An Open Source MSDL/C-BML Interface to VR-Forces

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Presentation Outline

• Overview/Introduction
• BML and C-BML
• Scripted BML
• MSDL
• BMLC2GUI
• MSDL/C-BML Integration with VR-Forces
• Conclusions
Overview

• This paper reports on development of an experimental open source interface among
  Military Scenario Definition Language (MSDL)
  Coalition Battle Management Language (C-BML)
  MÄK’s commercial product VR-Forces
• Our intention is to grow this to a tool useful to the BML research community, resources permitting
BML: Definition

BML - an unambiguous language to:

Command and control live and simulated forces conducting military operations, and

Provide for situational awareness and a shared, common operational picture.

*Shared Semantics between C2 and M&S via a Common Tasking Description*
Generic BML Architecture

Command and Control Systems

BML Messages (Orders, Reports, etc.)

BML Web Services

Simulation Systems

JC3IEDM and other databases
C-BML Background

• Purpose: provide a common, agreed-to format for exchange of Orders/Requests/Reports between C2 and simulation systems
• Implemented using a repository where participating systems post and retrieve XML documents
  • Extended to publish/subscribe for efficiency
• SISO study group 2005
• Product development group chartered 2007
  • Phase 1 Standard package to be balloted soon
• Development informed by NATO Technical Activities MSG-048 and MSG-085
MSDL Background

- Grew out of need US Army OneSAF program
  - Reduce scenario development time
  - Re-use resulting scenarios
- XML-based military scenario format
  - Designed for use by current and evolving simulations
  - Prototyped within OneSAF 2001-2004
  - Spawned SISO Study Group
  - Product Development Group chartered 2006
  - SISO MSDL v1.0 standard approved 2008
MSDL Data Components

- Geographic Region of Interest
- Force/Sides
- Units
- Equipment
- Installations
- Overlays
- Graphics
MSDL/C-BML Convergence 1

• Task Organization definition
  • Also called Order of Battle (ORBAT)
  • Multiple competing formats exist
    • Including MSDL and C-BML
  • MSDL has a standard and implementations
  • C-BML does not address in Phase 1 Standard
    • Should use MSDL
    • Alternative: define units in JC3IEDM

• Requirements:
  • Name and type of each unit (including map icon)
  • Identify superior/subordinate unit relationships
MSDL/C-BML Convergence 2

• Tasking definition
  • Describes actions to be carried out
  • With their interrelations
  • And control measures
• C-BML has well-developed draft based on MSG-048 experience
  • MSDL has only a placeholder; should use C-BML
• Tactical Graphics: icon and descriptive data
  • Existing MIL STD 2525C and NATO APP-6C are adequate - MSDL and C-BML should use
Scripted BML (SBML) Server

• Developed by GMU C4I Center to support coalition activities such as MSG-048
  • Open source
  • Reference implementation for SISO C-BML
• Scripted server concept
  • New constructs can be implemented rapidly
  • Changes to BML and JC3IEDM applied quickly
  • Reduced cost for experimentation prototyping
  • Script provides a concise definition of BML to data model mappings
Open Source MSDL/C-BML Interface to VR-Forces
SBML Publish/Subscribe
Using SBML to Support MSDL

• When multiple systems participate in a coalition their MSDL files must be merged
• Previously this has been done by hand
• GMU C4I team created a script to do it
  • Required one new script primitive
• Participating systems submit their MSDL prior to initialization
• Server merges it and publishes on command
MSDL Server Operation

**Diagram Description:**
- **Administrator** initializes the system.
- **Client** adds units and relations.
- **Client** adds equipment and relations.
- **Administrator** publishes the data.

**Open Source MSDL/C-BML Interface to VR-Forces**
BML C2 GUI

Patterned after Fraunhofer-FKIE C2LG GUI
Usable as editor or monitor
Reads/writes Orders and Reports
Auto-configures to any BML schema
View and modify a BML-XML file
Map/image display shows 2525B icons from XML
Enters geolocation data in BML-XML file
Open source at http://c4i.gmu.edu/OpenBML
BML C2 GUI

Open Source MSDL/C-BML Interface to VR-Forces
BML C2 GUI : ORDER

Open Source MSDL/C-BML Interface to VR-Forces
BML C2 GUI: CONTROL FEATURES

Open Source MSDL/C-BML Interface to VR-Forces
BML C2 GUI and MSDL

- GUI interface has been expanded to include MSDL scenario files
  - Use of JAXFront form generation made this easy
- Scenario file presented in editable forms
- Geospatial information can be displayed and updated graphically
- Uses MIL-STD-2525B symbols
MÄK VR-Forces

• “powerful and flexible simulation environment for scenario generation … has all the necessary features for use as a tactical leadership trainer, threat generator, behavior model test bed, or Computer Generated Forces (CGF) application”
  -- MÄK Website

• Features:
  • C++ toolkit allows embedding in another application
  • Distributed simulation with remote GUI control
  • Aggregate unit and entity modeling
  • Supports HLA and DIS
  • Multiple terrain formats
  • GUI-based entity and parameter editing
VR-Forces Configuration
(from MÄK Website)
Example VR-Forces Layout

Open Source MSDL/C-BML Interface to VR-Forces
MSDL/C-BML Integration with VR-Forces

- Goal: open source capability
  - expand simulation options for BML community
- Achieved with Java bridging application
  - C-BML and MSDL input processed in Java
  - Receives input from subscription and maps it to Remote Controller commands
  - Creates units in VR-Forces when found in Order
  - C++ Remote Controller passes data to VR-Forces DtVrfRemoteController class
- Implemented “move” command using this
  - It works
- Seeking resources to build full interface
Integration Architecture

C-BML Server (e.g. SBMLServer) → Subscriptions → Published C-BML/MSDL → Bridging Application → Report and State Data → Entity States

C-BML Client (e.g. BML C2 GUI) → Orders & Reports → Responses & Published BML → Orders & Entities

Open Source MSDL/C-BML Interface to VR-Forces
BML Moving Unit in VR-Forces (1)
BML Moving Unit in VR-Forces (2)
C-BML Reports from VR-Forces

- BML requires Reports in addition to Orders
- Entity-state data is available from VR-Forces Remote Controller interface
- We plan to implement this function in the open source interface
Full Interface Project

• Complete mappings of all needed actions
  • About 150
• Implement MSDL initialization
  • Running without MSDL requires that all entities are pre-loaded into VR-Forces
  • Current implementation loads units when it finds them in the Order
• Implement Reports
Conclusions

• General MSDL/C-BML interface to VR-Forces is within reach

• Will be shared with community as open source
  • Intended to expand options for BML experimentation

• GMU C4I Center has prototyped interface
  • Seeking resources to complete it