Decision Analysis Data Model

Context

The **INCOSE Vision 2035** outlines several challenges that must be realized to achieve the future state of systems engineering. Some of the key challenges are to:

- Enable **trusted collaboration** and interactions through a **digital ecosystem**
- Provide **analytical frameworks** for managing the lifecycle of complex systems
- Widely adopt **reuse practices**

The INCOSE working groups provide an excellent forum to collaborate and experiment with the concepts that will realize the Vision 2035 goals, while providing practitioners with the practical resources they need today.

The Decision Analysis Data Model (DADM)

With these objectives in mind, the INCOSE Decision Analysis Working Group is developing a **reusable model-based** Decision Analysis Data Model (DADM) intended to aid practitioners in making **multi-factored decisions**, such as design comparisons or trade studies, while leveraging a model-based environment to improve how those decisions are communicated. This data model is built upon the decision management methodology defined by the INCOSE Decision Analysis Working Group, captured in the INCOSE SE Handbook, and defines the **steps in the decision management process** and the **types of data exchanged** between those steps.

The DADM is not intended to be a solution, but an aid for practicing systems engineers working in any phase of the engineering lifecycle. **Have a use case for a data model like this? Participate in the DADM User Story Survey.**

Why build the DADM?

Every step of the engineering process requires decisions to be made, but we rarely approach those decisions systematically, with supporting data and feedback from stakeholders. The DADM is a **reusable model,** a first for INCOSE, that provides an **analytical framework** for making decisions. It is a practical aid for practitioners to accelerate **trade-off analyses**, increase consistency, and support the documentation of decision outcomes in a digital model, enabling **collaboration in a digital ecosystem**.

The DADM has potential applications across the systems lifecycle processes, such as supporting **configuration management** by aiding practitioners in selecting the optimal configuration for a given use case, or **risk management**, where it aids in defining risks and identifying mitigation strategies. For this model to be effective, it will require feedback and inputs from other INCOSE working groups, including those identified in **Figure 1**. This approach to reinventing INCOSE best-practices and methodologies into **tangible, off-the-shelf models** for practitioners to use in their own projects, can be leveraged across INCOSE to build out a portfolio of digital aids for today's system development. This is an iterative approach to achieving **wide adoption of reuse practices**, that leverages the existing INCOSE catalog.

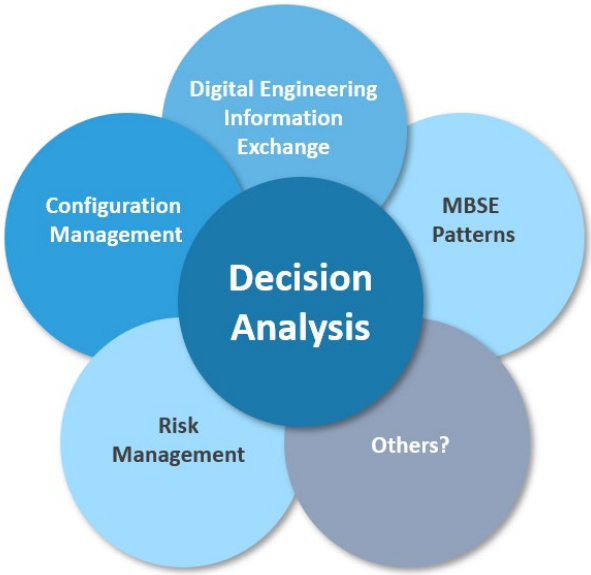
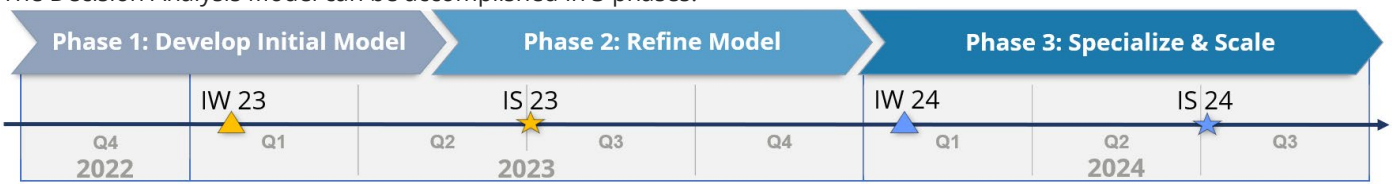


Figure 1: Working Groups with Inputs to Decision Analysis

The Roadmap

The Decision Analysis Model can be accomplished in 3 phases:



- Initial model prototyped and ready for collaborative development
- Initial model completed and ready for user testing and feedback
- Final model delivered for INCOSE review
- Final model approved and ready for release to community

Get in Touch

For more information on the Decision Analysis Data Model or to the INCOSE Decision Analysis Working Group, please reach out to Frank Salvatore (frank.salvatore@saic.com), Dr. Gregory Parnell (gparnell@uark.edu), or Dr. Robert Kenley (kenley@purdue.edu).