MoSSEC

A new initiative for sharing

Modelling and Simulation

information in a collaborative

Systems Engineering Context

Adrian Murton
Expert in Modelling and Simulation
Collaboration Frameworks
Airbus Operations Ltd

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Agenda

- **Why do I need MoSSEC?**

- **What is MoSSEC?**

- **How do I get involved in MoSSEC?**

- **Summary**

Adrian (Ad) Murton

- **BSc Computing & Informatics**

- **BAE SYSTEMS (1986 – 2001)**
  - **Corporate Research Centre**
  - **Concurrent Engineering research team leader**

- **Airbus Operations Ltd. (2001 – present)**
  - **Engineering – Knowledge Based Engineering**
  - **ICT – Product Line Manager**
  - **Engineering – Simulation Projects**
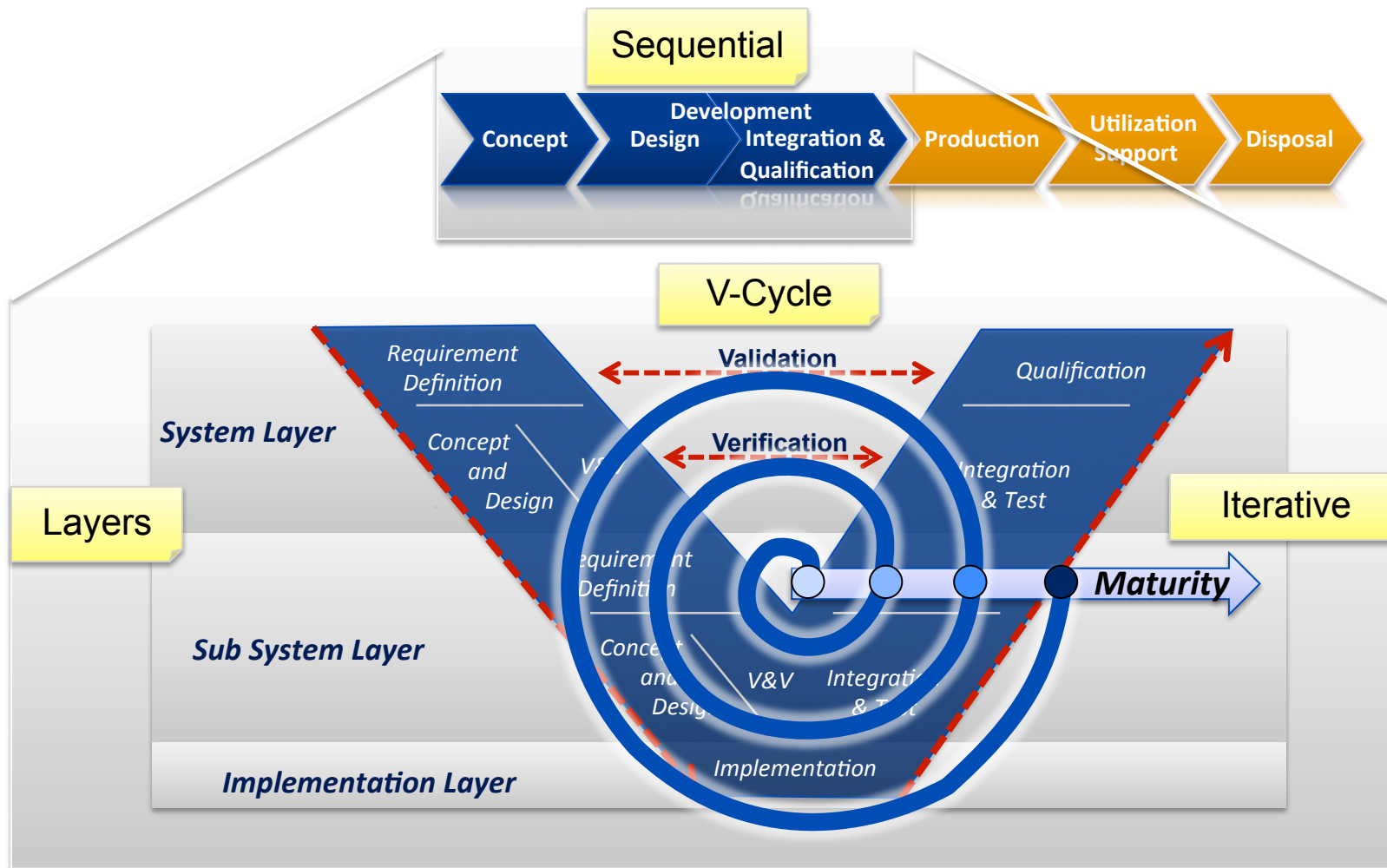 - **Expert in Modelling and Simulation Collaboration Frameworks**

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Lifecycle of "System of Interest"

Sequential

Concept | Development Design | Development Integration & Qualification | Production | Utilization Support | Disposal

