



Order and Report Schema Translation in WISE-SBML Server

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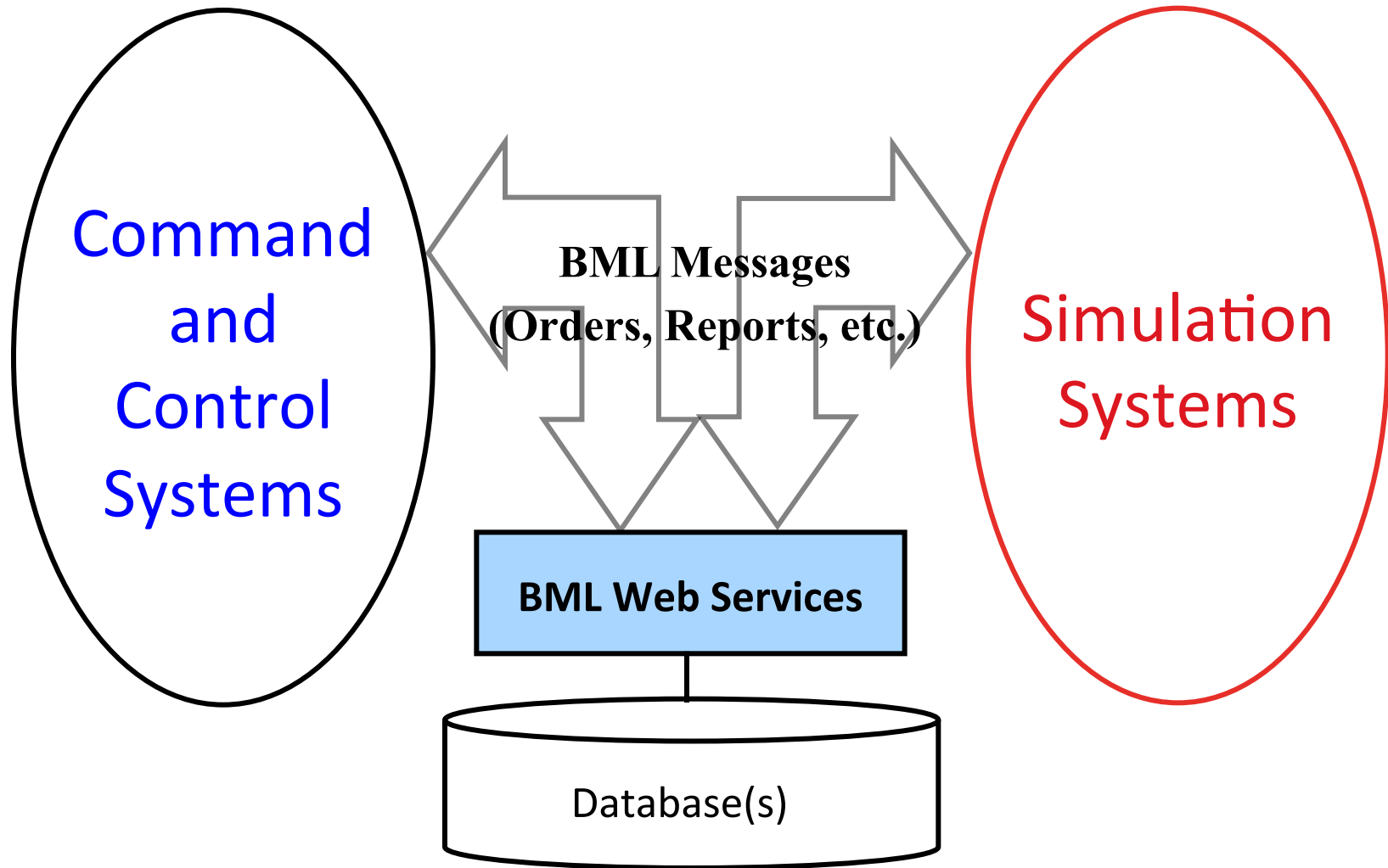
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Presentation Overview

- Introduction/overview
- Scripted BML Server
- WISE Integration Environment
- Rebuilding SBML Using WISE
- MSDL in WISE-SBML
- Conclusions

NOTE: This paper and 13F-SIW-024 are drawn from
NATO MSG Symposium 2013 Paper #4 (see references)

Generic BML Architecture



Introduction/Overview

- Overall goal: interoperation of Command and Control (C2) systems with simulations
- Server supports Battle Management Language (BML)
 - Stores XML formatted documents
 - Publishes them to subscribed clients
- Major components:
 - Military Scenario Definition Language (MSDL)
 - Initialization of simulation and 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
- Focus of upcoming NATO MSG-085 final demo

