Technical and Operational Issues in Combining MSDL and C-BML Standards for C2-Simulation Interoperation in MSG-085

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Presentation Overview

- Introduction/overview
- MSDL and C-BML background
- MSDL and C-BML alignment
- MSG-085 requirements
- Coalition Server
- Client implementations
  - ICC, JADOCS, JSAF, NORTaC-C2IS, OneSAF
- Way forward for MSG-085 and MSDL/C-BML

Introduction/Overview

- Goal: interoperation of C2IS with simulations
  - Shown by MSG-048 to have high potential value
  - Coalition training, COA evaluation, mission rehearsal
  - A focus of Simulation Interoperability Standards Organization
- Military Scenario Definition Language (MSDL)
  - Standardizes initialization of simulation systems
  - Recently shown also to be useful with C2 systems
- Coalition Battle Management Language (C-BML)
  - Orders, Requests, and Reports among C2 systems / simulations
  - Building block: Task (who/what/when/where/why) + its status
  - Intended for use by international coalitions
- The two must work together
  - This paper addresses their convergence in NATO context

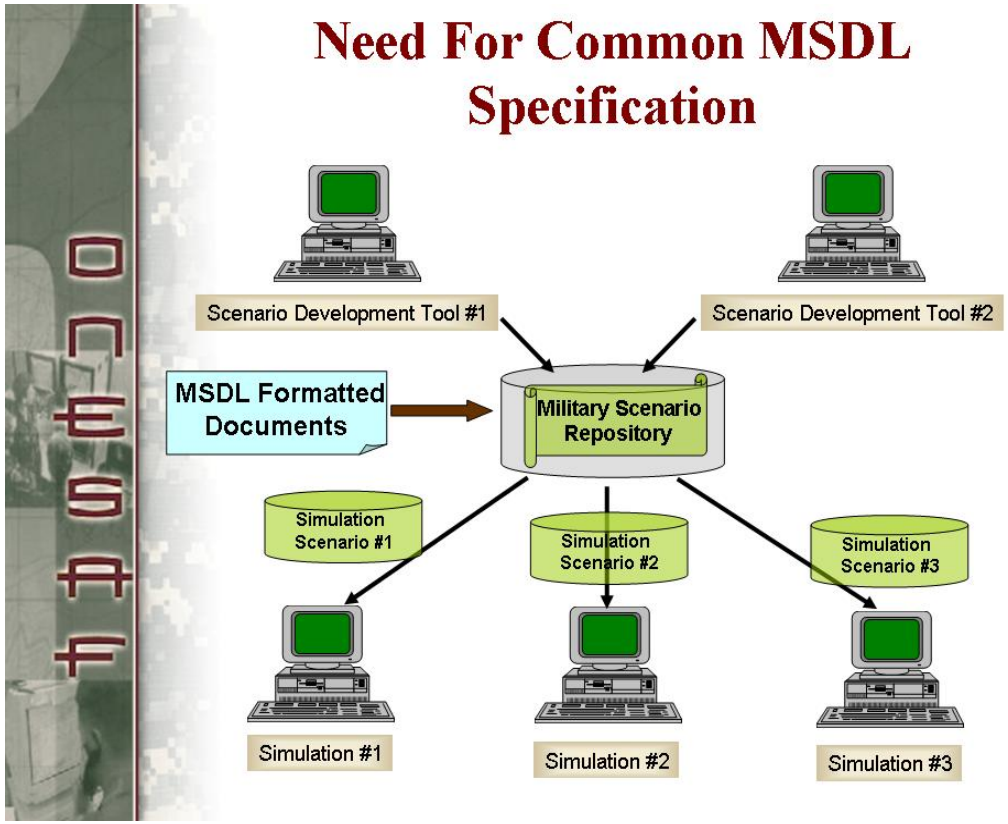
MSDL Background

- Grew out of need in 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

Why Use MSDL Data Format

Import Format versus Native Format

- **Allows MSDL and specific simulation initialization native formats to evolve at their own appropriate pace.**
- **Allows simulations to define specific information needs.**
- **Allows consistent scenario starting point for specific simulation initialization**



MSDL Data Components

- Geographic Region of Interest
- Force/Sides
- Units
- Equipment
- Installations
- Overlays
- Graphics
- Military Operations Other Than War

BML: Definition

BML - an unambiguous language to:

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

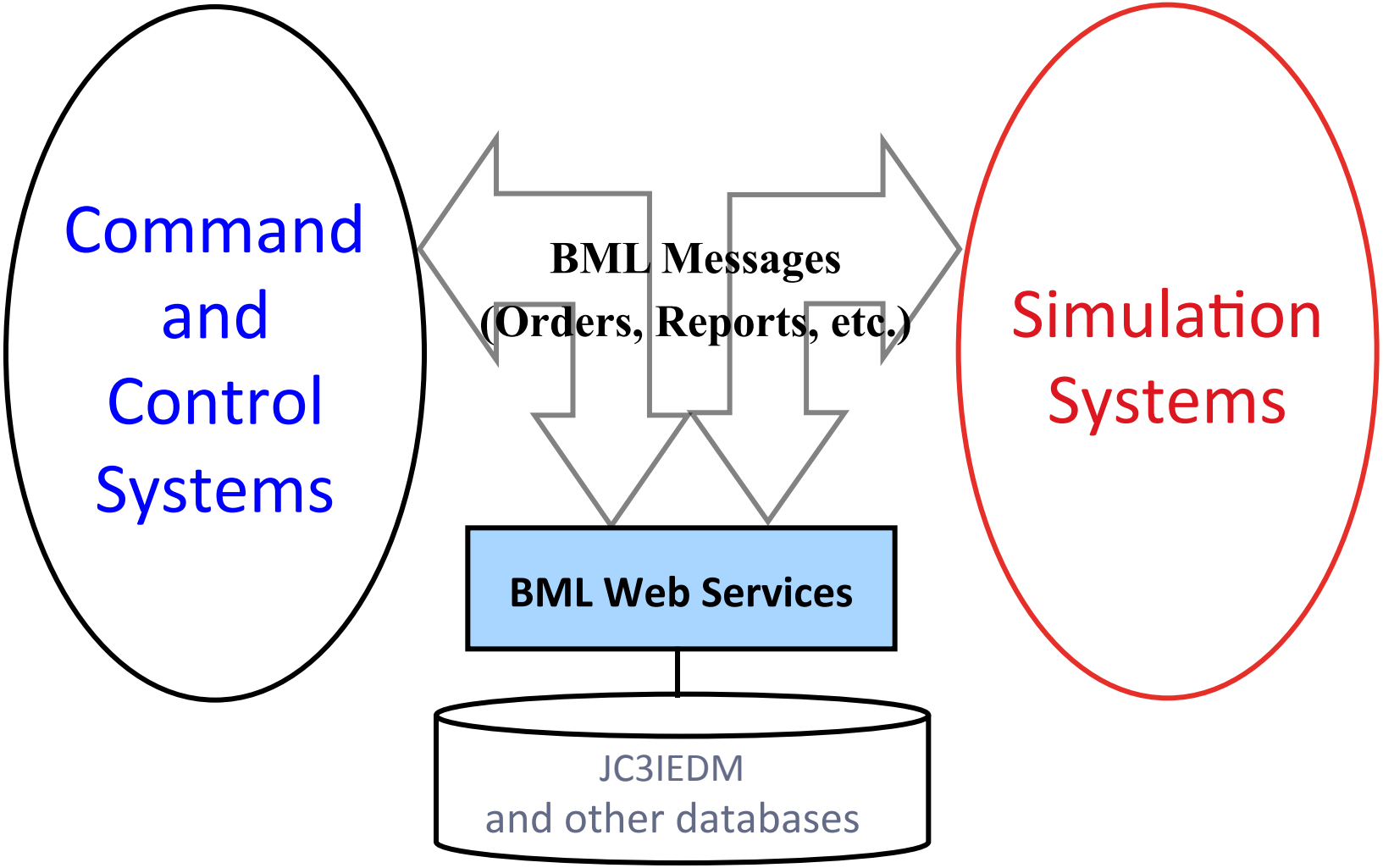
Provide for situational awareness and a shared, common operational picture.

Shared Semantics between C2 and M&S via a Common Tasking Description

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

Generic BML Architecture



MSDL/C-BML Alignment 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
    - Could use MSDL standard
  - 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; could use C-BML
- Tactical Graphics: icon and descriptive data
  - Existing MIL STD 2525C and NATO APP-6C are adequate - can support MSDL and C-BML

Requirements for Combined MSDL/C-BML

- SISO product development groups are working to converge the two standards
- Key distinction:
  - MSDL is for initialization
  - C-BML is for tasking and situational awareness
- Solution: provide a common way to represent military forces that supports both of these
  - Must allow for dynamic change to Task Organization
  - Allow wide range of units and equipment
  - Remain compatible with existing Tactical Graphics standards

