



# Consolidating Operations, Planning and Protection Model Management Using a Network Model Manager Approach

## *Summary of Collaborative Project Results*

P. Brown, E. Hatter, Q. Qui, J. Britton, E. Lambert, D. Manjure,  
A. Schiro, J. Baranowski, M. Goodrich

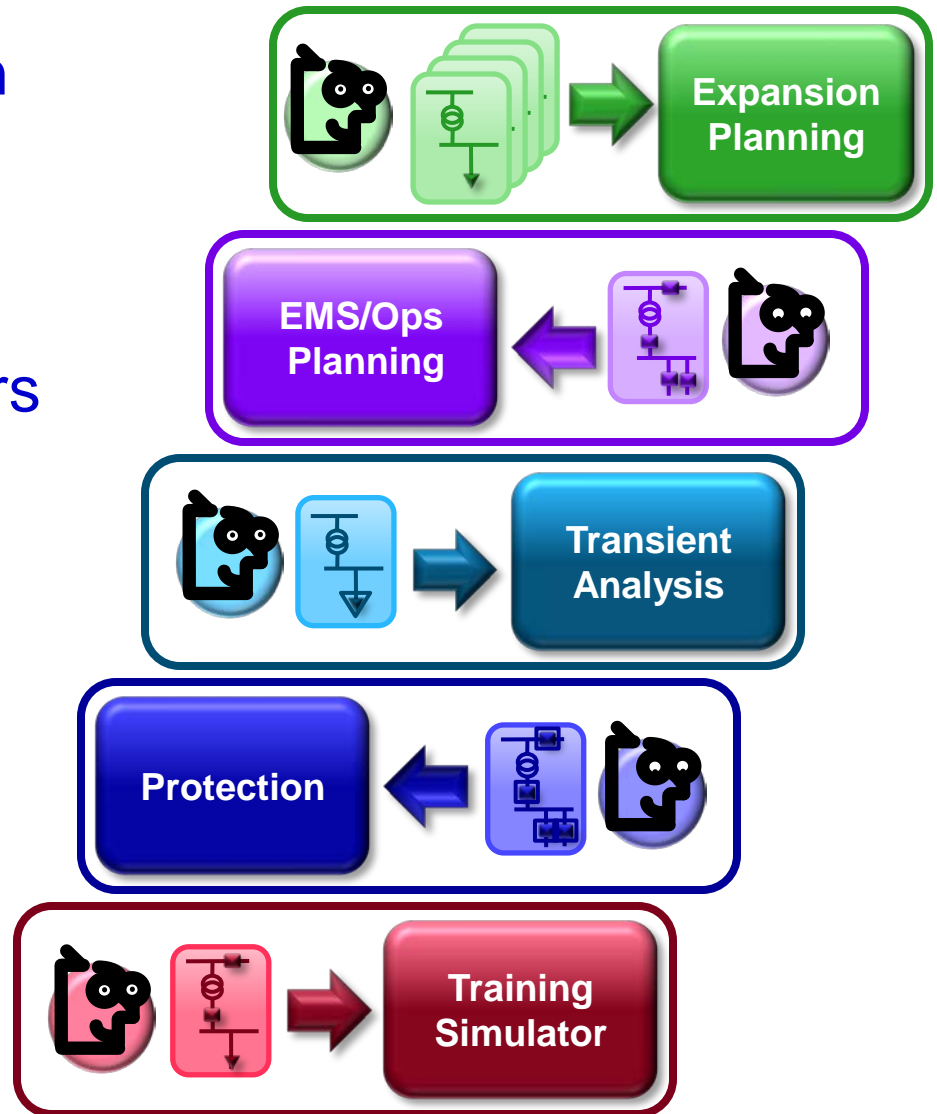
**CIGRE USNC Grid of the Future Symposium**

October 20, 2014

Houston, Texas

# Transmission Network Model Management In Support of Reliability

- Every tool requires its own network model, in its own format
- Every tool has its own users and maintainers
- **Silos are both technical and organizational**