V-Cycle

Layers

Iterative

System Layer

Requirement Definition

Concept and Design

Validation

Verification

Qualification

Integration & Test

Sub System Layer

Requirement Definition

Concept and Design

V&V

Integration & Test

Maturity

Implementation Layer

Implementation

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Lifecycle of "System of Interest"
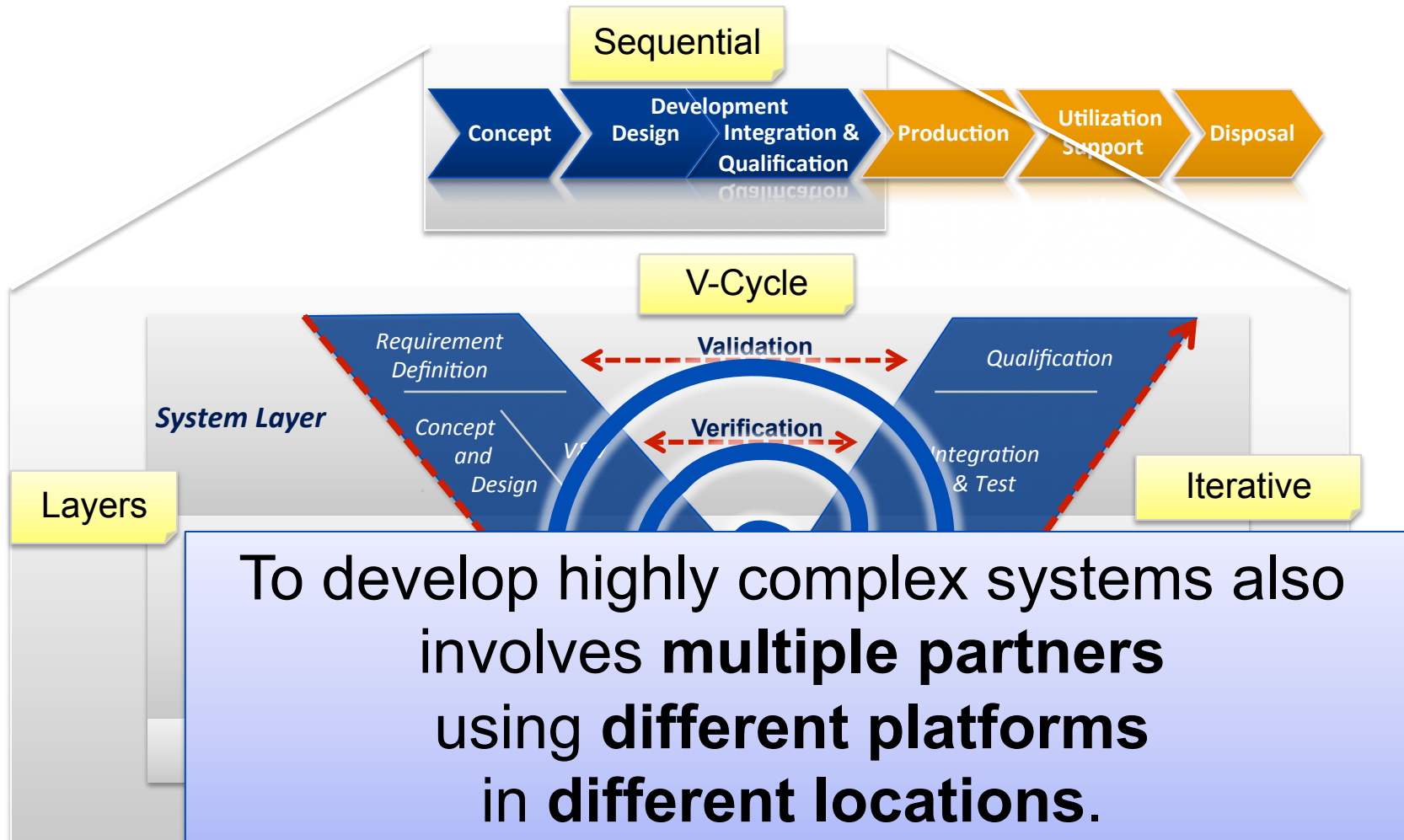
Sequential

| Concept | Development Design | Development Integration & Qualification | Production | Utilization Support | Disposal |

V-Cycle

System Layer

Requirement Definition

Validation

Qualification

Concept and Design

Verification

Integration & Test

Layers

Iterative

To develop highly complex systems also involves **multiple partners** using **different platforms** in **different locations**.

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Challenges for distributed systems engineering

- **Distributed Infrastructure**
  - Secure Collaboration for:
    - Locations
    - Organisations
    - Software Platforms

- **Distributed Processes**
  - Multitude of Modelling and Simulation tools

- **Distributed Data**
  - Modelling and Simulation data
  - V-cycle meta-data
    - (who what when where how why etc)
  - Efficient sharing, synchronisation and integration

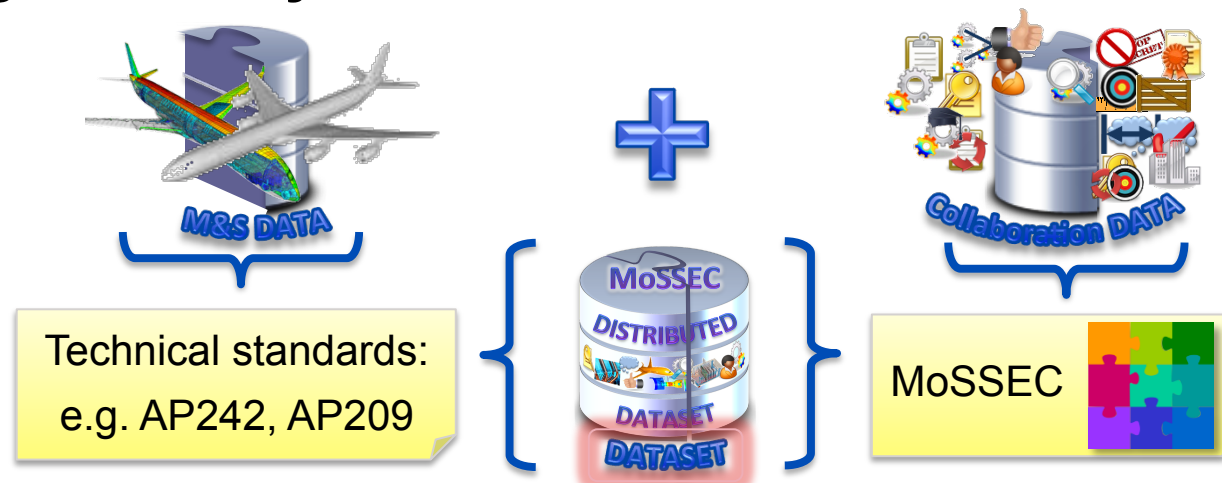**Remain Compliant with existing Standards** (e.g. AP233, AP239, AP242)

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MoSSEC DISTRIBUTED DATASET

Remain Compliant with existing Standards (e.g. AP233, AP239, AP242)

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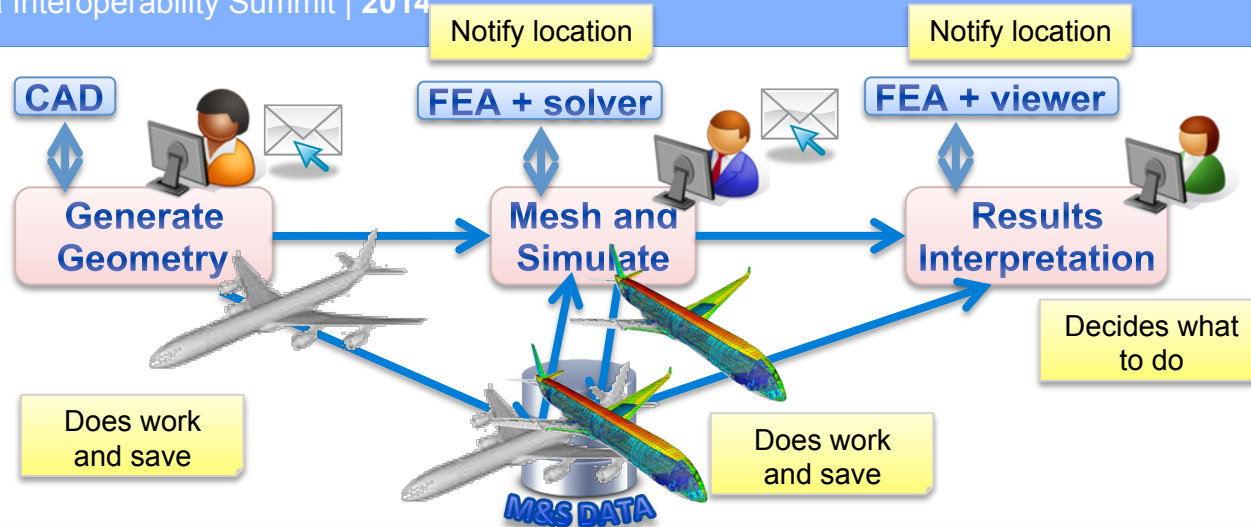# Collaboration vs Modelling & Simulation Data