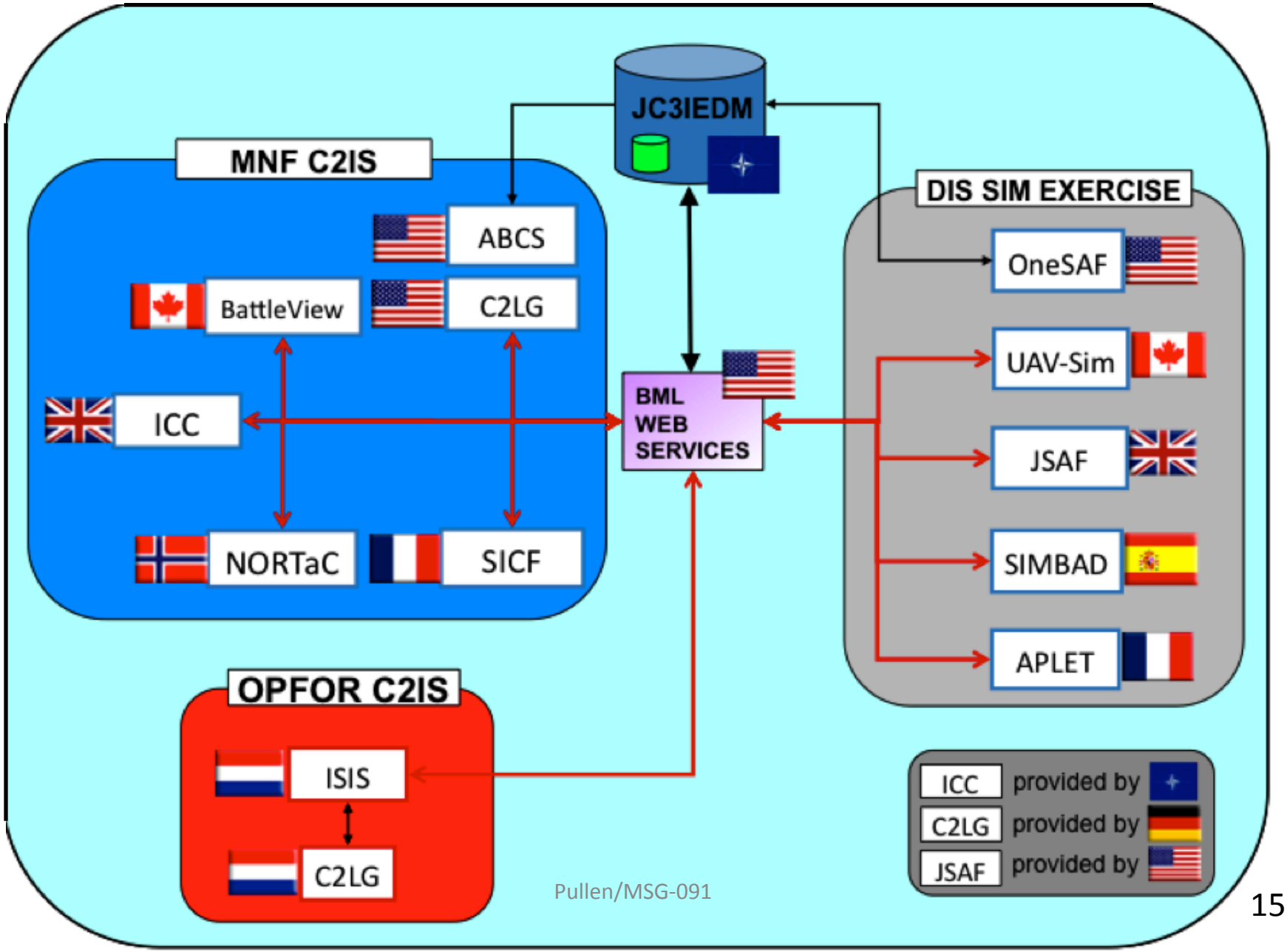
General Referencing Approach

- Defined across MSDL & C-BML development groups
- Evaluated in simulation federates (e.g. OneSAF)
- MSDL unique identifier that also is usable in C-BML and tactical Graphics
- Used in all C-BML expressions:
  - Orders, follow-on FRAGOs, Tasks, Requests, Reports
- MSDL instance document provides key for all references
- Initial results: approach works well

BML in NATO
Modeling and Simulation Group

- MSG has been nexus for BML cooperation
- US Joint BML project with France Aplet
  - Early demonstration 2006
  - Led to Exploratory Team 16
- MSG-048 Technical Activity started 2007
  - Demonstrations at I/ITSEC 2007 and 2008
  - One-week experimentation 2009 (9 nations)
- MSG-085 Technical Activity started 2010
  - Goal: operational use of MSDL/C-BML (12 nations)

