Using Ontology to Meet Big Systems Challenges

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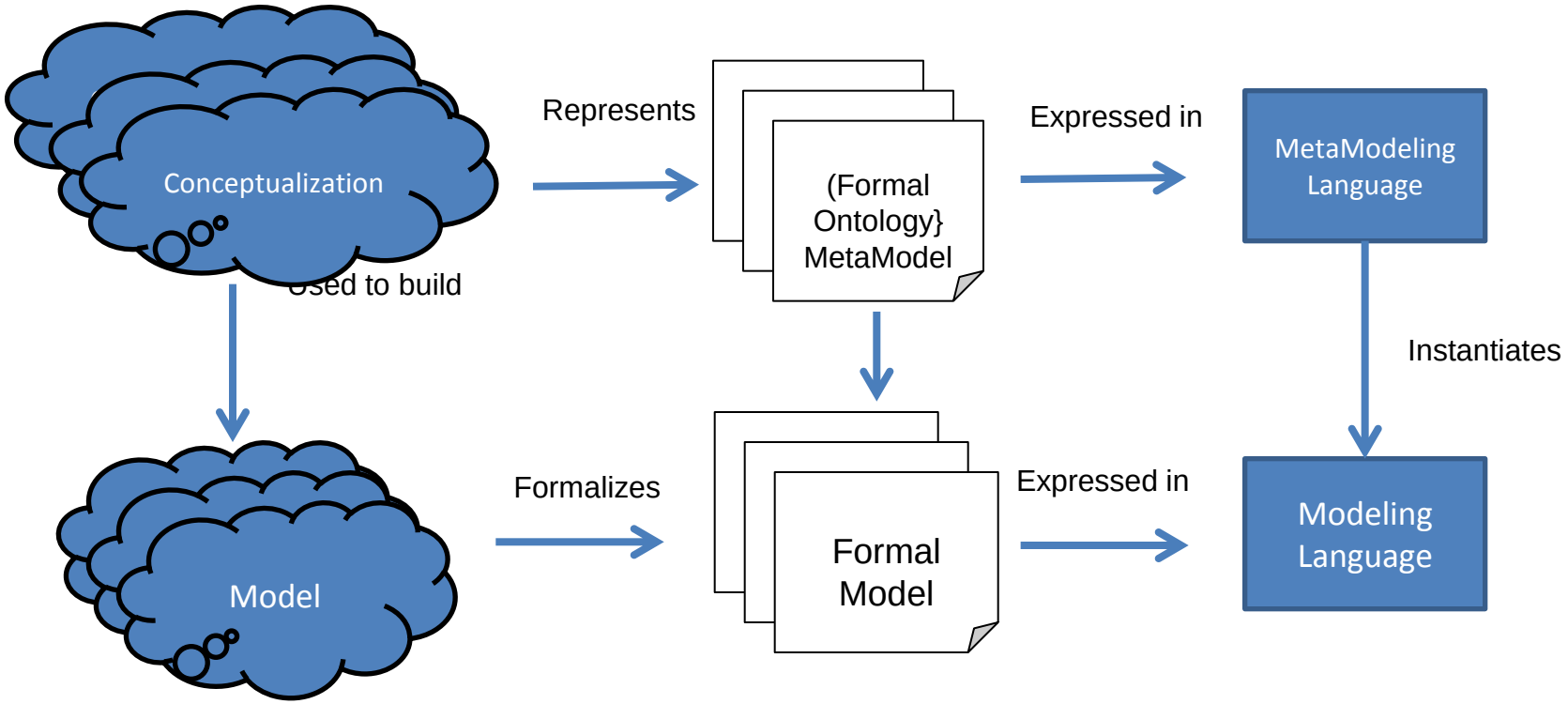
Big Systems Challenge

- **Big Systems**
  - built, maintained, used by large multi-national enterprises
  - Incorporates many disciplines: engineering, management,…
- **Endemic problem**
  - Program has a successful technical review, six months later they are in the ditch – management is completely blindsided
  - Cost and schedule overrun, poor quality product, program cancellation
- **Root Cause**
  - Inability to maintain an accurate, coherent model of the system and its development progress

