Power System Modeling Basics

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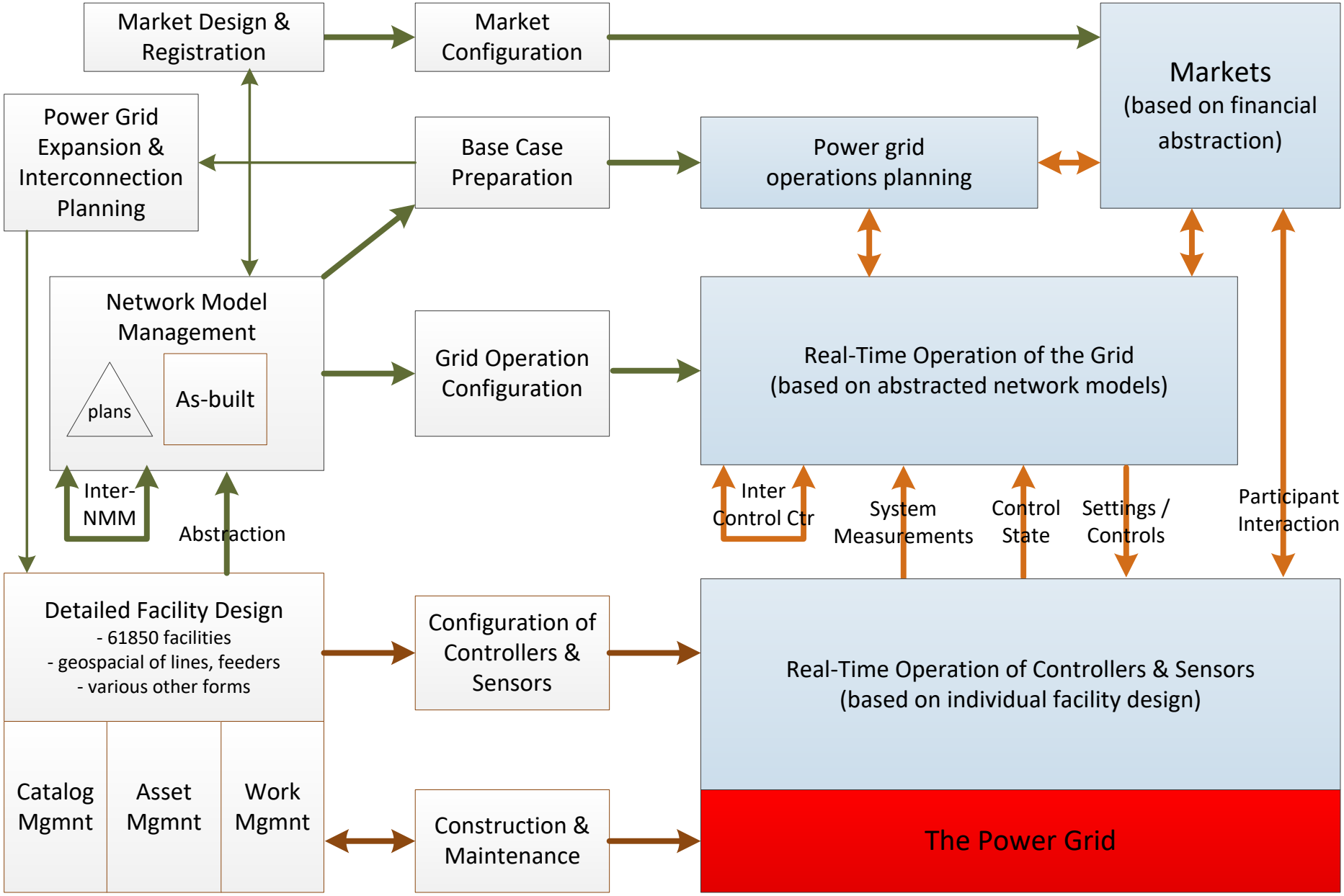
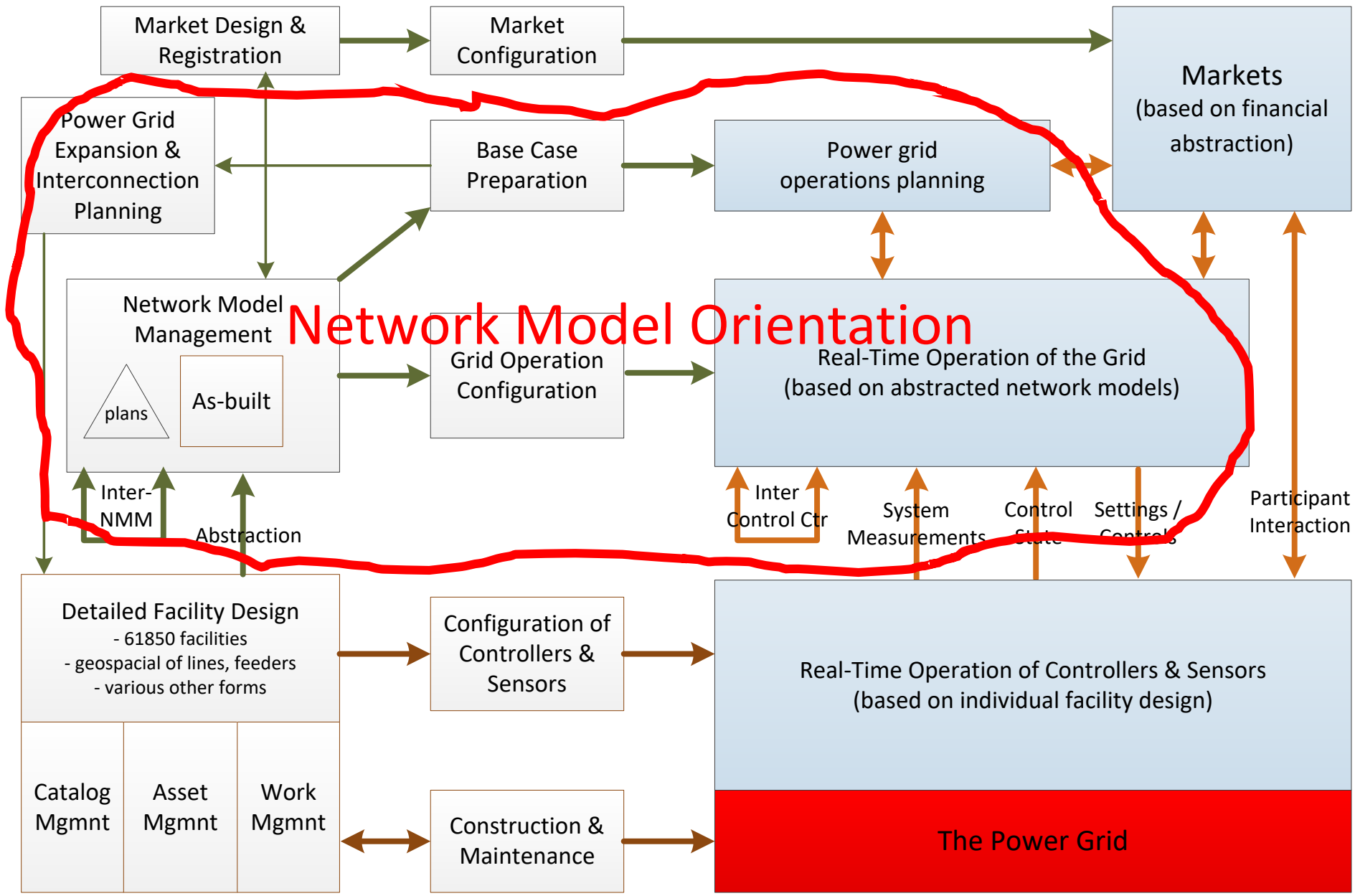
CIM users group

