Evolving a Stovepipe Set Of Systems Into An Enterprise Architecture

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Defining The Tenants For Developing An Enterprise Architecture
What Does It Take?

- Vision
- Planning
- Development
- Test & Integrate
- Evolution
Planning Tenants

- Define a Concept of Operation
  - System And User Level Operating Requirements
- Identify Legacy Capabilities That Are To Be Maintained
  - What Applications Or Capabilities Are Required
- Identify A New System Level Architecture That Can Be Phased In Over Time
  - Networks
  - Computing Platforms
  - Security Infrastructure
Planning Tenets (Continued)

- Identify The New Enterprise Software Architecture
  - Flexible And Extendable For Legacy And Future Capabilities
  - Loosely Coupled Versus Tightly Coupled Data Exchange
  - Data And Information Network Centric

- Identify A Common System Infrastructure
  - Avoids Duplication
  - Enforces Commonality Across The Enterprise

- Address The “ILITIES”
  - Flexibility, Usability, Reliability, Maintainability, and Deployability
Development Tenants

- Development Team Must Be Fully Cognizant Of The Vision
  - Buy In Is Very Important From The Start Of the Development
- Enforce Separation
  - User Interface
  - Business Rules
  - Data
- Must Support Network Centric Enterprise Activities
  - Allow Easy Access To Enterprise Data
  - Implement Applications And Services Using Published Standards
- Utilize Common Sets Of Tools Across The Enterprise
Integration and Testing Tenants

- Decision Needs To Be Made Whether A Capability Is To Be *Integrated* Into The Enterprise Or Simply *Interfaced* To
  - *Integrated* – Exists On Enterprise Server/Client Platforms
  - *Interfaced* – Externally Hosted, Uses Data Exchange Services

- Target Operational Environment Must Be Replicated To Ensure Compatibility
  - Interoperability Testing With Legacy Systems Can Be Performed
  - Live Operational Feeds Can Be Used Instead Of Simulations
  - Network And Security Infrastructure Can Be Fully Tested
  - Performance Criteria Can Be Accurately Evaluated

- Acceptance Testing Should Be Conducted At Fielded Operational Location
  - Validates System Performance And Capabilities
  - User Acceptance From Representative Operational Community
Evolution Tenants

- Start With The Vision And A Few Simple Questions
  - How Do Components Interact With The System?
  - What Data / Information Needs To Be Shared?
    - Internally and Externally
  - What Data Is Needed From External Systems?

- Continually Evaluate The Evolution Plan To Ensure That The System Is Evolving As Expected
  - Be Prepared To Make Adjustment In The Plan Due To Real-World Activities And New Emerging Technologies
Evolution Tenants (Continue)

- **Essential Requirements**
  - **Commitment**
    - Customer, Management, Development Must Be Committed To Achieving An Enterprise Architecture
      - Financial Resources, Schedule, And Requirements Must Be Provided
      - Willingness To Provide Capability In Phased Development Approach
  - **Standards**
    - Essential For Allowing Data / Information To Be Freely Shared
  - **New Technology**
    - Not Truly Essential, But Often Makes It Simpler To Make Transition
  - **Training**
    - Development Staff Needs To Be Fully Trained In The New Standards And Technologies
    - Users Need Training With Regards To The New System Capabilities
Putting It All Together

Developing An Enterprise Architecture – A Practical Example
TBMCS - Background

TBMCS Program Is Intended To Develop, Integrate, Field, And Maintain An Evolving Sequence Of Increasing Capabilities For Computer- Supported Management Of Theater Airborne Assets, In Peacetime, Exercise, And Wartime Environments At The Force And Unit levels. TBMCS Is A Joint And Coalition Forces System

Initially - Integration of Legacy Systems
- Contingency Theater Automated Planning System (CTAPS)
- Combat Intelligence System (CIS)
  - GCCS– Integrated Imagery and Intelligence (GCCS I³) From the Navy Replaced CIS in 1997
- Wing Command and Control System (WCCS)
- Desert Storm – Computer Assisted Force Management System (CAFMS)

AOC - Air Operations Center
WOC – Wing Operations Center
ASOC – Air Support Operations Center
TBMCS – Developing The Vision

• Recognizing Information As Capital Asset

Responds to the market

| Liquidity (Lifetime) | Short | | | | | | | | | | Capital Assets |
|---------------------|-------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Usage / Acceptance / Universality | Narrow | | | | | | | | | | Wide |

Embodies a Community of Interest

Long-term Value to the Enterprise
TBMCS - The Evolution In A Nut Shell

From

Stovepipe

Web Stovepipe

Fat App

Browser

HTML

Web/App Server
Servlet/COM Components

Business Logic

Business Logic

Web/App Server
Servlet/COM Components

Information Services

Information Services

To

Interoperability

Fat App

Browser

Portal

PDA/Phone

HTML/XML

machine-consumer

XML

machine-machine

Web/App Server
Web Service Wrapped Servlet/COM Components

Business Logic

Business Logic

Web/App Server
Web Service Wrapped Servlet/COM Components
TBMCS - Web / Application Logical Architecture

Tier 6: Information Consumers and Producers
- Application A
- Application B
- Application C

Tier 5: Access
- Secure
  - HTTPS Access
  - RMI Access
  - HTTPS, SMTP Access

Tier 4: Data Presentation
- Web Services
  - (WSDL, SOAP, XML)
- Web Applications
  - (Servlets, JSPs)

Tier 3: Business
- Business Objects
  - (Session EJBs)

Tier 2: Data Access
- Data Objects
  - (Entity EJBs)

Tier 1: Enterprise Data / Resource
- Databases
  - (AODB, ISDS)
- Files
  - (ATO, ACO)
- Other
  - (Ext Systems)
TBMCS - Information Service Data Flow

Tier 6
- SOAP Client
  - Native Data Objects

Tier 5
- SOAP
  - XML De-serialization
- Web Service
  - Java Data Objects

Tier 4
- SOAP
  - XML Serialization
- EJBs
  - Tier 2
    - Entity EJBs
      - JDBC
        - Files or other Resources
          - Data

Tier 3
- Session EJBs
  - Tier 2
    - Entity EJBs
  - Tier 1
    - Database
      - Data

Tier 1
- Database
  - Data

Tier 2
- EJB Instances
  - Tier 1
    - Database
      - Data

Non-SOAP Client
- HTTP
  - Native Data Objects

Native XML Client
- XML Streamed Data

Java Client
- RMI
  - Java Data Objects
Wrapping It Up

• Ingredients For Achieving An Enterprise Architecture
  ♦ Vision, Planning, Development, Integration & Test, Evolution
  ♦ Commitment, Standards, New Technology, Training

• Keys To Enabling Network Centric Participation
  ♦ Separation Of Persistent / Enterprise Data From The Client
  ♦ Provide Data Schema Insulation
  ♦ Wrap Data In Context (I.E., Move From Data to Information)
  ♦ Simple Information Access Mechanisms With Low Barriers

• TBMCS Answer
  ♦ Adapt A Common Infrastructure
  ♦ Design To An Open Standards Base Framework
  ♦ Information Services Access Layer
    – Allows Data To Be Freely Shared Internally And Externally