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Joint Battle Management Language (JBML) - US Contribution to the C-BML PDG

Pullen, J. Mark; Hieg, Michael R.; Levine, Stan; Tolk, Andreas; Blais, Curtis

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Dr. J. Mark Pullen
Dr. Michael R. Hieb
Dr. Stan Levine
C4I Center
George Mason University
Fairfax, VA

Dr. Andreas Tolk
VMASC
Old Dominion University
Norfolk, VA

Curtis Blais
MOVES Institute
Naval Postgraduate School
Monterey, CA

Who is Part of JBML Phase I

- Mr. Michael Powers, TEC, Program Manager
- Dr. Mark Pullen, GMU, Project Lead
- Dr. Stan Levine, GMU, Project Manager
- Dr. Michael Hieb, GMU, Technical Lead
- Dr. Andreas Tolk, ODU, Standards Lead
- Dr. Harry Keeling, HU, Testbed Lead
- Mr. John Roberts, ACS, Ground Lead
- Mr. Curt Blais, NPS, Maritime Lead
- Mr. David Perme, Gestalt, Air Lead
- Mr. John Kearley, DRC, Scenario Lead
- Ms. Shea Smith, JATTL, JFCOM Coordinator

Structure of the Presentation

- History of JBML / Relation to other BML Efforts
- JBML Architecture
  - Layers of JBML Services
  - BML Domain Configured Services
  - BML Base Services
  - BML Common Data Access Service
- Anticipated Results
- Contributions to C-BML