- ## Modelling and Simulation data
  - ### Managed in the PLM/M&S systems
  - ### Exchanged with technical standards

- ## Collaboration data
  - ### Managed by MoSSEC Compliant Tools
  - ### Exchanged with MoSSEC services
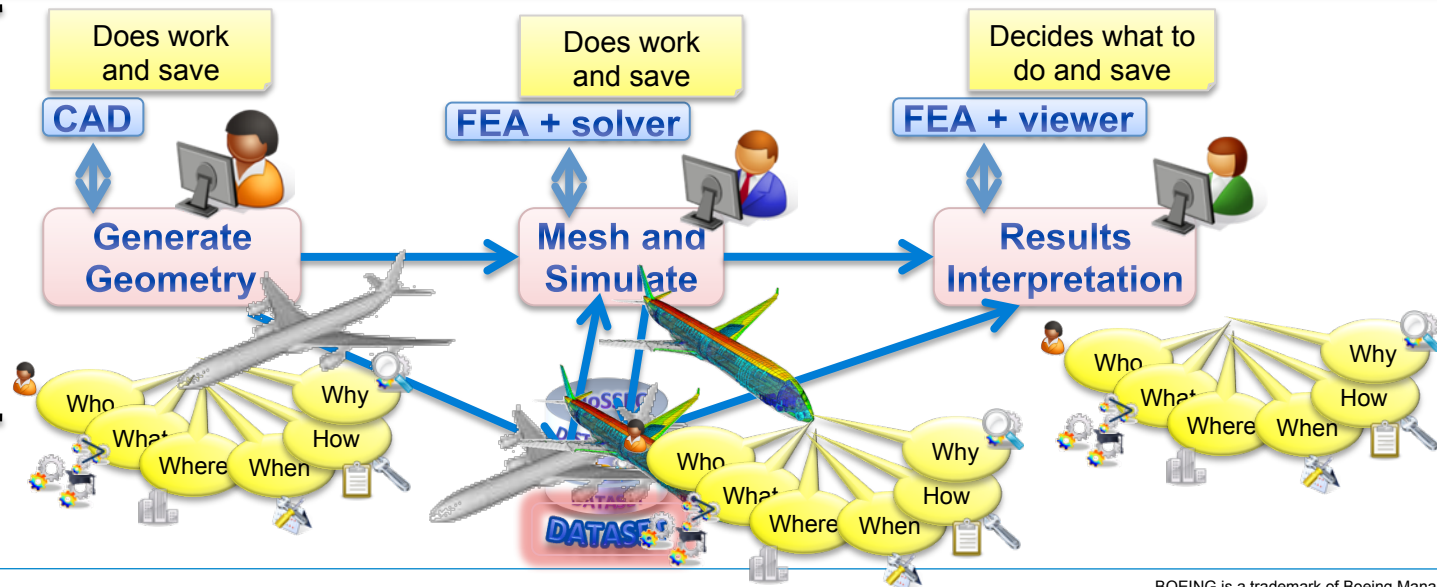
- ## Together they enable the distributed dataset

Technical standards:
e.g. AP242, AP209

MoSSEC

How is it used in practise

Typical process

Notify location — Notify location

CAD · FEA + solver · FEA + viewer

Generate Geometry → Mesh and Simulate → Results Interpretation

Decides what to do

Does work and save

Does work and save

M&S DATA

Typical process with MoSSEC

Does work and save · Does work and save · Decides what to do and save

CAD · FEA + solver · FEA + viewer

Generate Geometry → Mesh and Simulate → Results Interpretation

Who · What · Where · When · Why · How

DATASET

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How is it used in practise - distributed

- **Distributed Infrastructure**
  - Secure Collaboration for:
    - Locations
    - Organisations
    - Software Platforms

- **Distributed Processes**
  - Multitude of Modelling and Simulation tools

- **Distributed Dataset**
  - **Step1 – Generate Geometry**
  - **Step2 – Mesh and Simulate**
  - **Step3 – Results Interpretation**

Does work and save

Decides what to do and save

Does work and save

CAD

Generate Geometry

Results Interpretation

FEA + viewer

Mesh and Simulate

FEA + solver

Collaboration Services

MoSSEC DISTRIBUTED DATASET
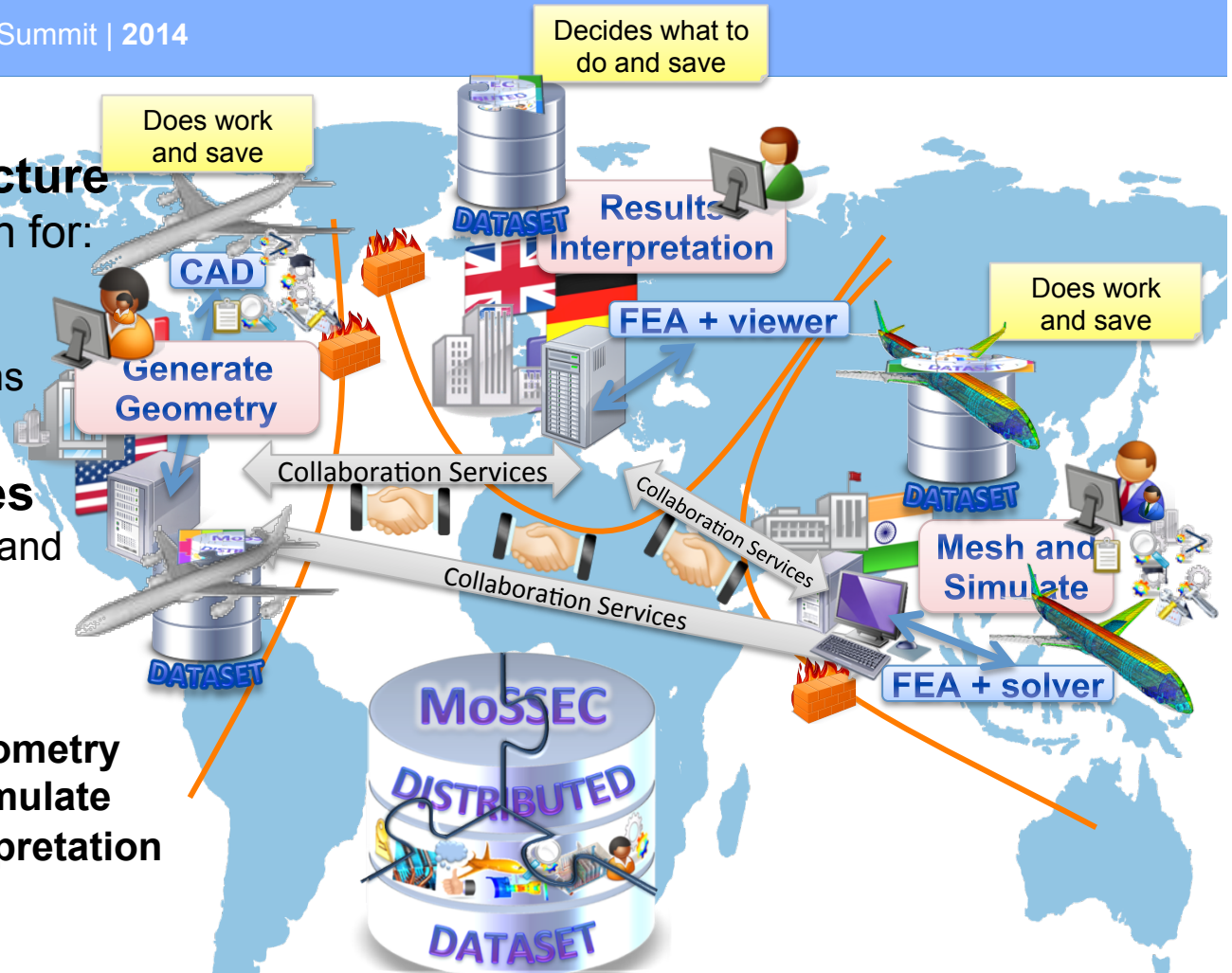
The MoSSEC structure and services enable the distributed dataset

