C2-SIM IN SIMPLE ENVIRONMENTS

APPROVED FOR PUBLIC RELEASE

Outline of Presentation

- **Definition**
- **C2Sim in the Land Domain**
  - US Army SIMCI BML Demonstration
- **C2Sim in the Air Domain**
  - Support to Air Mission Planning
- **C2Sim in the Maritime Domain**
  - MSG-085 Maritime Common Interest Group study
- **C2Sim in the Joint Domain**
  - UK JOTS CCD

Definition

- Simple Interoperation – Single Nation, Single Domain
- National Interoperation – Single Nation, Multiple Domains

- Simple implies *Easy*
  - Simpler goals
  - Fewer systems, possibly domain-specific
  - Smaller teams, quicker accreditation
  - Single time zone – for many countries
  - Same language – for most countries
  - Single location – sometimes
  - …

C2Sim in the Land Domain

- **National examples include:**
  - USA – SIMCI US Army Simulation to C4I Interoperability Programme
  - FRA – ADIS activities – VULCAIN federation capability shown at Eurosatory events – ELLIPSE infrastructure
  - DEU – C2LG-GUI application
  - DNK – Extended Systematic SITAWARE planning tool
  - ESP – TALOS C2 application
  - NLD – C2Sim concept for TACTIS LVC training capability proposed
  - NLD/NOR Multi-Agent System
  - SWE – 9Land BMS

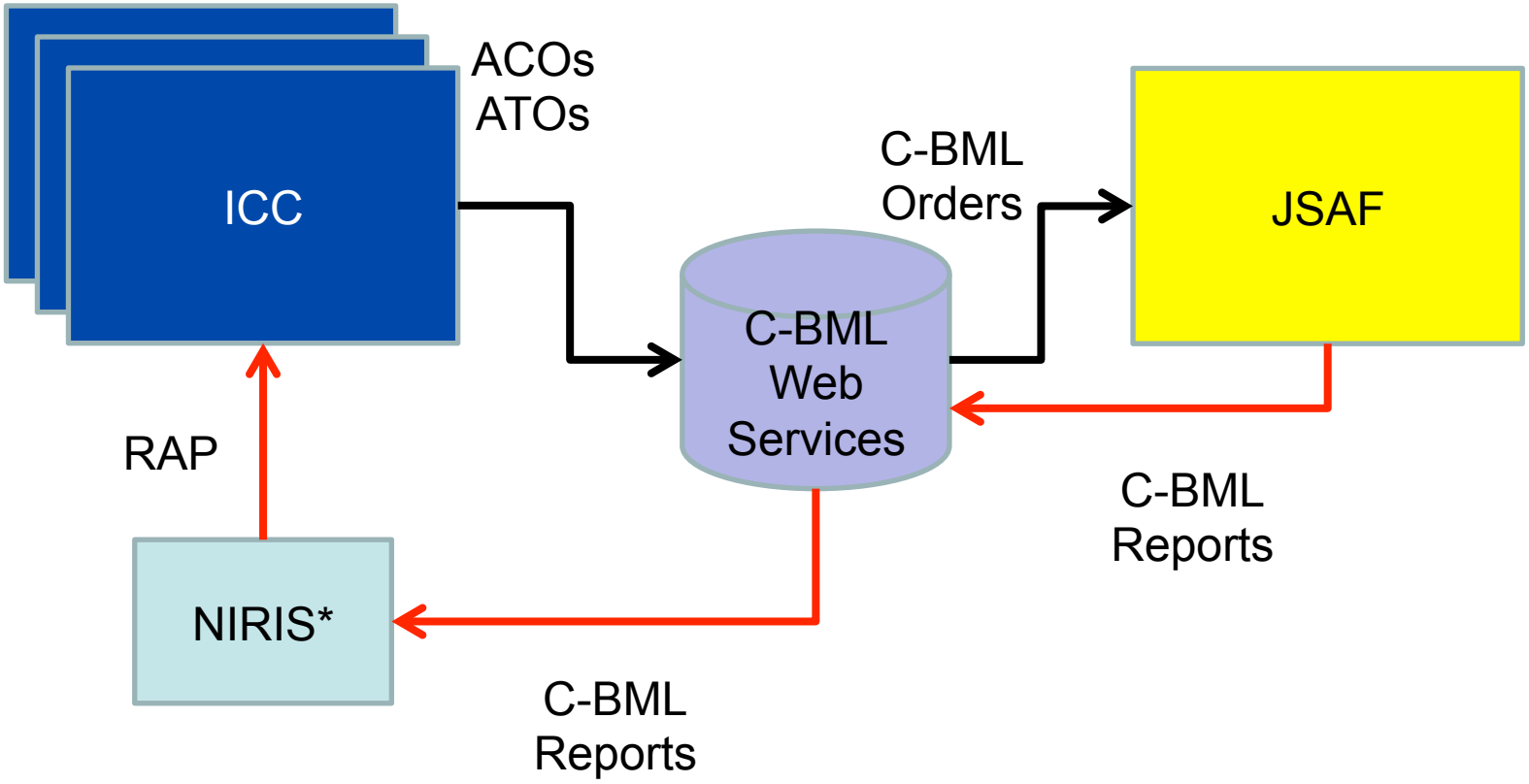
MSG-085 Land Operations CIG

- Mapping Operational messages to C-BML messages:
  - WARNO, ORDER, FRAGO, SITREP, ACK
- Extend C-BML and MSDL schemas to support specific operational requirements in:
  - Intel, Artillery, Logistics, Domains
- Evaluate system design requirements and agreements:
  - Led to new processes: C2Sim DSEEP Overlay

Air Planning Support

- **Purpose**
  - To provide Air Mission Planning personnel with a simulated environment in which to practice their mission planning skills, e.g.:
    - Resource allocation
    - Scheduling
    - Refuelling calculations
    - Airspace deconfliction
    - Targeting
  - To provide operationally credible scenarios
  - To de-risk planning for LiveEx events

