Low-level Battle Management Language

Anders Alstad, Ole Martin Mevassvik, Martin Normann Nielsen, Rikke Amilde Løvlid; FFI
Henk Henderson, Roger Jansen, Nico de Reus; TNO

Spring SIW
April 9\textsuperscript{th} 2013
San Diego, CA, USA
Low-level BML is a language for controlling computer generated entities

Objective

Our simulation system

Low-level BML
Our main objective is to make a simulation system which understands C-BML and MSDL.

C2IS: Command & Control Information System
MSDL: Military Scenario Definition Language
C-BML: Coalition Battle Management Language

*1: Figure copied from open source briefings under http://www.onesaf.net/community/
The simulation system consists of a multi-agent system together with a CGF tool.

Country specific military doctrine and tactics

True state: RPR FOM

Tasks, reports, scenario management: Low-level BML
Experiment Setup

Battalion Commander → C2IS → C-BML/MSDL → Orders, MSDL → Multi-agent System → CxBR or BDI → HLA → Tasks → RPR-FOM & Low-level BML

C-BML/MSDL → Orders, MSDL → Multi-agent System → CxBR or BDI → HLA → Tasks → RPR-FOM & Low-level BML

Reports

VR-Forces back-end

VR-Forces front-end

VR-Vantage
The multi-agent system uses a hierarchy of agents to decompose a C-BML order.
C-BML is not suitable for controlling computer generated entities

- **C2IS**
  - seize area 102

- **MAS**
  - set rules-of-engagement = fire-when-fired-upon
  - move into vee formation
  - move along route X
  - set rules-of-engagement = fire-at-will
  - move into line formation
  - move to area 102

- **CGF tool**

---

C-BML Low-level BML
We suggest Low-level BML as a standard language for controlling entities

- Independent of CGF tool and multi-agent system
- Reflect capabilities commonly found in COTS CGF tools
- Compact low-level commands easily interpreted by CGF tool
- Independent of doctrine and tactics
- Logistic reports and entity status reports
- Usable with HLA and/or DIS
## Language Constructs

<table>
<thead>
<tr>
<th>Scenario management</th>
<th>Commands</th>
<th>Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create entity</td>
<td>Wait</td>
<td>Spot report</td>
</tr>
<tr>
<td>Create aggregate</td>
<td>Move to location</td>
<td>Under fire</td>
</tr>
<tr>
<td>Create area</td>
<td>Move along route</td>
<td>Task completed</td>
</tr>
<tr>
<td>Create phase line</td>
<td>Move into formation</td>
<td>Entity fuel</td>
</tr>
<tr>
<td>Create route</td>
<td>Follow entity</td>
<td>Entity ammunition</td>
</tr>
<tr>
<td></td>
<td>Set rules of engagement</td>
<td>Entity in area</td>
</tr>
<tr>
<td></td>
<td>Set camouflage on/off</td>
<td>Entity crossed line</td>
</tr>
<tr>
<td></td>
<td>Subscribe to reports</td>
<td></td>
</tr>
</tbody>
</table>
We have represented Low-level BML with two different encodings

Extension of the RPR FOM / FOM module
   – Standardized way for defining new FOM structures

Wrap Low-level BML messages in existing Application Specific Radio Signal (RPR FOM / PDU)
   – Uses Google Protocol Buffers for serialization
   – Works with DIS and HLA
We suggest Low-level BML as a language for controlling entities independent of CGF tool.

We have made simulation systems which understands C-BML and MSDL.

The simulation systems consist of a multi-agent system together with a CGF tool.

C-BML is not suitable for controlling low-level computer generated entities.

Questions?