MDA Case Study: State of Wisconsin
Unemployment Insurance Division

MDA Implementers’ Workshop 2003

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Objectives

• Introduce an Adaptive Team Collaborative Process (ATCP)
• Review traditional request for proposal (RFP) process
• Government challenges with iterative development
• Introduce iterative RFP process management
• Review Architectural Tradeoff Analysis Method (ATAM)
• Describe case study at State of Wisconsin
  • Iterative process
  • Traceability strategy
  • Automation within an MDA framework
Adaptive Team Collaboration Process℠ (ATCP™)

- Adaptive
  - Plan in increments; get small things working (iterations)
  - Work together (collaborate) to get best results
  - Build team environment in which everyone learns and can contribute effectively

- Customer-centric
  - Deliver continual visible value to customer
  - Describe system capabilities with customer/user first, not system

- Risk-driven
  - Something that might happen that may affect the project
  - Minimize rework risk: business/requirements change and unknown technology
  - Identify and resolve potential risks
ATCP Predecessors

- Extreme Programming (XP)
- Adaptive Software Development (ASD)
- Usage-Centered Design (U-CD)
  - U-CD adopted ATCP Actor/Role concepts – Oct 2002
- Object-Oriented Analysis and Design (OOAD)
- Unified Modeling Language (UML)
- Rational Unified Process (RUP)
- Capability Maturity Model Integration (CMMI)
ATCP Foundation

- Built on industry standards to provide stable platform

Adaptive Team Collaboration Process (ATCP)

- Unified Modeling Language™ (UML®)
- Software Process Engineering Metamodel (SPEM)
- Model-Driven Architecture™ (MDA™)

- Ensures sustainability and longevity
- Integrates with industry process frameworks
  - SEI Capability Maturity Model Integration (CMMI)
  - Project Management Institute (PMI)
Sample ATCP Workflow

stakeholder list → identify system candidate actors → actor list

feature list → identify candidate system use cases → use case list

for each use case → draw system use case diagram → use case diagram

for each actor → identify roles → roles [identified]

use case diagram → organize system actors and use cases → packages [identified]

for each use case → describe system use case or actor → actor or use case [identified]

for each actor → describe system use case or actor → actor or use case [described]
Iterative RFP Process Management

- Adaptation of “pure” iterative development and “traditional” RFP procurement process
- Agile and adaptive collaborative development process
- Significantly leverage UML for modeling
- Comprehensive traceability strategy
- Complete automatic generation of RFP consumable work products
- Vendors held responsible for completely answering RFP
- Objective response grading captured in tool
- Simulation of multiple scoring algorithms
EnABLES Project

- Department of Workforce Development (DWD), Unemployment Insurance (UI) Division
- Enhanced Automated Benefits Legal Enterprise Services (EnABLES) project
- Completely replace legacy (Cobol/IDMS) application with new distributed web application
- Deploy new customer-centric business model
- Reduce call backs by increasing levels of customer self-service
- $30 million, seven-year project; using off-the-shelf solution
- See RFP and supporting materials at http://www.dwd.state.wi.us/asd/procurement
Project Inception

- Started at end of June 2002
- Began with no process and no tool environment, staff with incredible domain experience but no UML or tool experience
- Identified three iterations to finish RFP
  - Fourth iteration to review responses and award contract
- Issued RFP and all supporting materials November 6, 2002
  - Contract awarded in early May 2003
- ATC provided coaching, training, tool configuration
- ATCP provided software development process framework
- Applied Software Engineering Institute’s (SEI) Architecture Tradeoff Analysis MethodSM (ATAM)
  - http://www.sei.cmu.edu/atam
Four Iterations

- Built UML business use case model
- Detailed use cases and built UML business object model
- Built transparent tool environment with real-time reporting
  - Team could use all their time to advance project
- Identified system use cases
- Established fine-grained traceability from messages on individual flow diagrams to system use cases
  - Required extending traceability capabilities of tool set
- Built business model data warehouse for reporting
- Identified RFP questions and expected responses
- Automatically generated all RFP content
- Scored responses in tool and issued award
Model Elements Identified

- 35 business use cases
- 75 business actors
- 500 external business services
  - Business use case flows
- 400 internal workflows
  - Business use case realizations
- 2,000 internal business services
  - Business object responsibilities
- 80 internal business worker roles
- 250 business entities
- 300 system use cases
- 500 RFP questions
- 20 report templates
- 50 consumables
- 2,000 pages of RFP content
Automated Development Environment

- Rational Rose for UML modeling
- Rational RequisitePro for requirements management and basic traceability
- Rational ClearQuest for change management
- Rational SoDA for reporting
- Extended light native traceability with custom traceability tool
- Transparent tool usage critical
- If something was not in the tool, it did not exist, and it did not appear in the RFP
MDA Features

• Ease transition from one platform to another version
• Integrate with existing legacy applications
• Apply domain-specific reference business models
• Use UML 2.0 for all models
• Provide framework for vendor-specific transformation mappings
• Extend useful lifetime of system models
• Support specialized computing environments
Moving Forward

- Establish iterative project office inside automated development environment began July ’03
- Base system installation began Sept ’03
- Gap analysis began Oct ’03
- Customization begins Feb ’04
- Apply MDA principles to generating functional software from UML specifications
- Supports ITSC federal guidelines for unemployment insurance system modernization efforts
Cúram Software

- “Enterprise framework for social and human services”
- Domain-specific reference models
  - Business and system requirements model in process flows
  - System design model in UML
- J2EE architecture framework
- Model-driven development
  - UML class diagrams with special stereotypes
  - Use Rational Rose for modeling
- Web user interface
  - XML-based user interface metadata (UIM)
Cúram Overview

SOLUTIONS
- Child Support
- Labor Claims & Tax
- Welfare
- Workers Compensation
- Child Welfare
- Pensions

REFERENCE APPLICATION
- Core Business Services
- Cross Program Services
- Business Infrastructure Services

Application Development Environment
Reference Model
Implementing Cúram

Reference Model
1200 Screens
72,000 Design Objects

Base Application
Over 220 Entities
Over 600 Human Services
Business Processes

Infrastructure Administration
Organization, Security,
Products, Code Tables

Business and Technical Infrastructure
Rules, Workflow

Design/Analysis/Development Tools
Rose, IDE,
Wizards, Connectors,
Generators etc.

