SIMCI Combined Project

FY08 Accomplishments
FY08 Demonstration
FY09 Plan

Dr. Stanley H. Levine
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Simulation – C4I Interoperability (SIMCI)
FY08 Project Briefing

FY08 Combined Project

Improve M&S/ABCS Interoperability by Expanding JC3IEDM Data Sets
&
Extension & Enabling Tools for JC3IEDM support
&
Battle Management Language Web Services

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## FY08 Combined Project

### Project Description
- **Purpose:** This effort provides Net-Centric Web Service based interoperability for the exchange of information between BC systems and with M&S systems.

- **US-JC3IEDM Reference Implementation (RI)** including Web Services & Java APIs
- **The ABCS data mediation service**
- **Common C2 Adapter translation mappings to/from JC3IEDM**
- **Battle Management Language interface with supporting service supports coherent description of plans and reports**

### Deliverables
- **Coordination of Multiple Teams**
  - Large distributed projects offer many unique challenges
  - Leader must be clearly identified
- **Technical**
  - The tools generated as part of US JC3IEDM toolkit made working with this very complex model much easier

### Lessons Learned

### Status of Transition
- **Col Moore:** DMS will be fielded as part of first quarterly release after Intra Army Interoperability Certification (IAIC) – around Oct 09
- **The Reference Implementation will be included in the OneSAF 3.0 release**
- **Major benefit for efforts funded by CIO G6 and TEC that will define future Army, Joint, and Coalition use of BML**

### Diagram

![Diagram of FY 08 Combined Project](image_url)
Reference Implementation (RI) – provides Data Exchange Mechanism (DEM) like functionality to be accessed by Java APIs and web services

- Successfully provide what was proposed for 08
- Uses the US-JC3IEDM (JC3IEDM with extensions)
- XML data exchange between RIs
- Can be used as a data synchronization tool
- Connection into the RI via Java APIs and Web Services from remote locations (used this method to integrate all the components together concurrently with participants at 4 different locations)

• Added ability to “order” units in OneSAF via JC3IEDM (order originated via “BML”)
• DMS able to translate between JC3IEDM and PASS and exchange data, via DDS advertisements/subscriptions, with ABCS SWB 2+ MCS
• NOTE: Sensor Data Management also able to use the RI to provide correlated Observation reports via the JC3IEDM
Lessons Learned

**Coordination of Multiple Teams**
- Communication and documentation are key for success
- Requires participation/leadership of SIMCI Architect
- Project lead role requires significant amount of time
- Dependencies very hard to manage between programs with no contractual oversight
- In combined projects, very important to explicitly define interfaces, assumptions, schedules in excruciating detail to make sure all parties are on the same page and can deliver

**Technical**
- The classes provided by the SDK team are an important part of the RI. FY09 effort also depends on SDK and potential enhancements & bug fixes
- JC3IEDM is very complex and can be used multiple ways
- Design architecture needs to be documented early in process and then updated frequently

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**SIMCI FY08 Combined Project**

**Demonstration**
Operational Overview

M&S Community

C2 Adapter

US-JC3IEDM XML

Data Mediation Service

DDS XML

ABCS Community

DDS

DDS

FB 08 Multi-project Demo

C2 Adapter

OneSAF Mappers

Capes/JTCW

US-JC3IEDM XML WS and BML WS

C2 Adapter

OneSAF

SENSORS

SDMS

DDMS

DDS

DDS

BC Systems
Simulation-to-C4I Interoperability OIPT

US-JC3IEDM Reference Implementation (RI)

J2EE5 Container

- BML Web Client
- US-JC3IEDM Java Client
- US-JC3IEDM Web Client

BML Web Service

Web Service

US-JC3IEDM API

JAVA Classes

JC3IEDM API

JAVA Notification Service

Subscription

Announcement

US-JC3IEDM DB w/ BML Extensions

Business Object

Schemas, Mappings, & Interpreters

Message Topics

Announce

Announce/Ack

Announce

Put

Subscribe

Unsubscribe

Listener MDB

Announce

Unsubscribe

Announce/Ack

Listener MDB

Announce

Put

Subscribe

Unsubscribe

BML Web Service

Persistence Bean

Entity Beans (SDK Generated US-JC3IEDM classes w/ BML Extensions)

