Composite Enterprise Architecture: The Direction of FEMA’s EA

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FEMA Enterprise Architecture

• **Objective** - Intuitive visualization that provides the right information at the right time to the right person to make informed business and mission decisions.

• **Enterprise Architecture** is the design, structure and implementation for integrating and standardizing the business processes and technology domains to enable the organization to positively affect its mission and objectives. It provides an ability to make informed capital planning decisions.

• **Composite Enterprise Architecture** – Identifies the relationships and interactions between the seven FEMA Enterprise Architecture Domains: Business, Data, Information, Applications, Services, Infrastructure and Security.
Topics to Be Covered

1. Introduction to DHS/FEMA Enterprise Architecture
2. FEMA Composite EA Model
3. National Information Exchange Model (NIEM)
4. Service Oriented Architecture (SOA)
5. Web 2.0 technologies and IT Security
Duomo Florence, Italy
IL DUOMO – The realization of an Architecture vision

Residing in the heart of downtown Florence, Italy is Santa Maria del Fiore (Saint Mary of the Flowers), known to the world as the Duomo of Florence. The Duomo began construction in the 12th century, and main construction ended in the early 14th century.

The dome itself is amazing. At nearly 142 feet, the dome is larger than the domes of the Capitol Building in Washington, D.C., St. Pauls in London, the Pantheon in Rome, and even St. Peters in Vatican City. The dome remained the largest dome in the world until modern materials permitted the construction of stadium-sized domes such as the Metrodome in Minneapolis.

Brunelleschi's design contained two shells for the dome, an inner shell made of a lightweight material, and an outer shell of heavier wind-resistant materials. By creating two domes, Brunelleschi solved the problem of weight during construction because workers could sit atop the inner shell to build the outer shell of the dome.
Need for an Architecture Toolkit

One of the most obvious problems in building the dome was how to transport heavy building materials such as sandstone beams (1,700 pounds) and slabs of marble several hundred feet above the ground and then place them into position... To solve this problem Filippo (the Chief Architect) was compelled to imagine (and create) some ‘unheard-of machine’ to move and carry tremendous weights to incredible heights.

Ross King from “Brunelleschi’s Dome”

As in the Renaissance, today’s Enterprise Architects need a toolkit to turn their EA vision into reality.
Winchester Mystery House San Jose, CA
Winchester Mystery House - San Jose, CA

- Some of the bizarre phenomena that gave the mansion its name:
  - A window built into the floor
  - Staircases leading to nowhere
  - A chimney that rises four floors
  - Doors that open onto blank walls
  - Upside down posts

- Sarah Winchester kept the carpenters' hammers pounding 24 hours a day for 38 years

- Blueprints available: None! Mrs. Winchester never had a master set of blueprints, but did sketch out individual rooms on paper and even tablecloths!
Winchester Mystery House - San Jose, CA

- **Number of rooms**: 160
- **Cost**: $5,500,000
- **Date of Construction**: 1884 - September 5, 1922 (38 continuous years!)
- **Number of stories**: Prior to 1906 Earthquake - 7; presently 4
- **Number of basements**: 2
- **Heating**: Steam, forced air, fireplaces
- **Number of windows**: Frames 1,257; panes approx. 10,000
- **Number of doors**: Doorways 467, doors approx. 950 not including cabinet doors.
- **Number of fireplaces**: 47 (gas, wood, or coal burning)
- **Number of chimneys**: Presently 17 with evidence of 2 others
- **Number of bedrooms**: Approx. 40
- **Number of kitchens**: 5 or 6
- **Number of staircases**: 40, total of stair steps - 367
- **Number of skylights**: Approx. 52
- **Number of ballrooms**: 2 (one nearly complete, and one under construction)
FEMA Enterprise Architecture

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Connecting the Business

Business Security
- Personnel
- Property

Data
- Assets
- NIEM
- Meta model

Infrastructure
- Applications
- Systems
- Etc…

IT Security
- 4300 A & B
- FEMA Policies
- Infrastructure

IT Governance
- Policies
- Procedures

Business
- Service Components
- Service Requirements
- Core Functions

Connecting the Business
FEMA Enterprise Architecture

FEMA Enterprise Architecture Process Model

1. Define Mission, Strategic Objectives & Requirements
2. Characterize Baseline
3. Target Architecture
4. Opportunity ID & Gap Analysis
5. Transition Options
6. Implementation
7. Continuous Review & Update
FEMA Enterprise Architecture Domains

- Security
- Infrastructure
- Service
- Application
- Information
- Data
- Business
EA Domain Definitions

- **Business Architecture** is a blueprint of the enterprise that provides a common understanding of the enterprise and is used to align strategic objectives and tactical demands.