Business Functions Relating Directly to the Grid



Business Context for Network Model Standards



Network Model Management

- Unifies modeling support for planning, operations planning and real-time operations.
- Most utilities still maintain separation between EMS products and planning tools.
- Significant value is achieved in enabling exchange of results between the two environments.
- Europe:
  - Implementing sophisticated operations planning processes.
  - Need automated support for reliable participation.
  - Better operations planning results from using real-time as a basis for submitted cases.
  - Better real-time result from using operations planning to initialize external modeling. (e.g. pseudo-measurements)

This summary presentation is drawn from material that is presented in greater detail in the following document available free of charge from EPRI:

Using the Common Information Model for Network Analysis Data Management

A CIM Primer Series Guide

5 BIG Facts about Network Modeling

1. Power Grid Model

- Defines how the network is built.
- 95% of all model data
- Derived from as-constructed equipment characteristics – created following construction.
- Not the responsibility of an individual study engineer.
- Shared by all studies.

2. Steady State Hypothesis

- Defines specific steady-state condition for the network.
- Varies with each kind of study.
- Study engineers are responsible for the data.
- Sources for data vary. For example…
  - Load forecasting
  - Market outcomes
  - Similar studies

3. Time

- The physical model has a time dimension.
  - Past, present network:
    - Defined by construction process.
    - Validated by state estimation.
  - Plans:
    - Defined as result of a planning process.
    - Submitted by other participants.
- Studies are based on points in time.
- The entire picture evolves as new decisions are made.

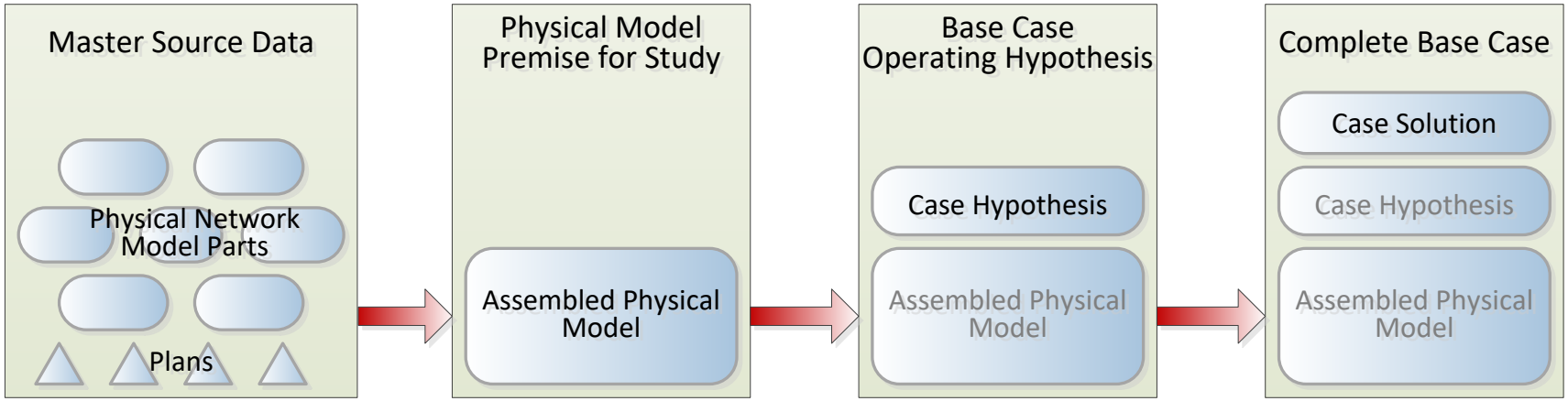
4. Distributed Model Authority

- Grid ownership is split among many different entities.
- Analytical models are assembled from their contributions.

