Integrated Battle Management Language (IBML) Architecture

IBML Reference Architecture V2.0

Final

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30 September 2009	1.0a	Initial Draft	GMU
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Reference Architecture Document

1. Introduction

There are many Army, Joint, and Coalition BML efforts completed, ongoing, planned, or proposed. Until FY09 there was no integrating overarching program to ensure that the Army receives maximum benefits from all of the ongoing and planned BML efforts. Since there is no single overarching BML program for development, these ongoing activities are at risk becoming divergent. In FY09, the US Army CIO/G6 funded a G3 sponsored BML Architecture effort to integrate and document a synchronized standard structure and set of products for BML developments.

1.1 Purpose

This document provides an initial architectural reference document for IBML, using one operational and one system architectural view, to capture and convey the significant architectural relationships that exist across separate BML initiatives. These depictions provide a framework for future technical and program analyses that will result in maximizing the benefits to the Army users, developers, and managers to ensure:

- That derived requirements were best prioritized
- That developments were compatible
- That technologies were well integrated
- That compliance with the ANCDS was achieved
- That this cross-functional, cross-MA, cross-domain area was an integral part of the Army Enterprise Architecture
- That the decisions on programs were aligned and in the best interest of the Army

1.2 Scope

The scope of this effort will be focused on Army WMA needs and will include defined Joint and Coalition capabilities. The focus will start with Ground Operations tasking-based formats for Orders, Plans, and Reports (including integrated geospatial information) and expand into non-tasking based information. This BML Reference Architecture Specification is one of several products under development for the IBML Architecture effort. The following additional products will be separately available to the IBML community during FY10:

- Technical Standards View (TV-1)
    - The purpose of this document is to provide the technical standards used as part of the IBML Architecture effort
- IBML Operations Order Schema
    - The purpose of this document is to provide a specification of the IBML Operations Order (OPORD) Schema. The eXtensible Markup Language (XML)-based OPORD schema has been defined as part of the IBML Architecture effort.
- Specification of Core BML JC3IEDM extensions, Operational View (OV-7) (Logical Data model)
    - The purpose of this document is to describe the United States (US) Joint Consultation, Command and Control Information Exchange Data Model (JC3IEDM) extensions required to represent the IBML data model.
- Systems and Services View (SV-11) (Physical Schema)

- The purpose of this document is to provide a description of the physical data model used as the basis for storing the I-BML data representation.

- Operational View OV-6c (Operational Event-Trace Description)
  - The purpose of this document is to provide a detailed description of the operational thread associated with the development of plans and orders within the context of the Military Decision Making Process (MDMP)
- System View SV-10c (Systems Event-Trace Description)
  - The purpose of this document is to provide a detailed description of the systems thread associated with the development of plans and orders within the context of the Military Decision Making Process (MDMP)
- JC3IEDM mappings to BML Schema
  - The purpose of this document is to provide a mapping of a representative instantiation of the IBML Operations Order (OPORD) Schema v1.0a to the Joint Consultation, Command and Control Information Exchange Data Model (JC3IEDM).
- IBML Web Service Specification
  - The purpose of this document is to provide a detailed description of the available method calls for accessing the I-BML data elements including the input parameters and output. Among these methods will be those used to get and put the entire OPORD as well as methods for accessing the engineered knowledge captured within the I-BML representation
- Specification of Engineered Knowledge for Stryker Brigade
  - The purpose of this document is to provide document the required knowledge that relates Units to Tasks and Tasks to Purposes for a specific US Army Brigade type.
- Reference script for the Scripted WS
  - The purpose of this document is to provide a reference script for a Scripted Web Service that implements the JC3IEDM mappings and IBML Web Service specification in a machine-readable format.
- Coordination plan for using results of on-going BML efforts
  - The purpose of this document is to define a coordination plan for extending and maintaining the results of ongoing BML efforts. This plan defines a repeatable configuration management process that any BML effort can participate in to produce results consistent with the community's standard.

There are 3 parallel BML efforts that are influential in this architecture:

- North Atlantic Treaty Organisation (NATO) Modelling and Simulation Group Technical Activity 48 (MSG-048): Coalition Battle Management Language (C-BML)
- Common Ground, Joint Capability Technology Demonstration (JCTD)
- Simulation to Command, Control, Communications, Computers and Information (C4I) Interoperability (SIMCI)

1.3 Definitions, Acronyms, and Abbreviations

Integrated Battle Management Language (IBML) – A collection of shared and integrated products and specifications that serve as a common foundation for the development and production of advanced command and control processes including orders, reports, and geospatial capabilities across BML stakeholders.