MSDL Initialization Data Components

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

C-BML XML Documents

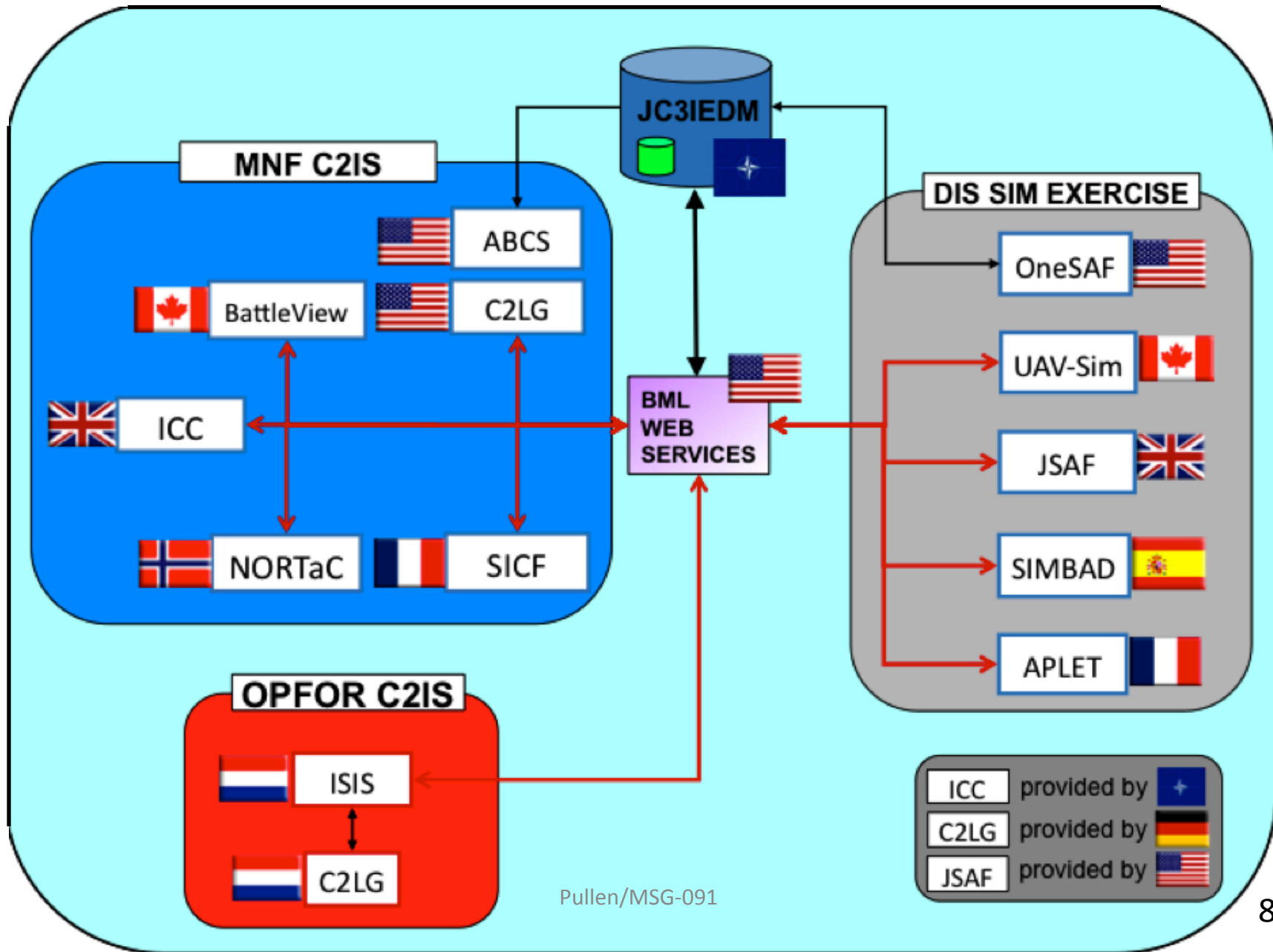
- Orders: provide a collection of tasks in a common framework
 - Who/what/when/where/why in tasking grammar
 - Initial orders and later fragmentary orders (FRAGO)
 - Low data rate
- Reports: provide data for situational awareness
 - Much higher data rate
 - Typically units report about once per minute

BML in NATO

Modeling and Simulation Group

- MSG has been nexus for BML cooperation
- MSG-048 Technical Activity started 2007
 - Stimulated by US-France project 2006
 - 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)
 - Planning demonstration Dec 2013
- Supports trial use of new concepts before standardization