History of JBML

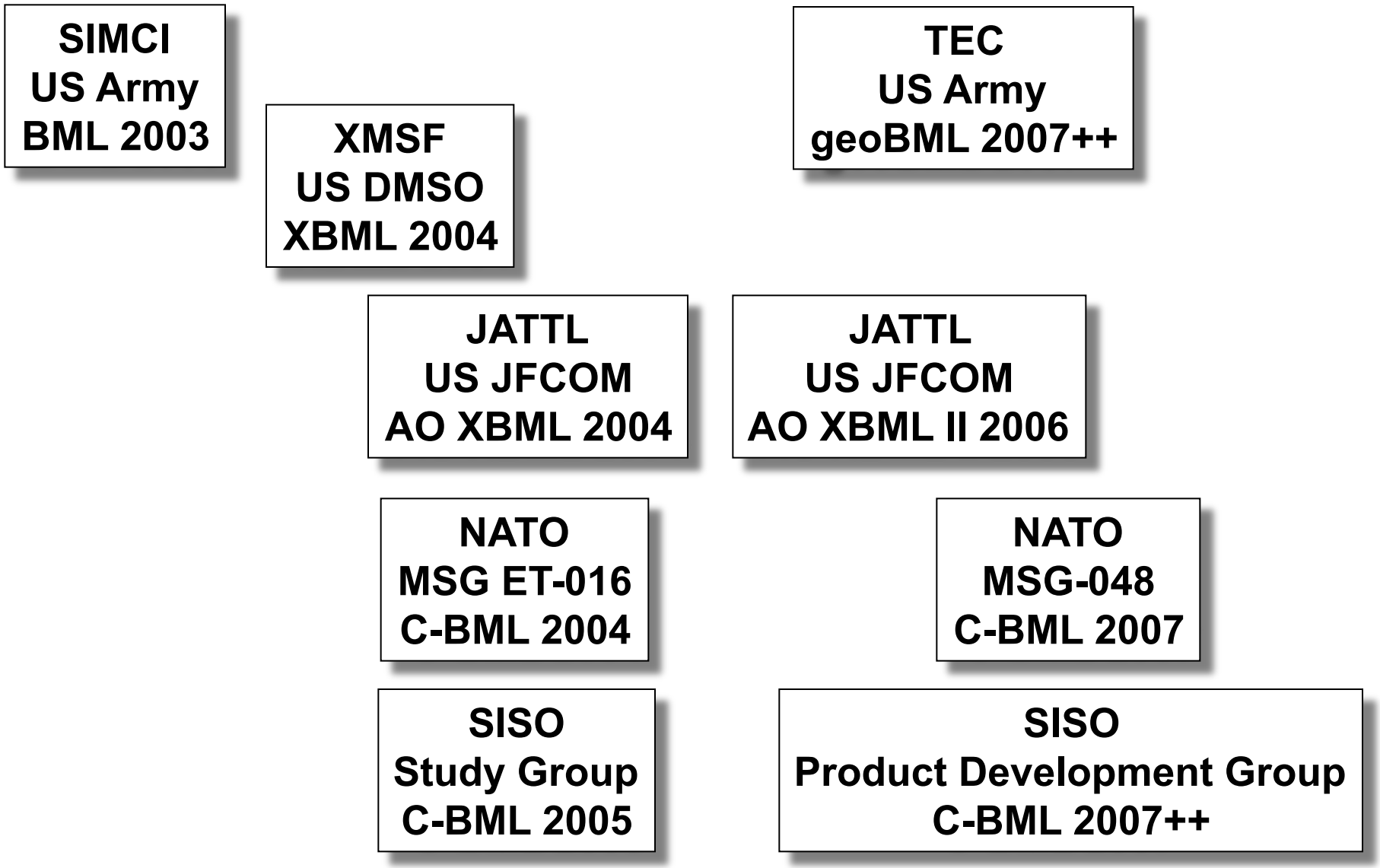
Relationship to other BML Efforts

Objective of Current Efforts

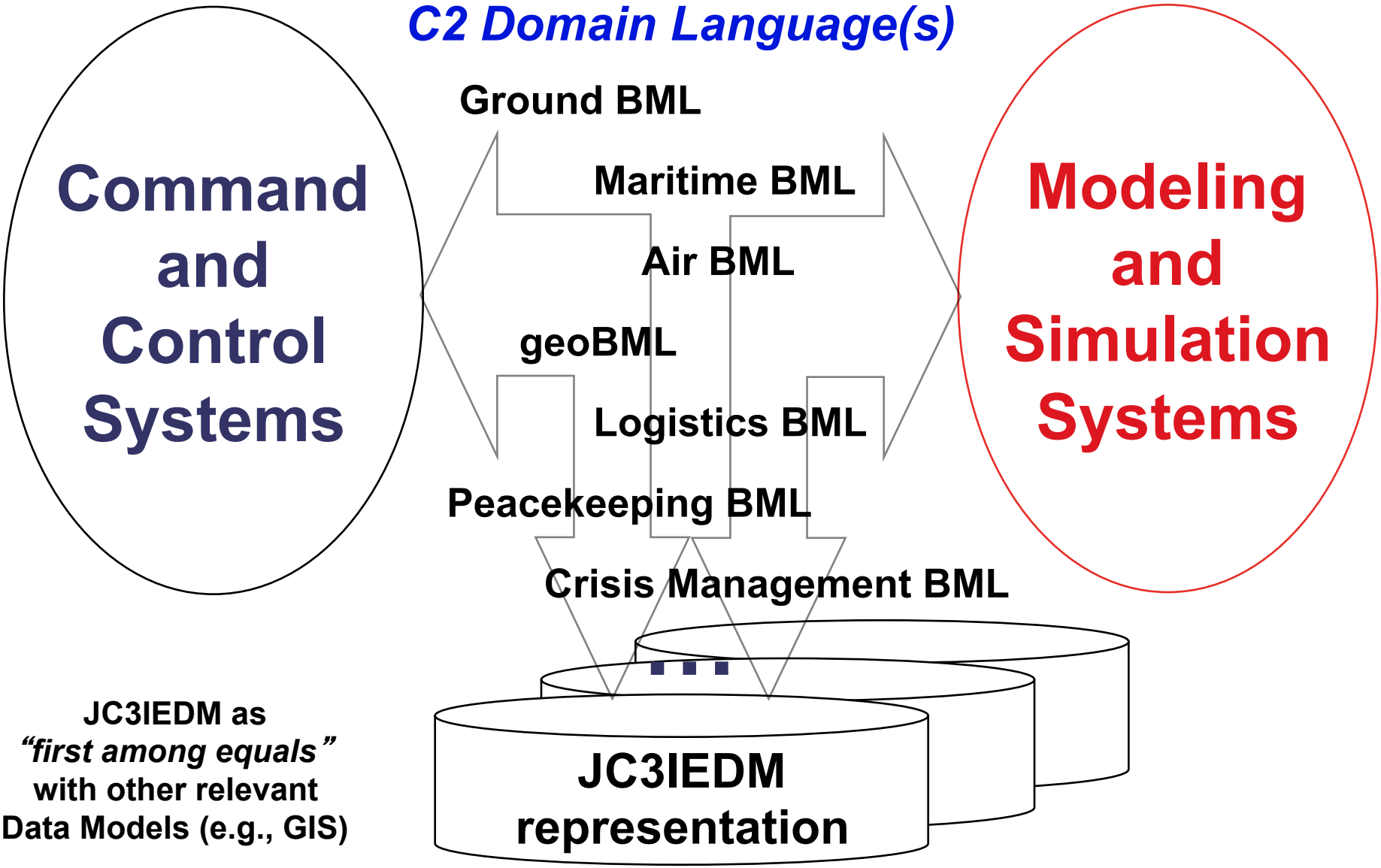
- Build and demonstrate
  - an initial Joint Battle Management Language Capability
  - to transmit Digital Orders to Joint (and Combined) Forces
  - using a Battle Management Language Specification

(Proof of Principle for JBML)

Genealogy of JBML



JBML Vision



JC3IEDM as *"first among equals"* with other relevant Data Models (e.g., GIS)