Systems Used



*NIRIS - Networked Interoperable Real-time Information Services

ICC

- ICC is the NATO Integrated Command & Control system
- Planning
  - ACOs
    - ACMs – geographical, time
    - Deconfliction
  - ATOs
    - Missions – pre-defined
    - On Alert missions – dynamic tasking (cf FRAGOs)
  - ACMREQs
    - Used to request permission to define and use a new ACM
- RAP – ICC can display the Recognised Air Picture
- COP – ICC can display the Common Operational Picture

ICC (cont)

- Target planning – using JTS/FAST*
- Integration of JTS/FAST with ATOs
- Display reports and ISTAR info (e.g. via CSD, MAJIIC)**

*Joint Targeting System/Flexible Advanced C2 Services for NATO Joint Time Sensitive Targeting

** Coalition Shared Database, Multi-sensor Aerospace-ground Joint ISR Interoperability Coalition

ICC/Simulation Data

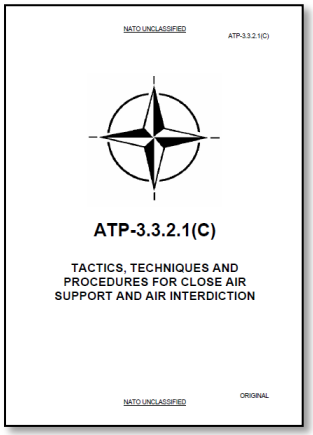
- Info extracted from ACOs/ATOs
  - Air base ICAO codes
  - Aircraft types
  - Air ORBAT and disposition
  - SCLs
  - IFF Codes
  - Refuelling capabilities/requirements
  - Mission types
- Not all this information is currently supported by C2-Sim standards – work-arounds are used to augment the systems

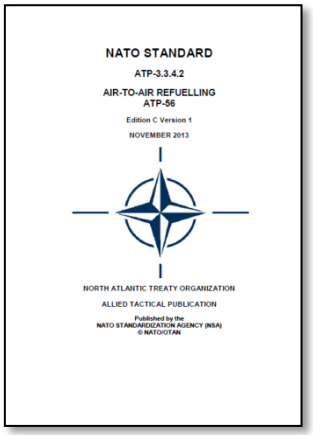
Observations on Missions

- Not all missions are tasked, most are 'On Alert'
- This means that dynamic tasking is necessary, e.g. using C-BML orders over a simulated Link-16 network
- The simulation flies the missions exactly as defined in the planning tool, not necessarily as a pilot would fly them

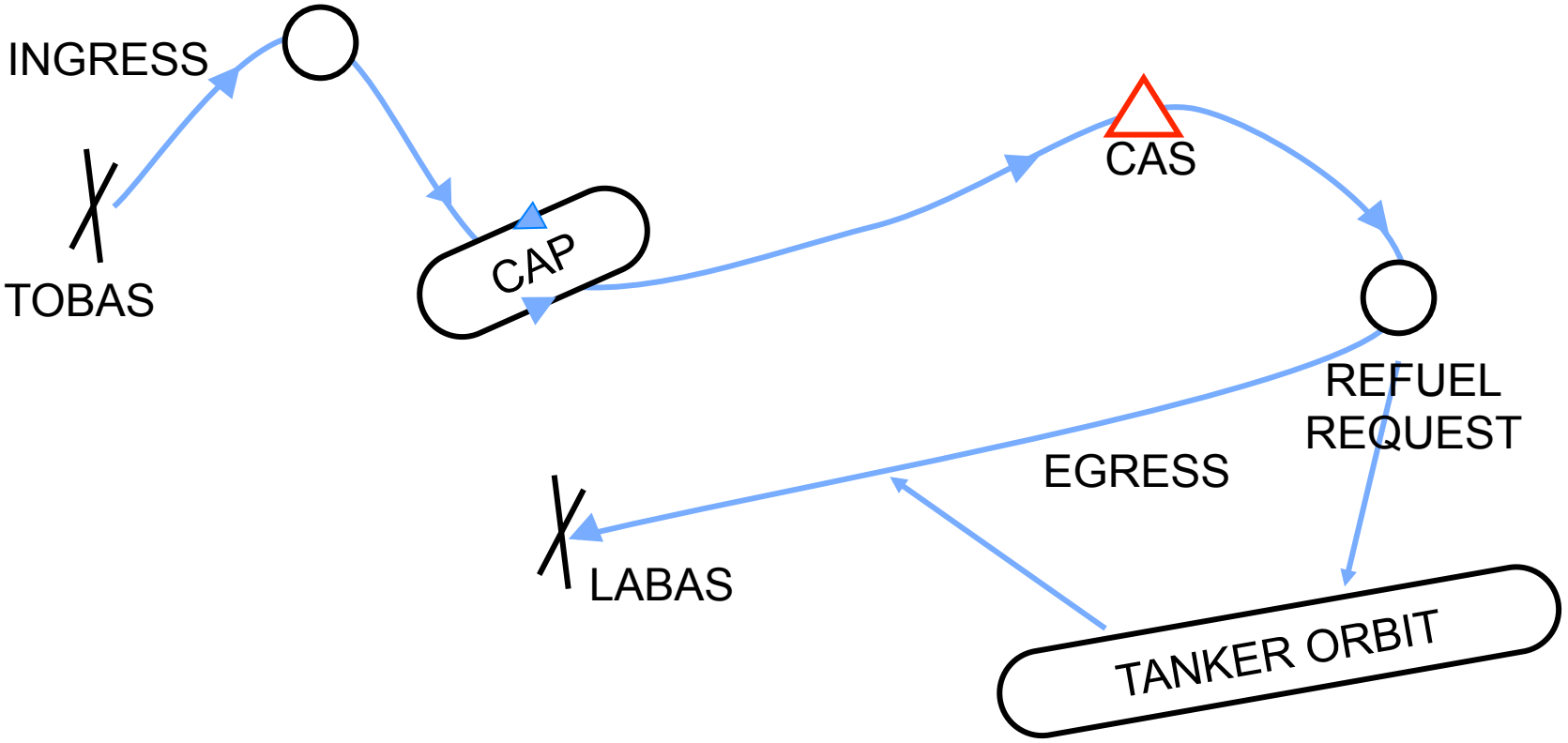
CAS and Refuelling based on

- ATP-3.3.2.1 Tactics, Techniques and Procedures for Close Air Support and Air Interdiction
- ATP-3.3.4.2 Air-to-Air Refuelling (ATP-56)





