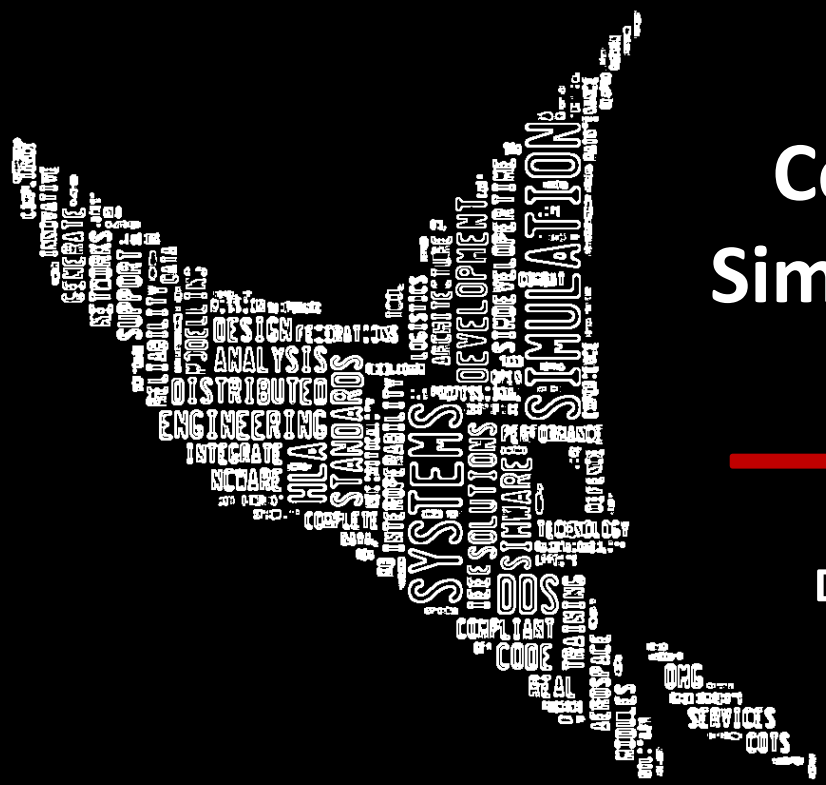


Convergence of Distributed Simulation Architectures Using DDS

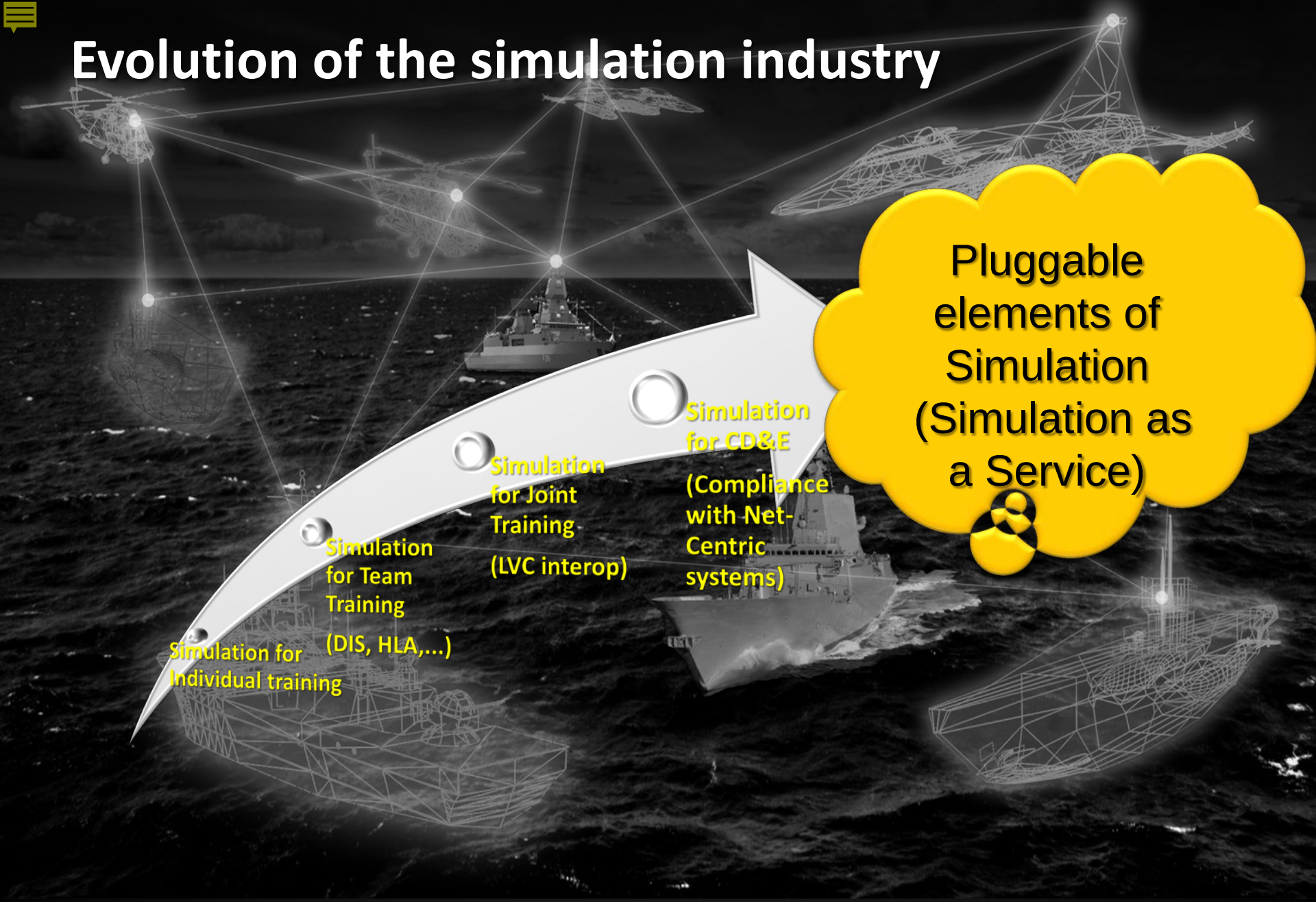
OMG TECHNICAL MEETING
Data Distribution Service Information Day
June 17th 2013. Berlin

Jose-Ramon Martinez-Salio
Presales director NADS
SISO LSA vice-chairman
jrmartinez@nads.es

