Extensible Battle Management Language

Dr. Michael Hieb
Alion

Dr. Hieb is an Architect of the US Army Simulation to C4I Interoperability Overarching Integrated Product Team. He can be reached at (703) 933-3376.

Also on the XBML Team are:
Dr. Mark Pullen - GMU
Dr. Andreas Tolk - ODU
William Sudnikovich - ACS
What Is Battle Management Language (BML)?

BML is the unambiguous language used to:

- Command and control forces and equipment conducting military operations, and
- To provide for situational awareness and a shared, common operational picture.

Along with this definition, we offer four principles that guide our discussion of BML though this brief:

1) BML must be unambiguous.

2) BML must not constrain the expression of a commander’s intent.

3) BML must use standardized data representations.

4) BML must allow forces to communicate information pertaining to their mission, their status and their environment.
The Problem

- Currently, Command and Control is conducted primarily via verbal and textual means, formatted messages are used only in special cases
- The GIG will provide new abilities to communicate and collaborate
- Without standard Command and Control formats, this communication will be dependent upon human interpretation
- As such, it is incapable of transitioning to the full range of automation that the DoD is implementing and will not support the integration of advanced M&S with “digitized” command and control in the GIG.

The current BML is a loosely knit “language” lacking clearly delineated rules governing its use. Strict application of its meanings is not required due to the give and take between people which leads to an understanding of what is meant, not necessarily what is said. This is particularly true when one has not been precise enough to begin with, or has given conflicting information. As such it does not lend itself to supporting integration of our digitized command and control systems with simulations.
BML Representation - The 5Ws

This slide shows an example of a COA sketch. Imagine the graphics being linked to the BML. 1) we can interpret the overall division mission: “Division attacks on order in zone to seize OBJ SLAM” Note that in place of the general description of Division we could actually identify the specific division by knowing what machine we were logged onto and keying to the ORG ID. Also “on order” was selected as the when for this example since there is not enough information to determine otherwise. Normally the COA sketch would be accompanied by additional products such as the COA statement and if analysis is complete, a synchronization matrix. 2) we can determine the Division’s concept of operation. Since this is an offensive operation we are interested in the chosen scheme of maneuver, in this case a penetration. We can identify the main and supporting efforts as indicated. As well as the reserve, security and tactical combat force. Again without the additional products it is assumed that the Aviation Brigade is the reserve. It is also assumed that the Cavalry Squadron is performing a screen. The graphics shows it doing a security mission – by adding an S, a G, or a C to the graphic this would be clarified. 3) we can translate the graphics into specific tasks to subordinates as shown. This could all be linked to the proper paragraphs of the OPORD and completed through auto-fill.

Though the simulation may only be able to interpret the message, we can see that it would be fairly easy to include graphics into the BML and translate the graphics to populate the correct fields of a BML message.
An examination of the LC2IED shows that the 5Ws can be represented to support BML development.
Battle Management Language is intended to be used to exchange C2 Information (Orders and Situational Awareness (SA)) between:

1) Individuals using C4I Systems;
2) Simulations; and
3) Future Robotic Forces.

While C4I systems can exchange primarily free-text based C2 directives designed for human consumption, Simulations cannot consume such information. Instead, Simulations need a large “overhead” of trained military experts to translate C4I free-text orders into Simulation Commands.
This approach to building the BML into the C4I data model also points the way towards expanding the concept to accommodate joint and international interoperability. BML accommodates Doctrine explicitly in it's methodology.
The XBML project is currently focusing on taking an existing Army BML testbed and using SOAP/XML interfaces to develop a demonstration of XBML’s utility. The goal is to develop a testbed for “plugging in” C4I and Simulation systems.
What Is XBML?

XBML is BML provided as a Web Service via XML/SOAP and the C2IEDM.

XBML is being developed as an integral part of the Extensible Modeling and Simulation Framework.

Supporting Technologies include:

XMSF

C2IEDM

Structured Representation of Doctrine as in FDMS

Doctrinal Definitions and Task Lists:

Joint Level Definitions and Task Lists
  [e.g. Joint Pub 1-02 Dictionary of Terms
   Joint Universal Task List (UJTL)]

Service Level Service Definitions and Dictionaries e.g.

and Graphics

15, The Army Universal

FM 101-5-1 Operational Terms

Service Task Lists e.g. FM 7-

Task List (AUTL)
Critical M&S Initiatives for the GIG

- XBML
- XMSF
- Sharable M&S Components

Operational Node

Joint Transformation

M&S Node

Doctrine Developer

GIG
Backups

For more information on XMSF and XBML visit:

netlab.gmu.edu/xmsf/pubs
BML is Key Enabler for GIG Capable Forces

- **Network Centric**
  - Know precisely, in real-time, location of all friendly and enemy forces

- **Robotics Integrated into Force**
  - Amplify capability of manned elements
  - Multi-functional (RSTA, armed, sustainment)

- **Increased Reliance on Extended Range Engagement**
  - Organic plus strategic and tactical support
  - Long range ISR and precision fires

- **Capable of Air-Mobile Operations**
  - Commercial and minimum DoD strategic and tactical lift

The US Army is devoting much effort to defining requirements for a Future Combat System (FCS). Key to this is performing studies to analyze what C2 configurations and technologies will be needed. This slide portrays a configuration of FCS that is being used for C2 Analysis. The configuration shown is of 2 Infantry Carriers and 2 C2 vehicles with a crew of 4-6 people. The other vehicles are robotic, consisting of Scout Vehicles, Unmanned Ariel Vehicles, and Direct and Indirect Fire Vehicles.

Current Operations Orders will not support C2 requirements for these robotic forces. Neither voice (via radio) nor text-based directives, as used today, will be sufficient. Thus we have determined that there is a requirement for a digitized Battle Management Language.

We also note that the current requirement for Simulations to receive unambiguous, data-based orders is very similar to the requirements for a FCS force.
Army, Joint and NATO Doctrine Hierarchies

Similarities
- Hierarchies have Capstone/Keystone pubs
- Similar Staff Structures Staffs 1-6
- Consistency in Numbering