Air-to-Air Refuelling



Developments under way

- Closer coupled initialisation of simulation using information from ICC database, such as IFF codes and SCLs
- 9-Line tool for:
  - Dynamic tasking (cf On Alert missions)
  - JTS/FAST integration for pre-defined targets
  - Dynamic targeting for time sensitive targeting
- MISREP generation from simulation

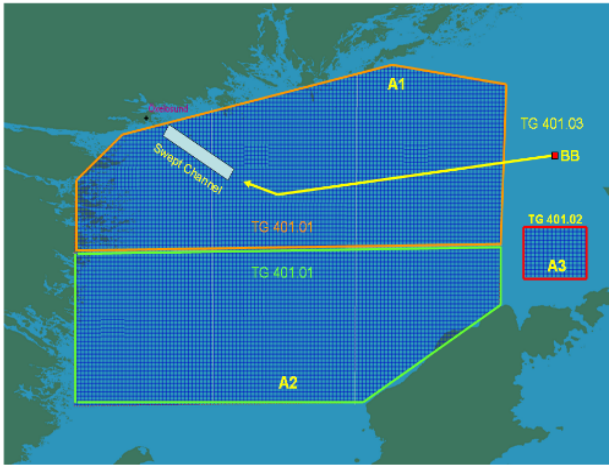
Other Coordinated Tasks

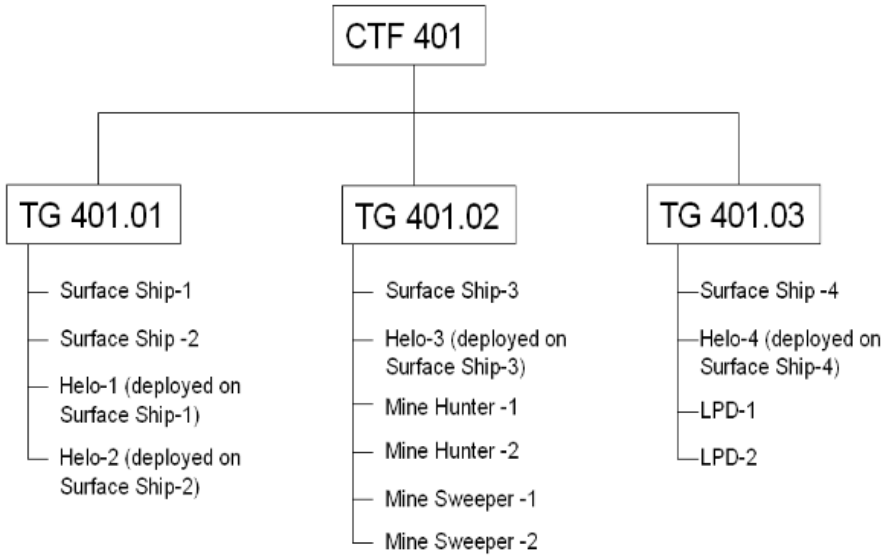
- CAS
  - 'On demand' Air-Land Coordination with FAC, etc
  - Detailed plan, confirmation, etc developed during execution time
- Air-Land Troop transport
  - 'Pre-planned' Air-Land coordination
  - Need to coordinate air and land operational planning tools

C2Sim in the Maritime Domain

- MSG-085 Maritime Operations Common Interest Group (TUR, NOR, CAN, FRA, DEU & BEL)
- Single Domain activities applicable for single or multi-national use in the Maritime Domain
- Investigated the use of C-BML in the maritime domain
- Earlier work by US Naval Postgraduate School [Blais] investigated the use of BML to support:
  - Tomahawk Mission Plans and Orders – capturing the content of US Message Text Format (USMTF) Launch Sequence Plan and INDIGO messages
- Use by FRA with ORQUE maritime simulation

MSG-085 Tasking and Task Organization





Naval Tasking:

TG 401.01 :
Maritime Interdict Operations in A1 and A2.

TG 401.02 :
Setting a swept channel ashore of Öxelosund.

TG 401.03 :
Movement of a Convoy and ASUW Ops.

Experiences, Challenges and Findings

- Current research covers only a limited part of ASUW.
- Each operational message is to be analyzed carefully. Not all messages/message fields are relevant or applicable for C-BML modelling.
- Operational requirements are to be refined in co-operation with technical people in order to identify technical requirements for C-BML modeling.
- An operational scenario and relevant operational message samples based on that scenario are very helpful for the validation of the requirements.
- Current research includes only tasking and orders. Status updates and reports from the units are not included.

Areas for Further Investigation

- Include status updates and reports from the units
- Naval Mine Warfare
- Naval Gunfire Support (Maritime/Land interaction)
- UAV component
- Maritime C2 (Surrogate)
- More sophisticated simulation of maritime entities
- Comprehensive IERs documentation.
- Assess the use of MSDL in the Maritime Domain.

MSG-085 Maritime CIG - Conclusions

- A preliminary study on use of C-BML in the maritime domain has been performed.
- The modeling is based on a set of IERs established by using an operational scenario.
- IERs have been mapped to the SISO C-BML Phase 1 Full Schema.
- A more comprehensive Maritime C-BML extension based on this research will be tested during the MSG-085 Final Experimentation event.