Validator Bean

API Call

API Call back

Web Request

Web Reply

US-JC3IEDM Java Client Y

US-JC3IEDM Web Client X

FY 08 US-JC3IEDM J2EE Reference Implementation (RI) Details
**SDK Operational Concept**

JC3IEDM Software Development Kit

- JC3IEDM 3.1c SQL Create Script
- JC3IEDM 3.1c SQL Sample Data Load Script
- JC3IEDM 3.1c MIRD SQL Create Script
- JC3IEDM 3.1c MIRD Business Rule Extension Script
- JC3IEDM 3.1c MIRD Business Rule Data Load Script
- JC3IEDM 3.1 Business Rules in OCL
- MS Access JC3IEDM 3.1c MIRD

**JC3IEDM Explorer**

- JC3IEDM Explorer Reference Application
- JC3IEDM 3.1c Web Services
- JC3IEDM 3.1c Java BO Classes
- JC3IEDM IE Schemas
- JC3IEDM 3.1c XML Schema

**JC3IEDM API**

- JC3IEDM API Implementation Tool
- JC3IEDM IE Schema Implementation Tool

**JC3IEDM IE**


**JC3IEDM XML Player**

- Business Rules in OCL

**JC3IEDM SDK Ref Impl.**

- MS SQL database schema create and sample data load scripts.
- Business rule MS SQL database schema extensions and business rule data load scripts.
- Tools for generating reusable .Net classes and XML schemas based on the MIRD.
- Reusable auto-generated .Net classes, custom UI .Net components and web services.

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**Validator Operational Concept**

Validation Using Generated Rule Components

- Client Application
- Working Memory
- Rule Repository
- Validation Core
- Rule Execution
- Error Repository
- Dependents/References/Related Data Objects

- DataObjects and Settings
- Data Objects
- Rule Components
- Rule with Data Objects
- Error Detail
- Exception Details
- JC3IEDM SDK Ref Impl.
SDMS Demo Architecture

BC

Asset/Resource Web Application

JBC2S UAV Camera Control

UAV Analog Video

SDMS SOA Layer

DCGS-A Web Services (JBOSS)

Sensor Control Service (SCS)

Sensor Control Service

Sensor Control Service

SDI Controller

SDMS Processes

DCGS-A Image/JBOSS 4.2.3

Extended SDMS and Simulation Processes

Level-1 Fusion Surrogate

UAV FLIR Camera Emulator

NVIG Virtual Video Source

Sensor Control Master

Sensor Control Service

MySQL

Sensor Resource Web Application

UAV Camera Control Application

JBC2S

JBC2SD

SDMS Hardware/Inter-Connect Diagram
Simulation-to-C4I Interoperability OIPT

Demo Concept

1. MCT PVD
2. Combined Project RI
3. C2 Adapter
4. CO +

XML/BML WS

Combined Project RI

BDG3

PASS

DIV

MCS

PASS

3b

3b

"路过"
DEMO SUMMARY

- Working Web Service Interface Between BC systems
- Working Web Service Interface between BC and M&S systems
- Automated Orders (tasks) through a BML Web Service (BC and M&S)
- JC3IEDM based
- Products planned to be included in Programs of Record (M&S and BC) in 2009.

SIMCI Combined Project FY09 Plan
**FY09 Combined Project**

**Project Sponsor Information**

- **PROJECT TITLE:** SIMCI09-Combined Projects (RCS-033 Extension of the C2 adapter, STDS-049 JC3IEDM Hardening, & RCS-031 Integrating Geospatial for Mission Context

- **SPONSORING/PROPOONENT AGENCY:** PM OneSAF, PM Battle Command

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### Combined Project (FY09)