Tasks in JBML

- Show Joint BML
  - Ground BML
  - Air BML
  - Maritime BML

  in one common language
- One (Joint) Language with several (Service specific) interoperating domains
  - Common components for shared information
  - Service-specific components for unshared information
  - Shared common controlled vocabulary (based on the JC3IEDM definitions)
  - Lexical (regular) grammar for the Joint Language

JBML Architecture

Layers of JBML Services

BML Domain Configured Services

BML Base Services

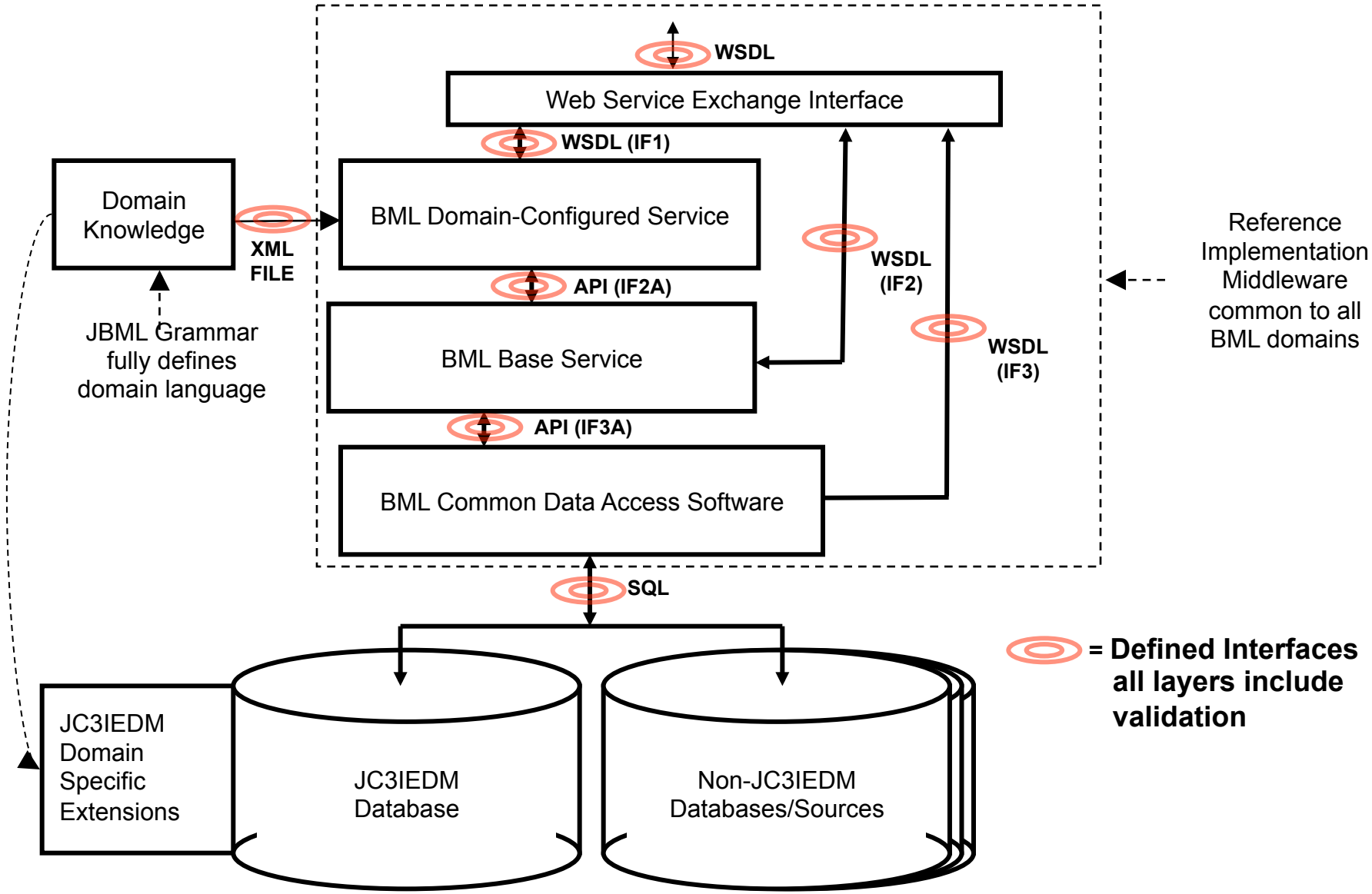
BML Common Data Access Service

Earlier C-BML Recommendations

- Web Services for C-BML Protocol
- JC3IEDM for C-BML Representation
- Grammar to capture C-BML Doctrine
- Ontology to capture C-BML Doctrine
- Layered Web services
  - Atomic web services for propertied concepts (tables)
  - Composite web services for associated concepts (view, transactional)
  - Aggregate services for system access (data mediation)