- **Data Architecture** defines how data is stored, managed, and used in a system. It establishes common guidelines for data operations that make it possible to predict, model, gauge, and control the flow of data in the system.

- **Information Architecture** is the art and science of organizing information to help people effectively fulfill their information needs. Information architecture involves investigation, analysis, design and implementation of data. Top-down and bottom-up are the two main approaches to developing information architectures; these approaches inform each other and are often developed simultaneously.

- **Applications Architecture** defines logical groups of capabilities that capture, manage and manipulate the data objects to create and analyze information sets and to support the business. The applications and their capabilities are defined without reference to particular technologies.
• **Service Architecture** describes a model for building applications and systems using a Service-Oriented Architecture. It categorizes services on the nature of the logic they encapsulate and the manner in which they are used. A service architecture extends and complements prior approaches to implementing services, and builds on open standards such as Web services.

• **Infrastructure Architecture** defines the underlying technology, services and processes that support the applications and business processes required by the enterprise. This involves the design of hardware and server software including server computers, storage, workstations, middleware, non-application software, networks, the configuration and capabilities of the data center, and the operation of the platforms required to support the applications, data storage and communications required by the Enterprise Architecture.

• **Security Architecture** defines common, industry-wide and open-standards-based technologies and applicable industry best practices to enable secure and efficient transaction of business, delivery of services, and communications among its citizens, federal government, state, local and tribal governments, as well as the private business sector. The enterprise security architecture links the components of the security infrastructure as one cohesive unit.
Homeland Security EA Overview
(The Cheese)
FEMA Information Technology Request End to End Process

Start → Initiate IT Product/Standard Request → Review DHS TRM Status →
- Yes: Initiate License Request → End
- No: Exist in DHS TRM with Permitted/Go-to Status?
  - Yes: Initiate License Request → End
  - No: Exist in DHS TRM with Restricted Status more than 3 agencies?
    - Yes: Initiate License Request → End
    - No: Exist in DHS TRM with Restricted Status?
      - Yes: Execute FEMA IT Waiver Process
      - No: Execute DHS Technology Insertion Process
        - Request Approved?
          - Yes: Implement IT Product/Standard
          - No: Recommend an Alternate Solution?
            - Yes: Review the Available License List
              - Is License Available?
                - Yes: Implement IT Product/Standard
                - No: End
            - No: End
FEMA Information Technology Waiver Process

Start

Initiate FEMA IT Waiver Request

Prepare Supporting Documents

Review the Waiver Request by Security Officer

Need More Information for Security?

Yes

No

Review the Waiver Request by SME

Need More Information for SME?

Yes

No

Review the Waiver Request by Enterprise Architect

Need More Information for EA Compliance?

Yes

No

Wrap up the Waiver Request Package

IT Product/Standard Waiver Request Result
What is a Segment Architecture?

**Enterprise Architecture** identifies enterprise-wide common or shared assets—whether they are strategies, business processes, investments, data, systems or technologies.

**Segment architecture** defines a simple roadmap for a core mission area, business service or enterprise service—aligning to the structure and artifacts of the Enterprise Architecture.

**Solution architecture** defines agency IT assets such as applications or components used to automate and improve individual agency business functions.
Larry Ellison: “…when talking about cloud computing at a financial analyst conference in September (2008). “It is really just complete gibberish. What is it? When is this idiocy going to stop?””