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Agenda

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➡ **What is MoSSEC?**

- **How do I get involved in MoSSEC?**

- **Summary**

MoSSEC: a common approach based on standards

- MoSSEC Business Object Model
- ISO 10303-233 Systems Eng.
- ISO 10303-239 PLCS
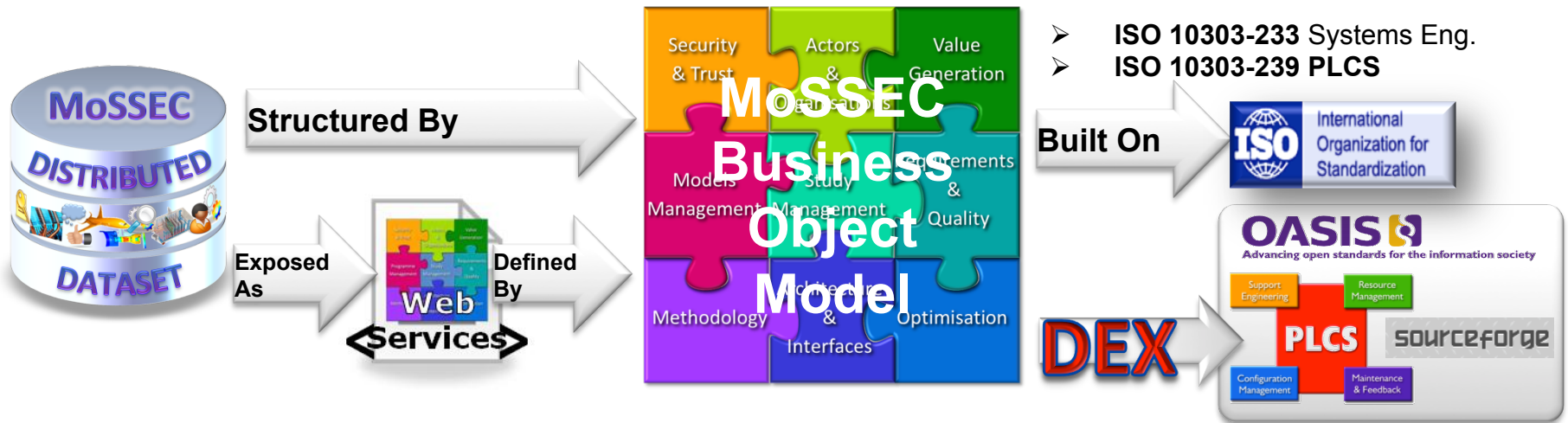
• **MoSSEC provides a common approach for:**
  • **Structuring the Distributed Dataset**
  • **Structuring the Information Services for Dataset Management**
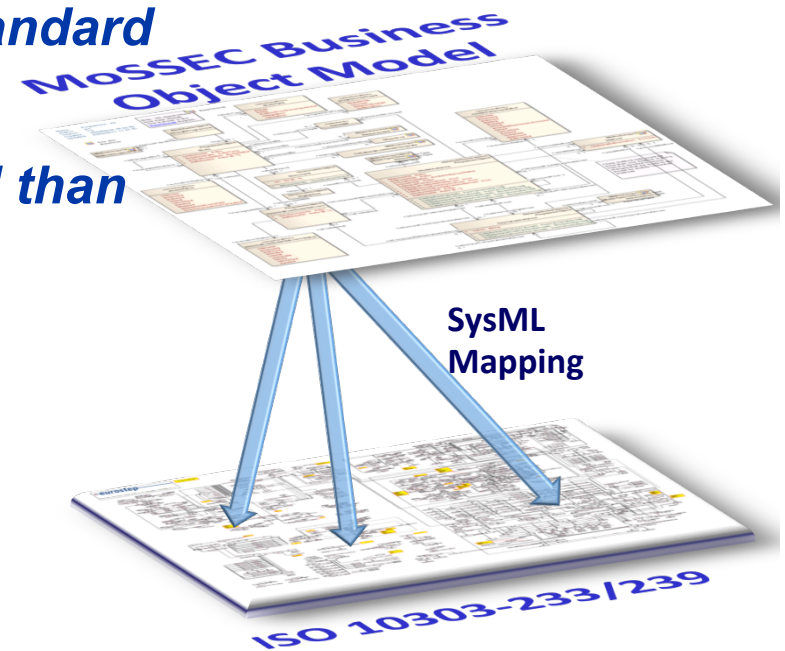
• **MoSSEC is built on ISO standards**
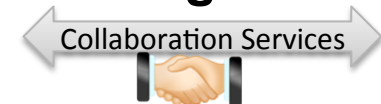
Why not just use the ISO standards?

PLCS (ISO 10303-239) is generic, flexible, and designed to be extended and specialised therefore:

➜ *MoSSEC Business Object Model provides usage guidance to explain how the standard is used in context*

➜ *MoSSEC Services are at a higher level than the standard, so are more efficient*
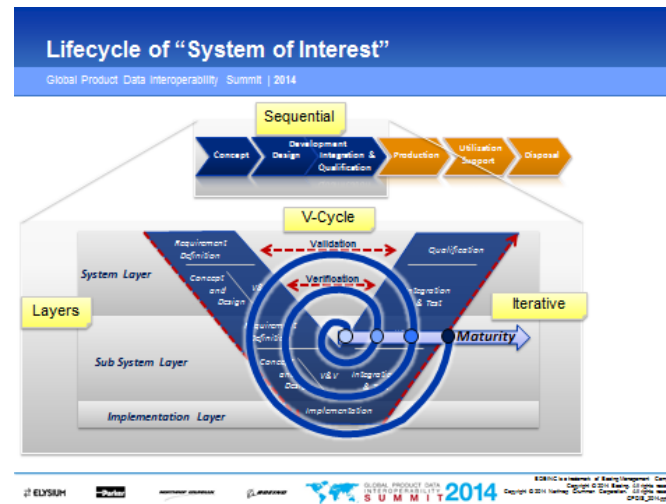
MoSSEC Business Object Model