1.4 References

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- Levine, S., M. Pullen, M. Hieb, C. Pandolfo, C. Blais, J. Roberts and J. Kearly, "Joint Battle Management Language (JBML) Phase 1 Development and Demonstration Results," IEEE Fall Simulation Interoperability Workshop, Orlando, FL, 2007
- Schade, U. & Hieb, M.R., „Battle Management Language: A Grammar for Specifying Reports", Spring Simulation Interoperability Workshop, Norfolk, Virginia, March 2007
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2. Architectural Representation

2.1 Overview

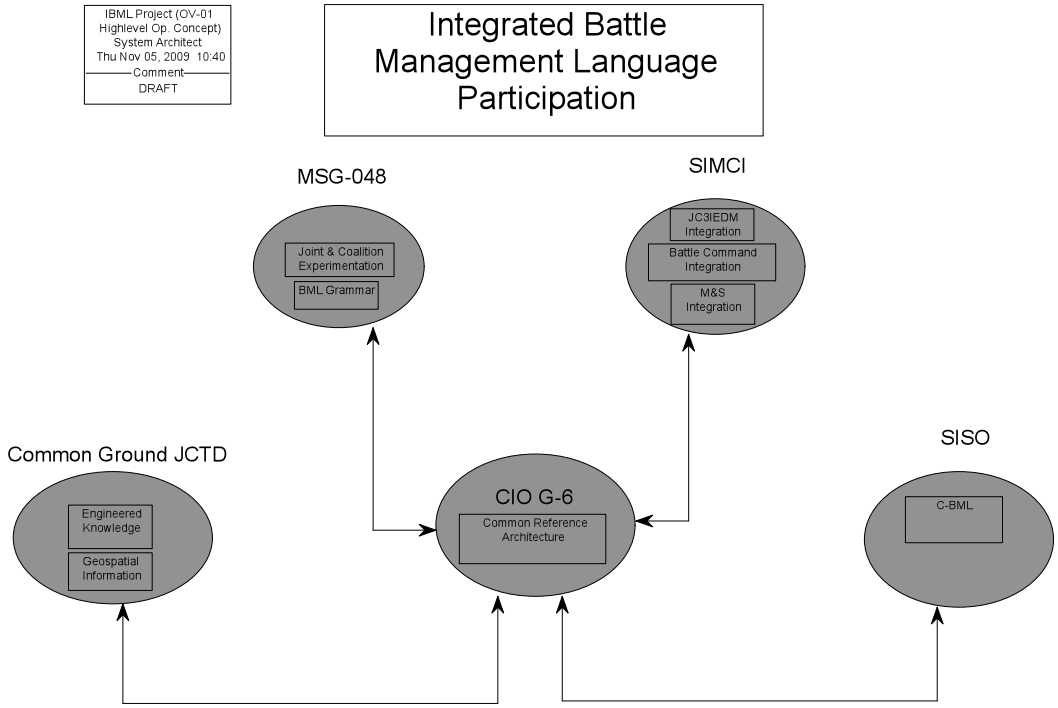
In DoDAF, the Operational View (OV) focuses on externally visible structure and behavior of the subject capability. Operational nodes and their relationships are described and dependencies reflecting mission requirements are identified, providing an overall context for enterprise definition and evolution. Realization of internal structure and behavior is the focus of the Systems View (SV), and incorporates a rigorous allocation of functional and non-functional requirements (from the Operational View) to both logical and physical system elements and interfaces. The focus of the FY09 BML Reference Architecture Specification is to provide an initial set of artifacts as a basis for continued stakeholder engagement: the Operational Concept Graphic (OV-1) and System and Services Interface Description (SV-1). The OV-1 and SV-1 artefacts are presented in detail in sections 3 and 4 respectively.

2.2 Architectural Goals and Constraints

The overarching goal of this architecture is to significantly improved Army, Joint, Coalition interoperability among C2 Systems and between C2 and M&S systems. It is expected that as this architecture matures the Army will realize:

- Improved accuracy and reduced processing time during Battle Command field operations
- Reduced time and cost to accomplish training
- Improved mission initialization

3. IBML Project [OV-01 Highlevel Op. Concept]



3.1 Overview

The OV-1 describes a capability and highlights interesting or unique aspects of operations. The purpose of OV-1 is to provide a quick, high-level description of what the architecture is supposed to do, and conveys what the architecture is about and an idea of the entities involved. The IBML OV-1 consists of a graphical executive summary with accompanying text and identifies the coordination of 4 entities reflected in the architecture.

3.2 Architecturally Significant Design Packages

3.2.1 CIO G-6

When published, the Army CIO/G-6 Reference Models will provide IBML architecture with an authoritative structure and definition of enterprise level entities. The five models cover the following domains: Business Reference Model (BRM), Performance Reference Model (PRM), Service Reference Model (SRM), Data Reference Model (DRM), and Technical Reference Model (TRM).

3.2.2 MSG-048

The MSG-048 Coalition BML Technical Activity is based upon voluntary contributions from Nations and provides insights regarding the usefulness of M&S-C2 interoperability and capability it can offer to coalition forces. The Objectives of MSG-048 are to evaluate the available specification of a Coalition BML and to assess operational benefits to C2 and M&S communities. This activity conducts experimentation with national existing systems that have been made compliant with the C-BML specification and provides input to SISO in standardizing and improving M&S-C2 interoperability for automatic, rapid and unambiguous command and control.