- Virtualization – Yes
- Surge Computing – Yes
- Consolidated Data Centers – Yes
- Service Level Agreements - Yes
- Cloud Computing – No!
Topics to Be Covered

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FEMA Composite EA Model

• Identifies repeatable and non-repeatable processes, systems, and projects
• Provides greater insight into the organization as more data is collected and imported to Architect tools
• The FEMA EA web portal will allow management and non management staff, from around the country, to evaluate data and make more informed decisions
• FEMA’s Composite EA Model is fully compatible with the Department of Homeland Security’s EA framework
FEMA EA Home Page:
http://online.fema.net/ea/
FEMA Composite Enterprise Architecture

• Creates high level visualization of FEMA’s organization
• Incorporates a wide range of information from core business missions and business requirements to mapping to the systems requirements and application services
The architect’s view of the main model includes containers for 7 architecture domain areas.
The FEMA Metaverse enables standard and unique queries to drill down with greater clarity because of the breadth of data collected.

FEMA's relationships allow senior managers to visualize patterns and connections within.
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NIEM Program Summary

• The National Information Exchange Model (NIEM) is a local, state, tribal, and federal interagency initiative providing a foundation for seamless information exchange.

• NIEM is an xml-based data dictionary and reference model, allowing for universal use in all levels of technology.

• The NIEM Program Management Office (PMO) develops standards, a common lexicon, and an online community to support the national program.
NIEM: A Common Language Model

- NIEM Core, Universal and Domains classify the data elements.
- As the NIEM Model matures, Future Domains will be implemented.
- The NIEM program is predicated on Communities of Interest. FEMA and DHS are cooperative managers of the Emergency Management (EM) Domain.
NIEM, DHS and FEMA

- Disaster Management eGov Initiative, DHS and FEMA Strategic Plans all emphasize ‘data sharing standards’ as a pillar to enhanced disaster response.

- DHS has cited NIEM as a EA priority: Systems Engineering Lifecycle (SELC) and DHS Enterprise Data Management Office (EDMO) guidelines mandate use of NIEM.

- DHS Office of Interoperability (OIC), FEMA EA and the NIEM PMO have an EM Domain Governance Memorandum of Agreement.
EM Domain Governance

• DHS OIC and FEMA EA will work together to:
  – Incorporate a combination of the Common Alert Protocol (CAP), Emergency Data Exchange Language (EDXL) and NIEM to facilitate data sharing at all levels of Government
  – Develop a Emergency Management Community of Interest to facilitate Governance with large-scale participation by subject matter experts
  – Develop a repository of reusable, standardized information exchanges
  – Integrate with the OASIS Standards Consortium
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SOA Is An Evolution, Not Revolution

- Loosely-coupled
- Standards-based
- Extensible
- Broadly accepted
- Secure
- Governance

**What is …?**

<table>
<thead>
<tr>
<th>…a service?</th>
<th>… service orientation?</th>
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<tbody>
<tr>
<td>A repeatable business task – e.g., check customer credit; open new account</td>
<td>A way of integrating your business as linked services and the outcomes that they bring …</td>
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<table>
<thead>
<tr>
<th>…service oriented architecture (SOA)?</th>
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<tbody>
<tr>
<td>An IT architectural style that supports service orientation …</td>
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<th>…a composite application?</th>
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<tr>
<td>A set of related &amp; integrated services that support a business process built on an SOA</td>
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Source: IBM SOA 101 …How to provide breakaway value using SOA or “Everything you always wanted to know about SOA but were afraid to ask”!
The Service Oriented Modeling and Architecture (SOMA) Technique

- FEMA Information Services Architecture (FISA) will use a customized version of IBM’s SOMA technique to convert business requirements into SOA designs.

SOMA:
- Builds on business analysis techniques such as the Component Business Model
- Has been used by IBM successfully over eight years of SOA development
- Produces a high-level design and service specifications that can be implemented using existing OOP/Component programming techniques such as the Rational Unified Process (RUP)
SOMA Supports All Elements of the Service Development Process

- A pilot doesn’t fly the plane without procedures, checklists and instruments: Similarly, SOMA gives the architect:
  - A set of development cycles constructed to optimize decoupling and process sharing
  - Detailed procedural steps for each development cycle
  - Metrics and checklists to support decision making
  - A design methodology built around the use of proven patterns
SOMA Accelerates SOA Development by Bridging the High-Level and Detailed Design Processes

SOA based solution architecture and implementation Initiative

- Business Aspect (Processes, Services, Artifacts)
- Functional Aspect (Components, Interactions, Data)

SOMA Design

Solution Outline → Macro Design

Release
- Micro Design
- Build Cycle
- Deploy

Solution Close (PMM)