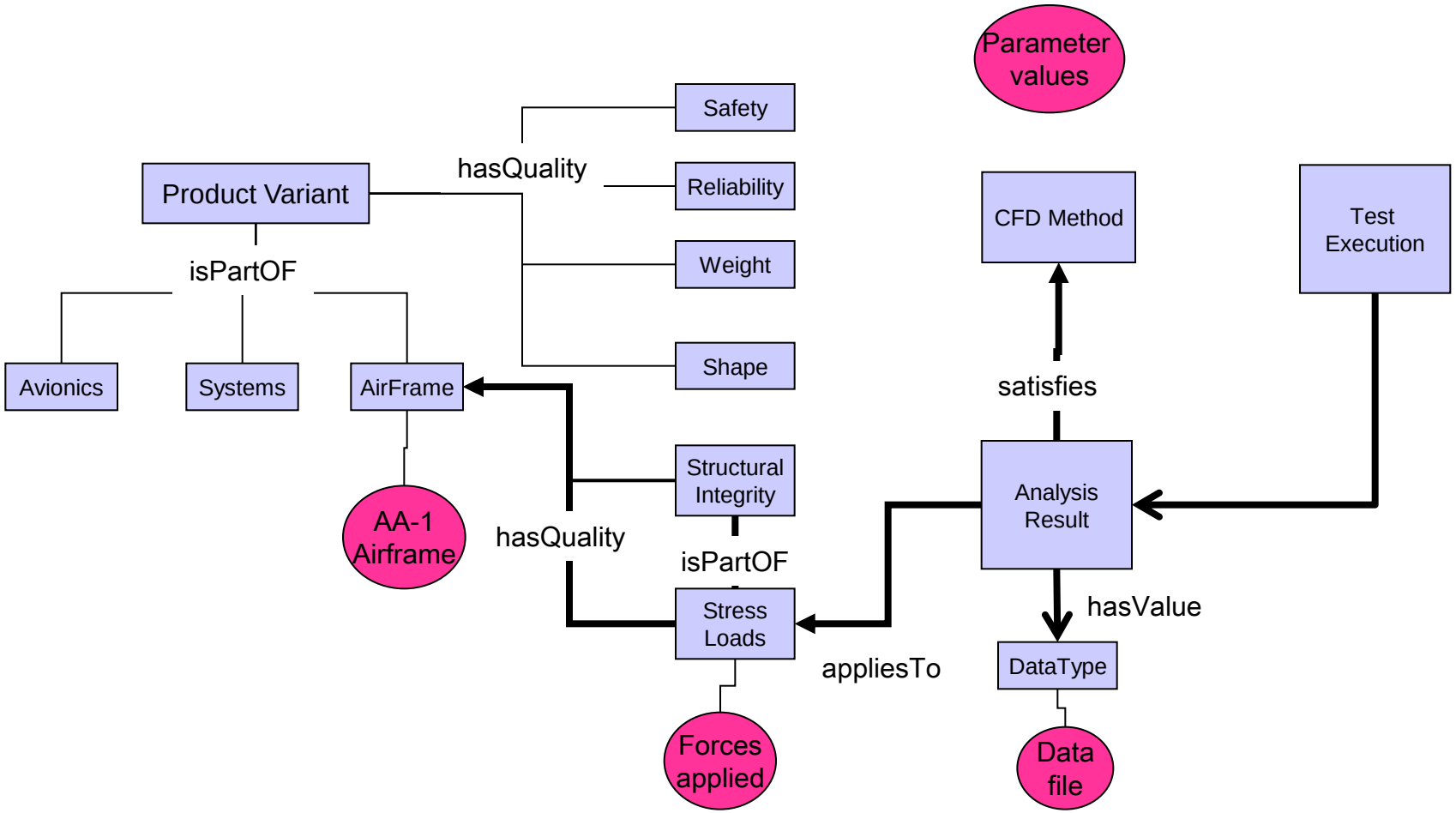
Root Cause Is With Enterprise Modeling

Models are the ground truth for enterprise management