3.2.3 Common Ground JCTD

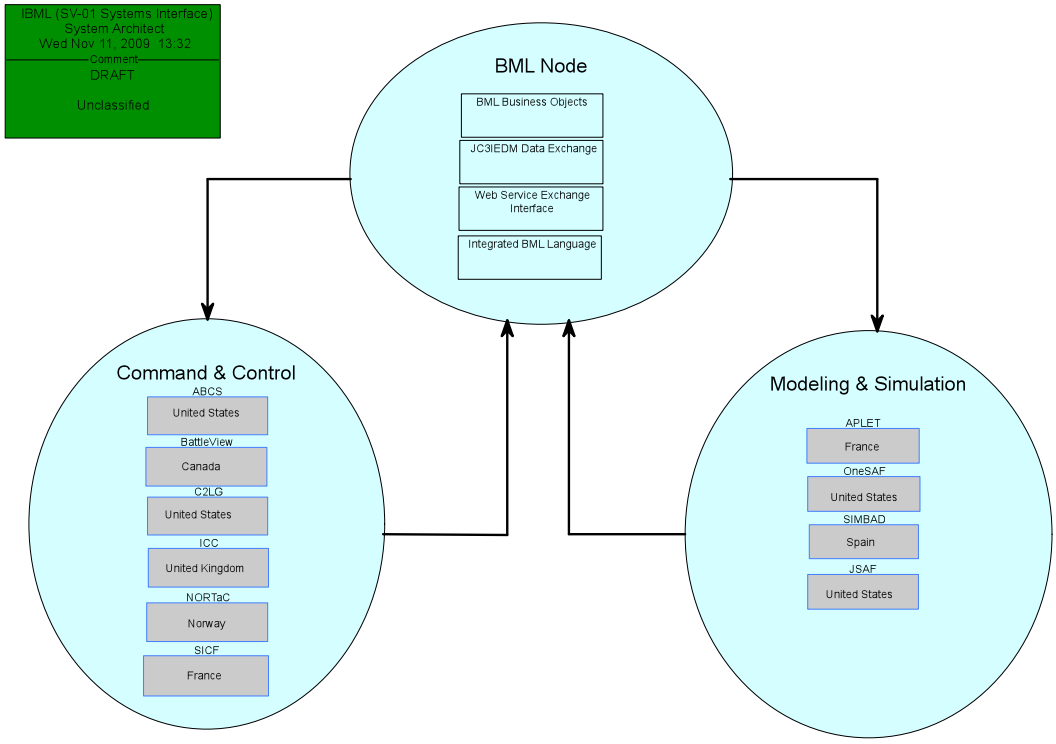
The objective of the Common Ground JCTD is to provide a common, shared operational capability that creates actionable geospatial information and intelligence, which can be integrated within Battle Command (C4I) processes. The intent is to implement this operational capability in a manner that is easily understood and used by geospatial, C2 and intelligence operators and to provision the capability to the Service, Joint, NATO and Coalition force in a framework which optimizes adoption accessibility and interoperability. The capability leverages BML based Engineered Knowledge which is a generalized Process that assumes tight coupling to the JC3IEDM data model in which the specifics of the domain is captured.

3.2.4 SIMCI

This effort provides Net-Centric Web Service based interoperability for the exchange of information between BC systems and with M&S systems. Ongoing development includes:

- 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

4. Integrated BML [SV-01 Systems Interface]



4.1 Overview

The SV-1 identifies the interfaces between systems and systems nodes. The initial version of this product only shows key interfaces. Future versions of this reference architecture will link together the OV and SV by depicting the assignments of systems and systems nodes (and their associated interfaces) to the operational nodes (and their associated needlines) described in an OV-2. The OV-2 depicts the operational nodes representing organizations, organization types, and/or human roles, while SV-1 depicts the systems nodes that house operational nodes and the corresponding systems resident at these systems nodes that support the operational nodes. OV-2 diagrams are not represented in this iteration of the Reference Architecture, but shall be included in future versions through the use-case process defined in the IBML Coordination Plan.

4.2 Architecturally Significant Design Packages

4.2.1 BML Server Node

The open and freely distributable BML Server Node and its various proposed extensions are intended to facilitate interoperation among command and control (C2) and modeling and simulation (M&S) systems by providing a common, agreed-to format for the exchange of information such as orders and reports. This is accomplished by providing a repository service that the participating systems can use to post and retrieve messages expressed in BML. The service is implemented as middleware, essential to the operation of BML, and can be either centralized or distributed. Recent implementations have focused on used of the Extensible Markup Language (XML) and Web service (WS) technology, consistent with the Network Centric Operations strategy currently being adopted by the US Department of Defense and its coalition allies.

4.2.2 *Command and Control*

The BML Operations Order Schema provides a doctrinally referenced Planning and Orders definition representing the 5 primary order paragraphs and other supporting information. The elements defined are presented in the following format: Header, Task Organization, Situation, Mission, Execution, Service and Support, Command and Signal, and Annexes.

4.2.3 *Modeling and Simulation*

The BML Reports Schema provides structure for a mechanism whereby human and computer agents can submit situational awareness reports for C2 systems using BML.