June-2013

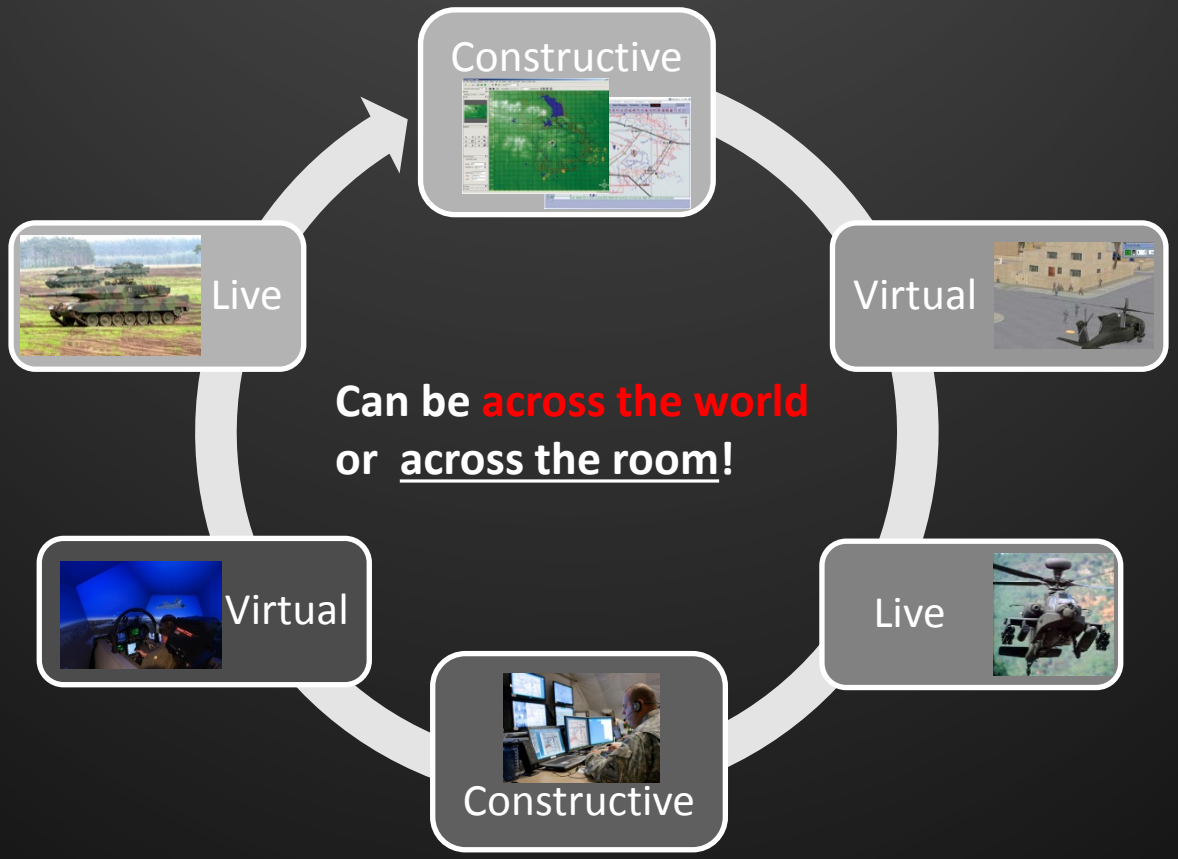
NADS

Evolution of the simulation industry



Concept of Distributed Simulation

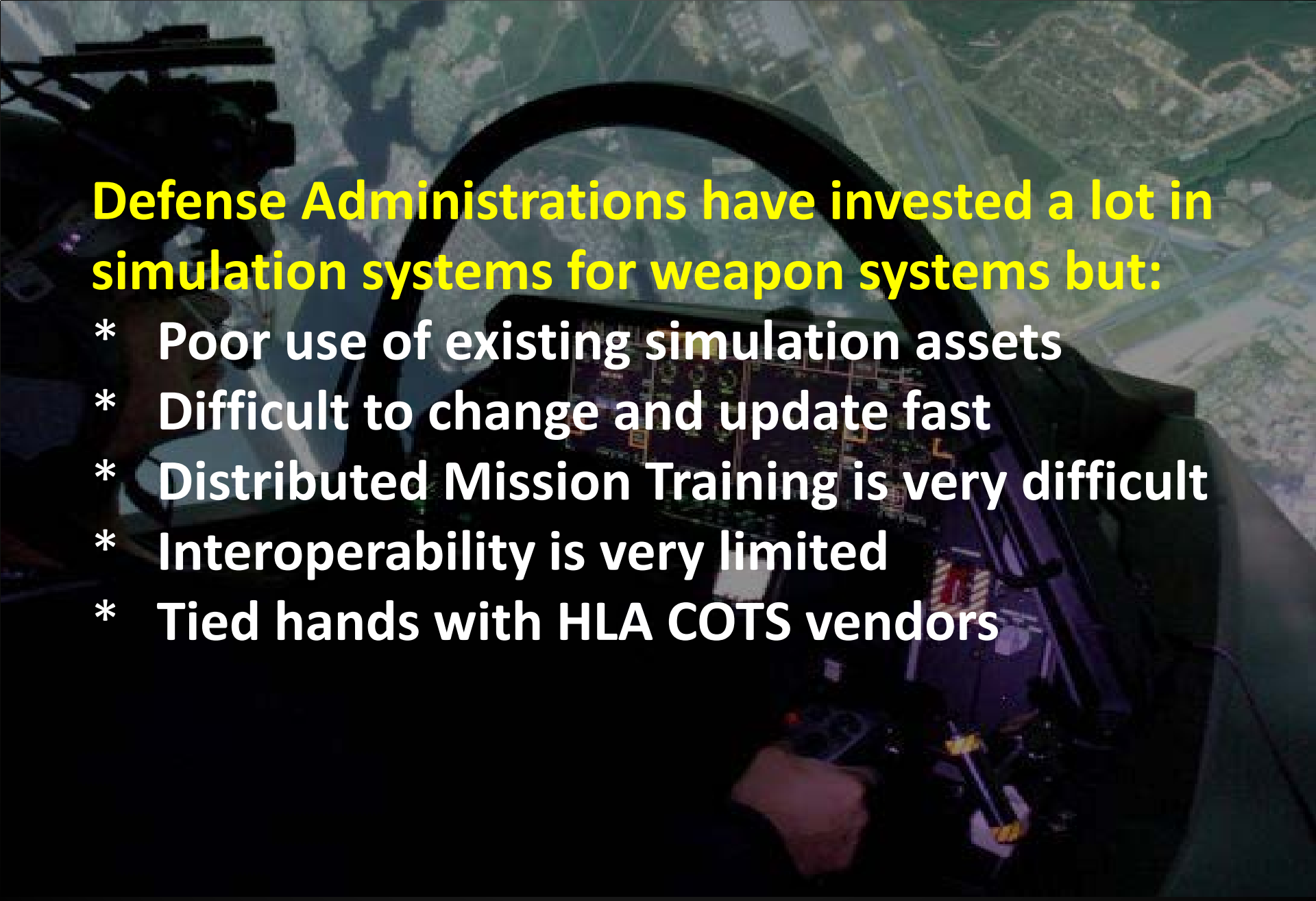
Simulations are interactive through current state-of-the-art communications systems



- **Simulation environments that are distributed across multiple computers, potentially at different locations**
- **Predictible latencies are required**