Highlights of work accomplished (MSG-085)

C-BML Expressions/Improvements:

- Naval task organization
- Initial location of units
- Control features
- Force dispositions / formation
- A set of ASUW tasks

- Maritime reports will be covered in future work

UK – Joint Operational Training System (JOTS) Research

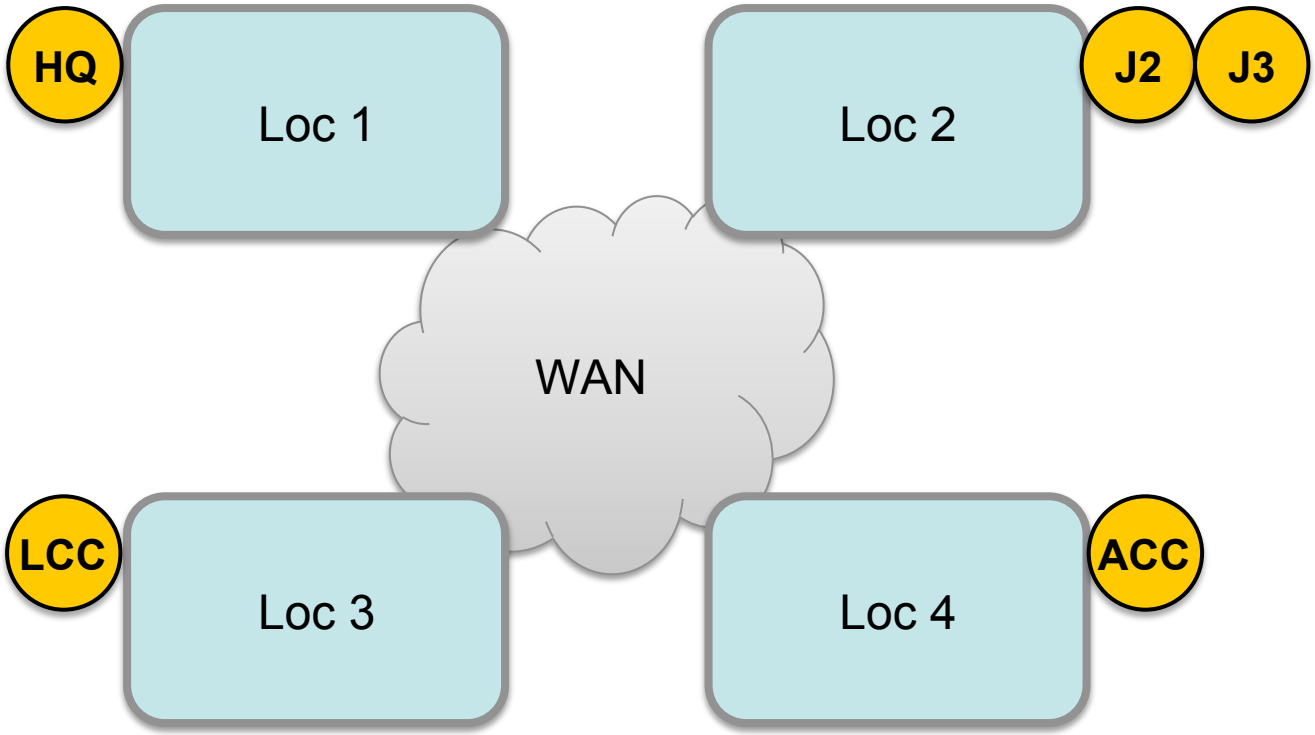
- **Aim**
  - To understand and inform the Joint Training and Experimentation requirements, and enable the development of the Future Force 2020 and beyond.
- **Research Objectives:**
  - Understand the need and scope for a future JOTS capability.
  - De-risk cost effective enablers and inform solution requirements including introduction of concepts like **C2-Sim Ops Planning**
  - Validate & refine requirements through end user engagement and capability concept demonstration (CCD).
- **Need to conform to open standards and protocols.**

UK – JOTS CCD

- JOTS CCD demonstrated how open standards-based, integrated and wide area distributed C2/Simulation can be used to support the following four themes:
  - Joint Warfare Individual Training & Education (JWITE);
  - Joint Collective Training (JCT);
  - Joint Mission Planning (JMP); and
  - Joint Warfare Development (JWD).
- MSDL/C-BML used with JSAF, ICC/NIRIS*, JADOCS, BCIP in JCT and JMP themes
- C2Sim-enabled systems were part of a much broader, heterogeneous set of systems and capabilities

