# Digital Engineering Information Exchange Challenge

## What is the DEIX Challenge?

As the industry migrates into Model Based Engineering, the amount of data easily overwhelms. In order for the digital transformation to be worth the cost, information and intelligence have to be synthesized from various models.

The DEIXWG Challenge is an opportunity for anyone in the Systems Engineering community, especially those in Digital Engineering/Transformation, to produce a set of self-consistent, authoritative Digital Views. The successful DEIX Challenge solutions will involve developing novel ways to synthesize Digital Information from a collection of SysML, Matlab, MCAD, FEA, and other types of Digital Artifacts into a Digital View that addresses a chosen scenario of specific perspectives and needs.

## Objective

The Challenge will take the form of a scenario development where the Challenge Participant (***Participant***) will choose to represent a ***stakeholder*** and their needs for specific type of information (or ***perspective***) in an early development phase as well as a later, mature design phase. The Participants are to develop a proposal for integrating data from sources of their choosing to address the needs of their chosen stakeholders and perspectives. Participants produce a prototype ***Digital Viewpoint Model*** using linked data synthesized from a set of models of their choosing that form a set of Digital Views.

## Materials – the Participant receives:

1. Platform Independent Model (PIM), based on the DVM Concept Model

Includes instances of the Concepts with specific Perspectives, Digital Artifacts, etc. as needed to fully express the requirements for the Challenge

1. Defined System Phases
2. Defined Perspectives
3. Defined Stakeholders
4. Standards and Success Criteria

## Challenge – the Participant chooses:

System Phases: two dissimilar phases, one for early development and one for mature design, to develop Challenge scenario

* Architecture Development
* System Design and Analysis
* Integration and Synthesis
* Validation and Verification
* Deployment Readiness
* Sustainment Operations

Perspectives: two dissimilar perspectives to develop the information needs during the two chosen phases

* Mission Assurance
* Program Management
* Cost Engineering/Finance
* Cybersecurity
* Human Systems Engineering
* Specialty Engineering (RAMS)
* Etc.

Stakeholder: choose one stakeholder for the information needs.

* Acquirer (can be defense or commercial)
* Prime/Integrator
* Program Management
* OEM
* Supplier
* Regulator (Mission Assurance, Development Assurance, FAA, may be related to Acquirer for defense, ISO/environmental?)

## Challenge Deliverables:

The Challenge deliverable will be a proposal that weaves success criteria based on the rationale for one decision point and showing Digital Engineering (DE) Information Exchange involving multiple Digital Artifacts across a heterogeneous tool chain to produce data valuable to the decision point.

### Challenge Participants Provide:

* **Platform Specific Model** (PSM)
  + Proposed extensions to the DVM Concept Model
  + Ownership of DE Information Exchange
  + Authoritative Source of Truth for Digital Information
    - Metadata: Baseline, Provenance, Trustworthiness
  + Digital Artifacts that contain the Digital Information
  + Required formats for those exchanges to occur
* **Proposed Digital View**
  + Form, Function, and Purpose of their proposed Digital View
  + Digital Information represented by Digital View
  + Traceability to Digital Artifacts providing Digital Information
  + Standards used to feed and create the Digital View
  + Tool Chain used to feed and create the Digital View
* **Scenarios/User Stories** providing the story for the problem solution
  + Who is the Stakeholder?
    - What is their Perspective (e.g. Interface Design Compliance)?
    - What is their Discipline (e.g. Systems Engineering)?
  + What does the Stakeholder wish to do with the Digital View?
    - i.e. What data and intelligence is required?
  + What is the level of maturity (Decision Point) of the product design during which the DE Information Exchange is occurring?

## Challenge Schedule

Appendix A Glossary

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Appendix B System Phases (correlated to INCOSE SE Handbook v4e)

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| Architecture Development | Based on Concept Stage (3.3.1):  Defining product concept based on customer based on stakeholder needs |
| System Design and Analysis | Based on Concept (3.3.1) and Development (3.3.2) Stages:  The development of the system based on analysis of overall performance and design within overall system constraints |
| Integration and Synthesis | Based on Concept (3.3.1) and Development (3.3.2) Stages  Integration planning of subsystems and supplied parts through production of initial units for integrated testing |
| Validation and Verification | Based on Concept (3.3.1) and Development (3.3.2) Stages:  Early validation done in the concept stage through final verification of the system to the customer |
| Deployment Readiness | Based on Development (3.3.2) and Production (3.3.3) Stages:  Proof to stakeholders the readiness of a system to fully enter into service (can be from LRIP to full production rate) |
| Sustainment Operations | Based on Utilization (3.3.4) and Support (3.3.5) Stages:  Operations for maintenance and upgrade as part of system sustainment |