But Reality is Complex:

* Different Standards for interoperability
* Too many COTS hard to interoperate between them
* Different Data & Voice Communications
* Legacy Systems
* Heterogeneous simulation ecosystems
* Security Issues
* Scaling-Up to Very Large Exercises



Defense Administrations have invested a lot in simulation systems for weapon systems but:

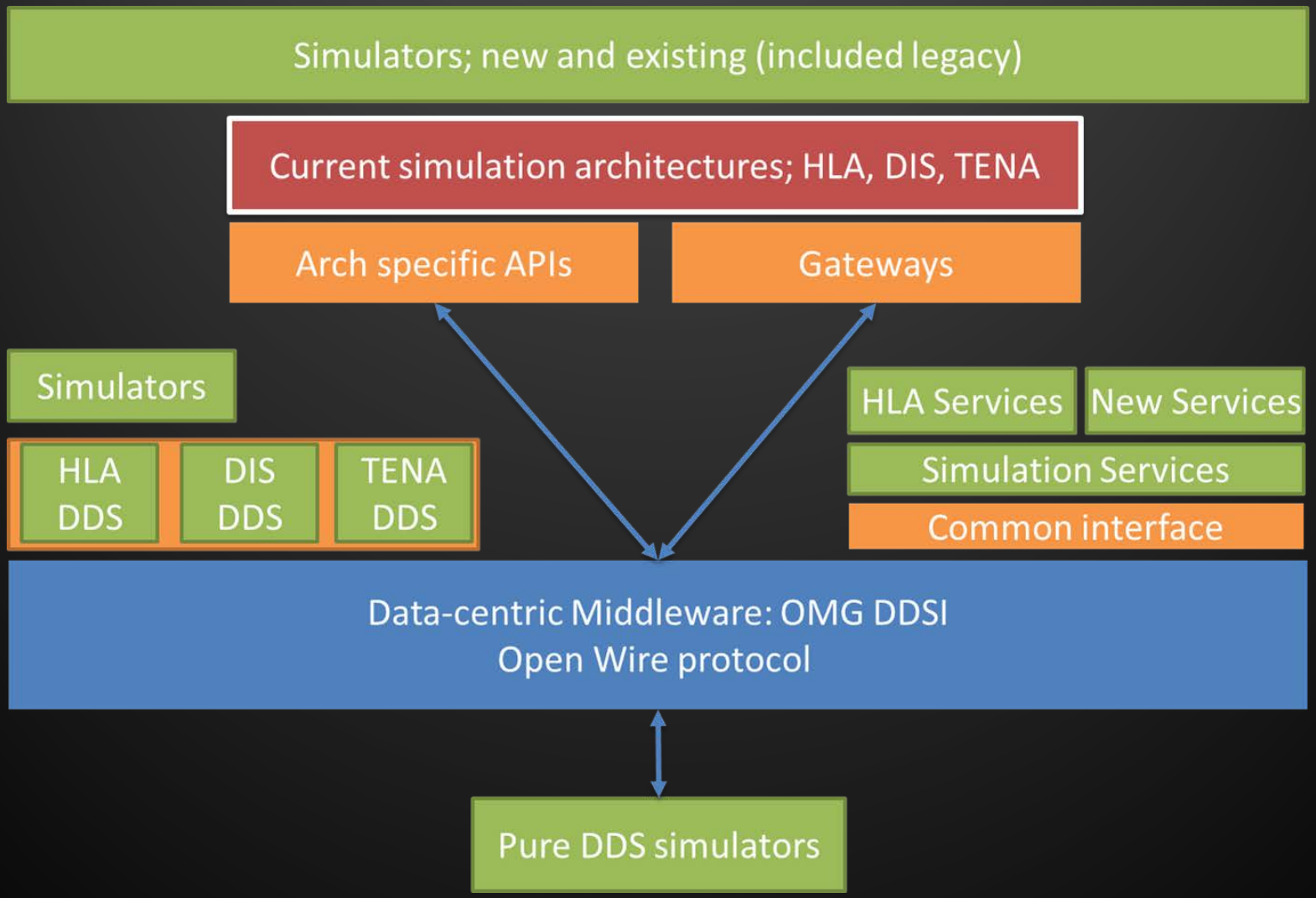
* Poor use of existing simulation assets
* Difficult to change and update fast
* Distributed Mission Training is very difficult
* Interoperability is very limited
* Tied hands with HLA COTS vendors

Due to these problems, SISO starts a new Study Group : LSA, looking to solve many of this pains.

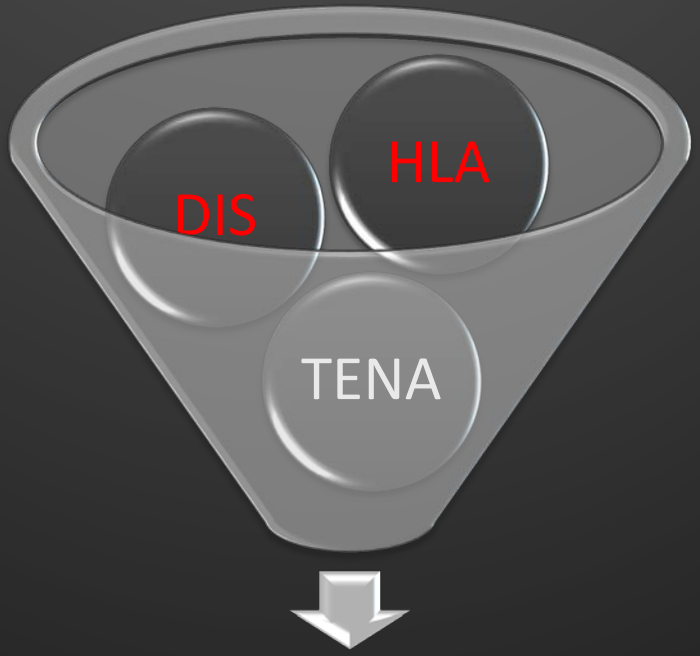
SISO LSA is looking to customize DDS for the simulation domain, providing the foundation for a Layered Simulation Architecture

SISO Simulation Interoperability Standards Organization
"Simulation Interoperability & Reuse through Standards"

LSA proposed layered architecture overview?