*Networked Interoperable Real-time Information Services

JOTS CCD: JCT



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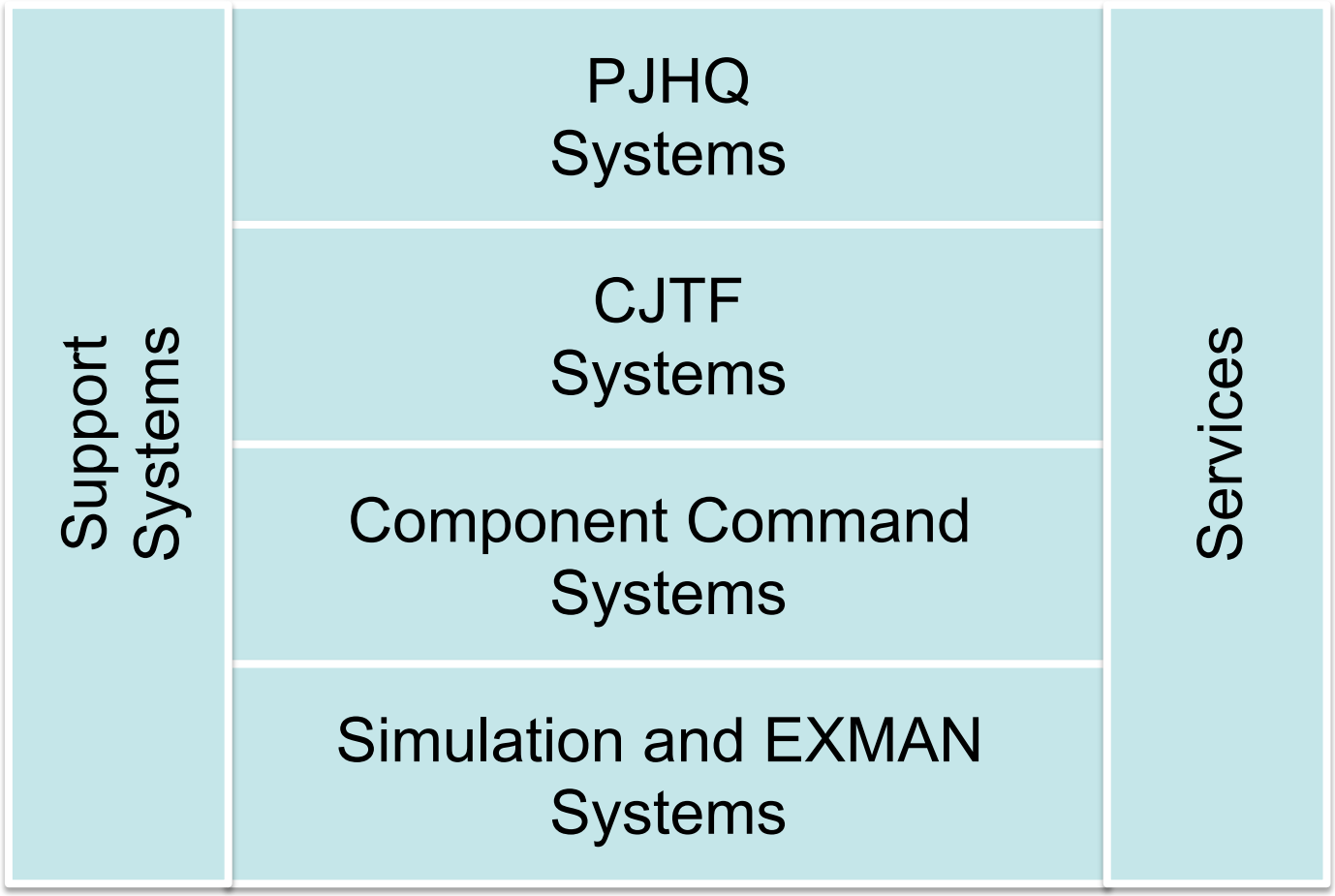
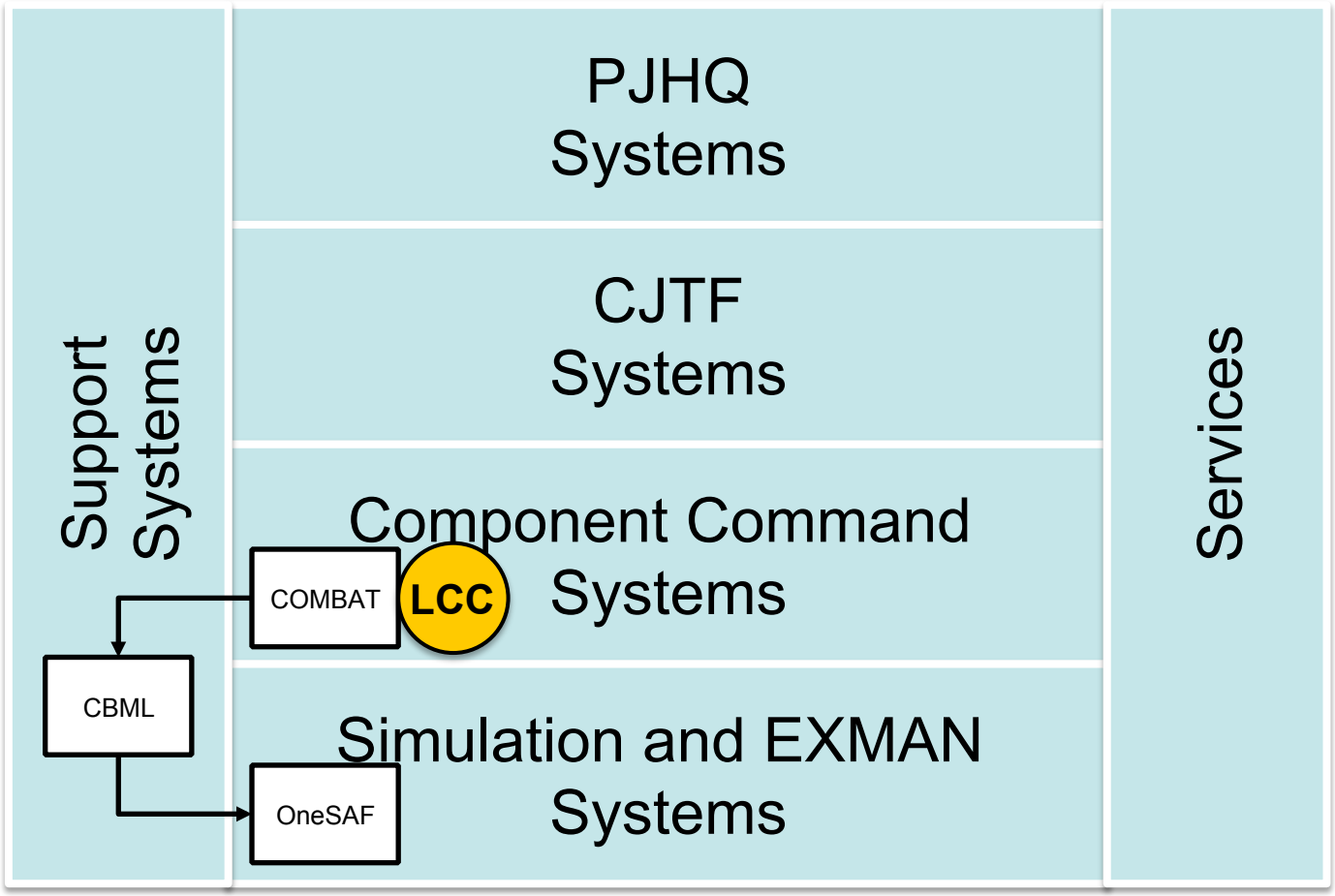

Support Systems
PJHQ Systems
CJTF Systems
Component Command Systems
Simulation and EXMAN Systems
Services

