



# UAS Control Segment (UCS) Architecture

## Interoperability through Model Driven Architecture (MDA®)

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# What is Object Management Group (OMG) MDA®?

- “A **model** of a system is a description or specification of that system and its environment for some certain purpose. A software model is often presented as a combination of drawings and text. The text may be in a modeling language or in a natural language.”
- “The **architecture** of a system is a specification of the parts and connectors of the system and the rules for the interactions of the parts using the connectors.”
- **Model driven** “is an approach to system development, which increases the power of models in that work. It is model-driven because it provides a means for using models to direct the course of understanding, design, construction, deployment, operation, maintenance and modification.”
- “The **Model-Driven Architecture**® prescribes certain kinds of models to be used, how those models may be prepared and the relationships of the different kinds of models.” [OMG MDA Guide v1.0.1]

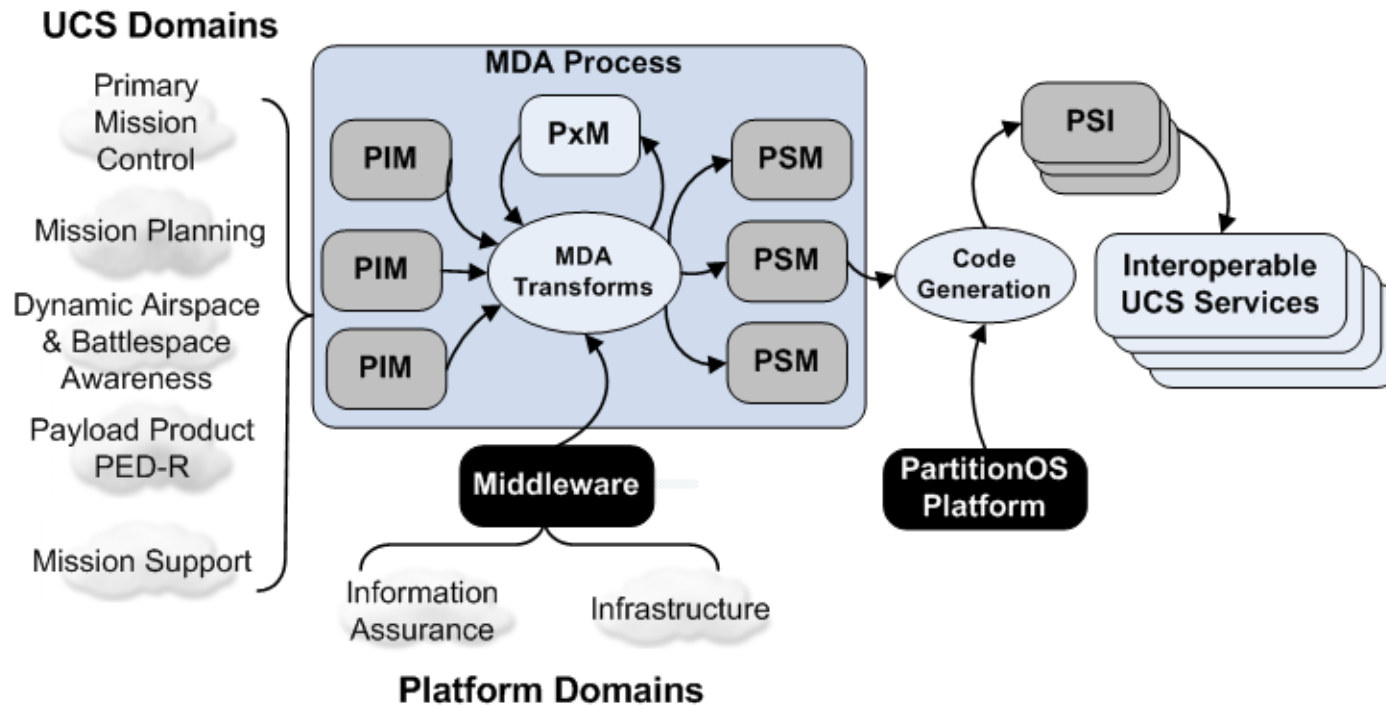


# Why OMG MDA® for UCS?

- ❑ “The UCS Application Software architecture is expressed as an open, vendor-neutral Platform Independent Model (PIM) ... that complies with the OMG Meta-Object Facility (MOF™), Unified Modeling Language (UML®) and XML Metadata Interchange (XMI™) standards.”
- ❑ “In the UCS Architecture, the MDA process ensures that ***interoperability is built-in*** to all of the PSMs derived from a common set of UCS service and data PIMs.”
- ❑ OMG MDA® is an appropriate methodology / technology for achieving common specifications that enable interoperable implementations without injecting unnecessary platform-specific requirements.
- ❑ OMG MDA® is an established best practice in this domain: The UCS WG leverages the successful NIAG SG125 MDA® methodology for developing an interoperable system architecture and Information Exchange Requirements for UAS Weaponisation.



