C-BML Phase 2
Standard Development Framework

Version 1.0
30 May 2012
C-BML Standard Development Framework

C-BML Standard Drafting Group Products

**Product 1 (Normative)**
- Information Exchange Structure & Content Specification
- C-BML Services Specification
  - Logical Data Model, XML Schemas, Grammar, Usage Rules
  - Definition of required & optional services for the exchange of information using C-BML

**Product 2 (Informative)**
- Guidelines Document
- Reference Implementation Description
  - Examples of how to construct valid expressions and messages; how to exchange information using C-BML
  - Example C-BML messaging service implementations that comply with the normative C-BML specifications.

A Standard Development Framework is required to build these products

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C-BML Standard Development Framework*

Overview

- Requirements: Mission threads, use-cases, derived requirements from stakeholders.
- Normative Specifications: Defines: (1) Content & Structure specification; (2) Services Specification.
- Specification Guidance: Examples that illustrate use of normative specifications for specific protocols.
- Reference Implementation: Technology-specific examples of how the standard can be implemented **.

*This work is based in part on the US Joint Intelligence Community/DoD Content Discovery and Retrieval (IC/DoD CDR) Model

**Out of scope for Drafting Group

C-BML Standard Development Framework

Overview

The C-BML SDF

- Defines a comprehensive model for requirements, domain-specific information products, information exchange interactions and service components.
- Separates normative and guidance documents.
- Provides a set of examples and usage guidance documents for technology-independent and technology-specific utilization.
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Requirements

Mission Thread

Operational Activity

Use Case

Information Flow

Operational Message is a Information Product

Information Object satisfies Information Requirement

Information Exchange Requirement

Consistent with Architecture Frameworks (AF):
- NATO AF... (NAF)
- UK MoD AF... (MoDAF)
- US DoD AF... (DoDAF)
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Reference Architecture Overview

- Requirements
- Reference Architecture
- Normative Specifications
- Specification Guidance
- Reference Implementation

Content Model

Message Framework

Vocabulary & Semantics

Grammar & Message Structure

Interaction Protocols

Service Components

Message interaction protocol definition and examples.

Service components for C-BML-based information exchange.

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Reference Architecture – Content Model

Who
- Thing
- Entity
- Facility
- GeospatialFeature
- GroupOfThings
- LivingThing
- Animal
- Person
- Materiel
- Equipment
- Organization

What
- Event
- Action
- CommunicationAct
- Property
- Capability
- PhysicalProperty
- Role
- SpatialRegion
- GeospatialRegion
- GeospatialBoundary
- GeospatialLocation
- 'Temporal Region'
- 'Temporal Boundary'
- 'Temporal Instant'
- 'Temporal Interval'

Where

When

Report/Task Primitives
- CommunicationAct
- Acknowledgement
- Assertive
- Directive
- Order
- Request
- RequestAction
- RequestInformation

Requirements

Reference Architecture

Normative Specifications

Specification Guidance

Reference Implementation

Content Model

Core

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Reference Architecture – Interaction Protocols

Represent military communications as interaction protocols using communicative acts:

- request
- refuse
- agree
- inform
- propose
- accept
- query
- subscribe
- etc...
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Service Components

- Requirements
- Reference Architecture
- Normative Specifications
- Specification Guidance
- Reference Implementation

Service Components:
- Content Model
- Message Framework
- Interaction Protocols

Core C-BML Services:
- Register
- Deliver
- Persist
- Initialize
- Publish & Subscribe
- Search

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1. Defines the basic vocabulary or lexicon comprised primarily of simple types;

2. Defines a set of complex types or constituents;

3. Provides a set of production rules or grammar for combining simple types and constituents to form expressions;

4. Establishes the business rules that ensure that expressions are well-formed, with respect to domain considerations and information exchange requirements.
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Information Exchange Structure & Content Specification

MESSAGE CONTENT
Assertive Expressions
Commissive Expressions
Directive Expressions

Who
- Thing
  - Entity
    - Facility
    - GeospatialFeature
    - GroupOfThings
    - LivingThing
      - Animal
      - Person
    - Material
      - Equipment
      - Organization
  - Event
    - Action
      - CommunicationAct
  - Property
    - Capability
    - PhysicalProperty
    - Role
  - SpatialRegion
    - GeospatialRegion
    - GeospatialBoundary
    - GeospatialLocation
  - TemporalRegion
    - TemporalBoundary
    - TemporalInstant
    - TemporalInterval

What
- CommunicationAct
  - Acknowledgement
  - Assertive
    - Report
      - EventReport
      - StatusReport
      - TaskReport
    - Commisive
      - RequestReply
      - AcceptRequest
      - DeclineRequest
    - Directive
      - Order
      - Request
      - RequestAction
      - RequestInformation
  - Declarative

Where

When

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Grammar Overview

Abstract Syntax for Message Content

Formal Grammars Definitions for C-BML

**Terminal symbol**: “word” defined as part of lexicon

**Non-terminal symbol**: combinations of terminals; or combination of terminals with other non-terminals.

**Start symbol**: a non-terminal symbol that indicates the beginning of the non-terminal definition.

**Production Rule**: specifies how symbols can be combined.

Example Terminal Symbols

- action
- unit
- Date
- line
- time
- target
- location

Example Non-terminal Symbols

- Task
- TaskOrg
- Start
- When
- Control
- Feature
- Command
- Intent
- Route
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Information Exchange Structure & Content Specification