JBML supports these ideas and modifies them to fulfill the objectives of the project

JBML Service Architecture



Web Service Overview

- The **BML Domain Configured Services (DCS)** represent the domain-specific language in form of schemas, inspired by grammar-based research, that are implemented by Web services (IF1)
- The grammar uses the **BML Base Services (BBS)** which represents the information element groups that are necessary to specify the information objects of interest, such as the 5Ws (who, what, where, when, why) and other constructs of interest (IF2)
- The lowest layer represents the information exchange of information elements. This layer is normally hidden from the user. In JBML, these are **BML Common Data Access Services (CDAS)** (IF3)

BML Domain Configures Services (DCS)

- The DCS will be implemented in the Document-Literal mode by a generic Web service that is driven by an XML schema
- The entire existing BML grammar will be formally described in terms of a number of primitives, that are labeled with

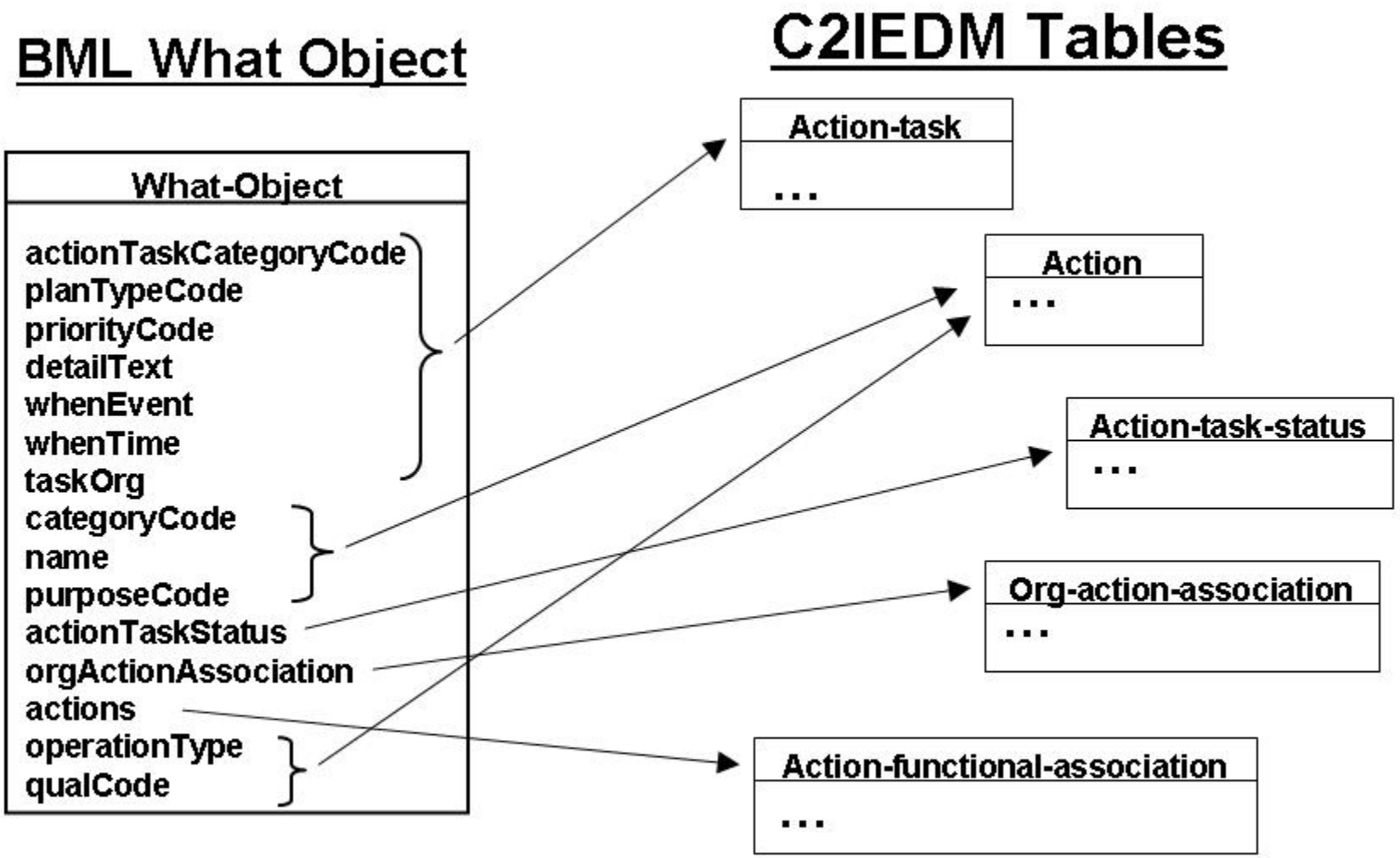
<command> (verb)
<taskee-who>
<what> (action)
<start-when>
<why>
<modifier>
<tasker-who>
<affected-who>
<where>
<end-when>
<label>