# 60 Second MDA® Tutorial



- ❑ **PIM** – Platform Independent Model
- ❑ **PSM** – Platform Specific Model
- ❑ **PSI** – Platform Specific Implementation
- ❑ **Platform** – a layer of supporting technology, for UCS this generally refers to Middleware



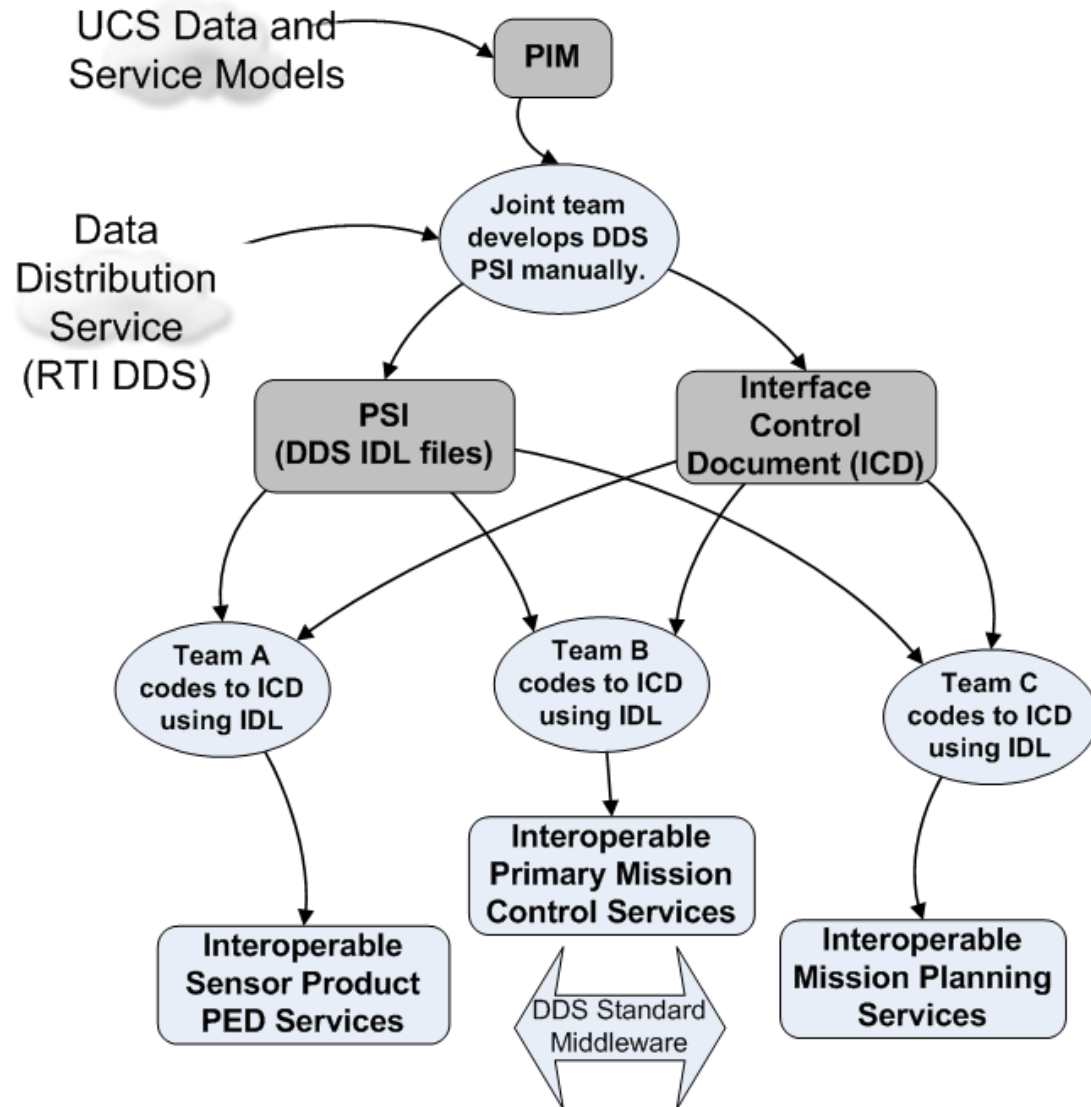
# Model Driven Interoperability

- ❑ **Model Driven Interoperability (MDI)** – a perspective on MDA® that focuses on the achievement of ***built-in interoperability***.
- ❑ Focus on not just the models, but on the ***MDA transforms*** that define the mappings from one model to another.
- ❑ Use of common transforms:
  - ❑ Assures ***common-platform interoperability***.
  - ❑ Enables definition of efficient and correct ***bridges*** for ***cross-platform interoperability***.
- ❑ ***No silver bullet***. The more comprehensive and verifiable the transform, the greater likelihood that interoperability of implementations can be attained and maintained.



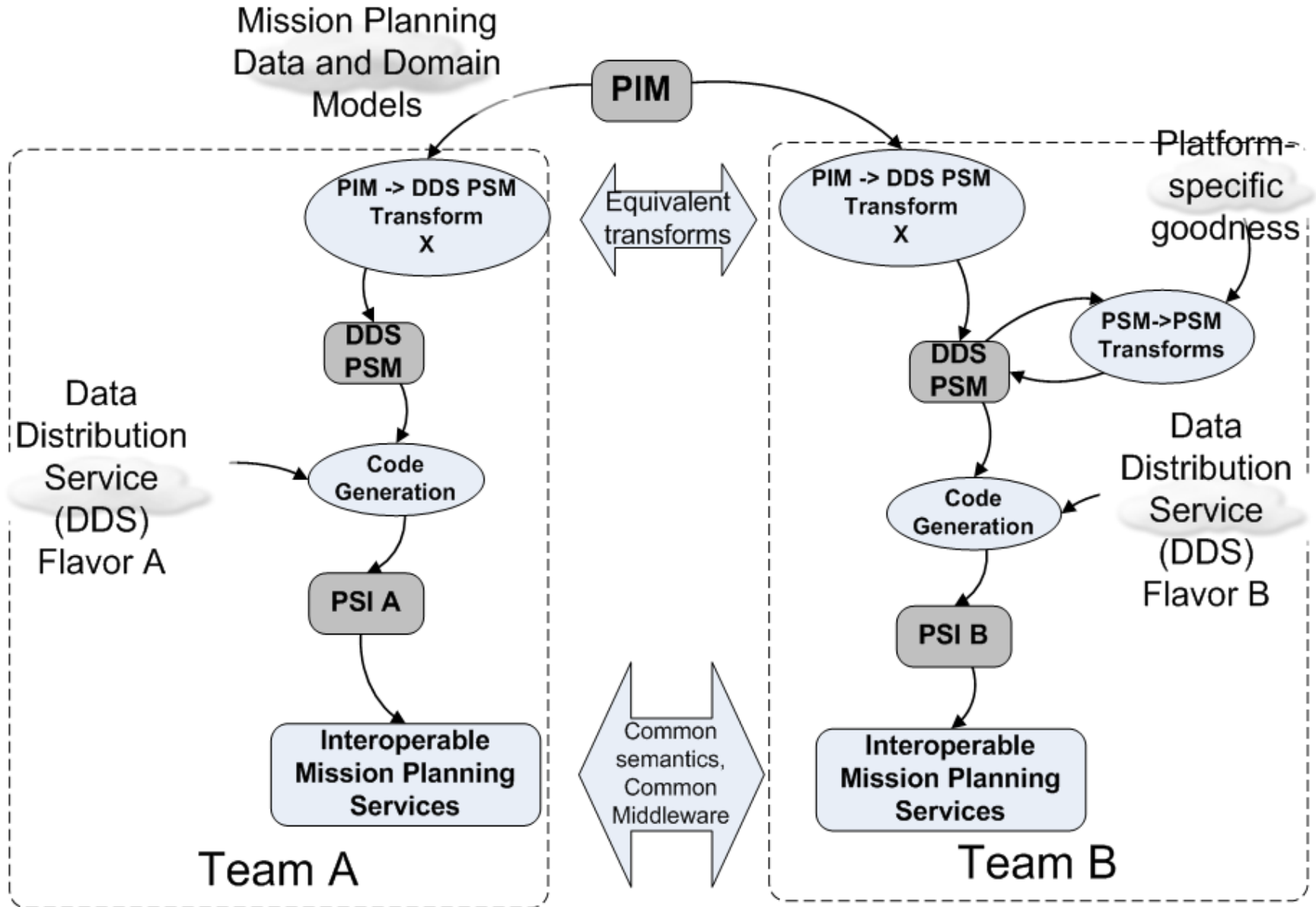
# Interoperability via Specifications

- ❑ Process used for Nov 2010 IWP demo.
- ❑ Very successful demo validating common UCS PIM and feasibility of multi-team, multi-system interoperability.
- ❑ Scalable over program space and time?