# Transmission Network Model Management

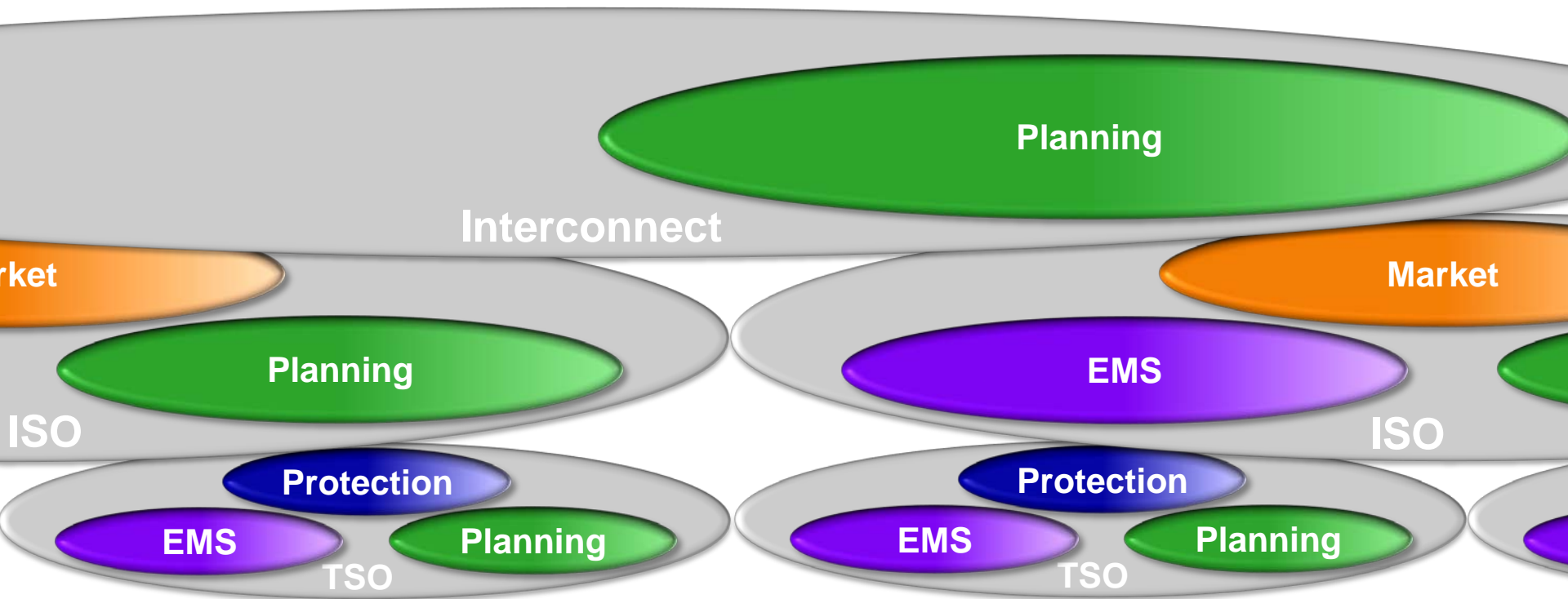
## Technical & Organizational Silos

- Silos cause:
  - Duplicate effort
  - Synchronization problems
  - Consistency issues
  - “Trapped” data