MSG-048 2009 Architecture

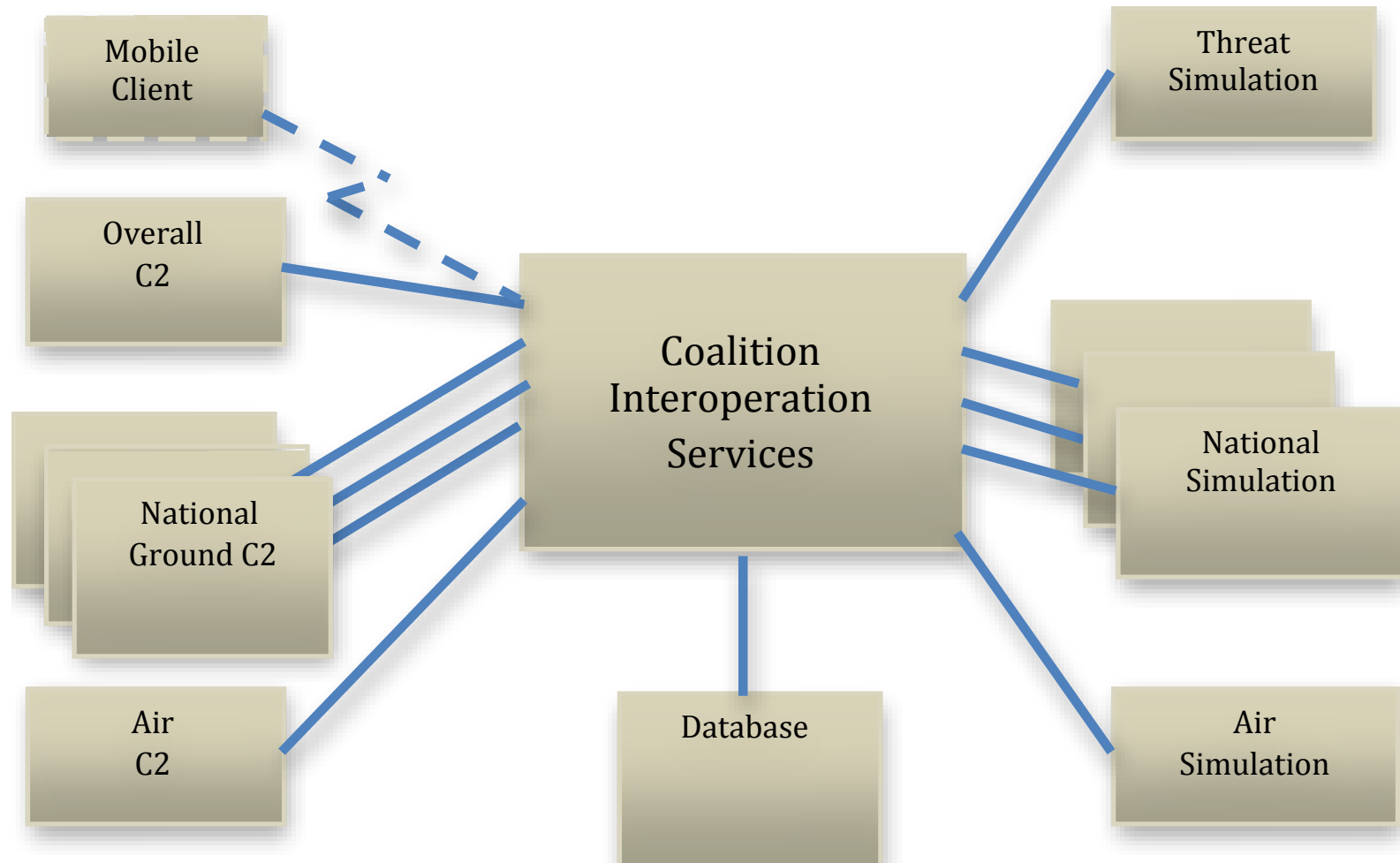


MSG-085 Mission Statement

*“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*

MSG-085 General Architecture



MSG-085 Infrastructure Common Interest Group

I/ITSEC 2012 Air-land Vignette: Sweden, UK & USA

Operational Thread and Capability Demonstrated

- Recce-focused integrated Air-Land vignette using BOGALAND Scenario
 - Ground force Recce cues UAV and fast jet CAS mission
 - Insertion of troops by helicopter
- Enables mission planning, C2 training, and mission rehearsal