SysML Mapping

ISO 10303-233/239

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Organizations
Persons

Contracts
Access rights
Security classification…

TOP SECRET

Security & Trust

Actors & Organisations

Value Generation

Expectations,
Needs and Goals,
Value Creation Strategy…

Networks
Models
Key Values…

Models Management

Study Management

Requirements & Quality

Requirements and Approvals
Assumptions and Justifications
Quality Gates and Reports…

Templates
Methods
Libraries…

Methodology

Architecture & Interfaces

Optimisation

Templates
Objectives
Variables…

Connections,
Components
Breakdowns…

Studies
Objectives
Concepts…

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MoSSEC Business Object Model coverage

Lifecycle of "System of Interest"

| Security & Trust | Actors & Organisations | Value Generation | Models Management | Study Management | Requirements & Quality | Methodology | Architecture & Interfaces | Optimisation |

MoSSEC enables capture of data throughout the Lifecycle of the "System of interest"

MoSSEC Business Object Model defined with SysML

Summary View

Detailed Block Diagrams
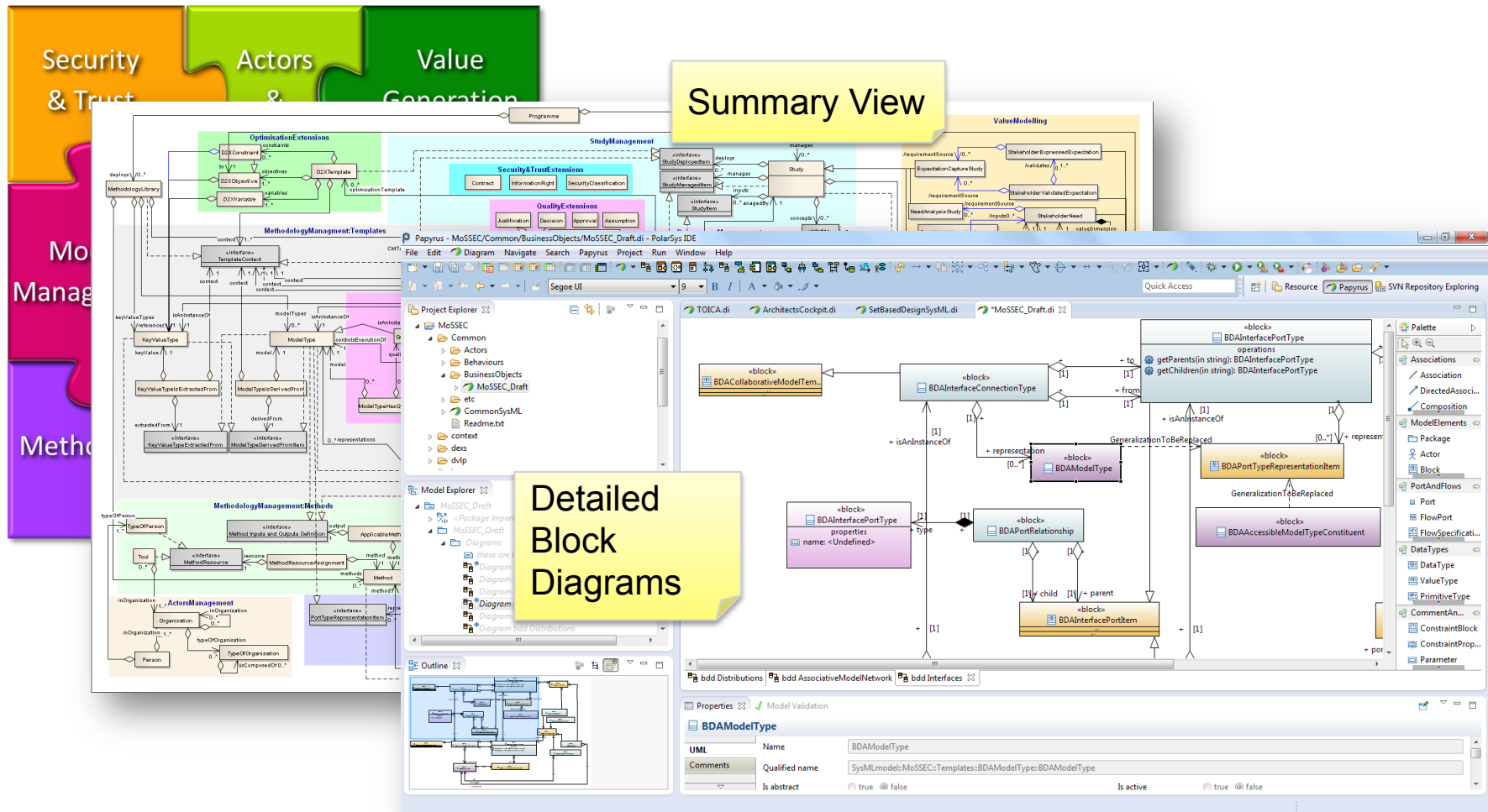
MoSSEC mapped to Standards with SysML in PLCSLib