MSG-048 2009 Architecture



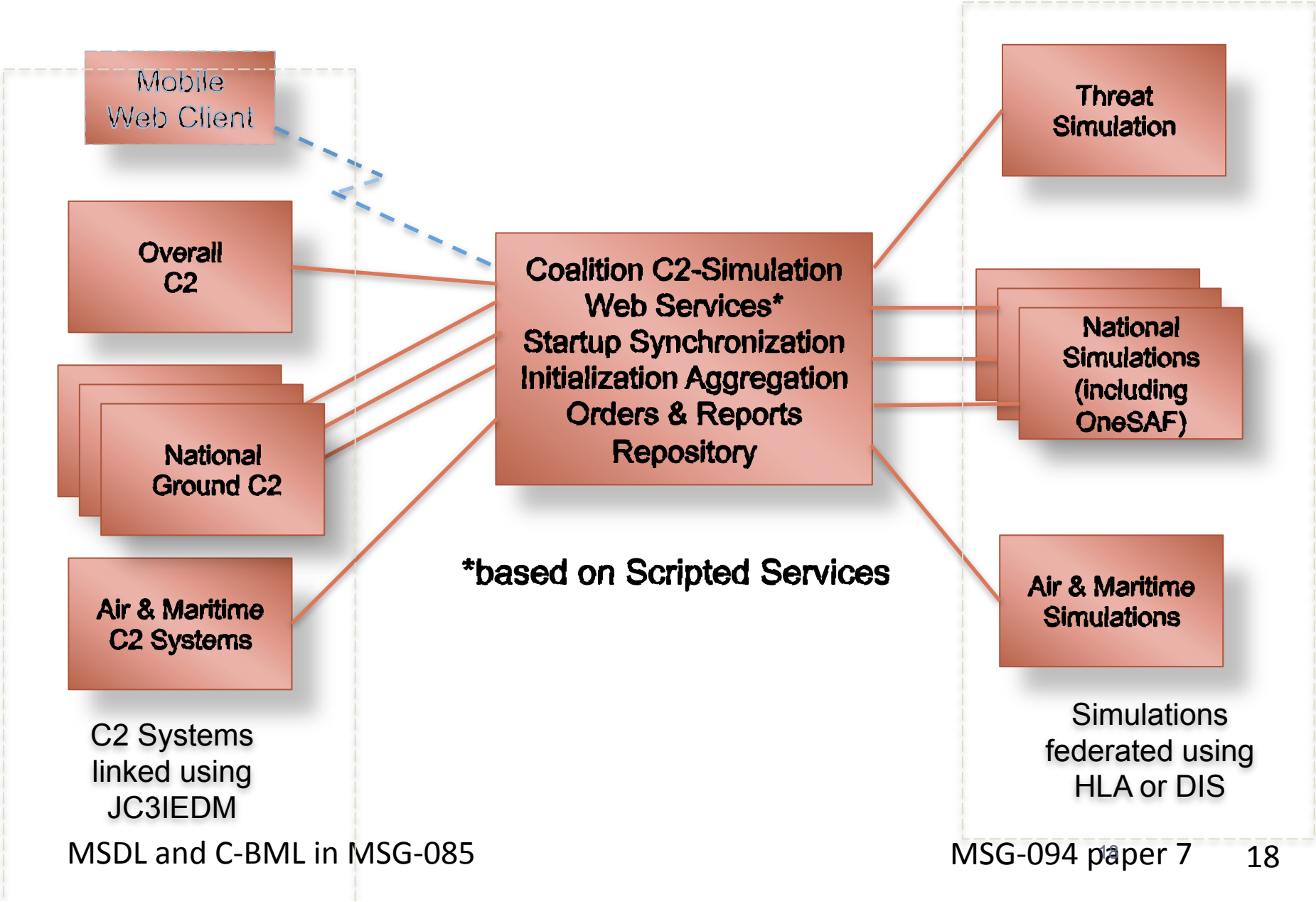
MSG-085 Mission Statement

*"Assess the **operational relevance** of *C-BML while contributing to C2-Simulation standardization and assist in increasing the **Technical Readiness Level** of *C-BML technology to a level consistent with **operational employment** by stakeholders."*