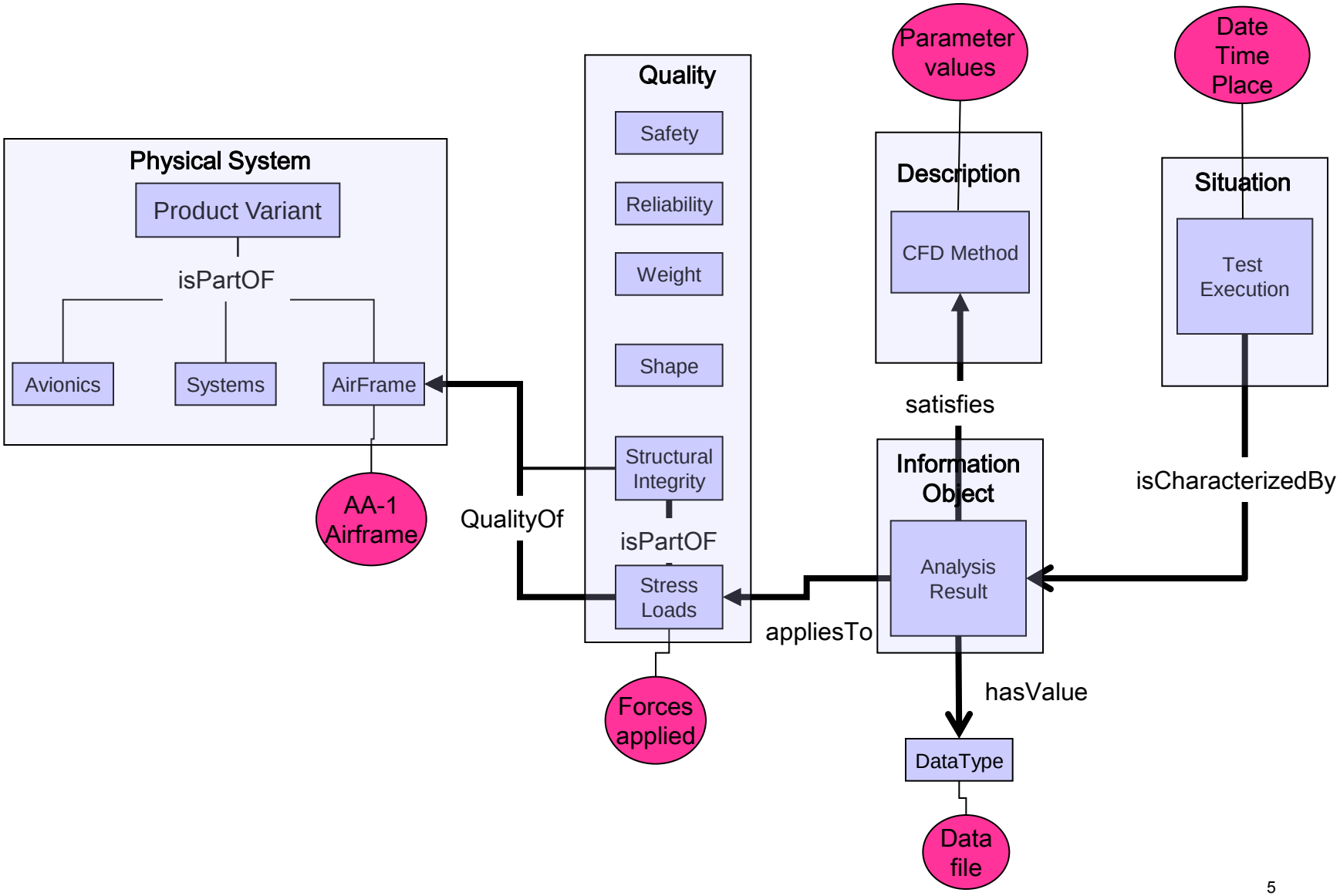
Yet they are incoherent , inconsistent, not trustworthy, and not present