SysML Parametric Diagram for each Business Object, with binding connectors to specify how attributes or properties are represented using PLCS objects
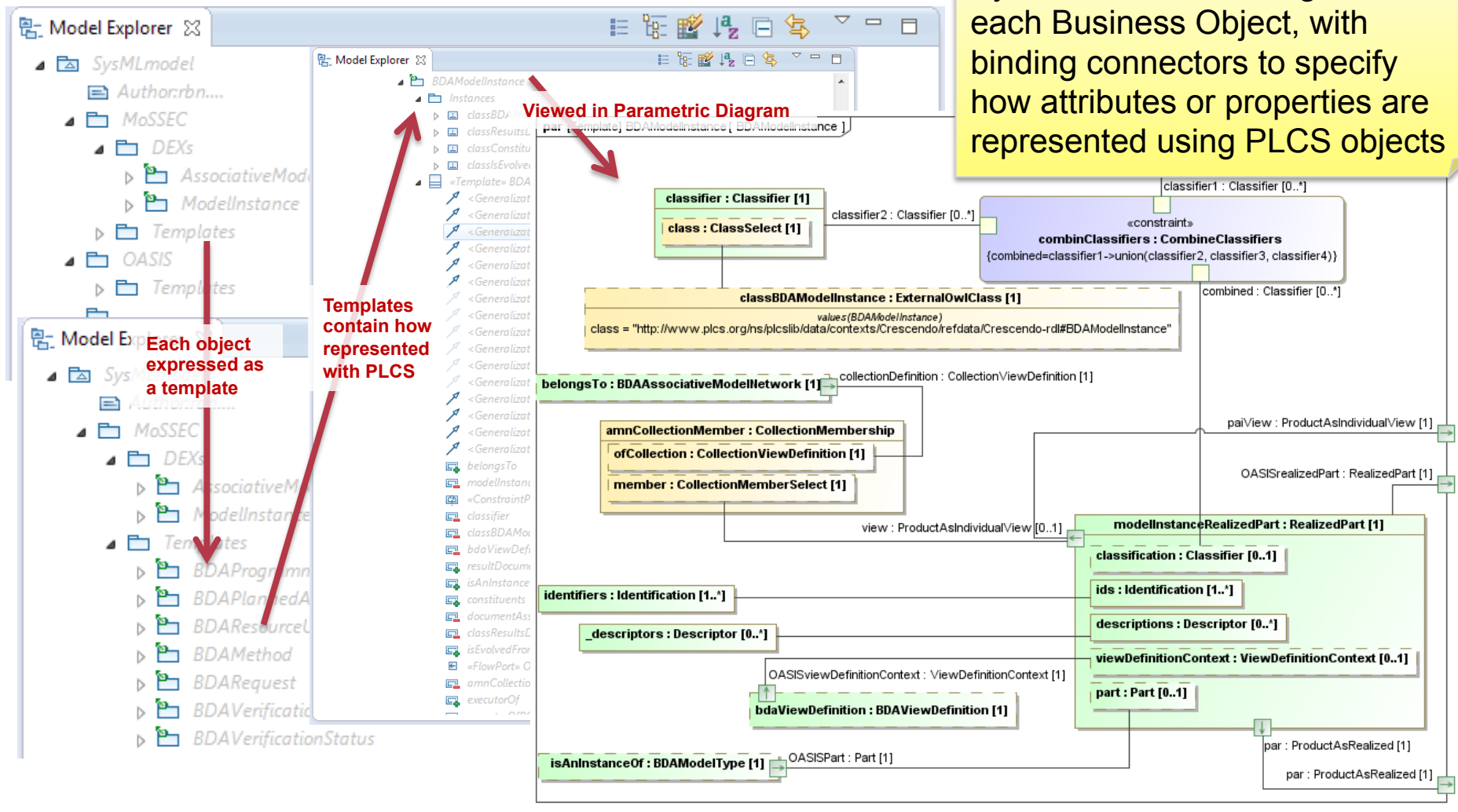
MoSSEC Data Sharing approach

MoSSEC
Templates

MoSSEC Web
Services
specification
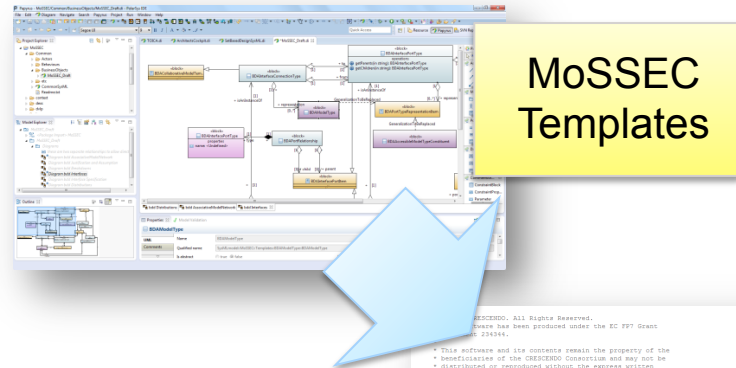
- **Data Sharing (Web services)**

  - **Defined using WSDL + XSD**

  - **Management of WSDL: To be Defined**
    - (e.g. OASIS PLCS, OASIS OSLC, OMG, ISO TC184SC4)

Data **shared**
using Web
services

Collaboration Services
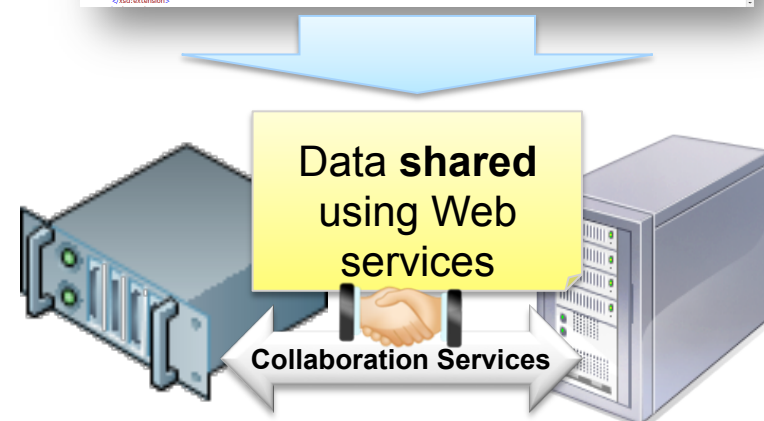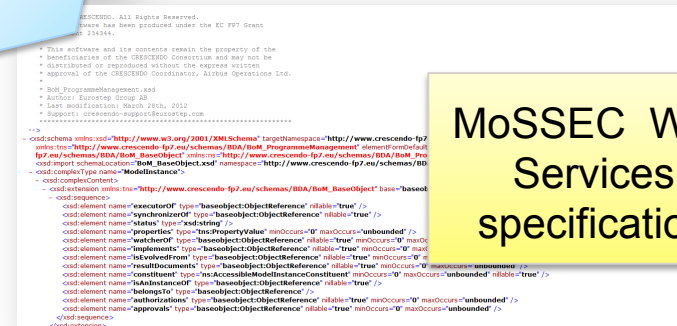
MoSSEC Data Exchange approach

MoSSEC Templates

MoSSEC Data Exchange [DEX] specification

Data **exchanged** using e.g. file transfer

Collaboration Exchange

- **Data Exchange (file based)**

  - **Baseline: DEXs to use OASIS PLCS PSM templates**

  - **Recommended practices (formal mapping of information model to underlying OASIS PLCS Standard)**