**Including the complementary use of MSDL for initialization*

Supporting Server Software

Coalition C2-Simulation Architecture



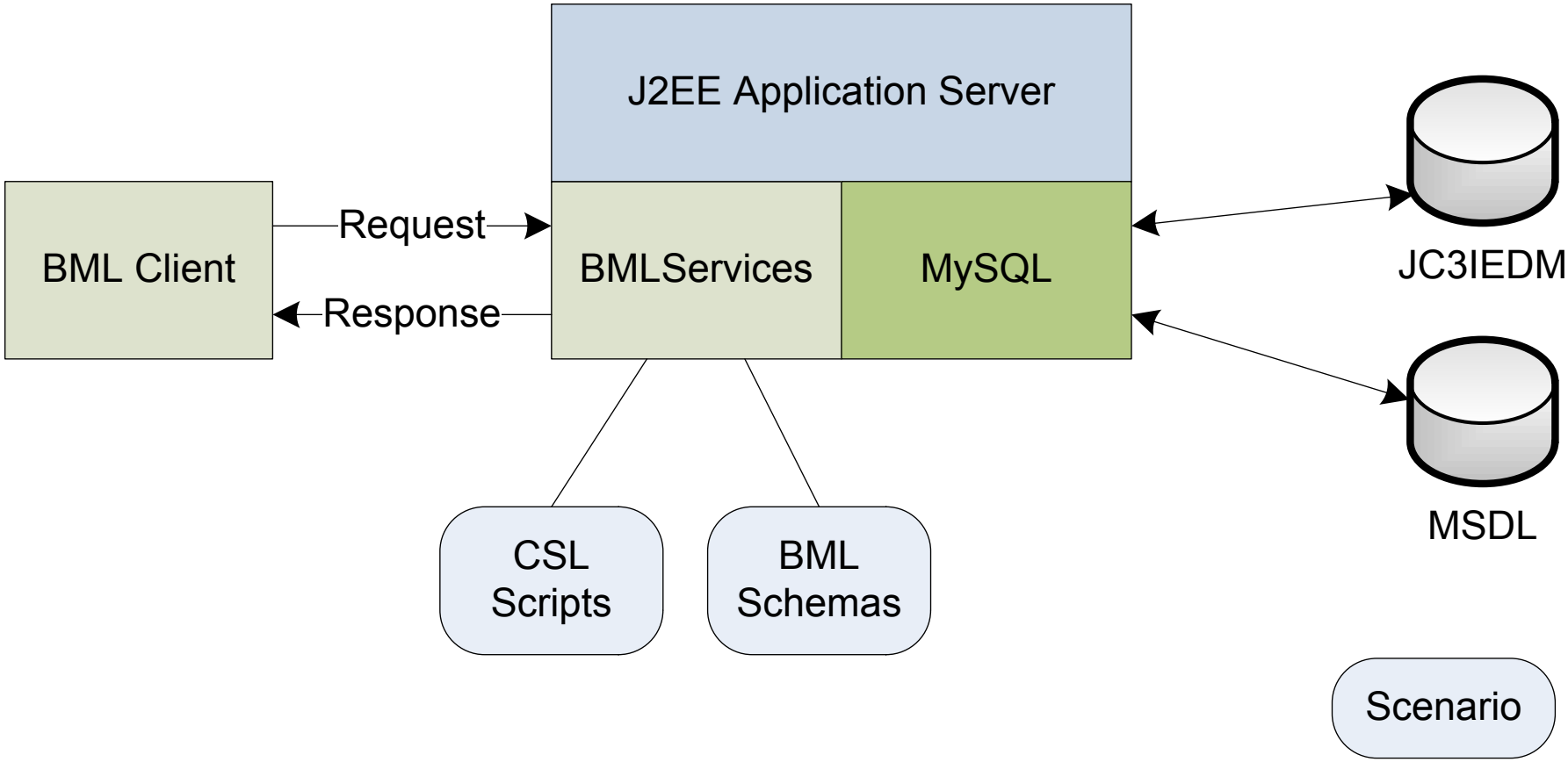
MSDL and C-BML in MSG-085

MSG-094 paper 7

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

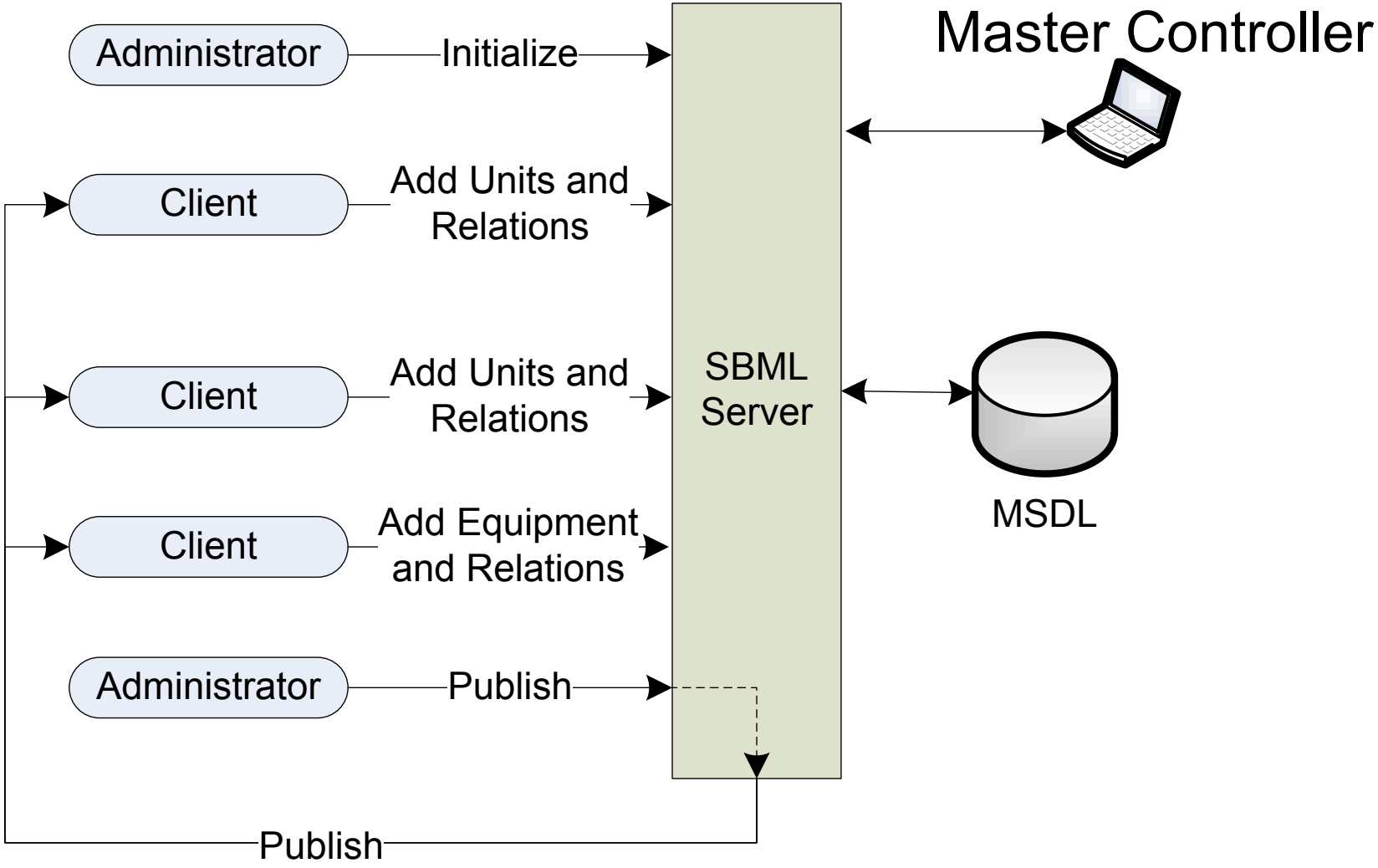
SBML Architecture



Adapting 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



New Demands on SBMLserver from MSG-085

- Publish/subscribe for C-BML and MSDL
- Dynamic publish/subscribe based on XPATH
- Multithreaded RESTful service for increased performance
- Translation between dialects of BML
  - MSG-048 IBML and SISO C-BML
  - Others possible using common JC3IEDM database

Status Monitoring and Control

- Lesson learned in MSG-048:
  - It is impractical to coordinate multiple interoperating C2 and simulation systems with only spoken communication
- Solution: a coordinating webpage
  - Shows possible states of each coalition system
  - Master Controller provides coordinating guidance
  - Inputs can come from webpage interface
  - Or Web service client

MSG-085 Status Monitor

MASTER CONTROLLER STATUS

Scenario: DH1 **Current Order:** stop

Scenario MSDL status: not started **Number of observers:** 2

Change current order: stop initialize run pause

Log out client/observers:

Publish MSDL Reset All Master log out

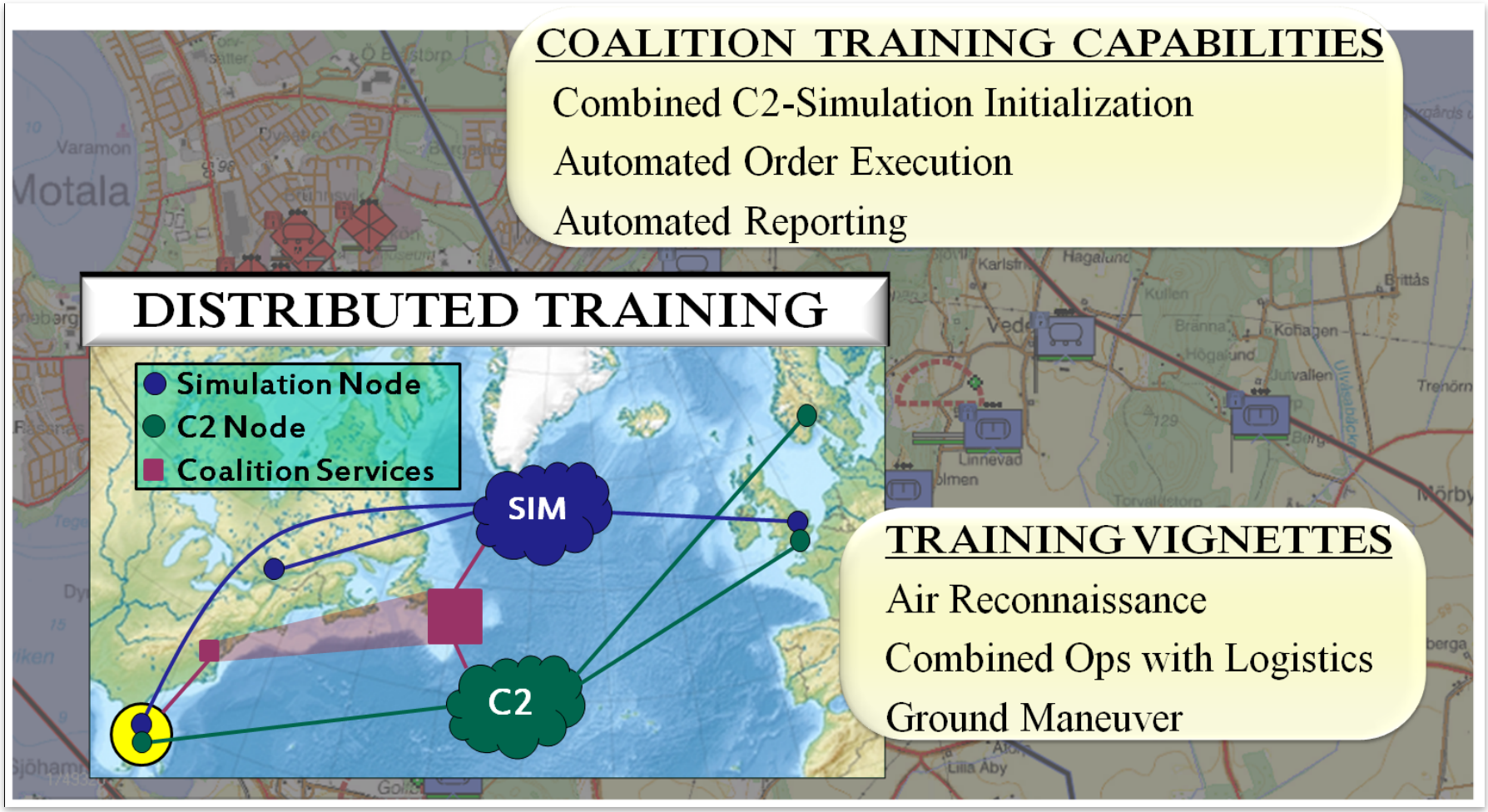
CURRENT CLIENT STATUS

		STOPPED	INITIALIZING	READY	RUNNING	PAUSED
C2IS1	rpt1		setting-up			
C2IS2	rpt2	stopped				
C2IS3	rpt3		MSDL Rec'd			
C2IS4	rpt4		Processing MSDL			
C2IS5	rpt5			ready		
C2IS6	rpt6		MSDL Pushed			
C2IS7	rpt7		setting-up			

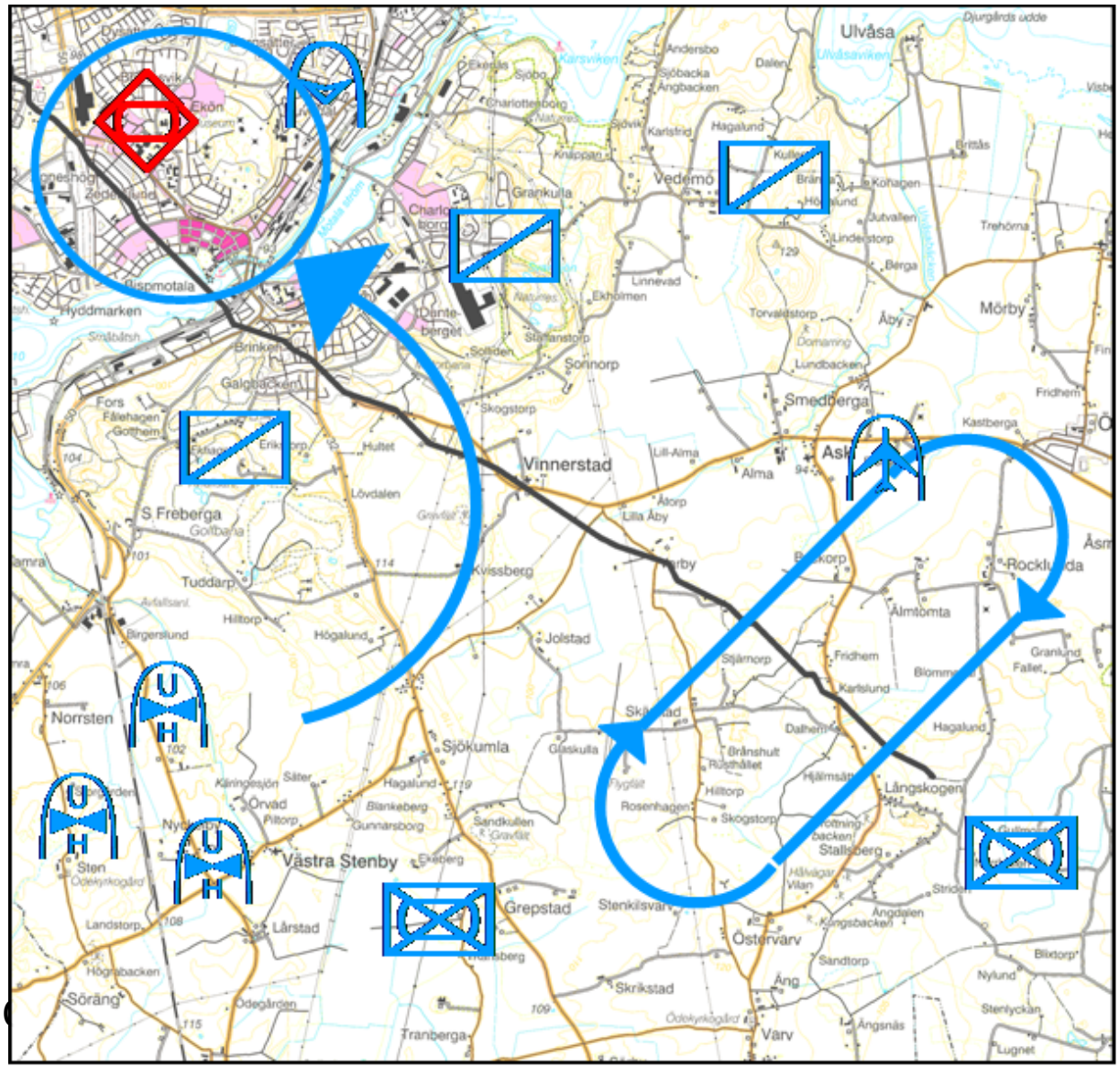
MSDL/C-BML Client Implementations as Employed for MSG-085 Demonstration I/ITSEC 2011