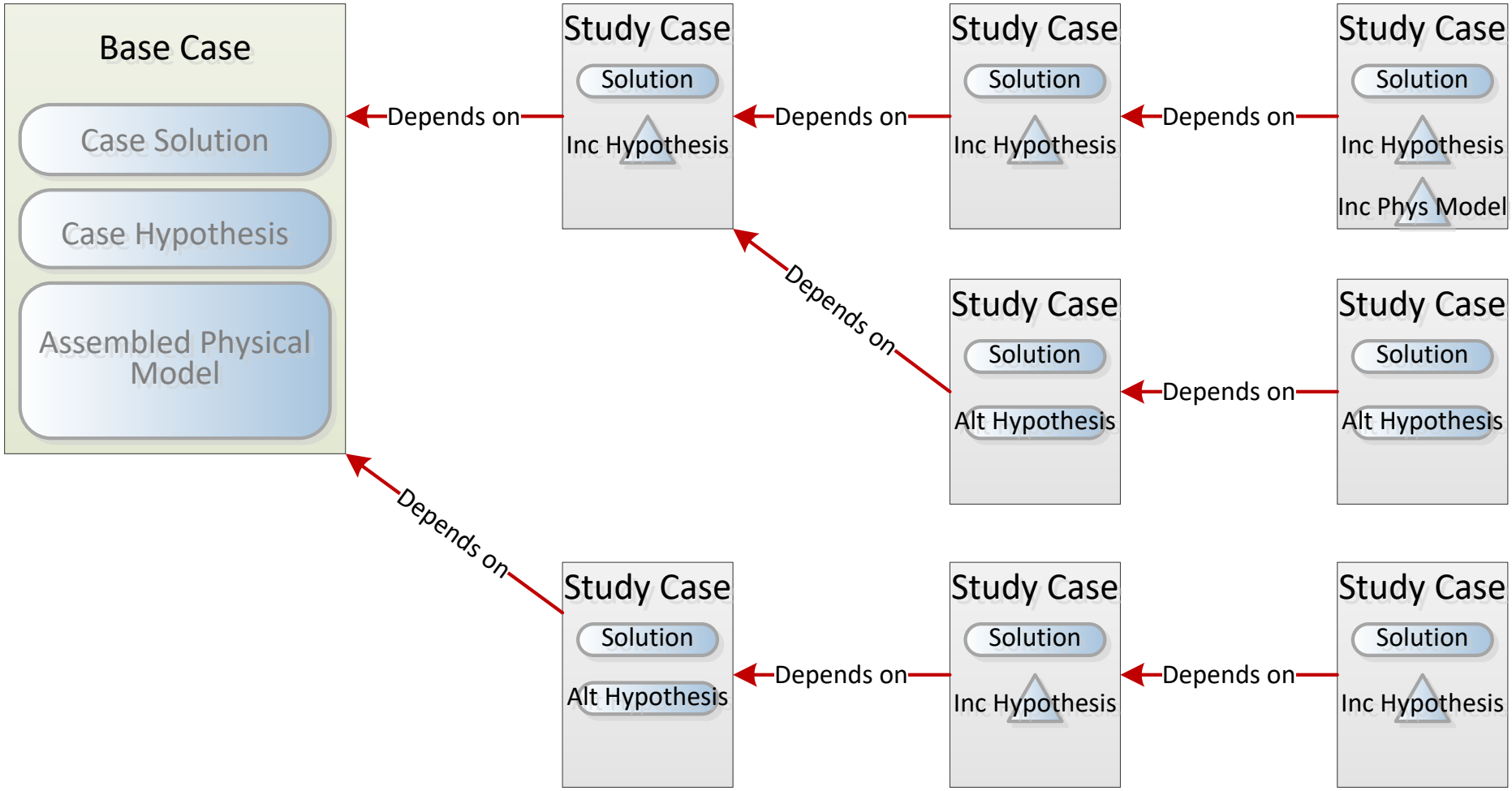
5. Object Identification

- Local naming conventions and requirements conflict.