  - **Target: DEXs to be based on ISO AP239 Ed 3 (assuming this happens – TBD)**

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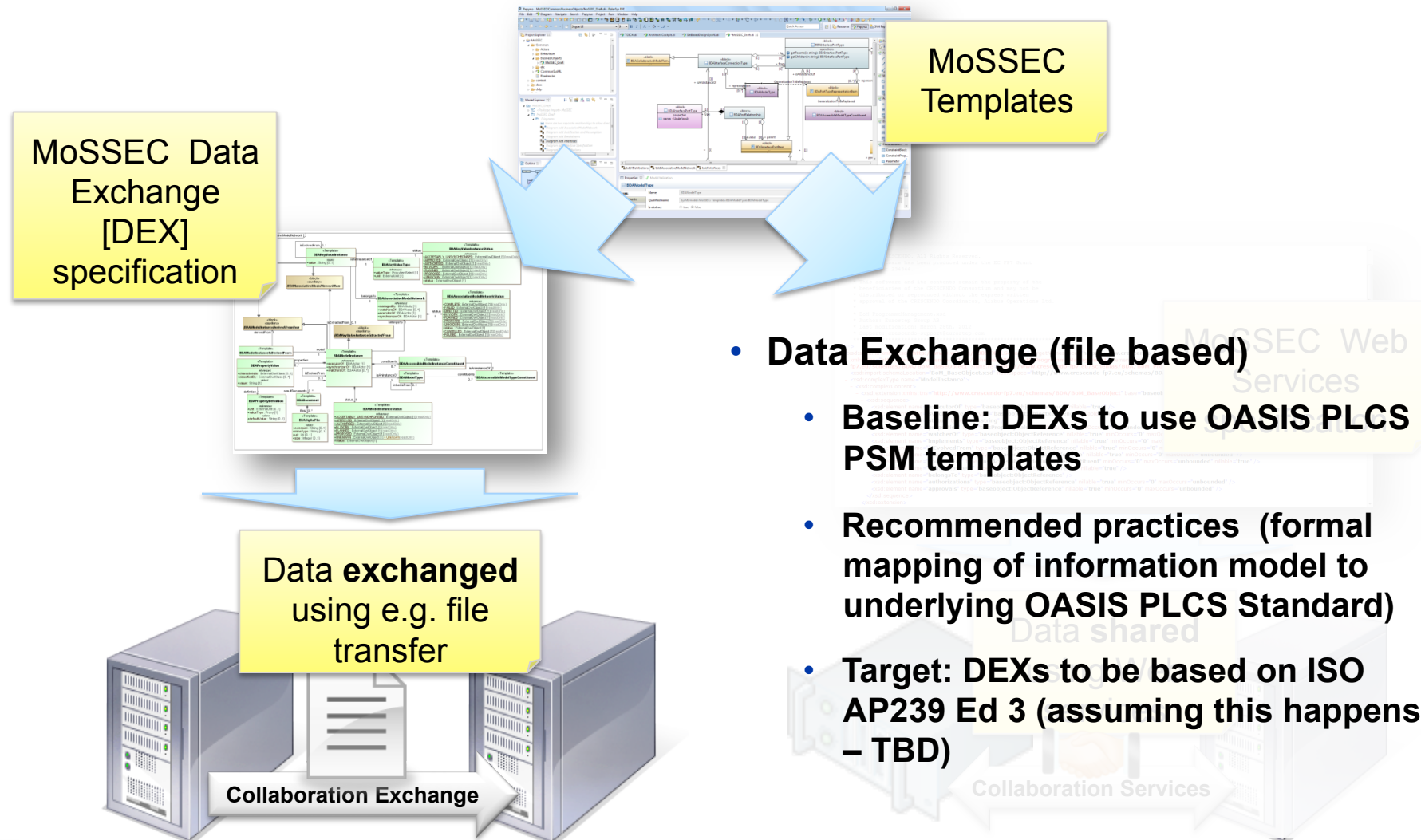
MoSSEC: Current and previous case studies

- **CRESCENDO** *Collaborative and Robust Engineering using Simulation Capability Enabling Next Design Optimisation – 59 partners*
  - **Thermal Aircraft**
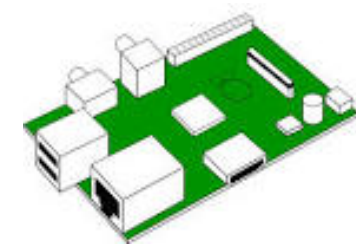 - **Power-plant integration**
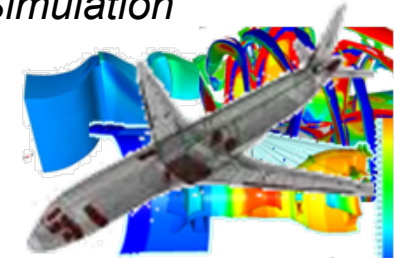
- **TOICA** *Thermal Overall Integrated Concept Aircraft – 30 partners*
  - **Dynamic Aircraft Thermal Architectures**
    - functional, physical, zonal, logical…
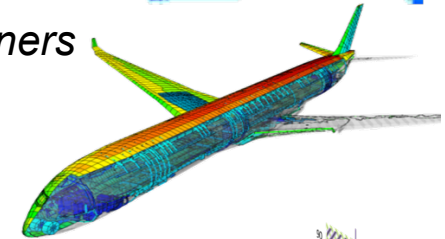
- **CONGA** *Configuration Optimisation of Next Generation Aircraft – 7 partners*
  - **Set Based Design**
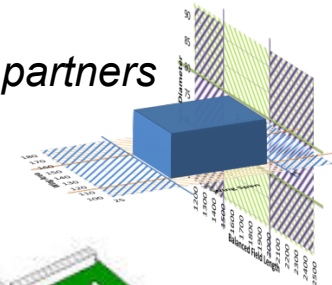
- **SAVI** *System Architecture Virtual Integration – 11 partners*
  - **Printed Circuit Boards**

Vendor involvement

- **Vendors are active in evolving and implementing the standard as part of ongoing research projects**

- **Vendors involved include:**

  - **Dassault Systèmes**
  - **Eurostep**
  - **MSC Software**
  - **Siemens PLM**

A MoSSEC distributed dataset will only happen if vendors implement clients and servers

MoSSEC: Status

- **Baseline version released through:**
  - CRESCENDO project

- **Utilised and evolved through:**
  - TOICA, CONGA and SAVI projects

- **Presented to:**
  - PDES & ProSTEP

- **Support for MoSSEC from:**
  - *AeroSpace and Defence Industries Association of Europe Strategic Standardization Group [ASD SSG]*
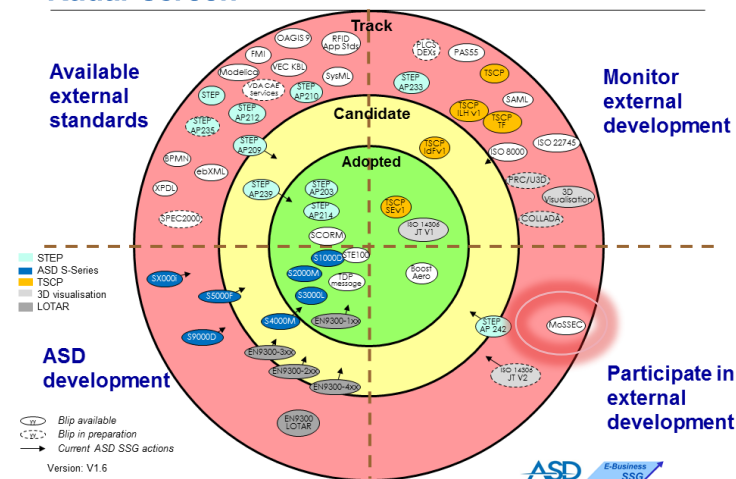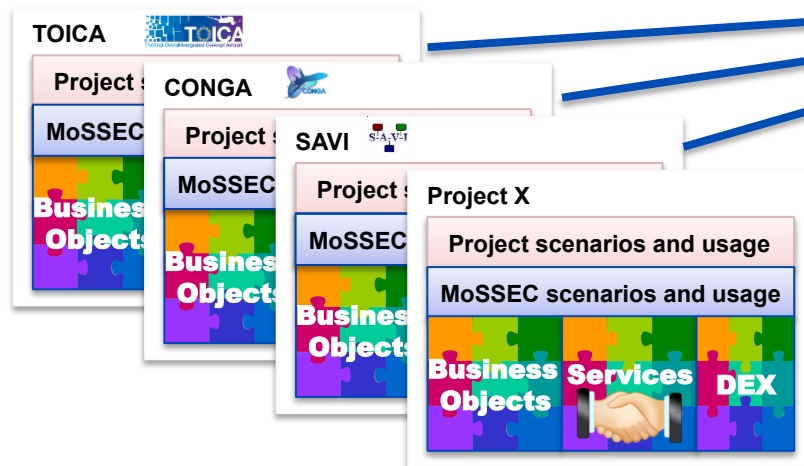
- **Using a MBSE approach**
  - **Captured using Polarsys**

- **Utilised by projects**

- **Contributions from Projects consolidated**

Public access

MoSSEC scenarios and usage

More projects are welcome to join and contribute.