JOTS CCD: JCT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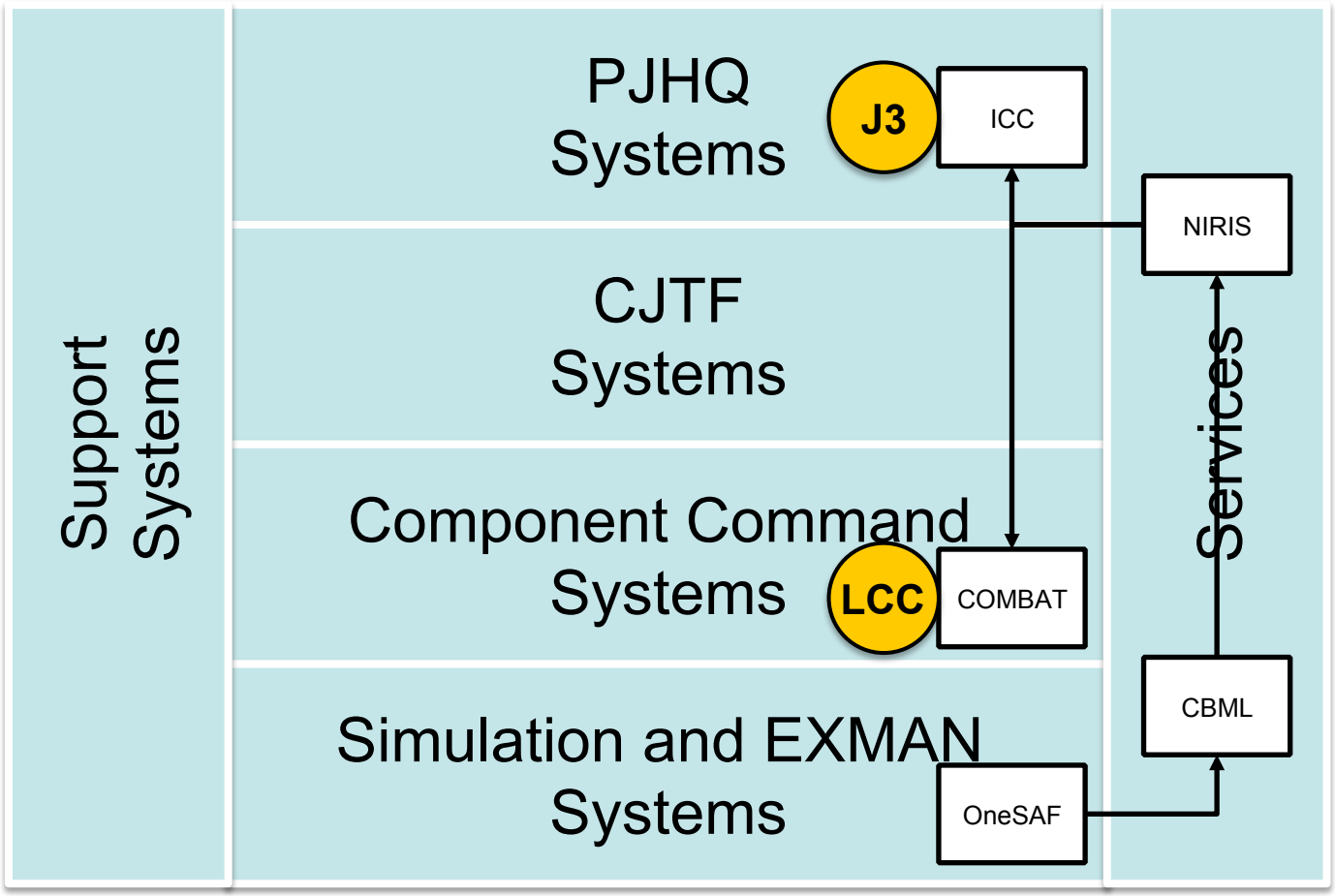
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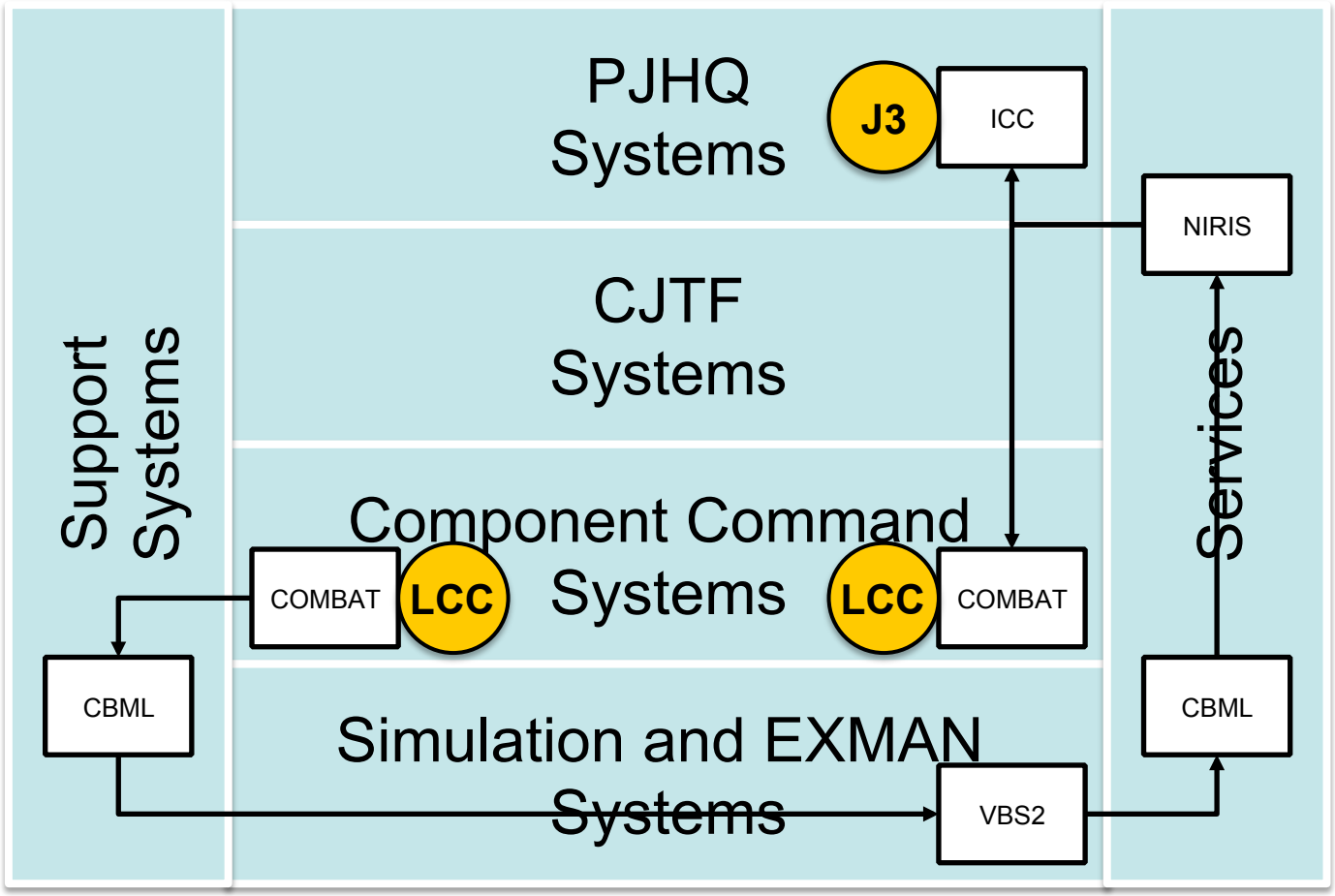
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VBS2