Abstract Syntax Tree

Start symbol
ORDER

OrderBody
SpatialConstraint
TemporalConstraint

TemporalConstraint
StartWhen
(EndWhen)
start TempMod DateTimeValue end TempMod
DateTimeValue

SpatialConstraint
ControlFeatureType Tasker (Taskee) ControlFeatureID StartWhen (EndWhen) Label

OrderBody
TaskingVerb Tasker Taskee (Affected|Action) Where StartWhen (EndWhen) Mod Why Label

*Example adapted from C2LG - http://www.bastianhaarmann.de/download/c2lg_specification.pdf
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Information Exchange Structure & Content Specification

Abstract Syntax Tree

ORDER

(CommandIntent)

OrderBody SpatialConstraint TemporalConstraint

(KeyTasks) EndState (ExpandedPurpose)

Concrete Syntaxes

Semantically equivalent; Derived from abstract syntax
## C-BML Standard Development Framework

### Services Specification

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. A Service</strong></td>
<td>A Service is a set of functionality provided by one entity for the use of others.</td>
</tr>
<tr>
<td><strong>2. Services are conceptually autonomous</strong></td>
<td>Services are conceptually autonomous (self sufficient) and opaque (independent of underlying technology) in nature.</td>
</tr>
<tr>
<td><strong>3. There is no need to make architectural distinctions</strong></td>
<td>There is no need to make architectural distinctions between services consumed as part of a process vs. ones that are not.</td>
</tr>
<tr>
<td><strong>4. There is not always a one to one correlation</strong></td>
<td>There is not always a one to one correlation between “on the wire” requests to invoke a service and service responses being consumed.</td>
</tr>
<tr>
<td><strong>5. Each logical Service has exactly one canonical Service Description</strong></td>
<td>Each logical Service has exactly one canonical Service Description.</td>
</tr>
<tr>
<td><strong>6. A Service Description is comprised of three logical parts:</strong></td>
<td>A Service Description is comprised of three logical parts:</td>
</tr>
<tr>
<td>- Data Model - The logical expression of a set of information items</td>
<td>Data Model - The logical expression of a set of information items associated with the consumption of a service or services;</td>
</tr>
<tr>
<td>- Policy - Assertions and obligations</td>
<td>Policy - Assertions and obligations that service consumers and/or providers must adhere to or provide, and;</td>
</tr>
<tr>
<td>- Contract (and/or offer thereof) - the syntactic, semantic and logical</td>
<td>Contract (and/or offer thereof) - the syntactic, semantic and logical constraints governing on the use of a service.</td>
</tr>
<tr>
<td>constraints governing on the use of a service.</td>
<td></td>
</tr>
<tr>
<td><strong>7. A security policy is a specialized type of Service Description policy</strong></td>
<td>A security policy is a specialized type of Service Description policy noted above.</td>
</tr>
<tr>
<td><strong>8. Service Policy may mandate security requirements to be met</strong></td>
<td>Service Policy may mandate security requirements to be met, and if they are not, the interaction may be refused.</td>
</tr>
<tr>
<td><strong>9. A null security policy is still logically considered a policy.</strong></td>
<td>A null security policy is still logically considered a policy.</td>
</tr>
<tr>
<td><strong>10. A Service Description is advertised to consumers</strong></td>
<td>A Service Description is advertised to consumers on a fabric to make it discoverable.</td>
</tr>
<tr>
<td>**11. Discovery does not constitute authorization to execute against the</td>
<td>Discovery does not constitute authorization to execute against the service.</td>
</tr>
<tr>
<td>service.**</td>
<td></td>
</tr>
</tbody>
</table>
C-BML Standard Development Framework

Specification Guidance

Requirements
Reference Architecture
Normative Specifications
Specification Guidance
Reference Implementation

REFERENCE EXPRESSIONS AND MESSAGES
- ATO
- ACO
- ACMREQ
- AIRSUPREQ
- MISREP
- BDAREP
- OPORD
- FRAGO
- STATREP
- LOGSITREP
- SITREP
- OPGEN
- OPTASK

INTERACTION PROTOCOLS
Call For Fire

SERVICE COMPONENT DEFINITIONS

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Relationship between Normative & Guidance Specifications

**NORMATIVE SPECIFICATIONS**
- Content Model
- Message Framework
- Interaction Protocol Definition Rules
- Service Specifications

**APPLICATION OF NORMATIVE SPECIFICATIONS**
- Extensions
- Message Catalog
- Interaction Protocol Definitions
- Service Implementations

**Relationship between Normative & Guidance Specifications**
- Based on national doctrine and service specific procedures.
- Based on specific standard transport protocols.

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Reference Implementations are NOT part of the C-BML products delivered by the Drafting Group.

Reference Implementations are programming language-specific implementations of one or more of the Service Specifications.

C++, JAVA or other language APIs might be developed as part of Reference Implementations and subsequently may considered for standardization.
C-BML Standard Development Framework

- Requirements
- Reference Architecture
- Normative Specifications
- Specification Guidance
- Reference Implementation

Questions?