Creating a Base Case

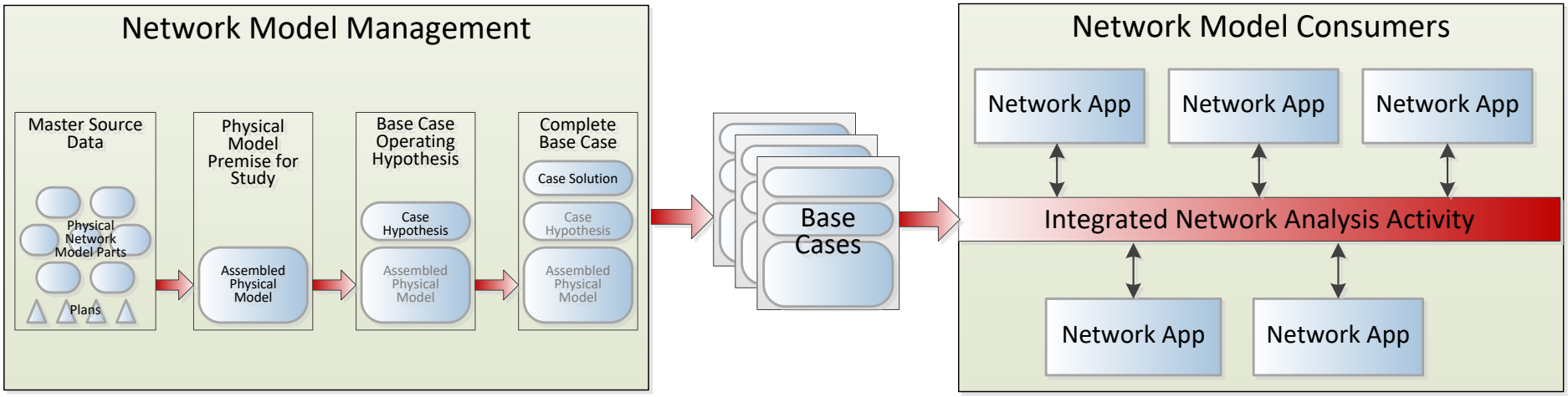


Study Cases Derived from a Base Case



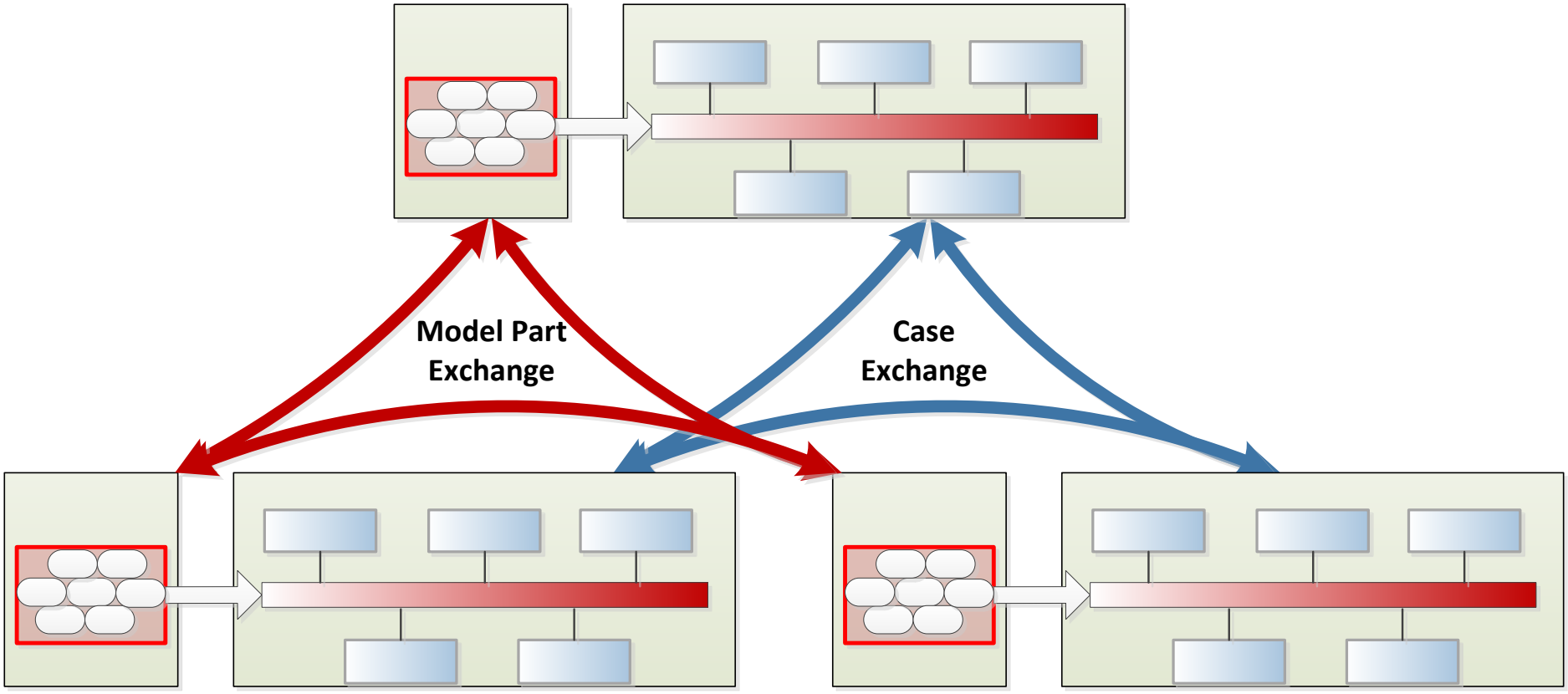
Within an Engineering Entity:

+ Base Case Development from Shared Master Sources
+ Feeds Multiple Network Model Consumers

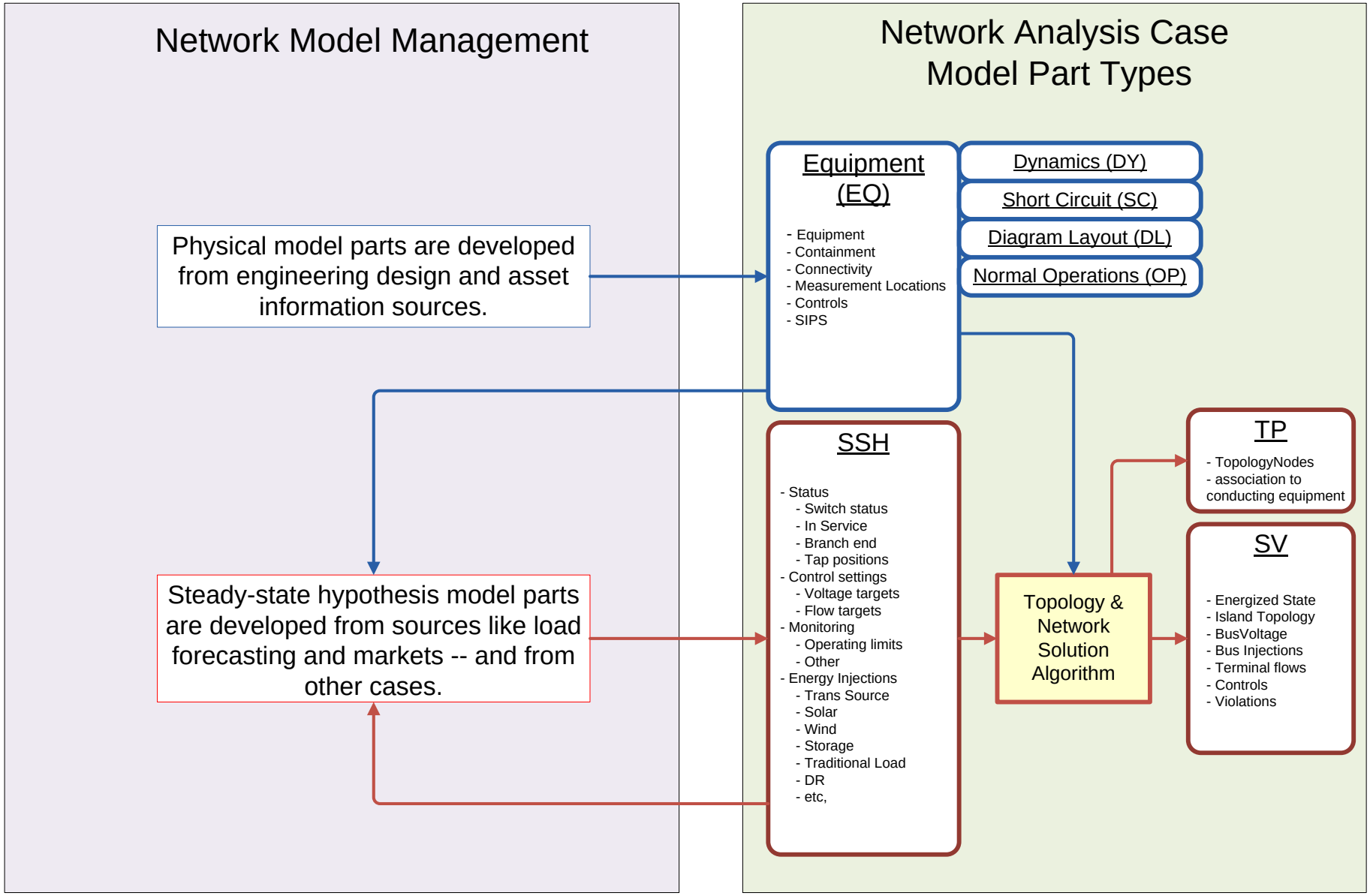


Coordination Among Engineering Entities

+ Model Part Exchange among Master Sources
+ Case Exchange among Analytical Processes