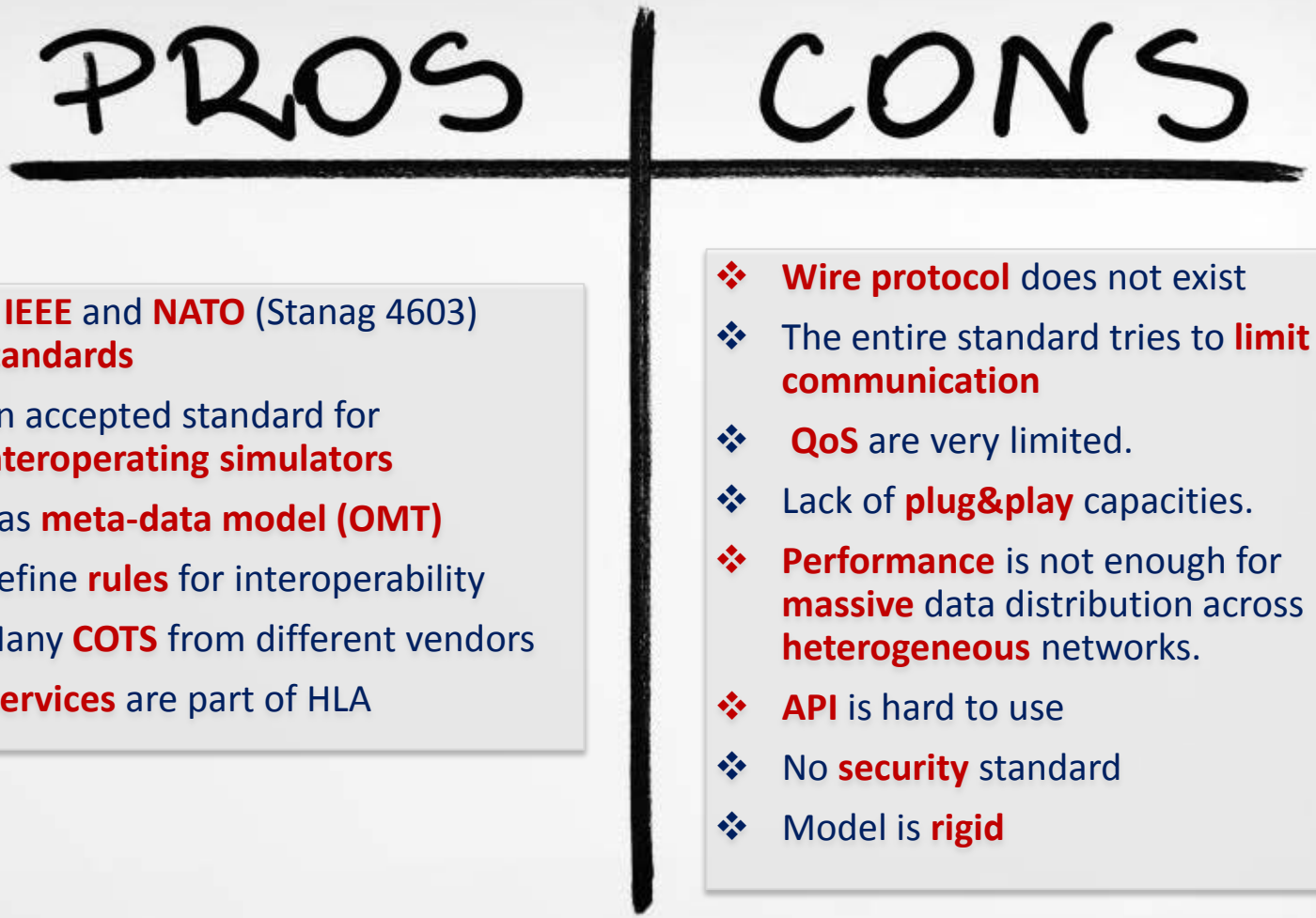


CONVERGENCE OF DISTRIBUTED ARCHITECTURES WITH SISO LSA



- Don´t try to re-invent the wheel
- Apply standards, don´t change the standards

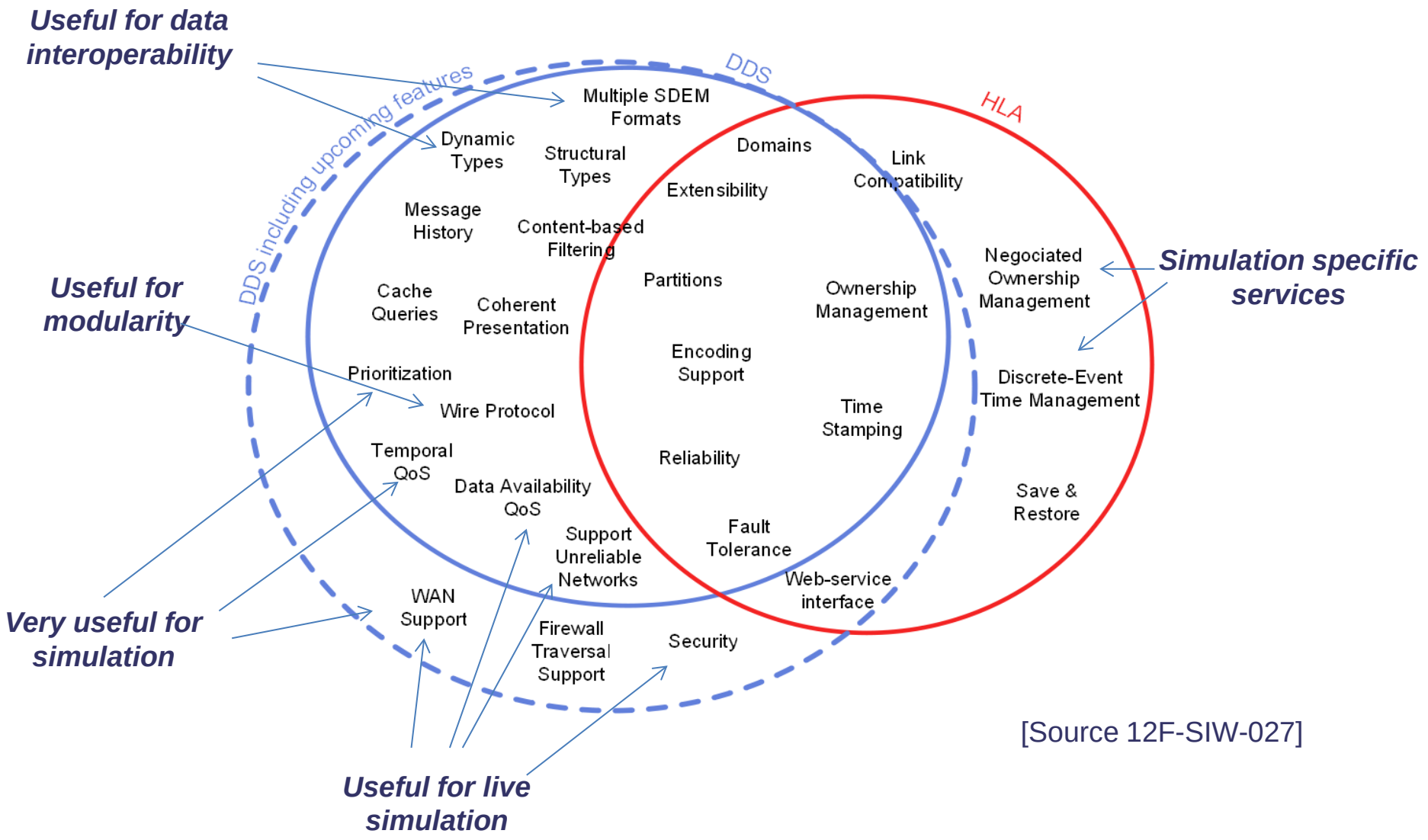
An assessment of HLA present capabilities



