Implementing Enterprise Architecture with MDA





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Consultant

- SOA, EA and MDA modeling, implementation, strategy and training
- Chief Architect for service-oriented systems
 - Finance, Insurance, Telecom
- IT Architecture and Strategy
- 25+ years experience in distributed systems, software and architecture

Affiliations

- Cutter Consortium Director of Enterprise Architecture
- SOA Institute Editorial Director, SOA Conference Co-chair

Author

- Cutter Consortium
 - "Designing Service Oriented Applications"
 - "EA It's not Just for IT Anymore"
 - "Agile Methods and Enterprise Architecture"
 - "Enterprise Architecture Roll-out and Training"
 - "Service Oriented Integration: Aligning SOA with Enterprise Integration"
 - "Implementing SOA on Common Technologies"
 - "An Application Centric Approach to Enterprise Architecture"
- Applied SOA: Architecture and Design Strategies, Wiley, due 2008
- Developing e-Business Systems and Architecture: A Manager's Guide, 2000, Morgan-Kaufman
- Integrating CORBA and COM Applications, 1998, Wiley

Agenda

- What is EA?
- MDA Process
- Implementing EA with MDA
- Case Study
- Conclusion

What is Enterprise Architecture?

- The primary goal of Enterprise Architecture is to align present and future IT systems with business goals and strategy
- Typical technology goals are:
 - Establish interoperability between systems
 - Provide consistently stable technology
 - Implement cost-effective standard infrastructure, leverage existing investments
 - Maximize benefit to the business through appropriate reuse of technology
- Business and architecture goals are:
 - Reduce IT expenditures
 - Support IT portfolio management
 - Support outsourcing
 - Provide framework for enterprise IT governance
- EA is about enabling change and managing complexity

WebGo Telecom Portal

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Mobile Internet	\$2.00	\$5.00
Television	\$1.00	\$90.00
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Ask Eric?		
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Architecture — The Immediate Need

- Let's assume all of the external systems for WebGo exist. While building WebGo, we would need certain information
- The first Architectural-Level needs for WebGo are:
 - How the WebGo Portal will connect to those systems?
 - How it will communicate (protocol)?
 - How it will understand data (formats, meaning)?
- The next Architectural-Level issues are understanding of the process WebGo implements:
 - What users can do?
 - What level of security is there?
 - What amount of automated process is there?
- Then as we turn WebGo on:
 - What scale of usage was introduced?
 - What about reliability of the integrated systems?
 - What about operating (supporting) this new portal?

Architecture — The Broader Need

- The previous slide did not describe a very broad view. There are additional considerations:
 - How does WebGo support a business strategy?
 - How will we measure the success of that?
 - What of WebGo was already implemented in the enterprise?
 - Did we just add a redundancy?
 - What technologies did we introduce, and what is their support cycle?
 - What did WebGo tell us about the various data models in the backend systems?
 - When WebGo becomes "WebGone", are there components or services that can be re-assembled to make "WebGo++"?
- The immediate needs described application architecture
 - Application Architecture is part of EA, but it is not the same as EA

Architecture Scope

W1

Enterprise Architecture:

Describes concerns and guidelines for integration of process and data across the entire enterprise. Applied to many application domains.

Application Architecture:

Describes abstract concepts, things and relationships within the application domain. Applies to many products or applications.

> **Design:** Describes specific items and relationships, Applies to a single product or application.

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WebGo Portal Architecture in Detail



WebGo Portal "Conceptual Architecture"



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Slide 10

WebGo Implementation Slice



WebGo Application Architecture



infrastructure

Application Services Platform

Application Architecture

- Describes how to build systems that meet specific application requirements
- Describes how to:
 - Create consistent applications across the enterprise
 - Use technical architecture
 - Configure and manage applications

Includes

- Architectural elements
- Fundamental product elements
- Common construction patterns
- User model
- Application frameworks

Web Services Architecture



infrastructure

Web Services Platform

Combined Architecture



Architectural Foundations



WebGo Deployment View



Technical Architecture

- Describes how to build systems that meet specific technical requirements
 - Non-functional requirements
 - Enterprise "abilities"
 - Architectural qualities

Describes standards, products, protocols and technologies

Includes

- Architectural layers
- Distribution tiers
- Infrastructural services

Business Architecture — Value Chain



Business Architecture

- Understand and describe the underlying Business Value Chain within the enterprise
- Understand and describe fundamental business processes
- Link business strategies to business processes
- Leverage technology to align business process strategies with IT initiatives
- Understand the gap between business process "as is" and "to be" environments. Identify a transition strategy.

Enterprise Architecture Revisited

- A set of architectures, which taken together, provide a complete view of an organization.
- Conforms to architectural principles, especially Separation of Concerns:
 - Business
 - Information
 - Application

- Technical
- Operations
- Implementation
- Architecture must achieve three primary goals:
 Coescribe a solution to a specific set of problems and requirements.
 Coeffectively communicate the solution to all stakeholders.
 Coeffectively construction of systems that conform to the architecture.

