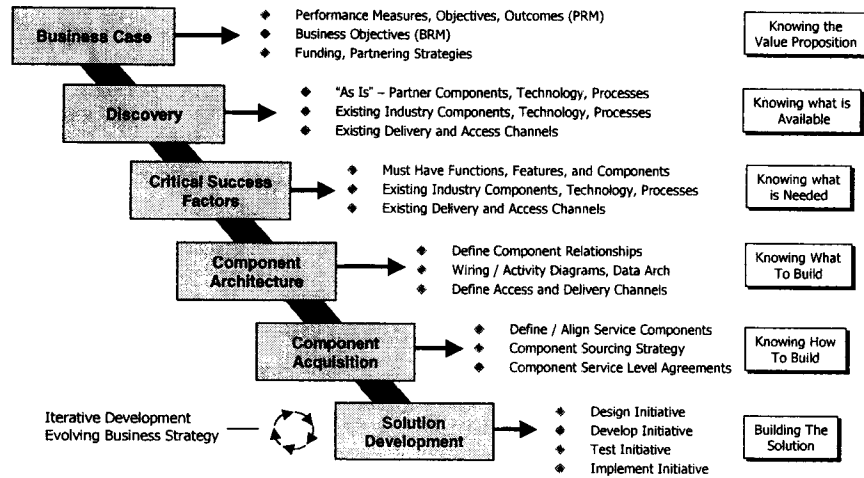 ▪ Industry Advisory Council (IAC), OASIS (Interoperability)

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The SAWG Leadership Team consists of solution architects who are focused across vertical areas of expertise

Expanded structure based on demand of skills		Norman Lorentz	Executive Management
			Directional Oversight
		Chief Architect, Robert Haycock	Recommendations
Solution Architects			Program Management
		Sr. Solution Architect, Marion Royal	Delivery Oversight
			Communication/Outreach

Solution Architect	Solution Architect	Solution Architect	Solution Architect	Solution Architect
PRESENTATION Forms, Scripting DHTML, XSL, XML JSP, ASP HTML, JavaScript FirstGov Integration	**PLATFORMS & DB** J2EE, .NET SQL, Databases Services Architecture	**BUSINESS LOGIC** EJB, COM, COM+ UML, Use Cases	**SECURITY** SSL, e-Authentication Encryption Security	**MESSAGING** SOAP Web Services XML ebXML

Supporting Partners

| OMB Portfolio Managers | Managing Partners | Government-wide Groups |

| State and Local |

| Industry Working Groups (i.e., NASCIO, w3.org), others |

| Industry |

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While still in development, the SAWG has defined the following high-level SDLC areas to support the e-Gov Initiatives

Business Case
- Performance Measures, Objectives, Outcomes (PRM)
- Business Objectives (BRM)
- Funding, Partnering Strategies

Knowing the Value Proposition

Discovery
- "As Is" – Partner Components, Technology, Processes
- Existing Industry Components, Technology, Processes
- Existing Delivery and Access Channels

Knowing what is Available

Critical Success Factors
- Must Have Functions, Features, and Components
- Existing Industry Components, Technology, Processes
- Existing Delivery and Access Channels

Knowing what is Needed

Component Architecture
- Define Component Relationships
- Wiring / Activity Diagrams, Data Arch
- Define Access and Delivery Channels

Knowing What To Build

Component Acquisition
- Define / Align Service Components
- Component Sourcing Strategy
- Component Service Level Agreements

Knowing How To Build

Iterative Development Evolving Business Strategy

Solution Development
- Design Initiative
- Develop Initiative
- Test Initiative
- Implement Initiative

Building The Solution

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Near-Term Next Steps for the SAWG and FEA

Solution Architects Working Group	Federal Enterprise Architecture
◆ Continue to engage with E-Gov Initiatives	◆ Issue FEA *Management and Maintenance Plan* to describe continued upkeep and agency use of the FEA reference models

◆ Continue creation of the E-Gov Solution Development Life Cycle (SDLC)
  ▪ Intended to supplement existing SDLC's
  ▪ Focused on cross-agency collaboration and development
  ▪ Will identify and provide examples of supporting Artifacts
	◆ Continue to define and validate the draft Service Component, Technical and Data Reference Models

◆ Continue to create and deliver Intellectual Capital
  ▪ Best Practices
  ▪ Lessons Learned
  ▪ Case Studies, White Papers
  ▪ Delivered through http://www.feapmo.gov
	◆ Work with OMB and Federal Agencies to define government-wide and Line of Business-specific performance measures and outcomes (Performance Reference Model)

	◆ Continue consultations with defense and intelligence agencies to obtain their input on the Business Reference Model
	◆ Continue to collect agency comments on the Business Reference Model, Version 1, issue draft revision in December 2002 for agency review, and issue updated model in February 2003
	◆ Launch FEAMS on www.feapmo.gov

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