**Lots of energy invested in unproductive work**  
**Errors can go unrecognized**

# Transmission Network Model Management Industry Landscape

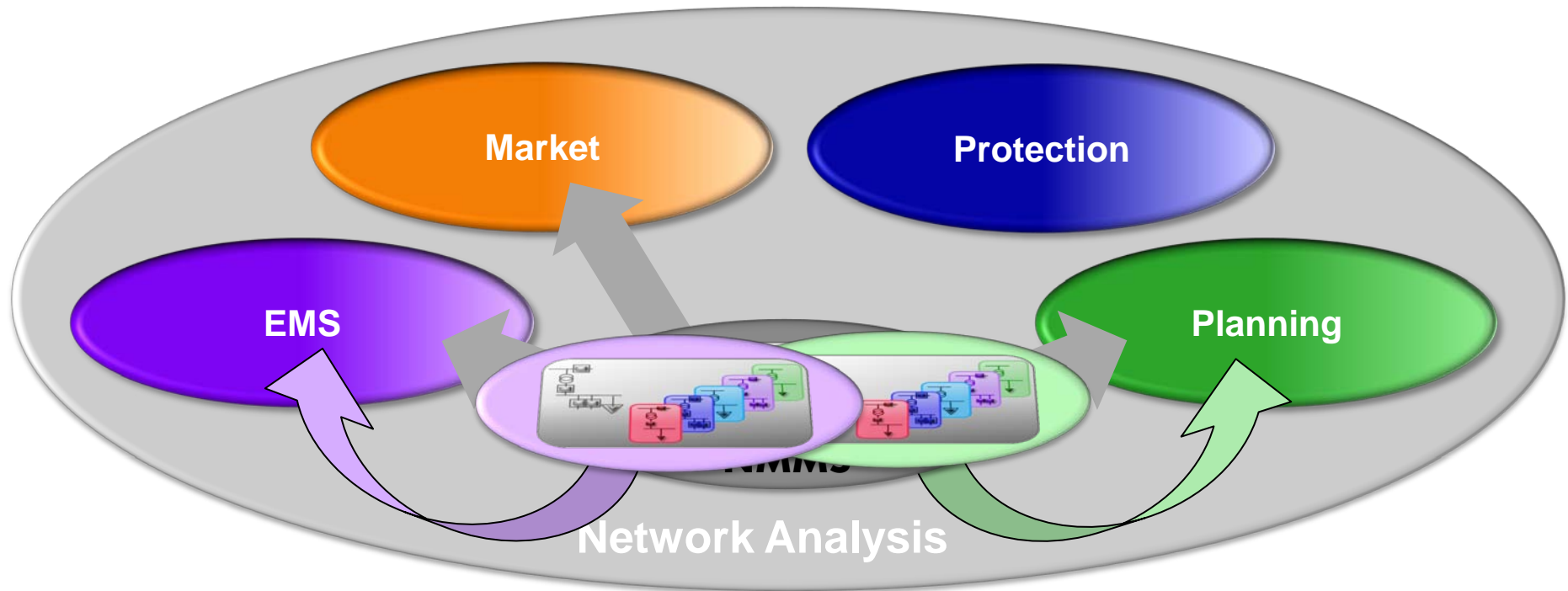
- Silos at multiple levels – TSO, ISO, Interconnect



# Transmission Network Model Management

## Encouraging Developments

- Consolidated model management
  - ERCOT model management implementation
  - Product configuration tools



# Transmission Network Model Management Support from the CIM

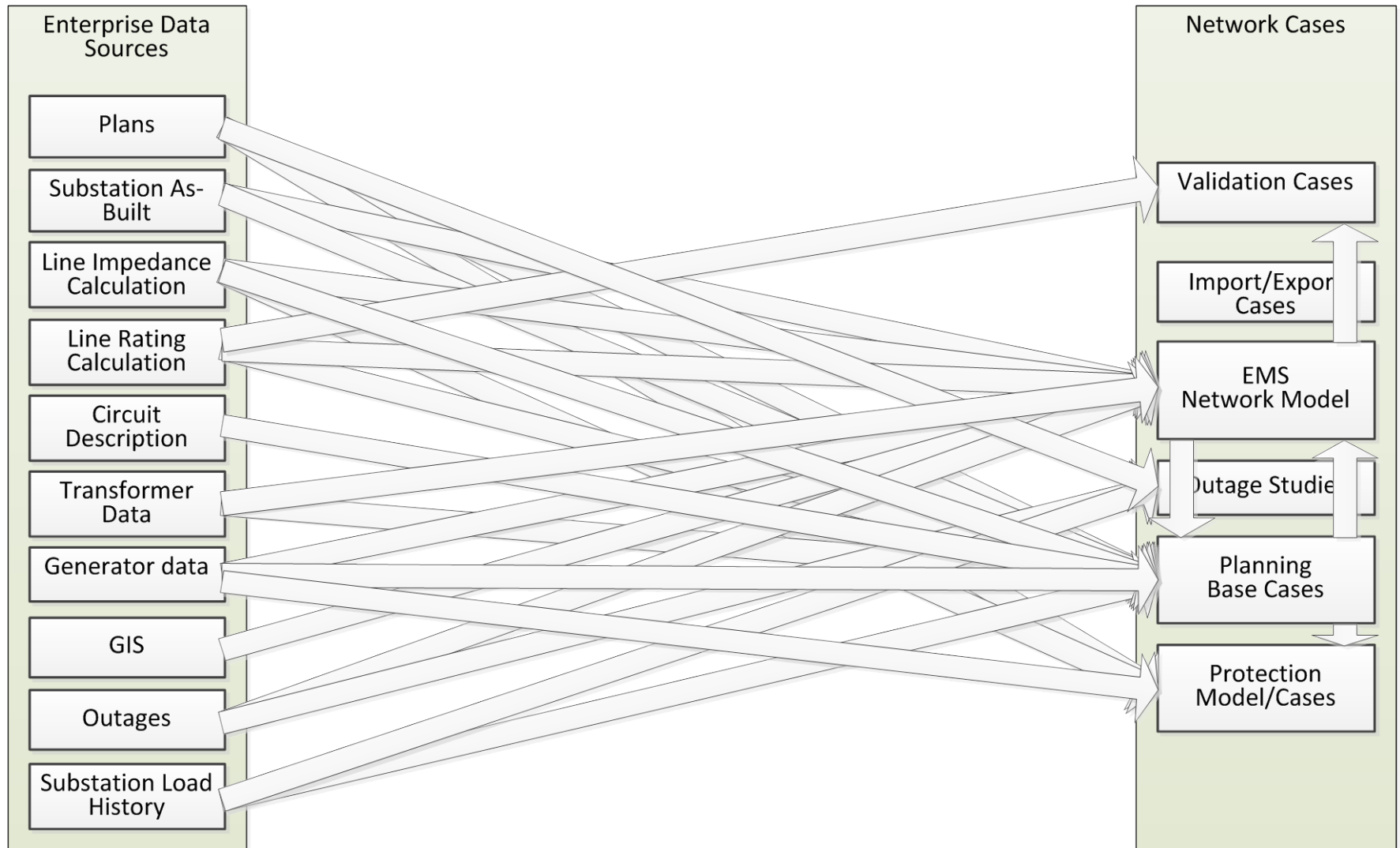
- Common Information Model (CIM) as foundation
  - Began as operational model in early 1990s
  - Support EMS components from different vendors
  - Became IEC Standard in mid-1990s
  - Understood as basis for semantic model for enterprise integration
  - Network model interoperability tests started in 2000 – more than 15 to-date
  - Planning (bus/branch) model added in 2008
  - Dynamics (transient behavior) model added in 2013
  - Projects, outage and contingency modeling are current topics