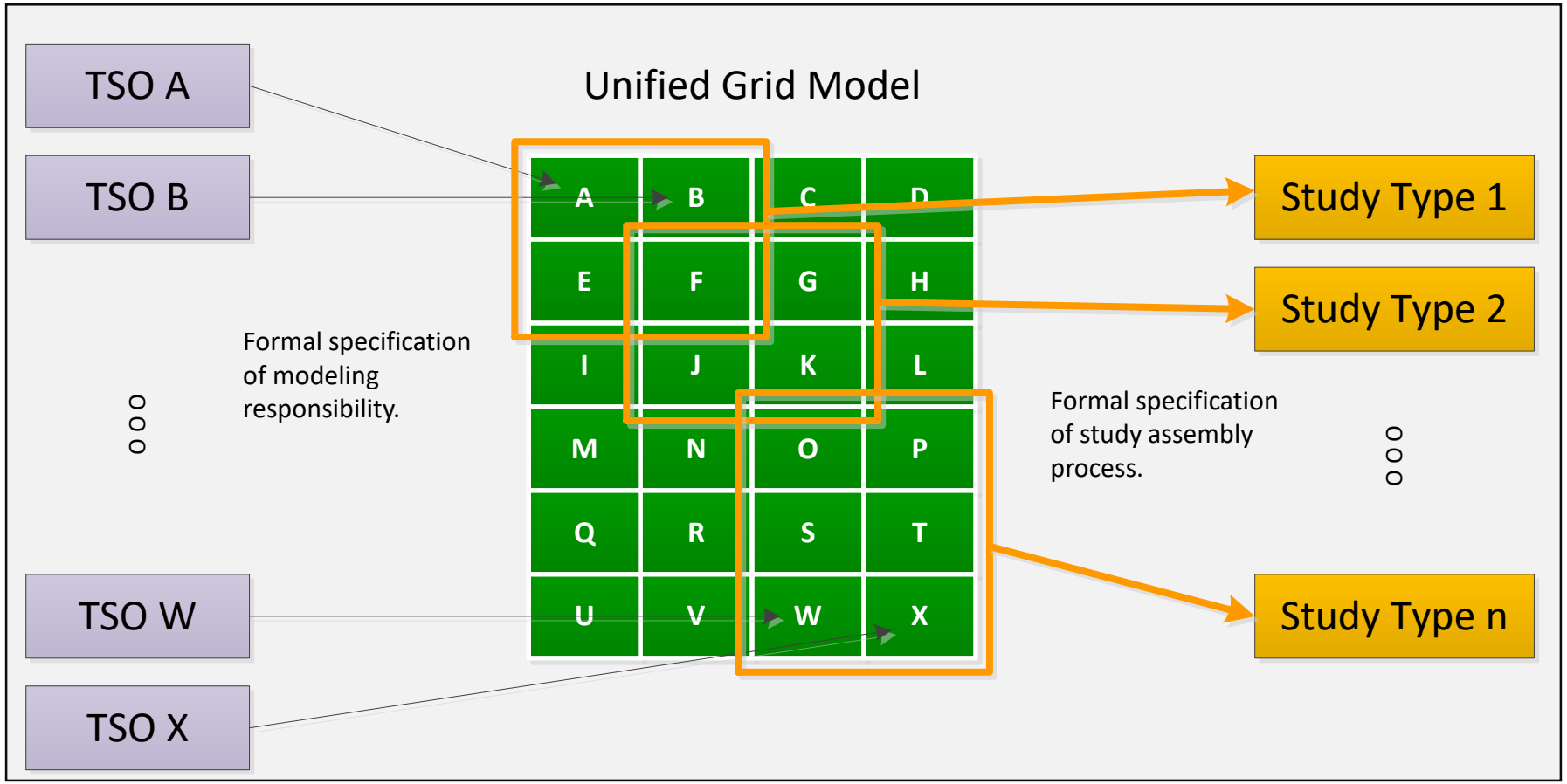


Model Part Types in a Network Analysis Case



Model Partitioning by the Responsible Source

Model parts are maintained once …



… and used in many different study case assemblies.

Summary

- Siloed apps used proprietary models specifically designed for their purpose.
- CIM modeling:
  - ASSEMBLIES for different purposes are constructed from
  - MODEL PARTS (with type and scope) that fit together in a FRAMEWORK

    and
  - PROJECTS that project future changes

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