- These primitives are represented in the BML Base Services
- The Domain knowledge produces
  - the XML file defining the DCS information
  - extensions to representing data models (such as JC3IEDM)

BML Base Services (BBS)

- BBS provides composite BML elements – such as Who, What, When, Where, and Why – as primitives to the DCS
- Other elements may be introduced for new and existing BML domains as required
- The BBS accesses all of the database tables relating to the composite elements through software that implements the Common Data Access Services
  - Mapping between BBS data elements and CDAS data elements
  - Data mediation – where needed – within the implementing web services
- The standard at this layer will identify the information objects exposed by the database tables to be updated for each BML information element and the validation conditions to be applied

XBML Example of Mapping



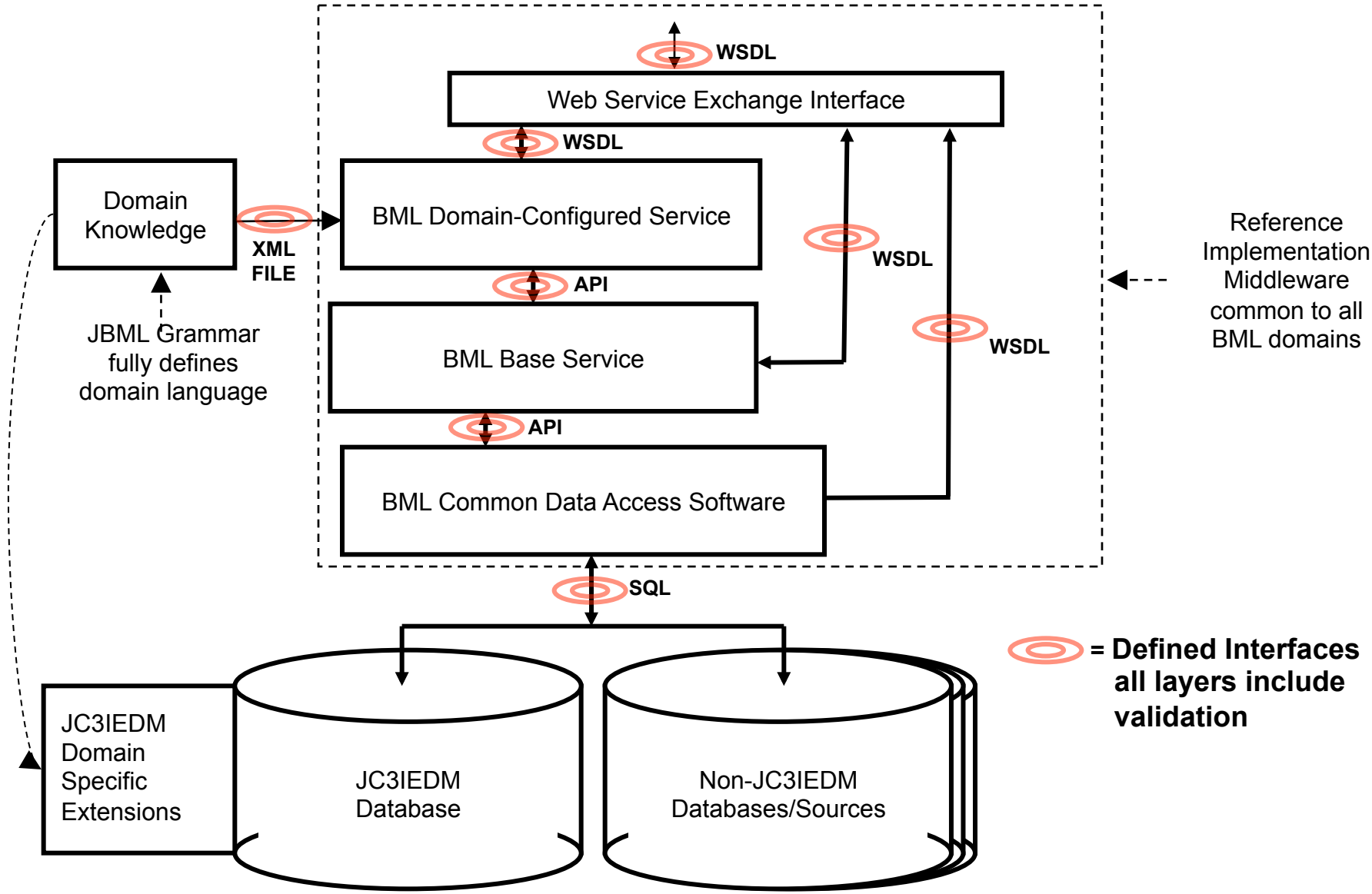
Common Data Access Services (CDAS)