Deployed Application
Base Application
Customer Extensions

Configured Infrastructure
Organization, Security,
Products, Code Tables

Business and Technical Infrastructure
Rules, Workflow

Implement

Extend

Configure

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Cúram Business Entity Reference Model
Cúram J2EE Architecture

- Web thin-client, MVC architecture
- Apache Struts (moving to Java Server Faces)
- JSP, servlet, EJB
Cúram Server Runtime Architecture

- EJB session beans
- Java business objects
- Data access objects
Base System Installation Stage

- Acquire Curam software through traditional process
- Install Curam software on development servers
- Team training (including many new team members)
  - Introduction to Object-Orientation
  - Curam Business Analyst Training
  - Curam Technical Training
  - Use Case Modeling Fundamentals
  - Introduction to Rational Suite AnalystStudio
- Apply development activities to three use cases to test process and software installation
Gap Analysis Stage

- Compare out-of-the-box features of Curam to DWD-UI needs
  - Done at high-level using existing work products
- Leverage UML models built during RFP process
  - Required customized gap analysis process and tools
- Extended RFP traceability strategy
Gap Analysis Traceability Strategy

- Business Actor
- Business Worker
- User Actor
- System Actor
- Boundary Class
- Control Class
- User Interface Metadata
- User Role
- Concern Role
- Business Process Object
- Business Use Case
- Business Workflow
- System Use Case
- Business Entity
- Entity

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Gap Analysis Process

UI Business Entity to Cúram Entity Traceability Process

**What**
Look at business entity classes in EnABLES RFP and map them to entity classes in Cúram.

**How**
1. Select a package of UI business entities
2. Select one or many business entities from the list of business entities in the selected package
   2.1. Review what the business entities represent
      2.1.1. Examine its description (documentation)
      2.1.2. Examine any class diagrams on which the entity is shown
      2.1.3. Examine any collaboration diagrams on which objects for the entity are shown
      2.1.4. Examine the business object message survey for the messages sent to objects of the business entity across all collaboration diagrams
3. Select a package of Cúram entities
4. Select one or many Cúram entities from the list of Cúram entities in the selected package
   4.1. Review what the Cúram entities represent
      4.1.1. Examine its description (documentation)
      4.1.2. Examine the Cúram entity quick reference
      4.1.3. Examine the Cúram entity reference model diagram
      4.1.4. Examine any related Cúram process flows
5. Select to trace the selected UI business entities to the selected Cúram entities
6. Repeat steps 1-5 for additional UI business entities

**Why**
1. Show which UI business entities will be implemented as out-of-the-box Cúram entities
2. Show which UI business entities will be customized Cúram entities
3. Show which UI business entities do not relate to any Cúram entities
4. Show which Cúram entities do not relate to any UI business entities
5. Show ranked density of UI business entities to Cúram entities
   5.1. Show which UI business entities map to the most/fewest Cúram entities
6. Show ranked density of Cúram entities to UI business entities
   6.1. Show which Cúram entities map to the most/fewest UI business entities

**Who**
Business Analyst

**When**
Inception or Elaboration of Gap Analysis Stage
Gap Analysis Traceability Tool
Business Entity to Cúram Entity Traceability

Documentation:
The Adjudicator Schedule shows the schedule of each individual adjudicator, to show when they have interviews scheduled, with which claimant, and the issue. It also shows vacation, meetings, and off line time. It is used to schedule eligibility issues.

Documentation:
ALLOW_OPTIMISTIC_LOCKING=yes
COMMENTS=Entity to hold integrated case specific information
Conclusions

- EnABLES RFP process could not have been done and will not be sustainable without MDA principles
- Built a computational independent model
  - CIM has its own CIM, PIM, and PSM
- Now detailing PIM and generating PSM
- Transformations mostly done by hand
  - Enforced and captured by tools
  - Transformations more automated moving forward
- Provided framework for implementing custom-developed or off-the-shelf product on any technical platform
Questions?

Thank you for your attention and participation!
RFP Sample Business Service Diagram

Claimant → Claim Weekly Benefits → Employer

Child Support Agency

UI Bank

Print Mail Provider

UI Tax General Accounting
RFP Sample Internal Business Workflow

1: present claimable week
4: determine questions
10: present certification questions
13: review answers
15: request confirmation
17: send confirmed certification

5: get certification questions
18: receive confirmed certification

6: determine appropriate questions
19: create weekly certification
26: send certification
27: update activity log

2: receive claimable week acceptance
11: receive answers
16: receive confirmation

12: create
14: review

3: add

20: get

7: get claim record

8: review for questions
24: update week claimed
23: add weekly certification

21: create
22: create
25: update as claimed
28: add weekly certification filed

29: verify certification

work flow: Activity Log

contact: Activity Log

: Claimant
: Certification Processors
: Certification Answers
: Weekly Claim Processor
: Certification Questions: Eligibility Questions
: Weekly Certification
: Claim Record
: Benefit Records Processor
: Benefit Certification/Disbursement Record

: Claimant
: Claims Taker
: Weekly Claim Processor
RFP Extending Native Traceability