- A **IEEE** and **NATO** (Stanag 4603) **standards**
- An accepted standard for **interoperating simulators**
- Has **meta-data model (OMT)**
- Define **rules** for interoperability
- Many **COTS** from different vendors
- **Services** are part of HLA

- **Wire protocol** does not exist
- The entire standard tries to **limit communication**
- **QoS** are very limited.
- Lack of **plug&play** capacities.
- **Performance** is not enough for **massive** data distribution across **heterogeneous** networks.
- **API** is hard to use
- No **security** standard
- Model is **rigid**

Comparison of DDS and HLA Standards

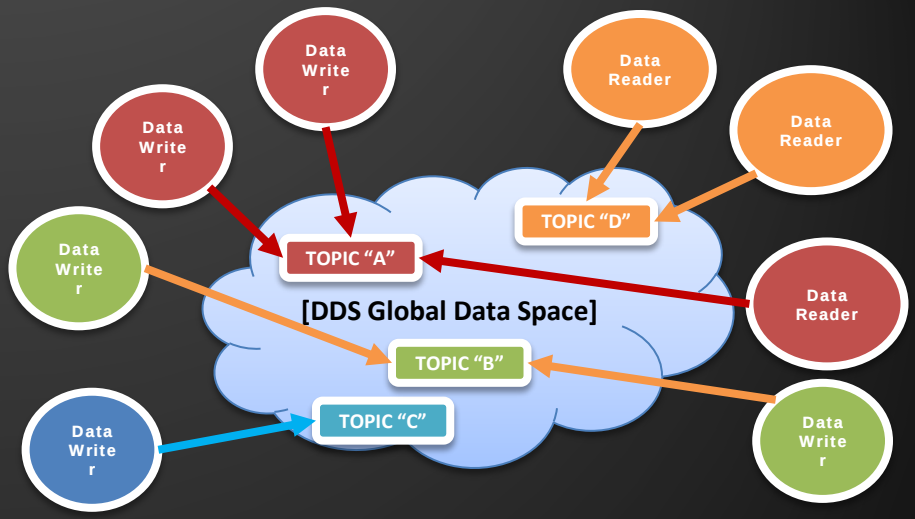


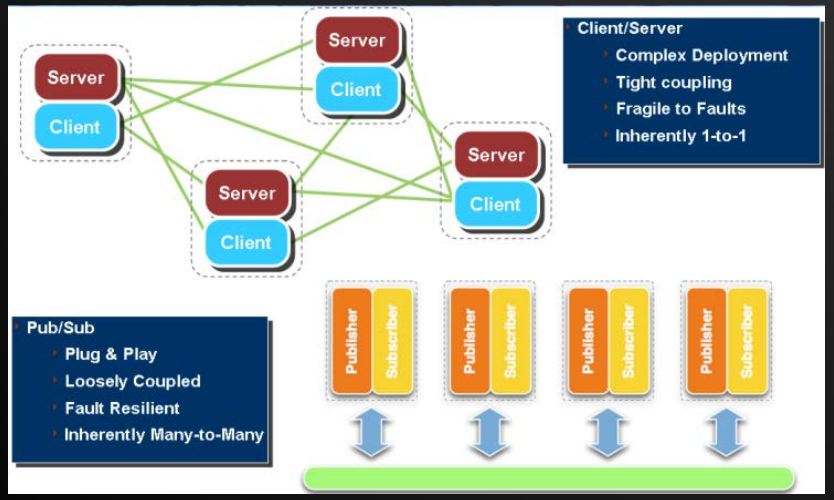
[Source 12F-SIW-027]

Why use DDS in Simulation?

COMMUNICATION

- DDS is centered in controlling the communication
- HLA tries to minimize the communication. It cannot control it
- DIS trust the communication





SCALABILITY and FAULT TOLERANCE

- DDS has automatic discovery, is fully publish-subscriber, no single point of failure
- HLA is central server based: scalability and fault tolerance are difficult

Why use DDS in Simulation?

LESS-THAN-PERFECT COMMUNICATIONS

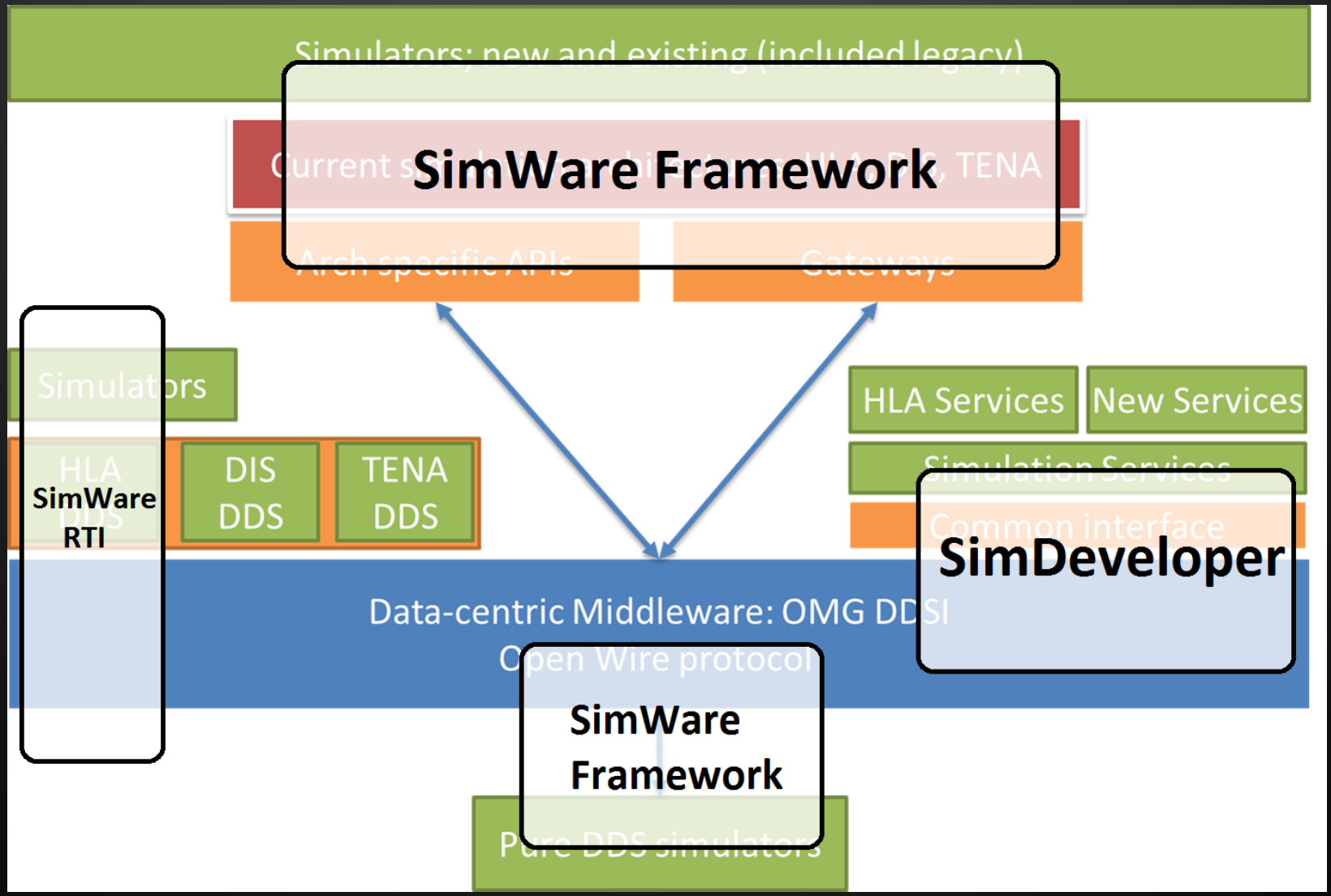
- DDS has been proved over small bandwidth (4800 bps in digital network radios)
- DDS can cope with heterogeneous networks