Domain Models

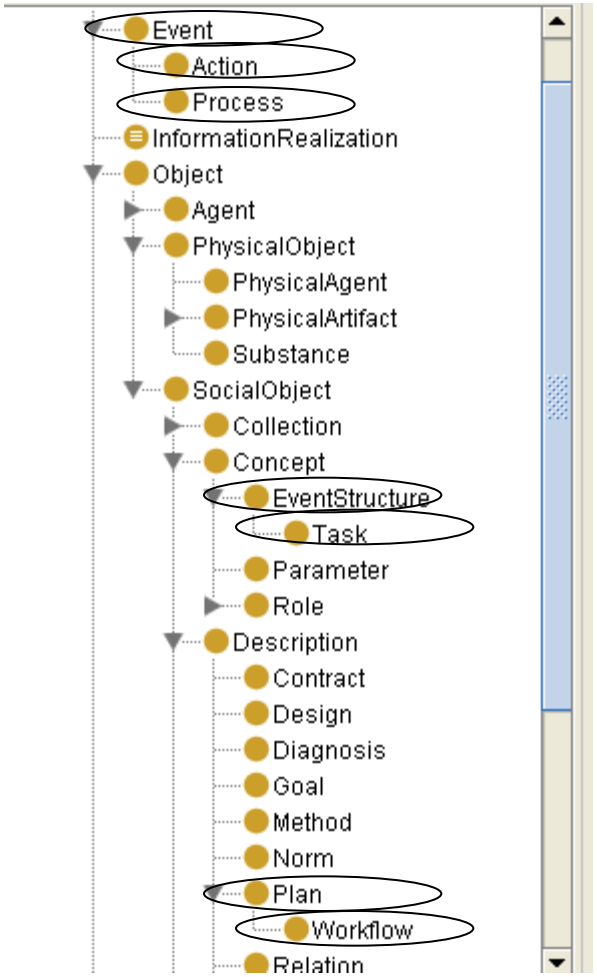


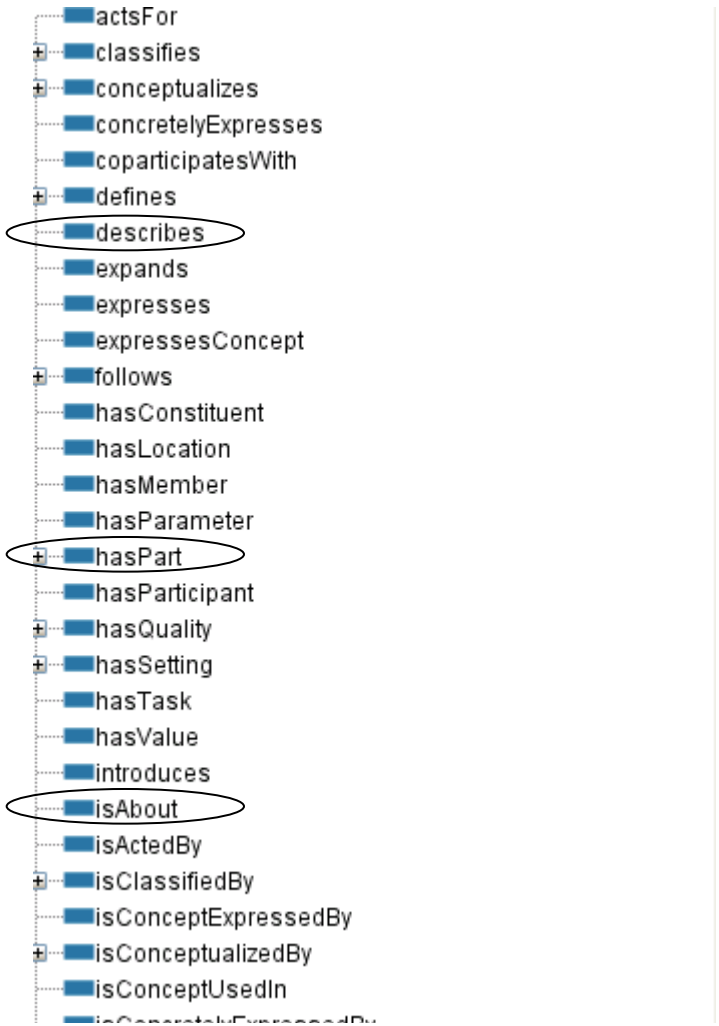
consist of text, spreadsheets, diagrams, UML models, CAD models, which don't integrate, regardless of any workbench & federation architecture