MSG-085 I/ITSEC 2011 DEMONSTRATION

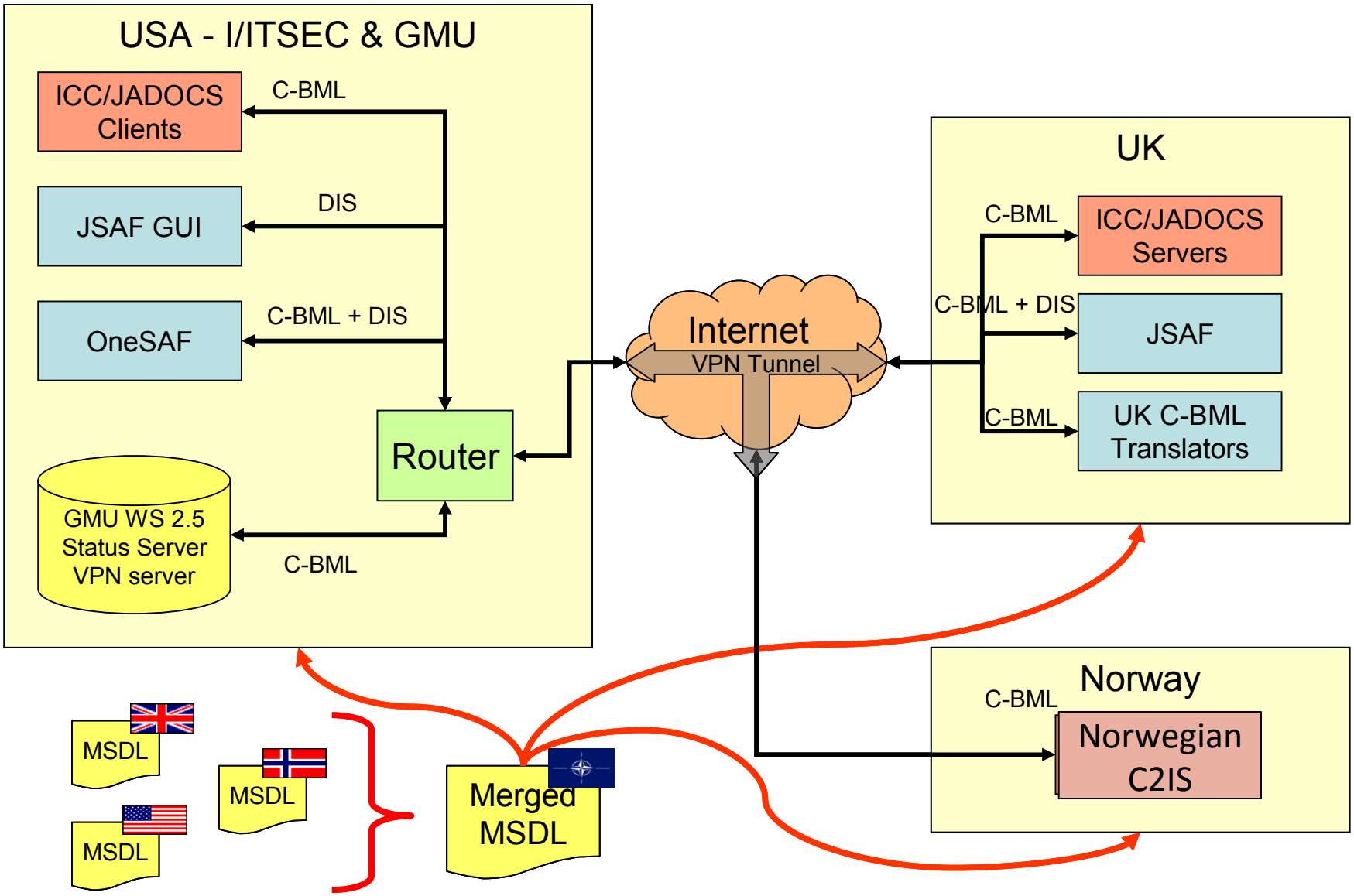
MSDL for initialization, C-BML for execution
Demo Harness 1: NOR, UK, US