REAL TIME SIMULATION

- Military platforms use DDS as the communication backbone
- Simulating with DDS can incorporate this data in real time

SimWare

SimWare and LSA?



SimWare: IRC revolution

INTEROPERABILITY: We can connect HLA and DIS simulators without changing them. HLA Evolved also included

REUSABILITY: You can reuse your previous work

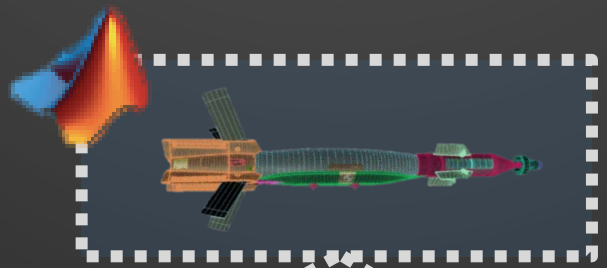
COMPOSABILITY: Make your simulation just by joining pieces

REAL TIME COMMUNICATION BUS

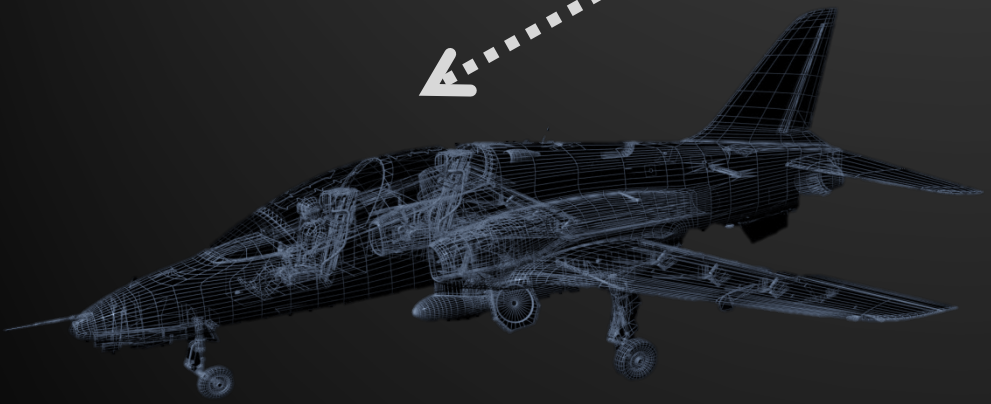
SIMWARE

Concept #1: Interoperability

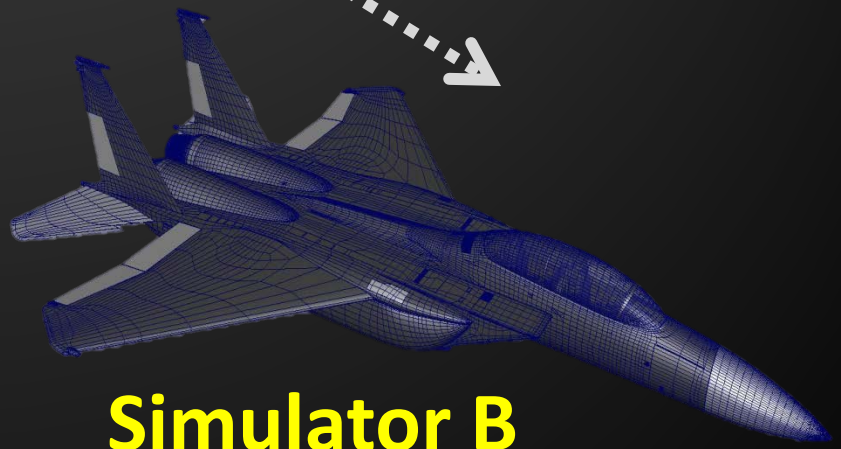
Concept #2: Reusability



same weapon model runs in both simulators

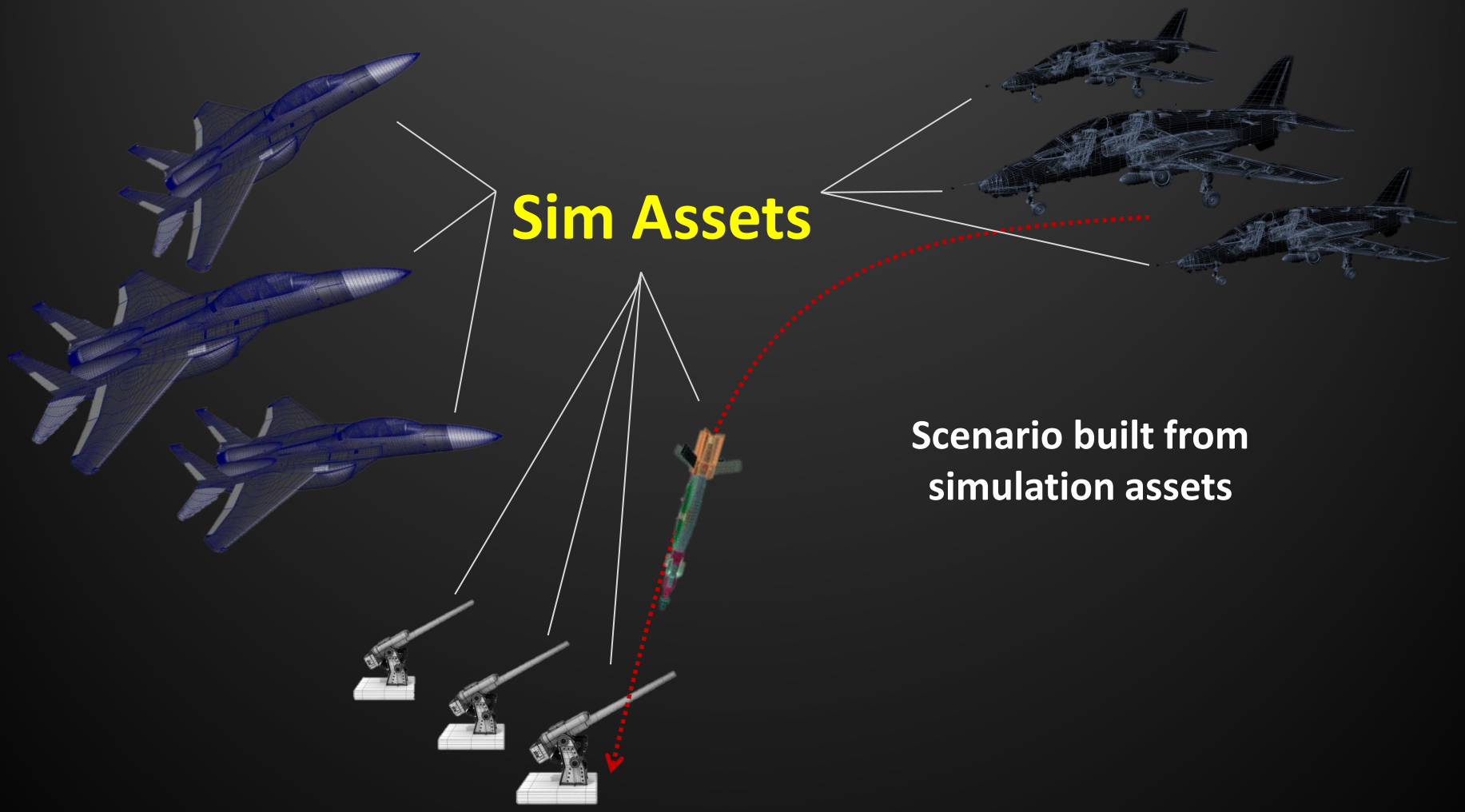


Simulator A



Simulator B

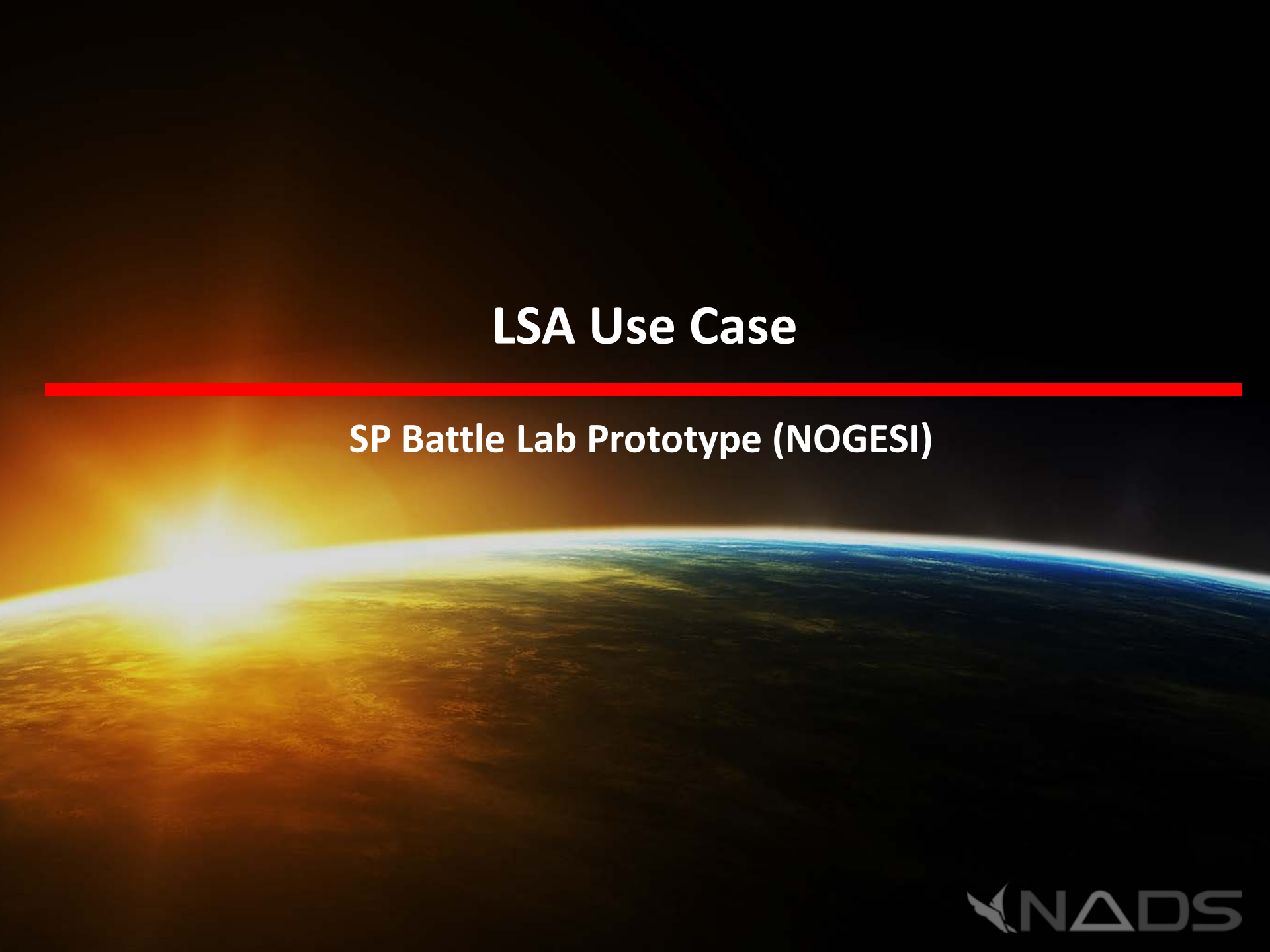
Concept #3: Composability



Scenario built from simulation assets

LSA Use Case

SP Battle Lab Prototype (NOGESI)