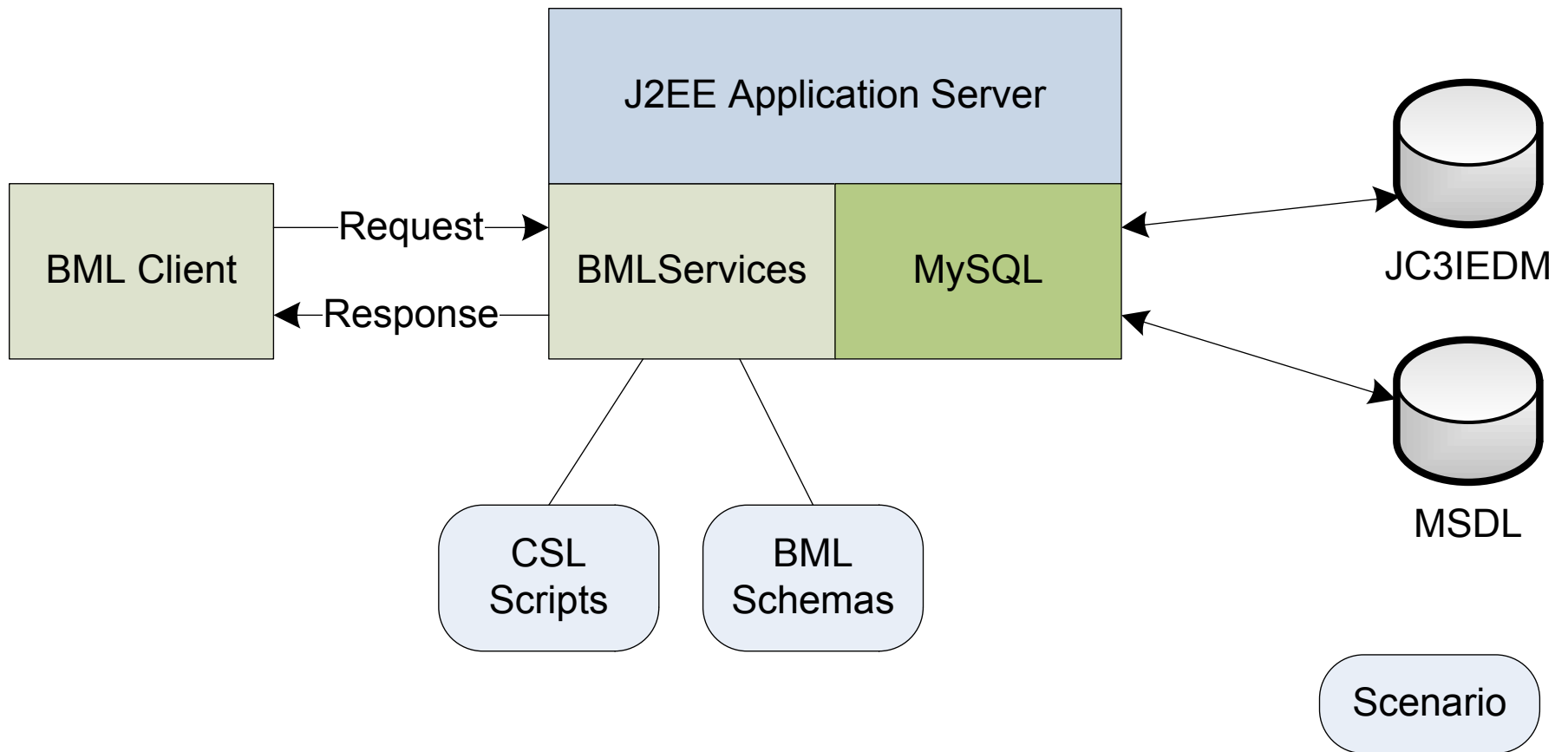
Technical Capability

- MSDL/C-BML Infrastructure Information
- MSDL Toolset/Population Mechanism for Preparation and Initialization
- Aggregated MSDL initializes systems
- Scripted BML Server v2.5 bridges multiple schema versions
 - IBML(MSG-048) & SISO C-BML-Light
- Use of WISE Server (SAAB) linked through SBML server and populating 9Land BMS (Swedish C2 system)
- Use of ESRI Track server for Visualization
- Operational C2 systems; ICC and JADOCS integrated JSAF and OneSAF
- WAN-based system

Scripted BML (SBML) Server

- Created during MSG-048 as open source solution to asynchronous exchange of BML documents (Orders and Reports)
 - Scripted approach allows rapid reconfiguration and reduces errors
- Matured to have a number of features
 - Most important is ability to translate among schemas with same semantic content
- GMU runs a server accessible via Internet
 - Under OpenVPN to avoid hacking
- Demonstrated supporting 10 documents per second
 - Performance reduced under translating feature
- Will remain available open source

SBML Architecture



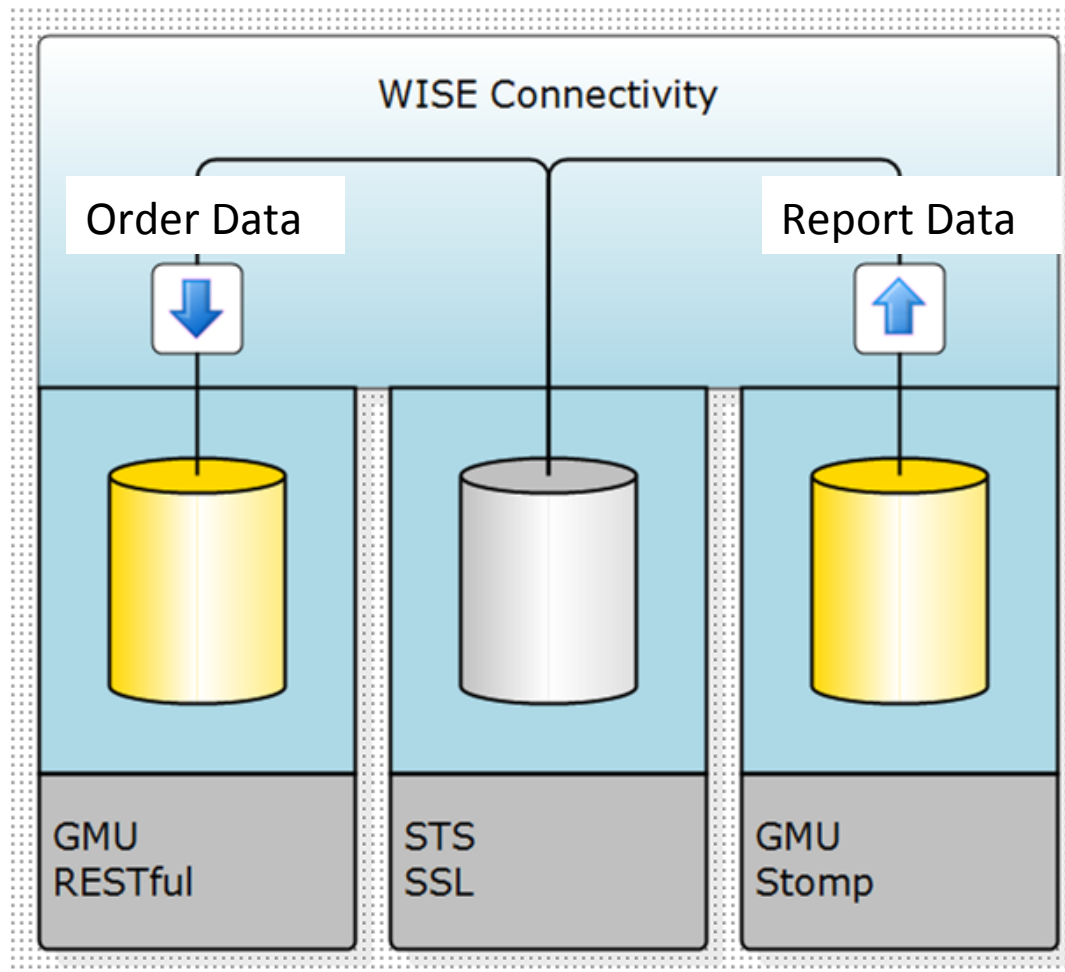
Evolving SBML to Commercial Infrastructure