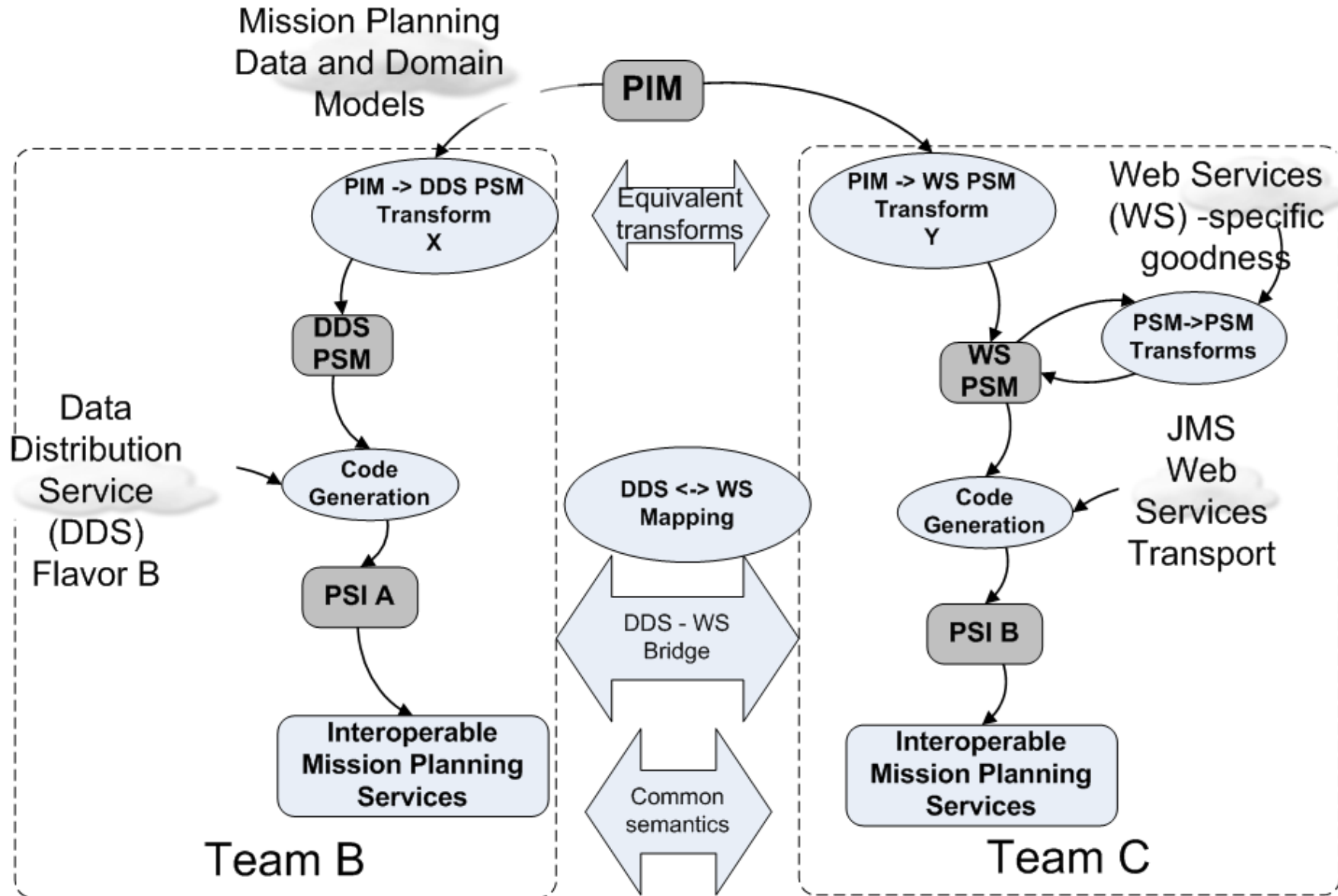


# Common Platform Interoperability





# Cross-Platform Interoperability



# Summary



- ❑ The UCS WG has selected MDA® as a valuable process for driving and supporting the development of interoperable UAS Control Systems.
  
- ❑ UCS WG work now underway to develop specific processes and techniques required.
  
- ❑ Questions?
  
- ❑ Thank you!