GOBIERNO DE ESPAÑA | MINISTERIO DE DEFENSA

Powered by SIMWARE

Tactical C2 system

BMS

FFT service

Command service

SP Army C2 DDS services Interface

SimWare PowerLink

Distributed Simulation Services

Missile Sim Service

LGB Sim Service

Sensor Sim Service

Aircraft Sim Service

SimWare

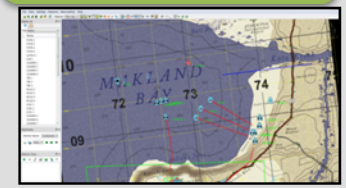
FAC virtual Sim

Simware RTI

DDS Simulation Bus

Simware RTI

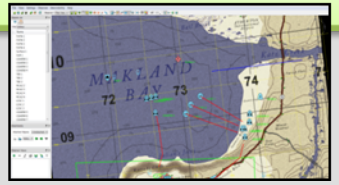
VR-FORCES



SimWare PowerLink

DIS Connector

VR-FORCES



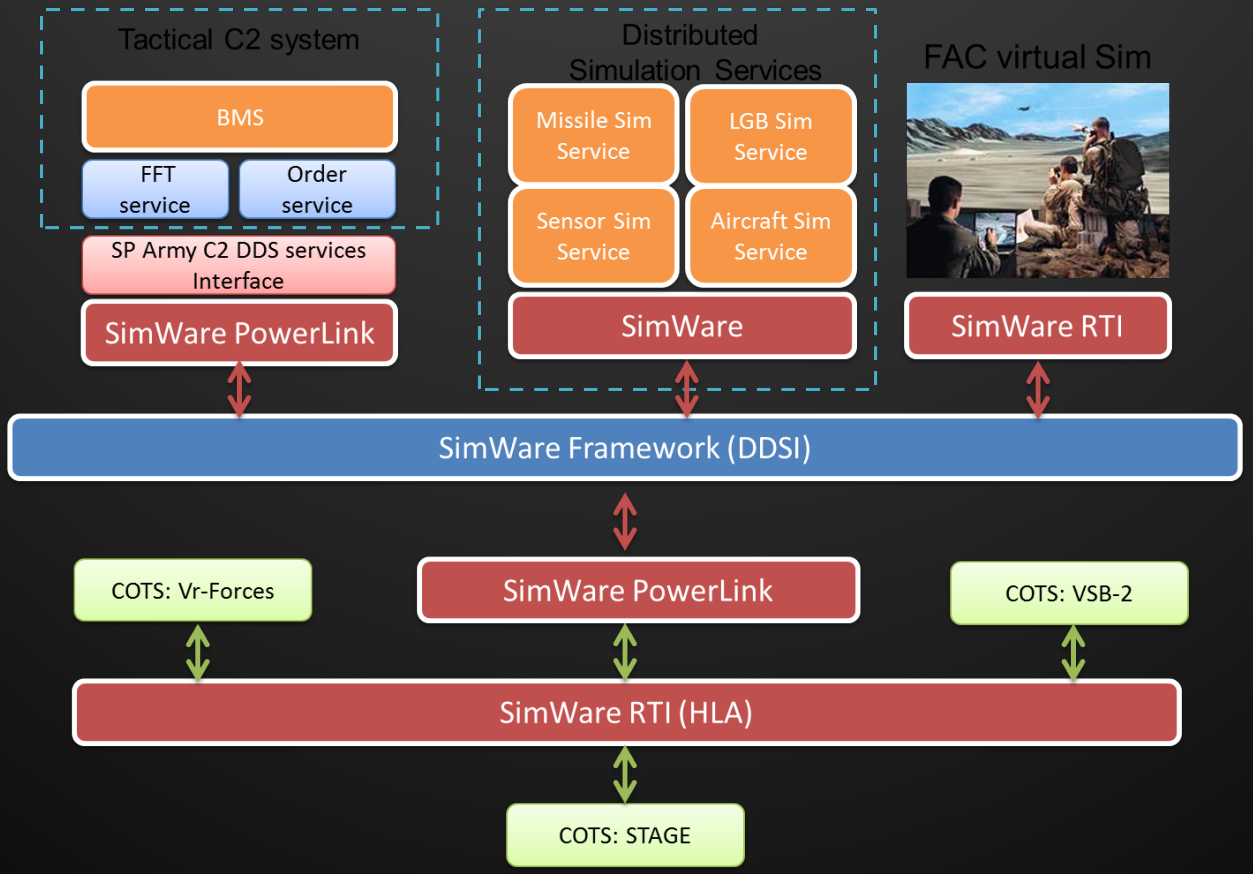
Simware RTI

VBS-2

NADS

Nogesi milestone

NOGESI project has been the test bed and proof of concept of SimWare architecture



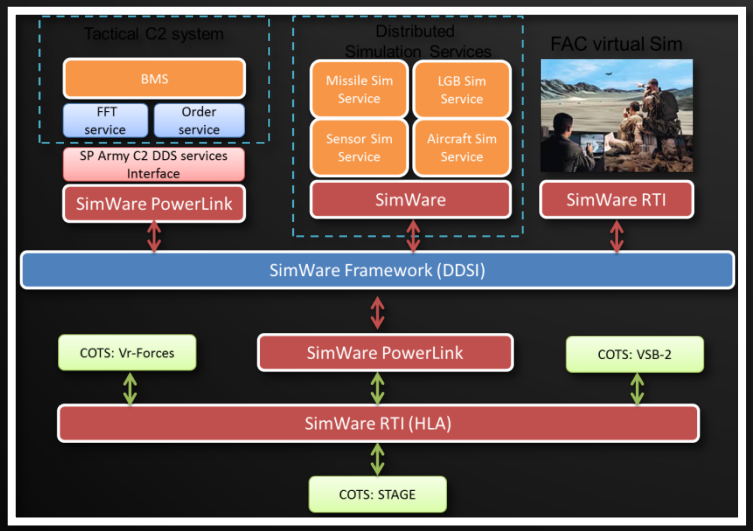
SimWare Lab

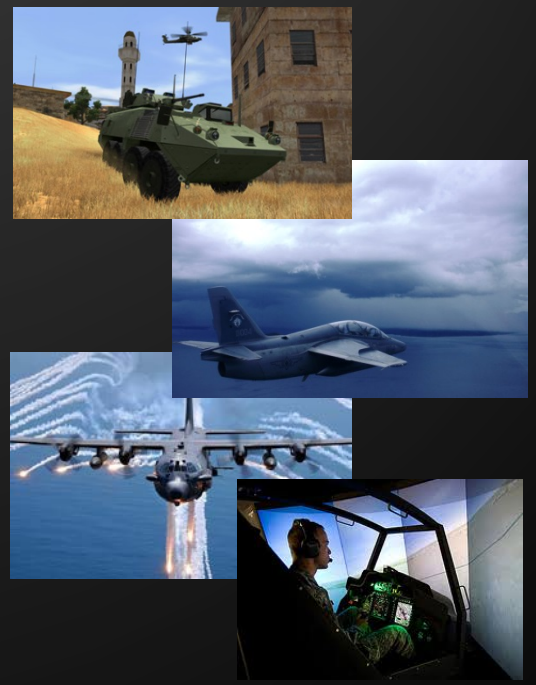
SimWare Lab has evolved as integration laboratory for SimWare

SimWare: Simulation as a service

SimWare Lab is the first simulation service

- Transparent to the user
- Composability
- Pluggable
- Fully distributed





Please address any questions about this presentation to:

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