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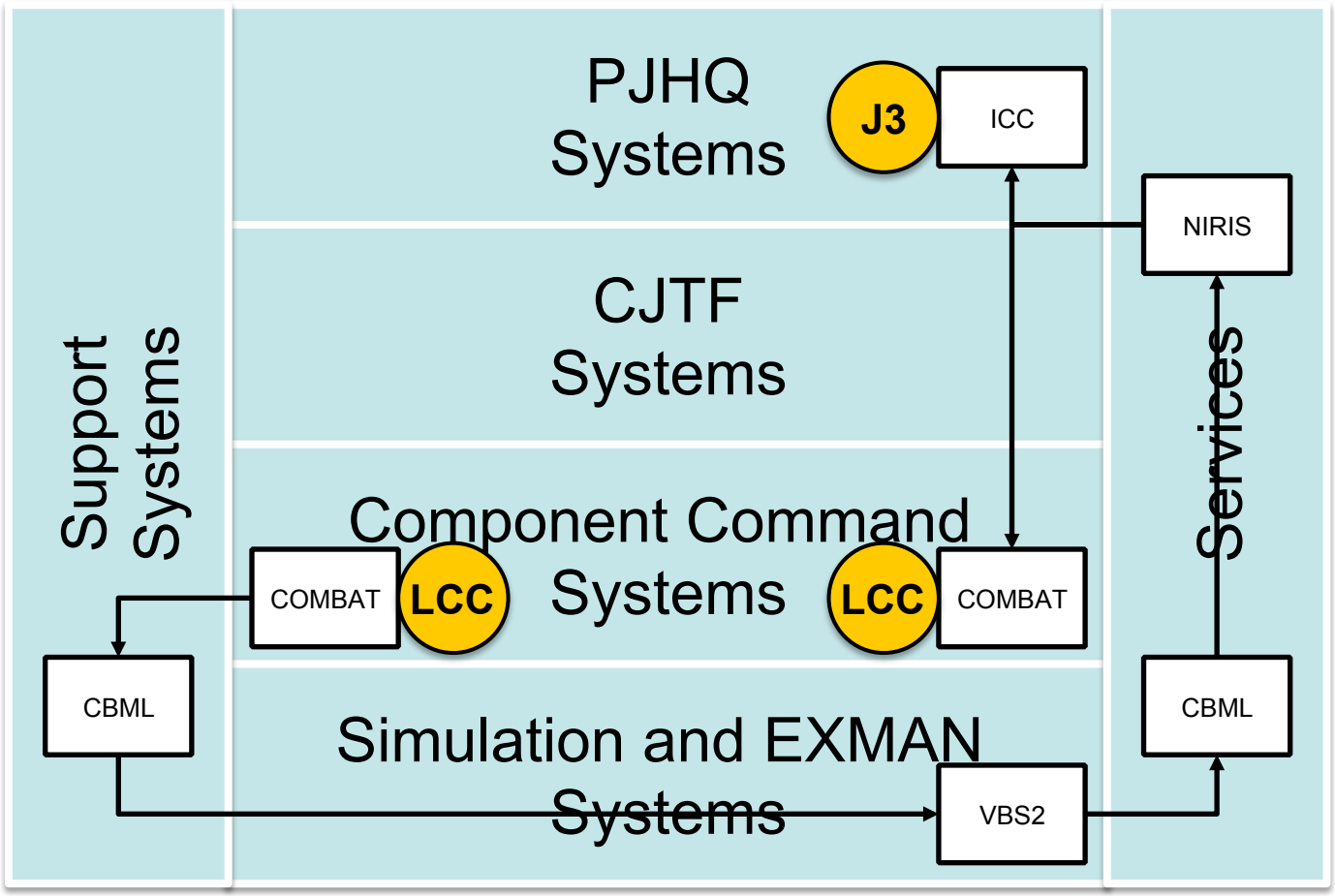
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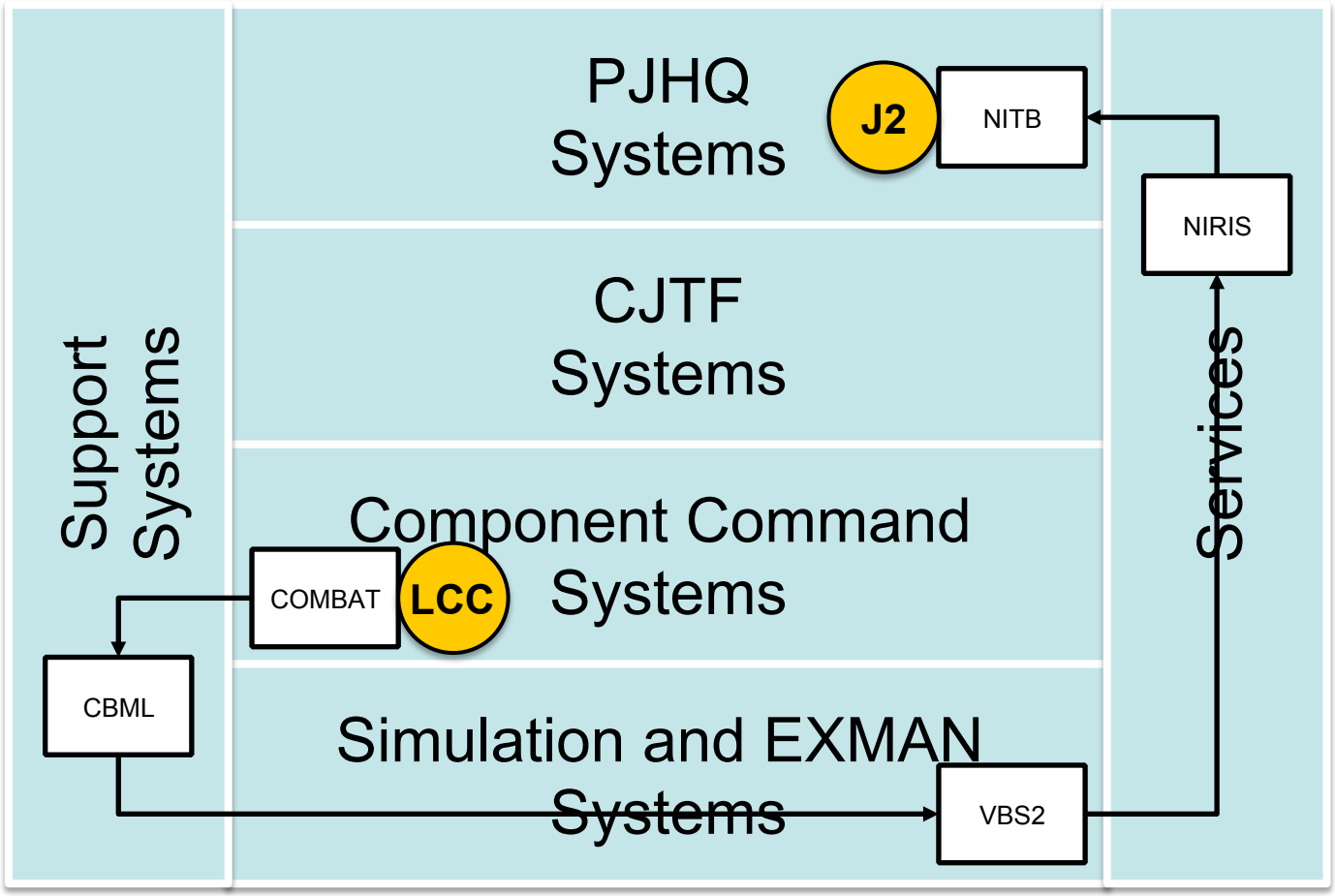