Architecture-Driven Design



MDA Distilled



MDA Mappings



MDA Under the Hood



Metamodels

- Provide rules for how to build a correct model for a particular purpose, e.g. "business integration metamodel"
- UML Profile
 - Provides a targeted subset of UML
 - Standard mechanism for extending UML
- Refinement and Constraint
 - Metamodels refine the definition of modeling elements by placing constraints on their behavior through the use of stereotypes

Stereotypes

- Standard UML Stereotypes
 - <<boundary>>, <<control>>, <<entity>>
- Extending the UML Stereotypes
 - Inheritance used to extend and refine the meaning of stereotypes
 - Tagged Values use to apply specific properties

WebGo Application Architecture



infrastructure

Application Services Platform

Metamodel Stereotypes



Web Architectural Style Metamodel "Rules of Engagement"



MDA Profiles

Computational Independent Model

 Business-oriented non-UML representation. Simplified UML subset appropriate for business analysts.

Platform Independent Model

- Custom profiles for enterprise architecture and standards
- Standard based profiles (EDOC, EAI)

Platform Specific Model

• Standards based profiles (CORBA, EJB, .NET)

MDA Process Revisited



Architecture Profiles



Architecture-Driven Design



EA and MDA Summary

- Enterprise Architecture involves separating concerns into viewpoints
- Specific architectural viewpoints are formalized in profiles and metamodels
- Profiles enforce application conformance to enterprise architecture
- MDA provides a standards-based approach to defining profiles and using the profiles to help automate development

Case Study

- Large US Insurance Company
- \$25 Billion USD
- ~ 20 Lines of Business

Maintenance
Integration
New Applications

- No consistency across design
- Little to no reuse
- Redundant functions and data
- IT costs too high
- IT time-to-market to slow

- Enterprise Architecture Group exists
- ...with little to no effect
- …ARB Exceptions at 80%

What we did

- Institute an architecture based / MDA approach
- Create a set of UML Profiles that specify the enterprise architecture
- Integrate the UML Profiles into a modeling framework built with Rational Rose and REI
- Tie the Software Architecture Specification to the Framework
- Create documentation: User Guide, Modeling Guide, examples
- Create education program: Architecture, Modeling, Framework
- Ramp up the number of application architects. Focus them on assisting projects

APSL Enterprise Process



Define the approach

- Integrate enterprise architecture into the development process.
- Create meta-models and profiles

Define the problem

 Create Business Models (Domain, CIM, System)

Define the solution

Refine into PIMs and PSMs

Leverage the results

- Integrate assets into a reuse repository
- Architecture and design accommodates: reuse, customization, enhancements, versioning...

Rose Framework for Application Architects







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Solution Definition Views Enterprise Architecture Business Architecture **Solution Definition** Information **Architecture** <<Focus Package>> <project name - solution space> **Application** Architecture Logical Architectural View **Operational View Technical Architecture** Process View Deployment Views Application System Analysis High Level Design Model Structural View Implementation Architecture **Operational**

Architecture

Logical Architecture

- The Logical Architecture is a result of Application Analysis and the application of patterns
- Verifies that business requirements are addressed
- Confirms architectural alignment
- Identifies services
 - Consumed
 - Produced
- Reflected in the Model and the Software Architecture Document

Software Architecture Document

The SAD is a communication tool that

- Ties together business needs, application development, domain / enterprise views within a project
- Keeps scope within application area, but with an enterprise architectural underpinning
- Helps integrate with other projects/areas
- Is an important physical deliverable

• Is a poor choice of acronym...



Basic Approach to SAD Modeling

- Use the SAD Rose framework to create your model and to document the elements in the model
- Use the SAD SoDA template to create a project template for extracting information from the model and documenting sections of the SAD not placed in the model
 - Don't forget to update the File / Properties

Generate the SAD report



Challenges

- Adoption
 - Overcome skepticism about architecture
 - Change behavior of software organization
 - Win over business sponsors
- When is an architect done?
 - Don't get sucked into implementation
 - Logical architecture level
 - Preliminary SAD 4 weeks, SAD 10 weeks

Ramp-up

- Where do you get all the architects?
- Grow architects from within
- Develop project criteria

New EA Organization



Results

- Consistency
 - SADs have same structure and format across projects
 - Project architectures have the same logical structure, roles and responsibilities
 - Allows for comparison between projects
 - Enables standard technology platforms

Reuse

- Opportunities for reuse more easily identified
- Component ~reuse up 200%

Usage

- Used for all 'App Architect' projects
- Increasing adoption of LOB architects and designers

Demand

- 5 architects first year
- 25 architects 2nd year, 50 architects 3rd year
- 500 projects get architects...1000 others wich they could

Exceptions

- Compliance up 500% for applications with architects, review process streamlined
- Exceptions down to 10% for projects with architects

Architecture Value Proposition

- Alignment of IT systems with business goals and strategy
- Improved customer satisfaction
- Consistency across applications
- Reduced costs to implement, maintain, evolve, and retire applications
- Improved IT operations
 - Common semantics and information
 - Interoperability between applications
 - Integration of applications
 - Reuse of infrastructure, frameworks, utilities

Improving Productivity and Consistency



Parallel Paths of Technology and Application



The Importance of Early Knowledge



time

Thank You!

"Every complex problem has a solution that is clear, simple...and wrong" — H.L. Mencken, 1949