- Scripting offers great flexibility
- Open source helps seed BML community growth
- But high-performance, industrially sustained infrastructure is needed for operational use of MSDL/C-BML
- GMU C4I Center and Saab are working together to achieve this

Saab WISE

- Widely Integrated Systems Environment is a Saab commercial product
 - Aimed at integrating information services (e.g.C2)
- Essentially a very high performance in-memory (non-persistent) database
 - Suitable for cloud environment
- Features a graphic scheme for programming information flows
 - Fills same role as scripting but easier/faster to use
- Saab has offered use of WISE to MSG-085 for use in experimentation

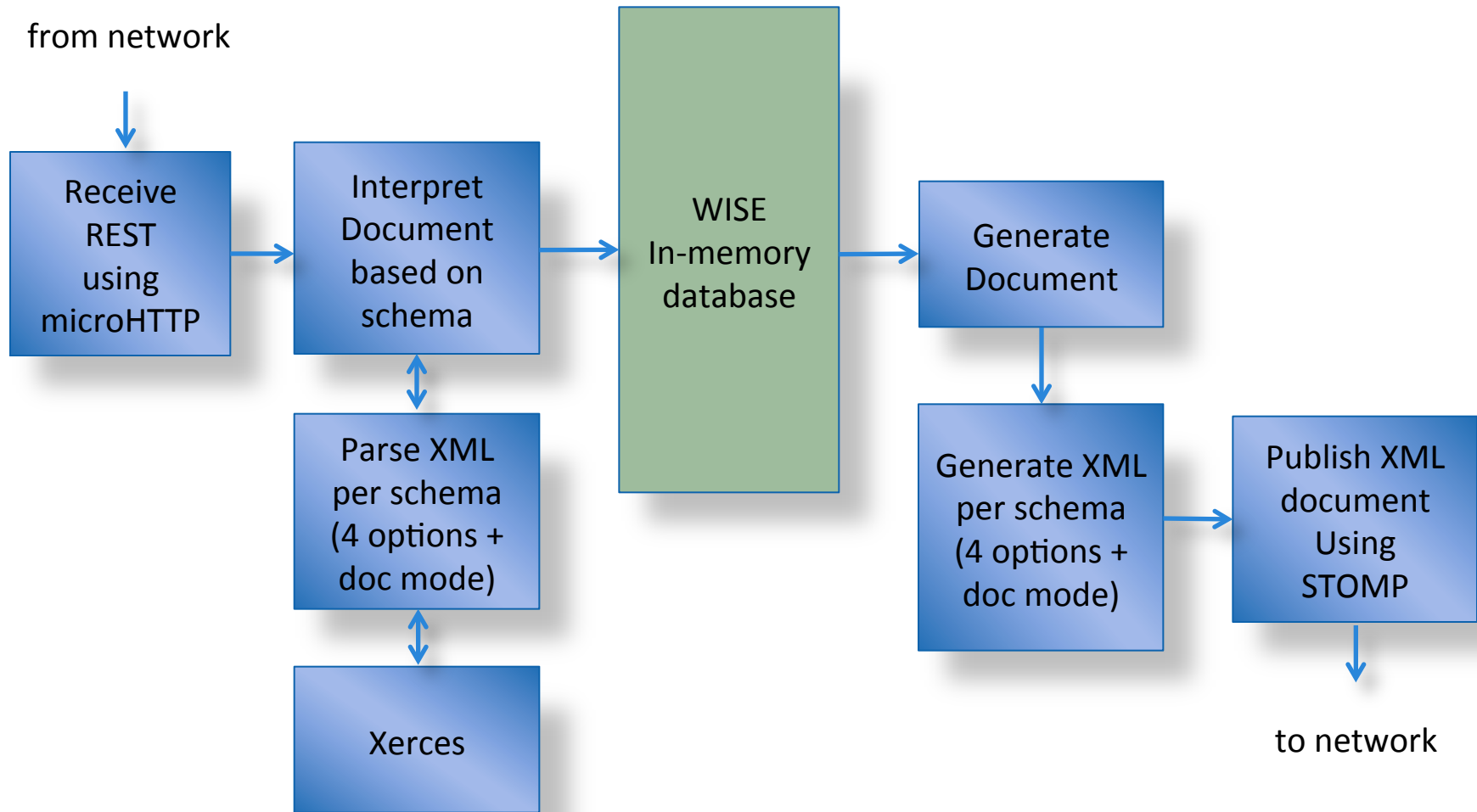
WISE MSDL/C-BML SUPPORT



WISE-SBML

- Saab is supporting GMU fundamental research to show how to use WISE as BML server
 - Open publication and open source components to use with WISE
- GMU has completed prototype high-performance translating server
 - IBML/C-BML with MSDL, like previous SBML
 - MSG-085 CIG Land Ops