Domain Models Are Instances of MetaModels



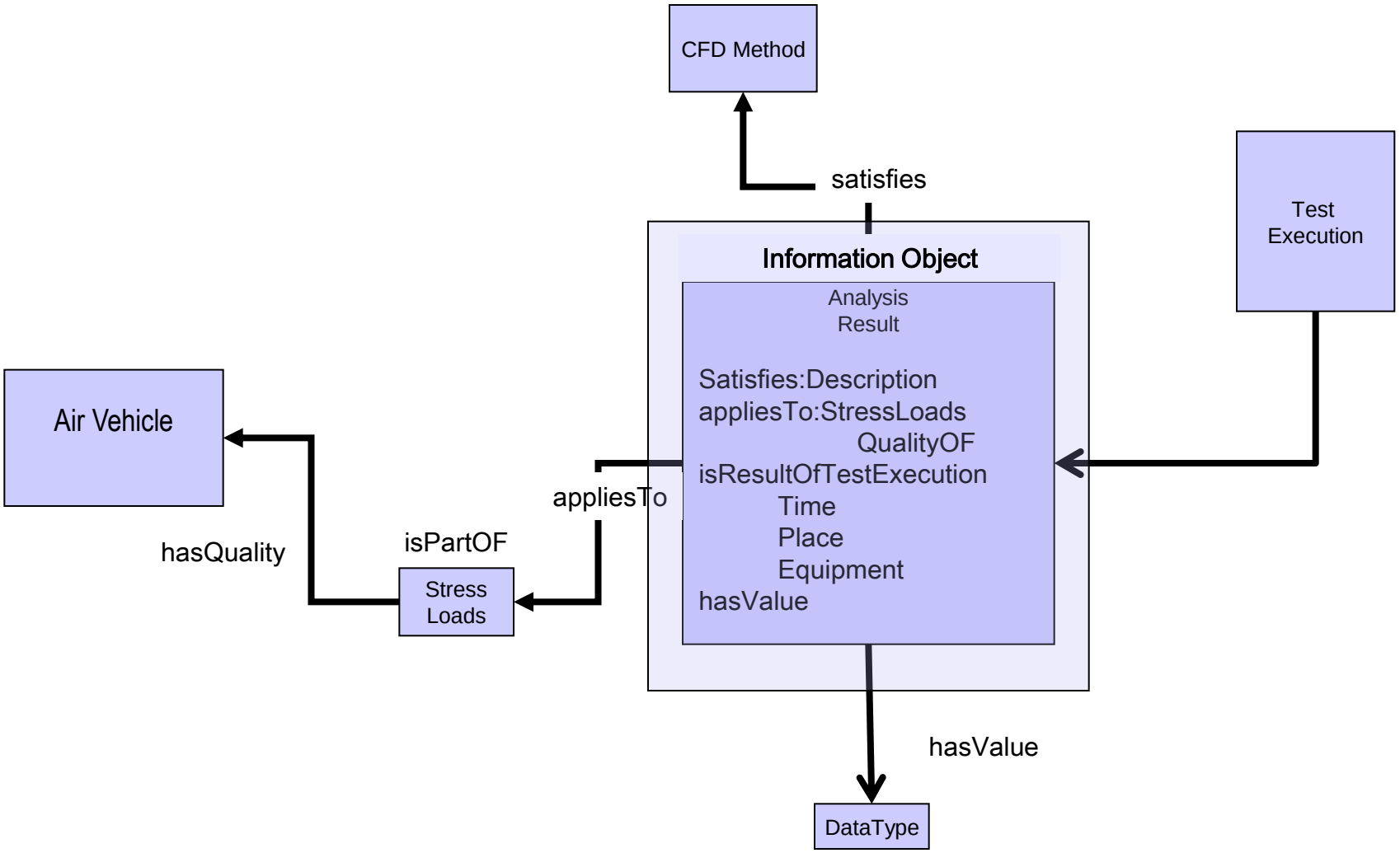
Conceptualizations Needed For Big Systems Can Be Found in Foundation Ontologies