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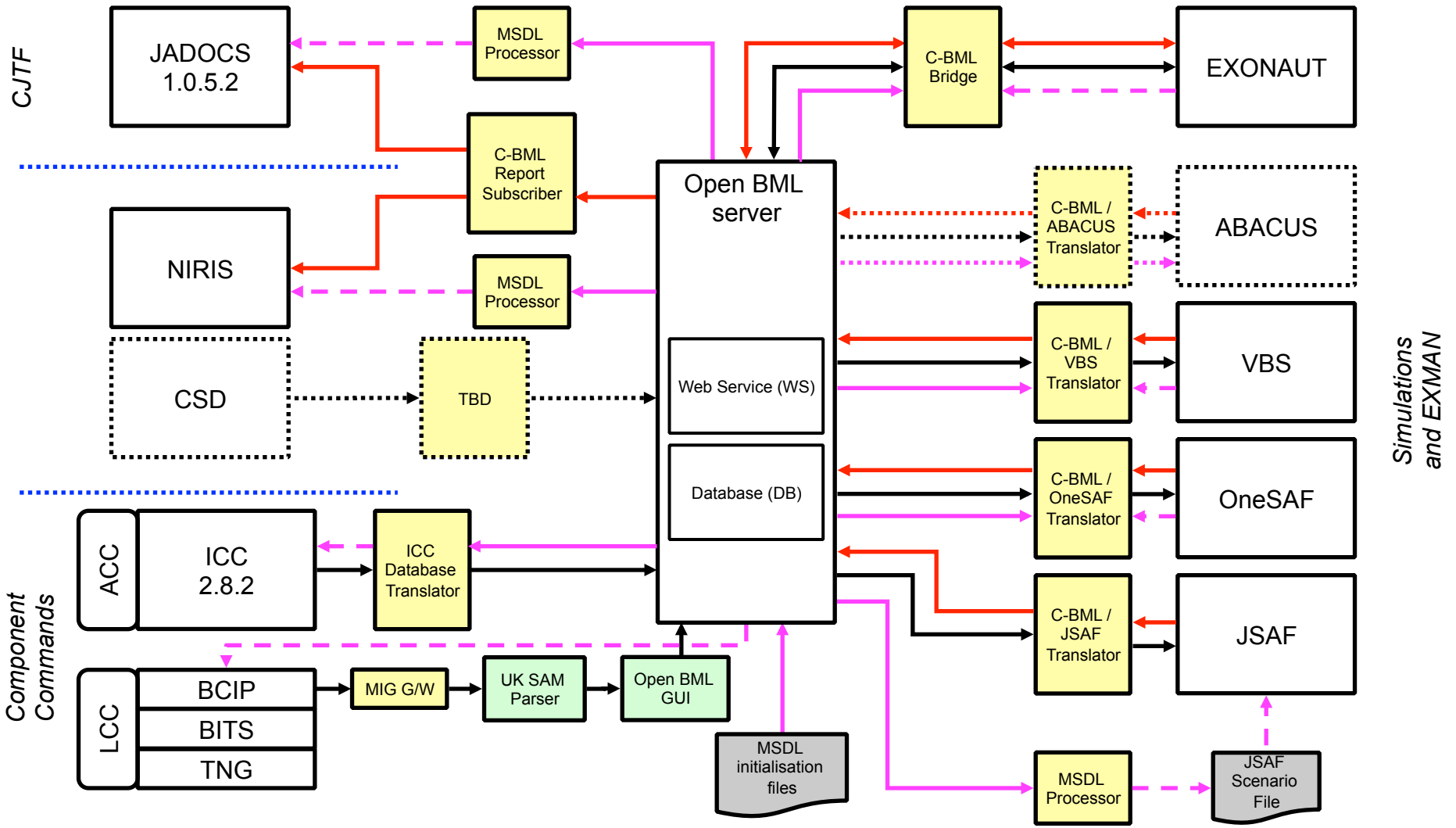

JOTS CCD Applications

C-BML Orders
C-BML Reports
MSDL
MSDL Derived