 - C-BML Light and compatible C-BML Full
 - Also unparsed/document mode
 - Logging/replay usable to provide persistence
 - (e.g. restart coalition from some point)
- Saab intends to productize this capability
 - Quality assurance and maintenance by Saab developers
 - Will make non-production WISE-SBML server available to developers on no-cost license
 - Also no-cost evaluation license for production
- GMU runs an instance on Internet over OpenVPN

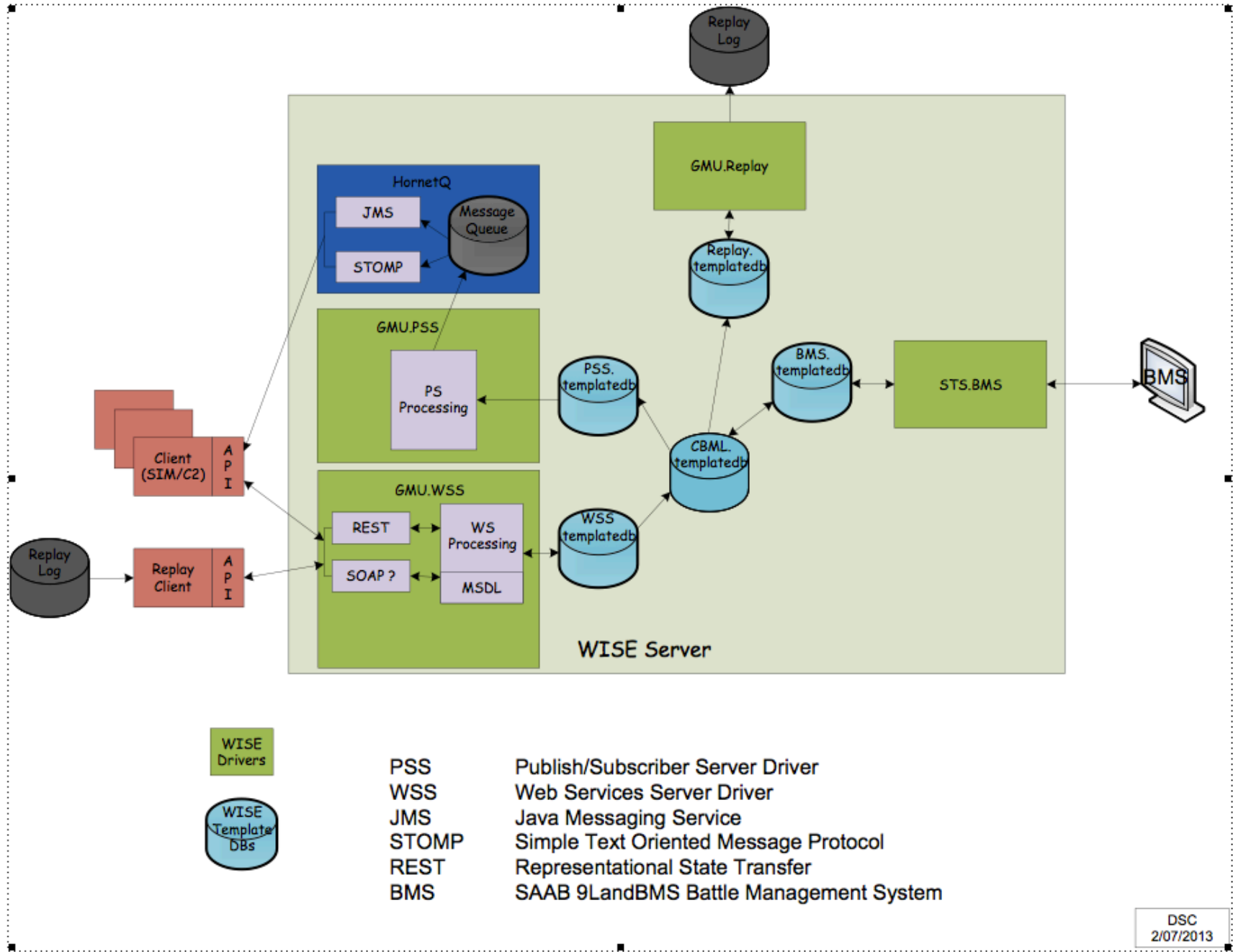
WISE-SBML Processing



WISE-SBML Processing Steps

- Steps in development:
 - Build input WISE Driver with parser per schema
 - Parses XML and stores elements in WISE database
 - Build output WISE Driver with XML generator per schema to publish
 - Also include support for directly interfaced systems
 - Build a WISE Driver for persistent recording
 - Edit the information flows using WISE editor
- Driver steps:
 - Input: parsing XML and loading database
 - Output: reading database, generating alternative schema XML, and publishing