What's next – Create International MoSSEC Project

- **Agree scope of MoSSEC releases**

- **Agree the relevant modelling, documentation and usage guidelines**

- **Push through the relevant standards bodies**

- **Agree the governance for the standard**

- **Promote approach**
  - **Internal to your companies**
  - **With your vendors**
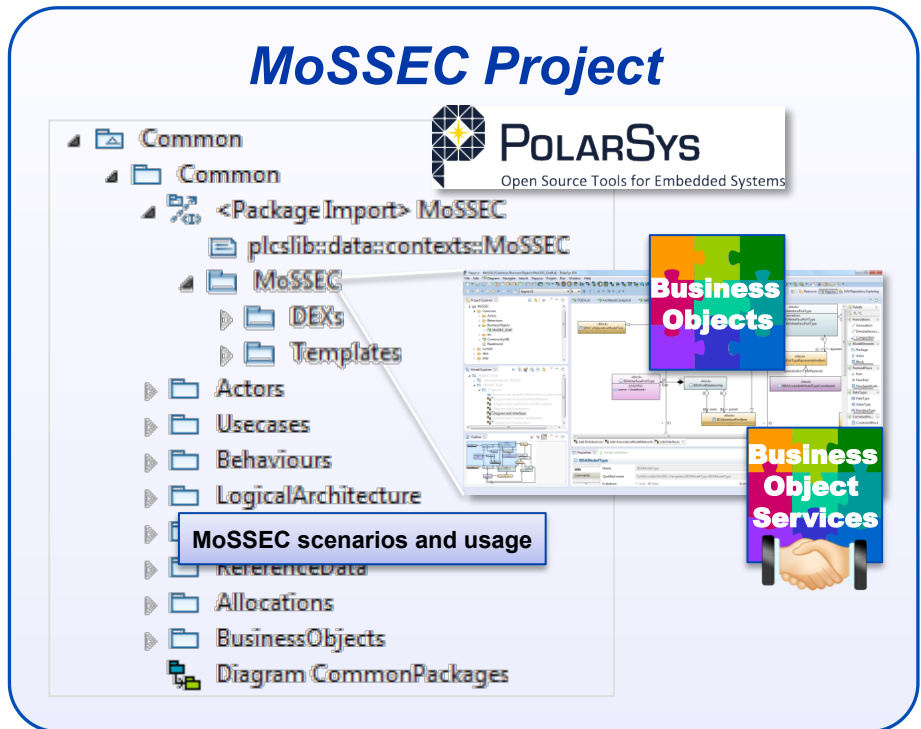
MoSSEC Project

- **Why do I need MoSSEC?**

- **What is MoSSEC?**

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Involvement: Access MoSSEC information

- **ASD-SSG website**
  - http://www.asd-ssg.org/asd_ssg_standards
  - **Overview**
  - **WSDL + XSD**
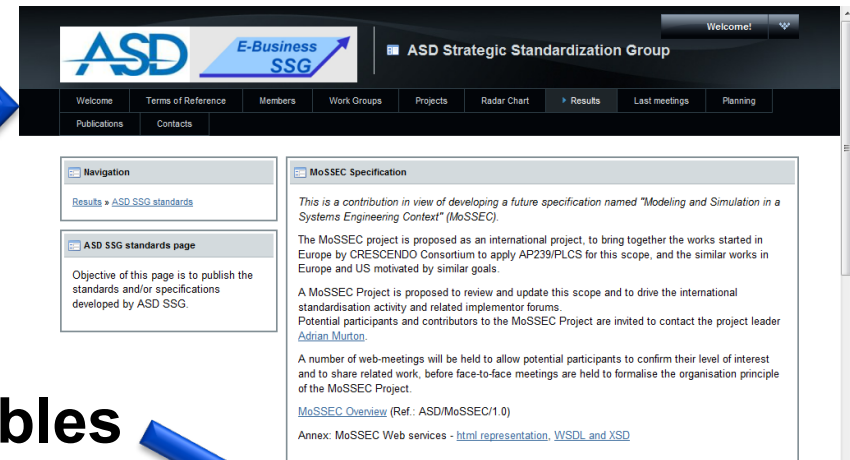
- **CRESCENDO public deliverables**
  - http://www.crescendo-fp7.eu
  - [technical documentation downloads](#)
    - [UML model](#)
    - [Descriptive documentation](#)
    - [Deployment guide](#)

- **Contact:**
  - adrian.murton@airbus.com

Involvement: Review the MoSSEC information

- ## Do you agree with the scope of MoSSEC?
  - ### What is missing?

- ## Do you agree with the Object Model definitions?
  - ### How can they be improved?

- ## Do you agree with the way information is modelled?
  - ### How can it be improved?

- ## Does the user documentation make sense?
  - ### What topics could be improved?

- ## Discuss the approach with your vendors
  - ### Do they support it?

Involvement: Attend the Project Kick Off Meeting(s)

- ## Date: October 2014 (Date TBC)

- ## Format: Teleconference

- ## Agenda:
  - ### Context of the MoSSEC project
  - ### Overall planning of the standard versions
  - ### Overview of the main components
  - ### Organization of bi weekly teleconference
  - ### Preparation of a kick off international MoSSEC workshop
  - ### Consolidation of the draft list of participants
  - ### Duration: 1h30 to 2 hours

  - ### Contact adrian.murton@airbus.com to be added to invite list

- **Why do I need MoSSEC?**

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Summary

- **Why do I need MoSSEC?**

  - *Industrialists*:

    - To provides a platform independent approach to structuring and accessing a distributed dataset

    - To enable Modelling and Simulation in a collaborative Systems Engineering Context

  - *Vendors*:

    - To provide access to data and processes in other vendor platforms with one set of services

Summary

- ## What is MoSSEC?

  - ➢ A SysML based definition of business objects and services extending/specialising ISO 10303-233 *(Systems Engineering)* and -239 *(PLCS)*

  - ➢ A proposed project launched to formalise and publish as a standard

- ## How do I get involved in MoSSEC?

  - ➢ Use and contribute to the evolving publicly available definitions and usage guides

  - ➢ Join the kick off meeting(s) of the proposed MoSSEC project

  - ➢ Contact adrian.murton@airbus.com to be added to invite list

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