Now nearly robust enough to truly support NMM tool integration

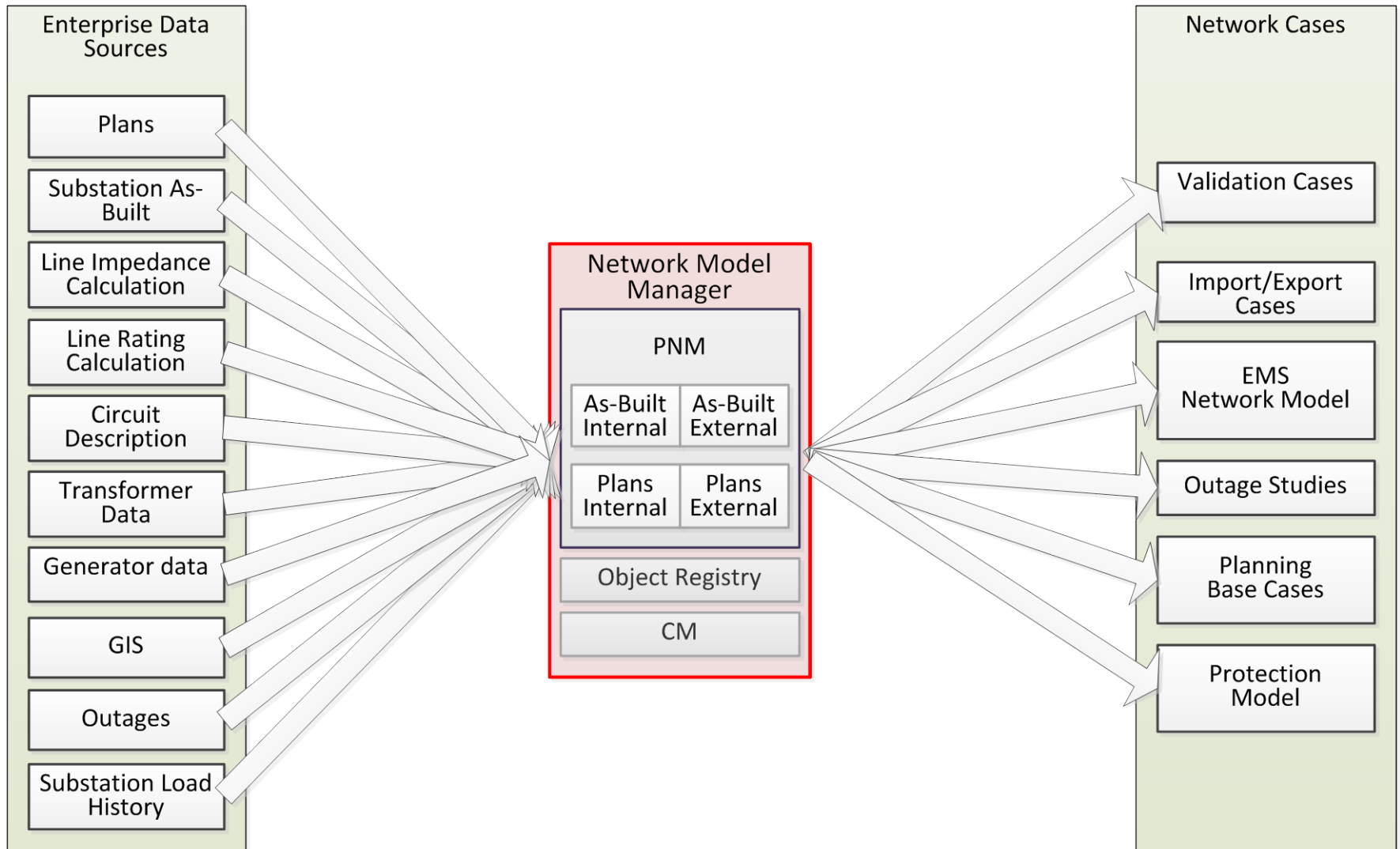
# Transmission Network Model Management

## Existing Situation



# Transmission Network Model Management

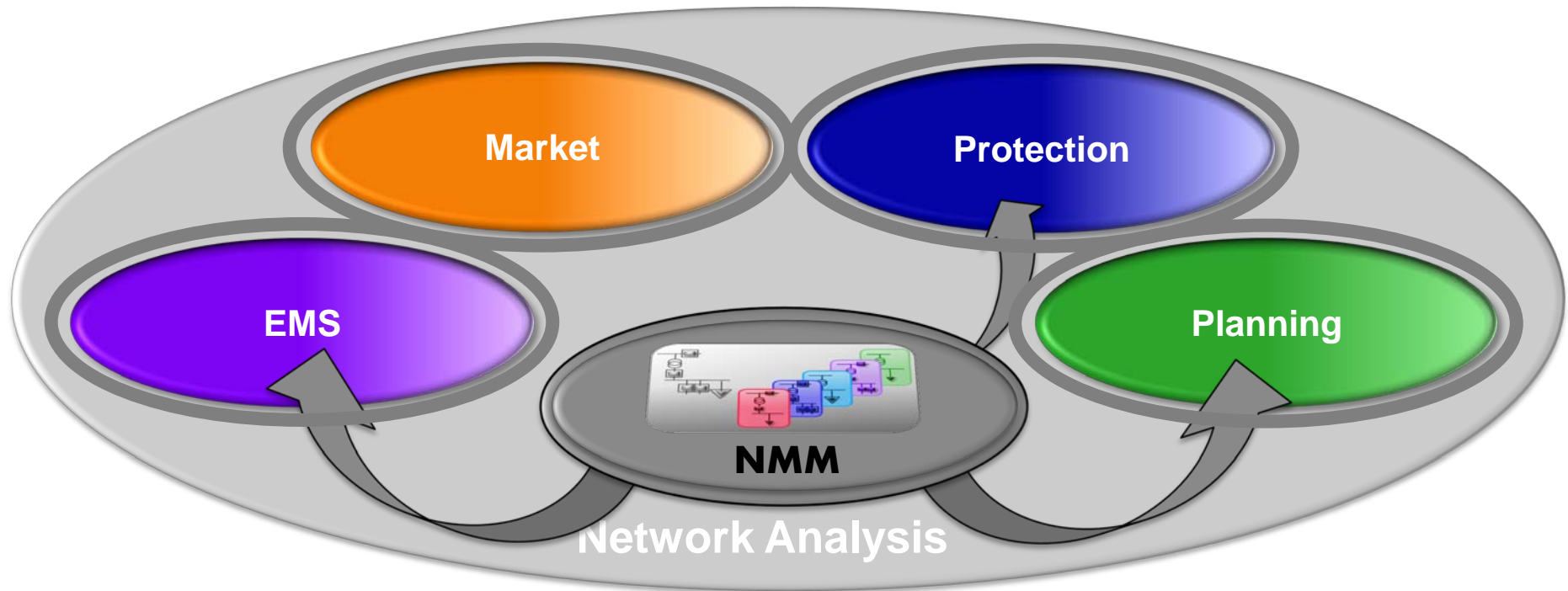
## The NMM Vision – one source for each piece of data





# NMM Requirements Overview

- Consolidated model management
  - Utilities ready to implement
  - Real NMM product market niche
  - Silos get in the way