WISE-SBML Architecture

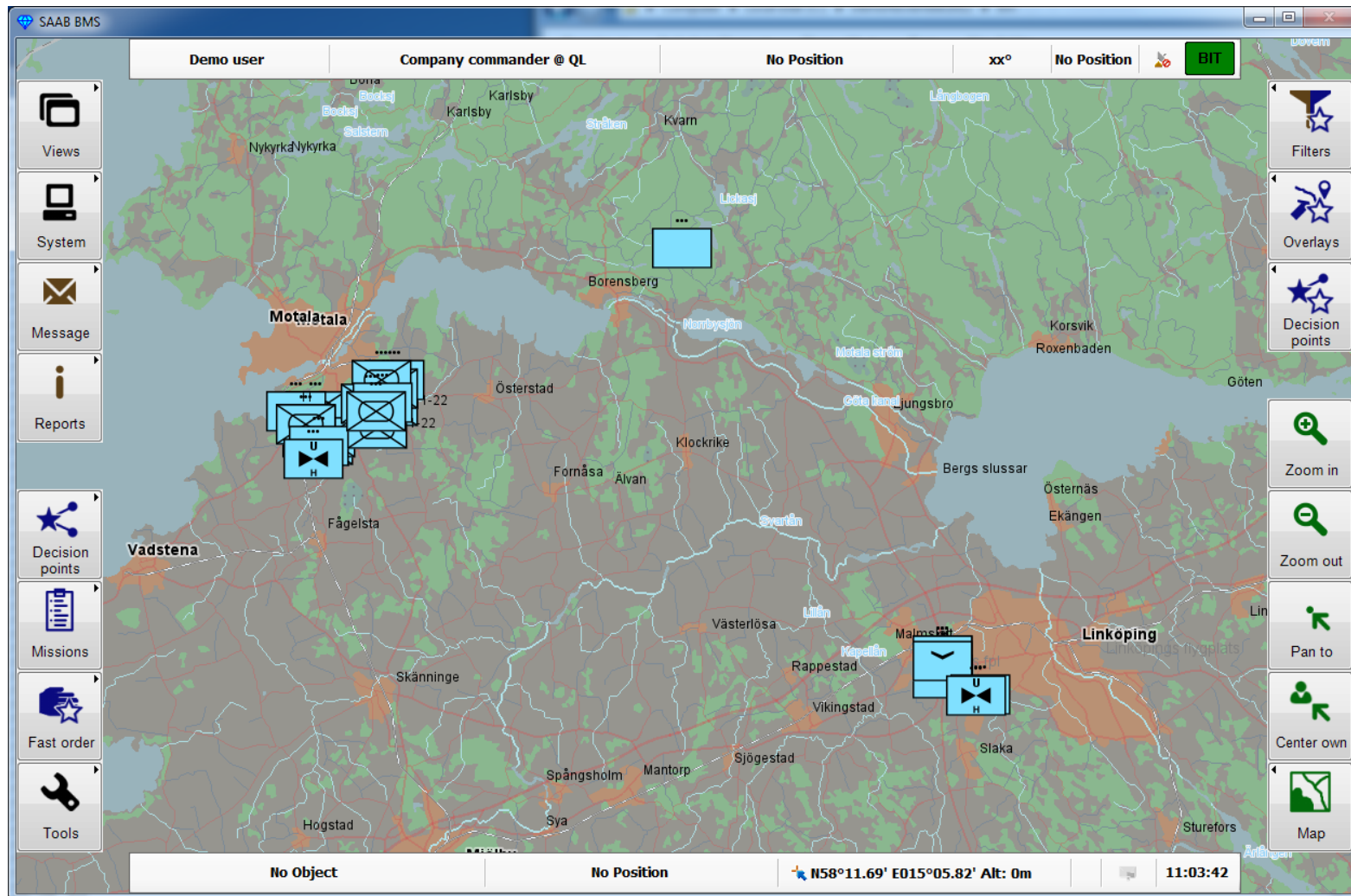


Directly Interfaced C2 System: 9LandBMS

- Battalion/Brigade level operational/commercial C2 system
- Used by Swedish forces
- Runs on Windows platform
- Touch interface for field use (wearing gloves)
- Offered to MSG-085 for experimental use
- WISE interface available
 - Used to provide C-BML interface