- Provide a mechanism for the BBS to both read and update the database tables directly
- For testing and debugging purposes, an inspection mode is implemented
- Generic web service for data access
  - Parameter: table name and attributes
  - Advantage of generic service
    - Efficient access to the JC3IEDM database
    - No updates needed if data model is extended
  - Disadvantage of generic service
    - Data validation only at higher layers
    - Can't provide JC3IEDM interface without database
- Use of database supports asynchronous access (good for development) but precludes faster synchronous C2-simulation connect

JBML Data Representation

- Joint Command, Control and Consultation Information Exchange Data Model (JC3IEDM)
- Extensions and Enhancements derived from the Domain Knowledge
- Additional operationally relevant data models – such as used within Geospatial Information Systems – may be used in addition to the JC3IEDM
- BBS collective update of all tables associated with a given business object (who/what/when/where/why etc) via CDAS ensure consistency
  - Don't allow BBS transactions to be interleaved – can result in inconsistent database state
  - If update is impossible, roll back to original state

JBML Service Architecture

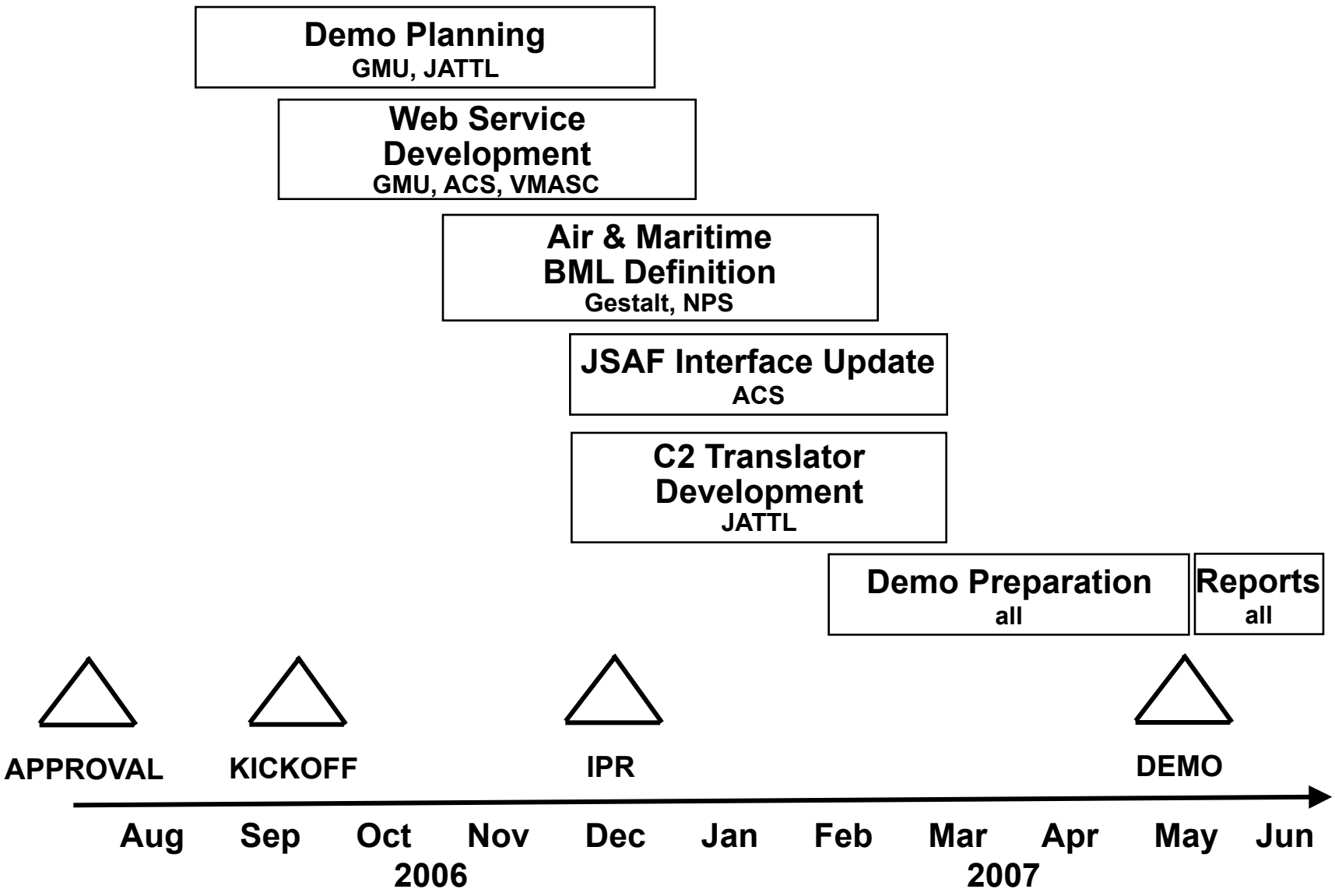


Anticipated Results

Where are we

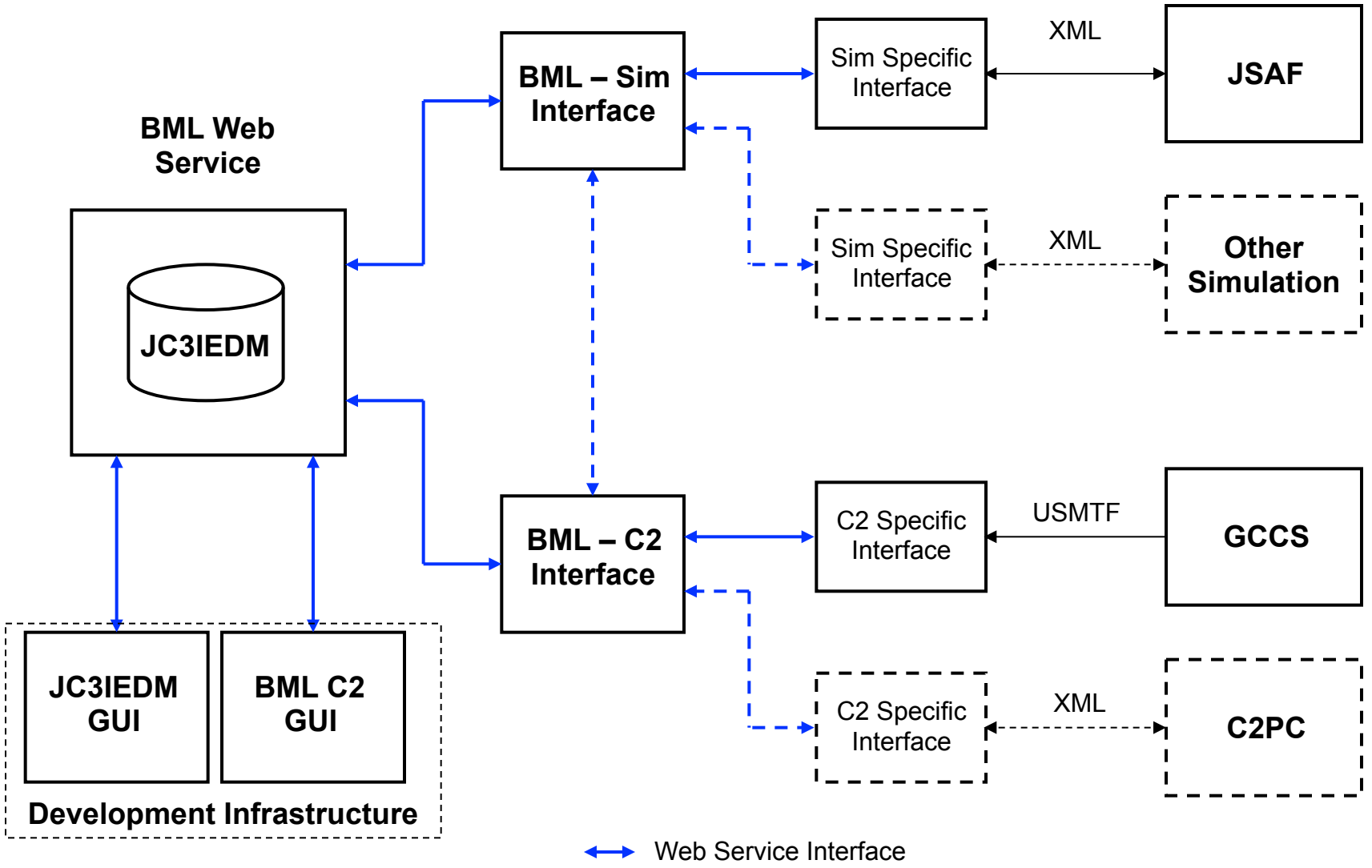
Where do we want to go

JBML Phase 1 Plan



BML Demo Environment Architecture

from ACS



JBML Principles

- JBML embraces the concept of standards-based interoperability
- No custom engineering of each system-to-system interface required
- Assembling a rational language standard that rests on commercial standards (XML, SOAP, Web services, etc.)

