PROBLEM, OPPORTUNITY, AND NEED

- Engineering enterprises are transiting from document-centric to model-centric digital exchange with rationalized and streamlined product-based workflows.
- Engineering workflows are characterized by:
  - Complex interdependencies
  - Many parallel processes
  - Frequent process changes
  - Reconciliation loops & rework
- The engineering workflow is not static and depends on the project, technical issues, personnel, organization changes, external factors, etc.
- Organizations engineering workflows are adaptive, making ad hoc changes.
- Model-centric digital engineering workflows require structure, but still need to be adaptive.
- The enterprise engineer approach led by the Jet Propulsion Laboratory is to characterize the workflow patterns associated with different types of projects and conditions, and be adaptable in instantiating the patterns.
- Modeling the engineering workflow patterns key to streamlining and rationalized the workflows with:
  - Sequence control measures
  - Early coordination and early reconciliation loops
- Engineering enterprises need methods, procedures and tools (MPT) to:
  1. Collect data documenting the workflows on projects
  2. Identify workflow patterns
  3. Model, analyze and rationalize the patterns
  4. Instantiate the patterns, and dynamically adapt the instantiation in response to changes and discoveries during execution.

TECHNICAL OBJECTIVE

- Develop MPT to collect data documenting the workflows on projects:
  - To model project workflows
  - To discover workflow patterns and sub-patterns
  - To adapt workflow pattern instantiation during execution

TECHNICAL APPROACH

- Enhance Configuration Management (CM) work product meta-data:
  - Work products include requirements, decisions, engineering models, test results, etc.
  - Standard CM meta-data includes project name, work product name, version number, version change summary, release date and sign-offs.
  - Enhance CM meta-data by adding the standard CM meta-data for all the work products that were inputs to preparing the work product.
  - Necessary and sufficient to model the logical & temporal workflow.
  - Provides execution data needed to adjust workflow patterns.

- Iteration and alternative exploration.
- Multiple levels of data maturity.
- Uncertain timelines.
- Logical and temporal factors.

Diagram:

- Environment Requirements
- Environment Modelling
- Vehicle Requirements
- Vehicle Design
- Simulation
- Requirements Document
- CAD
- Product Concept (PC v1; CN v1)
- Product Concept (PC v2; PC v1, CN v1, CAD v1)
- CAD (CAD v1; PC v1)
- CAD (CAD v2; PC v2)