9LAND BMS

WISE SUPPORTED MSDL/C-BML



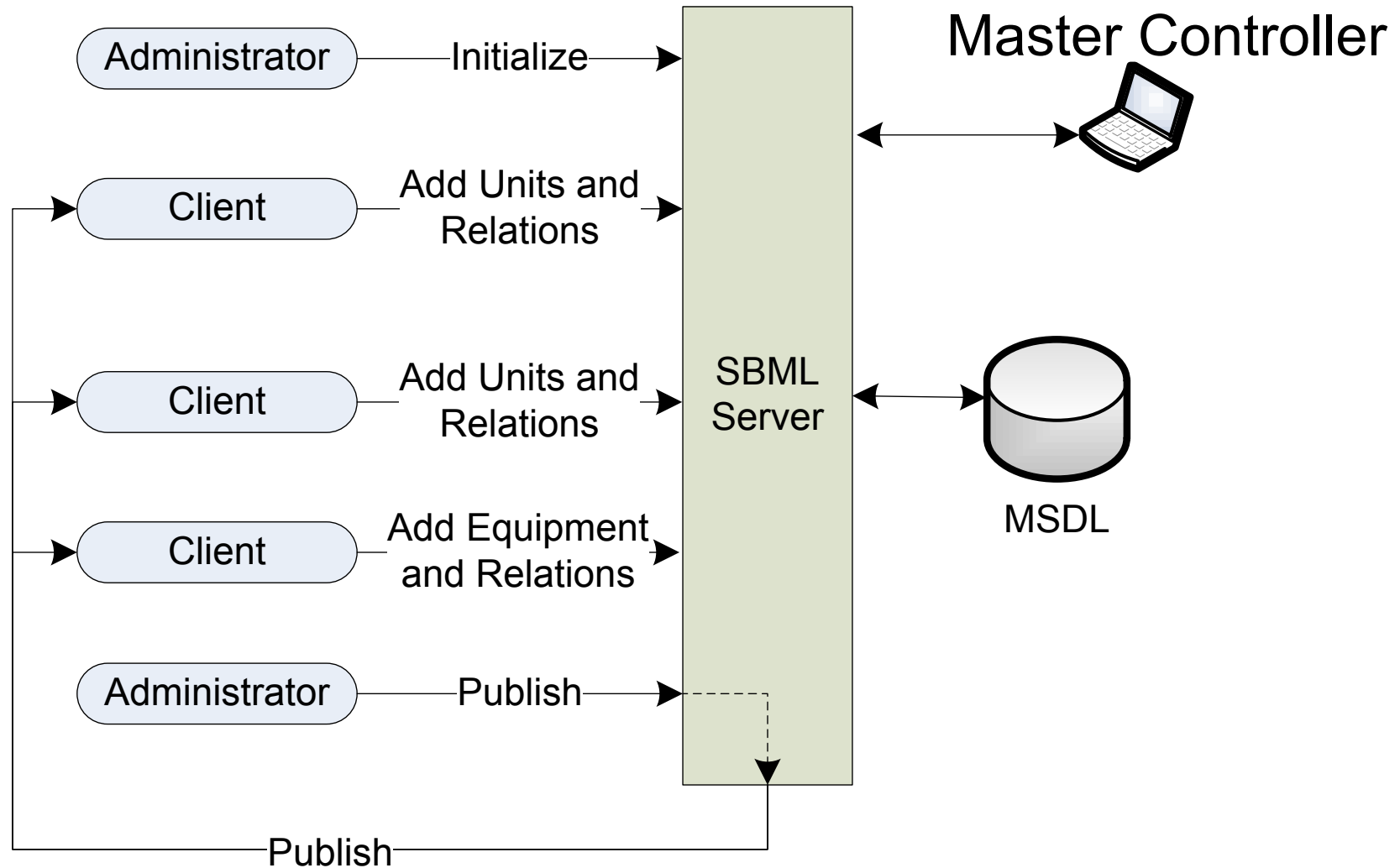
Schema Translation in WISE-SBML

13F-SIW-023

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



Continued Progress In MSDL + C-BML

Common industry standard-based scenario data:

- Enables rapid development
 - Compliant import/export/merge tools
- Encourages ID and tracking of scenario development among slice providers
- Extends use of widely available spreadsheet and XML tools
- Supports data element extensions
- Key capability: cross-linked MSDL and C-BML
 - See 13S-SIW-039

WISE-SBML for MSG-085

- WISE-SBML will enable MSG-085 to interoperate all Common Interest Groups using data with shared semantics
 - Regardless of what schema they have implemented
 - Performance projected to be ~100 documents/second
- The hard part of development is done
 - Initial testing complete for three schema to be used
 - Completed work with Fraunhofer-FKIE to link servers
 - See 13F-SIW-024
- Saab also will make WISE-enabled 9LandBMS C2 system available for MSG-085 experimentation

Conclusions

- MSG-085 continues to be a driving force for development of SISO standards
 - Final demonstration planned for 2013
 - Defined path to MSDL/C-BML convergence
- Development process has resulted in multiple, semantically-compatible schemata
- Translating server using high-performance platform enables interoperation
- Evolution of BML is likely to result in repeat of this pattern