Summary

Contributions to C-BML

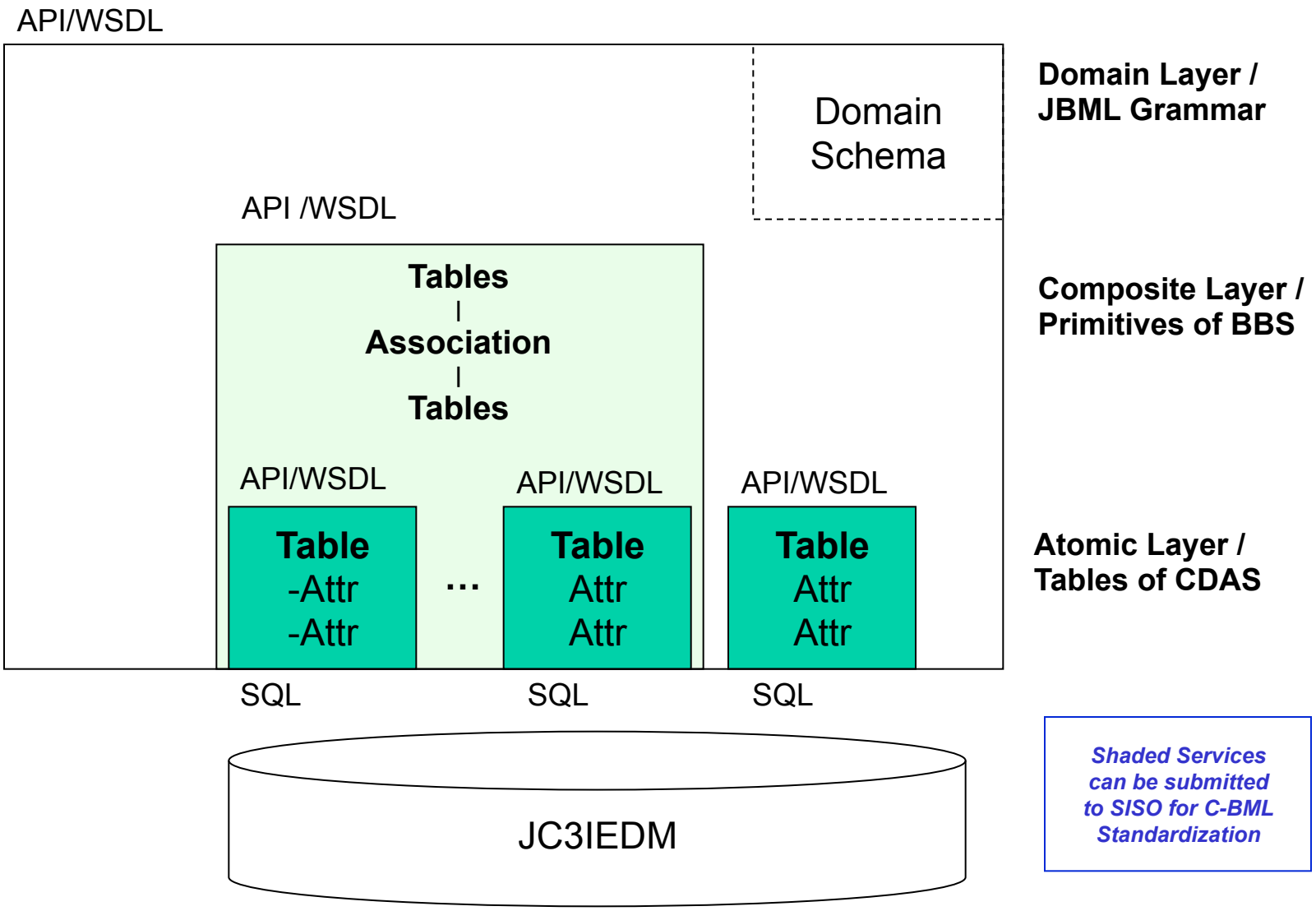
What can C-BML get from JBML

- The immediate contribution of the JBML project to C-BML is the service architecture
- The JBML architecture will provide a regular and extensible framework upon which a powerful, flexible and growing family of standards can be created
- Contributions on all identified layers
  - Primitives of the DCS
  - BBS as applicable in the SISO context and
  - CDAS (potentially with transient implementations)
  - Recommended extensions and alternative data models
- JBML Web services are open source

Web Service Infrastructure

- The JBML Web services are available as experimental infrastructure to create a reference implementation of C-BML
- While JBML is designed to exchange information with C2 systems and simulations at the top (DCS) layer, we recognize that C–BML needs to offer flexibility of interfacing
  - Comply with standard by interfacing at any layer
- The JBML Web services therefore will be configurable to expose all three layers
  - Can be configured (and, if necessary modified) to create a reference implementation at every layer

Possible Components for C-BML



Other 07S-SIW papers of interest

- JBML is leading edge research, so different schools of thought are still evaluated:
  - *Blais C and Jensen J (07S-SIW-040) A Maritime Component for the Joint Battle Management Language*
  - *Diallo SY and Tolk A (07S-SIW-099) Adaptive Generative Grammar for JC3IEDM Web Services*
  - *Hieb MR and Schade U (07S-SIW-036) Battle Management Language: A Grammar for Specifying Reports*
  - *Turnitsa C, Blais C, Tolk A (07S-SIW-028) Filling in the Ontology Space for Coalition Battle Management Language*

Questions

C4I Center

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