…such as DOLCE which is expressed in OWL 1.1 using the Protégé tool

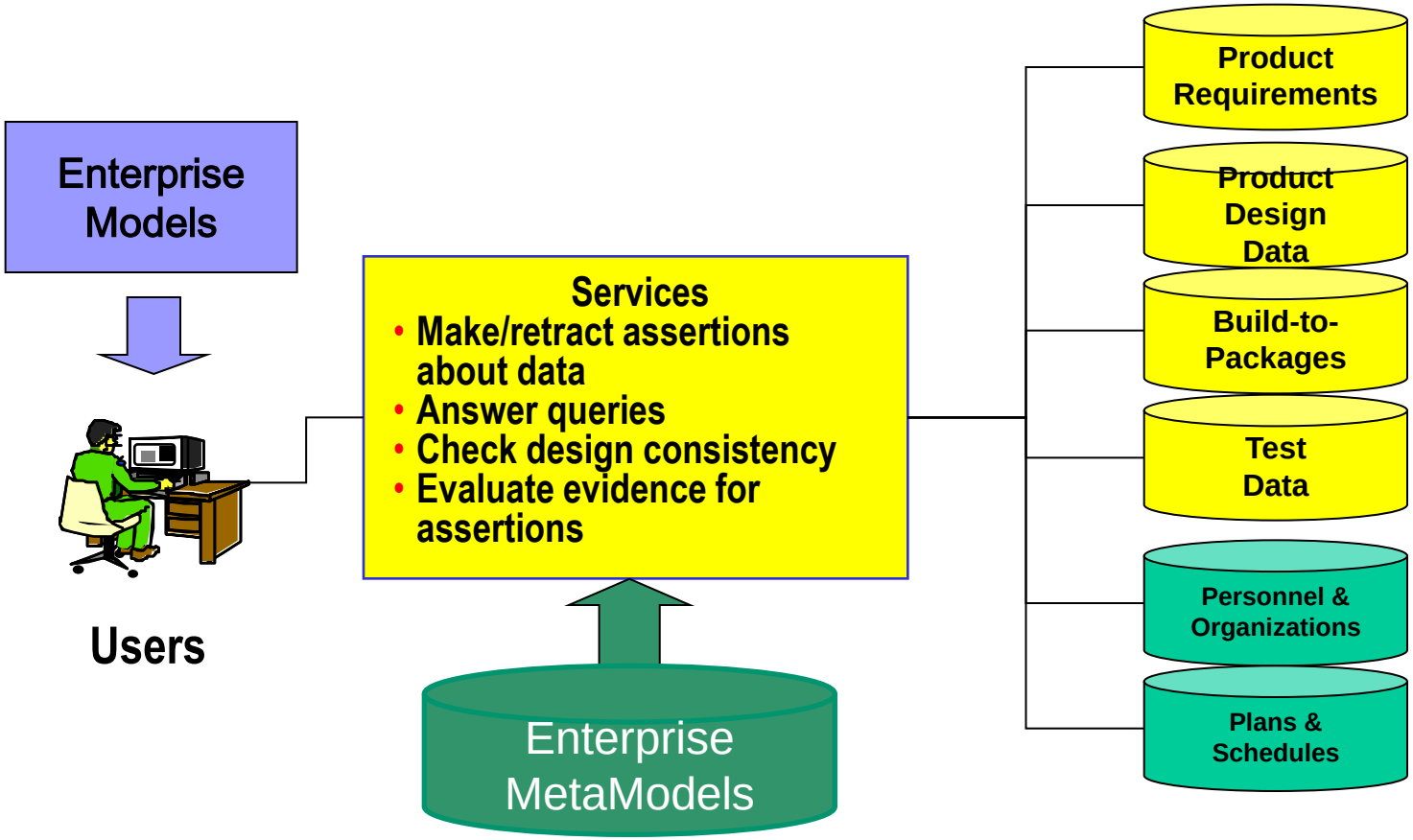
But More Is Needed: a Template For Each Conceptualization



…the AnalysisResult is an instance of a specialization of an information object

A Collection of Enterprise MetaModels

... Can be used by an information portal to achieve semantic interoperability



Conclusions

- **Model Management is the single greatest challenge**
- **To mitigate**
  1. Find a good foundational ontology for enterprise artifacts
  2. Develop a template for each concept (metamodel)
  3. Use the formal ontologies as the information model to glue together separate data repositories
- **Evidence this will work**
  - Know of one information architecture which partially realized this idea and is a partial success