MSG-085 I/ITSEC'11
Recce Vignette: Operational View



System Architecture for I/ITSEC 2011 DH1



MSDL and C-BML in MSG-085

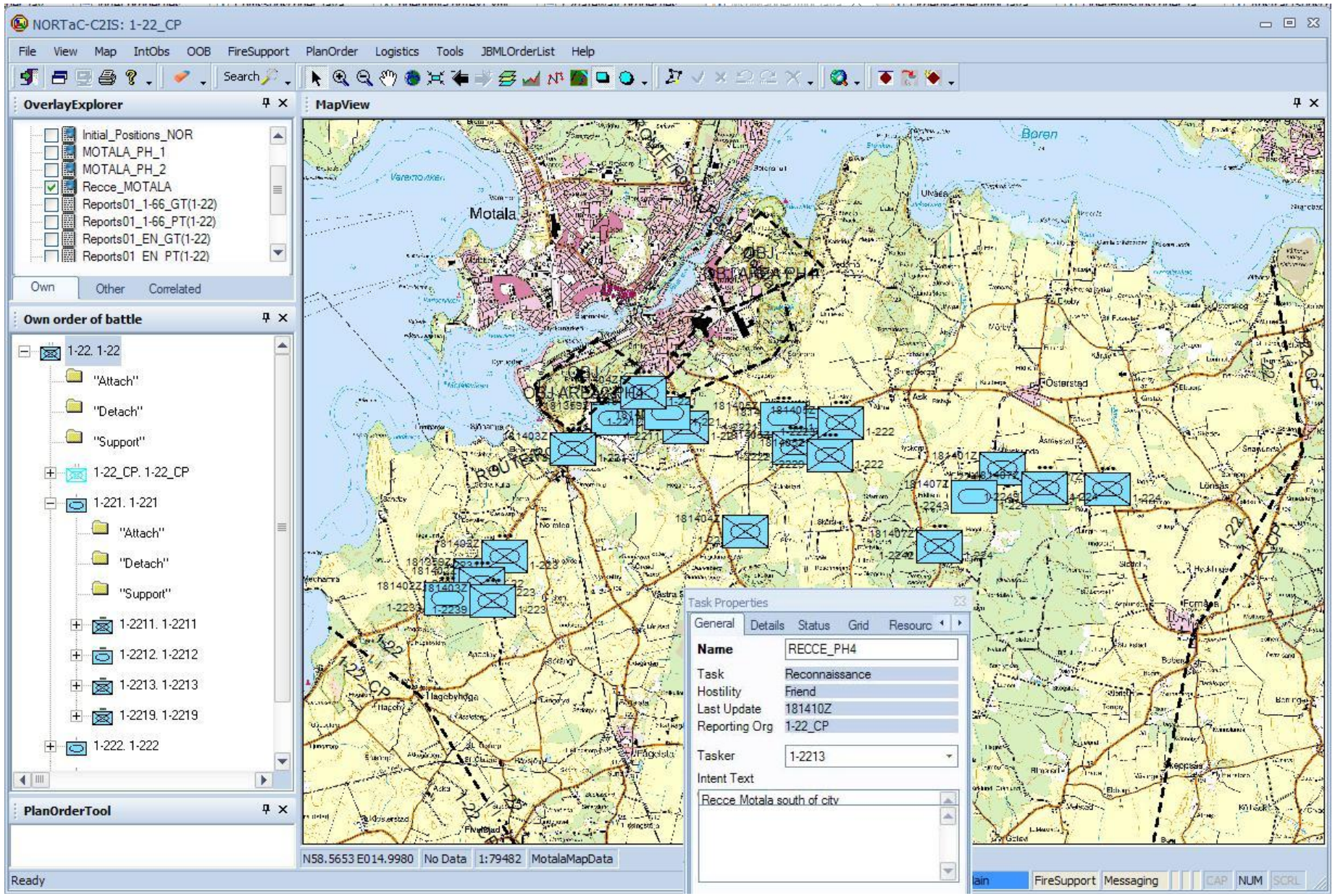
UK Operated Systems

- Located in Farnborough, England
- NATO Integrated Command and Control System (ICC)
  - Air component C2
- Joint Automated Deep Coordination System (JADOCS)
  - Joint battlespace C2 (linked to MSDL)
- JSAF entity level constructive simulation
  - Air simulation and perceived truth sensor

Norway Operated System

- Located in Kjeller, Norway
- Norwegian Command and Control Information System
  - Ground C2 for reconnaissance units
  - Issued Order as MSG-048 IBML
  - JC3IEDM-based
  - MSDL-capable for initialization
    - Extracts static task organization, equipment, location
  - Mapping from JC3IEDM to MSDL symbol IDs proved to be complicated

Reconnaissance Task in Norway C2IS



USA Operated System

- Located in Orlando, Florida
- OneSAF entity-level constructive simulation
- Lead system for “crawl, walk, run” development of MSDL/C-BML integration
- Challenges:
  - OneSAF-specific MSDL schema modified
  - Generalize One-SAF specific MSDL tags
  - No existing server access mechanism
  - No support to relate C-BML Orders/Reports to MSDL
  - No support to task OneSAF units

The Way Forward for MSDL/C-BML

- MSG-085 continues to be a driving force for development of SISO standards
  - I/ITSEC 2011 is only one of several activities
  - Experimentation planned for 2012
- Path to MSDL/C-BML convergence is (mostly) clear
  - Use MSDL Task Organization
  - Use C-BML Tasking
  - Use standard tactical graphics
- SISO should follow MSG-085 developments closely as indicators for
  - MSDL and C-BML requirements
  - Effective, implementable techniques