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Deliverables</th>
<th>Risk Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose:</strong> Completion, hardening and additional functionality of the 08 Combined Project</td>
<td>Hardened and Enhanced:</td>
<td>Technical / Schedule:</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>• US-JC3IEDM Reference Implementation (RI) including Web Services &amp; Java APIs</td>
<td>• BML Hardening task will require some rearchitecture of JC3IEDM access</td>
</tr>
<tr>
<td>• Harden the 08 project deliverables to fielding quality</td>
<td>• Deployable ABCS data mediation service</td>
<td>• SDK &amp; Validator – not funded thru SIMCI next year. SDK funded thru CIO/G6, Validator thru PM BC. Will need support from both for 09</td>
</tr>
<tr>
<td>• Comply to required Security requirements (ABCS BCS)</td>
<td>• Common C2 Adapter translation mappings to / from JC3IEDM</td>
<td>• Schedule risk in that security requirements to live on BCCS may not be obtainable in the time period – working closely with PM BC BCCS team to mitigate</td>
</tr>
<tr>
<td>• Provide bi-directional “notification” services between differing JC3IEDM applications</td>
<td>• Battle Management Language interface with supporting service for a coherent description of plans and reports</td>
<td></td>
</tr>
<tr>
<td>• Augment BML to send orders &amp; reports as a single JC3IEDM object</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Expand the data to be exchanged via JC3IEDM to 6 BML reports (sitrep, personnel status &amp; 4 more tbd)</td>
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<td></td>
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<tr>
<td><strong>Issues/Concerns</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• None yet</td>
<td></td>
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</tbody>
</table>

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**Simulation-to-C4I Interoperability OIPT**
FY09 Schedule

09 Combined Project Milestone Chart

Summary

- Reference Implementation (RI) including Web Services & Java APIs:
  - Will be included in OneSAF 3.0 (release date tentatively first quarter 2009)
  - Will be included in the ABCS Data Mediation Service – planned to be on the BCCS by the end of 2009

- OneSAF and ABCS DDS Mappers will be included in the software products to be released

- Battle Management Language interface with supporting service will provide capability for coherent description of plans and reports
Scripted BML Web Services

Background

• Current approach to BML requires a Web service with JC3Iedm database
  – BML Orders and Reports can be pushed and pulled
  – Information is stored in standard way in JC3Iedm using well-defined mappings
  – Can be exchanged with other compliant systems using replication
• BML and JC3Iedm are still evolving
  – We need a straightforward way to generate new services and cope with changes

Motivation

• new BML constructs can be implemented and tested rapidly
• changes to the data model that underlies the database can be implemented and tested rapidly
• the ability to change the service rapidly reduces cost and facilitates prototyping
• the scripting language provides a concise definition of BML-to-data model mappings that facilitates review and interchange needed for collaboration and standardization
SBML Architecture

SBML Script Example

```xml
<call>
  <boName>TaskeeWhoPush</boName>
  <anchorTag>TaskeeWho</anchorTag>
  <parameter>
    <workingVariable>task_act_id</workingVariable>
  </parameter>
</call>

<BusinessObjectTransaction>
  <transactionName>TaskeeWhoPush</transactionName>
  <parameter>task_act_id</parameter>
  <tableQuery>
    <!--
    0 GET unit
    formal_abbrd_name_txt = TaskerWho
    result <- unit_id
    -->
    <databaseTable>unit</databaseTable>
    <queryAction>GET</queryAction>
    <resultName>unit_id</resultName>
    <columnReference>
      <columnName>formal_abbrd_name_txt</columnName>
      <businessObjectTag>UnitID</businessObjectTag>
    </columnReference>
  </tableQuery>
</BusinessObjectTransaction>
```
<tableQuery>
  <databaseTable>act_res_item</databaseTable>
  <queryAction>PUT</queryAction>
  <columnReference>
    <columnName>act_id</columnName>
    <workingVariable>task_act_id</workingVariable>
  </columnReference>
  <columnReference>
    <columnName>act_res_ix</columnName>
    <workingVariable>act_res_ix</workingVariable>
  </columnReference>
  <columnReference>
    <columnName>obj_item_id</columnName>
    <workingVariable>unit_id</workingVariable>
  </columnReference>
</tableQuery>

<BusinessObjectReturn >
  <BusinessObjectReturnElement>
    <tag>Result</tag>
    <literalValue>OK</literalValue>
  </BusinessObjectReturnElement>
</BusinessObjectReturn>
</BusinessObjectTransaction>
</BusinessObjectInput>