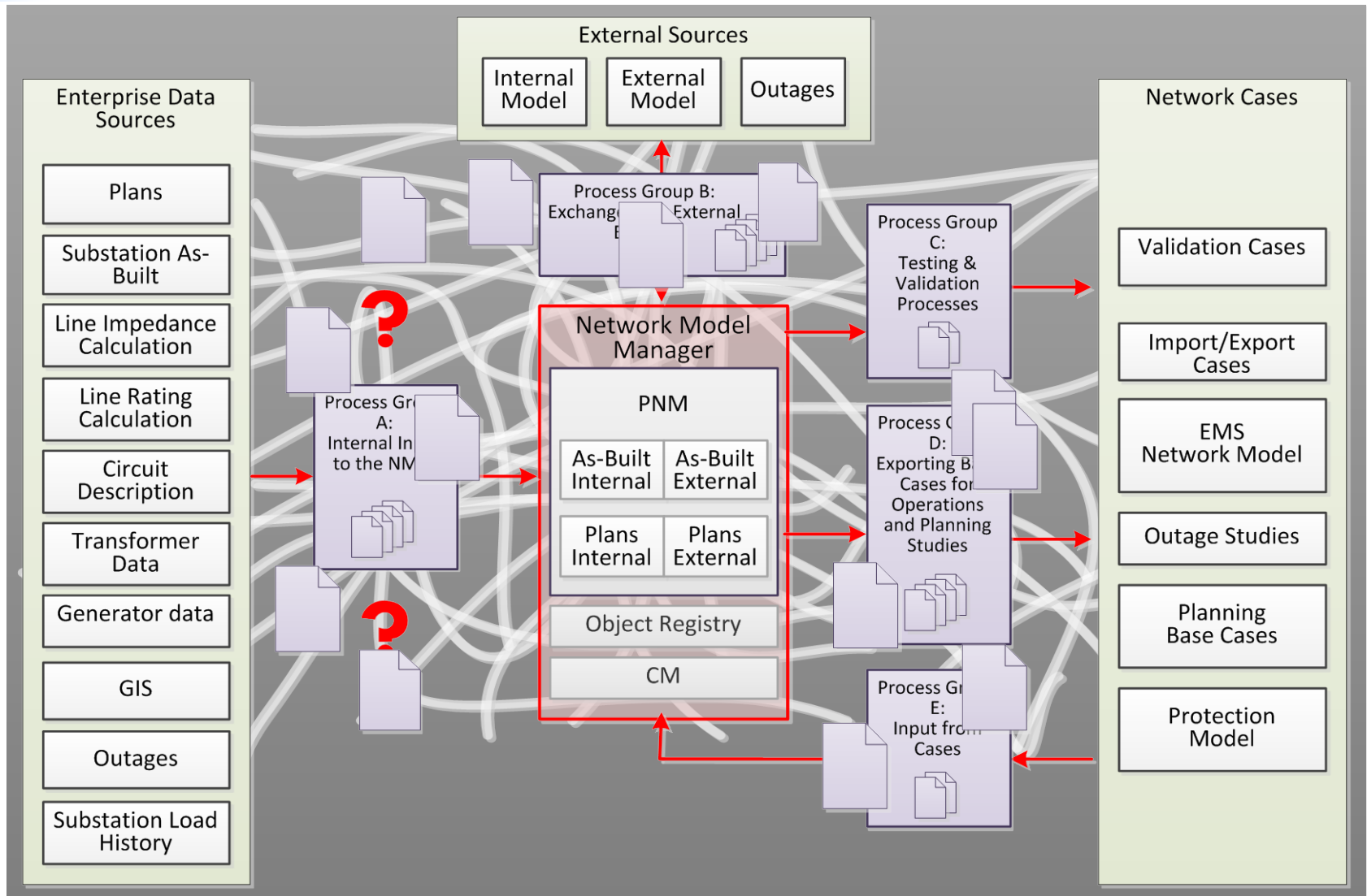
# NMM Requirements Overview Project

- 2014 Network Model Manager Requirements Overview supplemental
  - Overview of consolidated model management tool requirements
  - Sponsored and created by 8 utilities and 2 vendors
    - TSOs - AEP, BPA, Électricité de France, NationalGrid UK, Oncor
    - ISOs – ISO-NE, MISO, PJM
    - Vendors – Alstom, Siemens/Siemens PTI
  - Results publicly available for free

**Influence the industry** by accelerating utility interest and  
broadening vendor vision

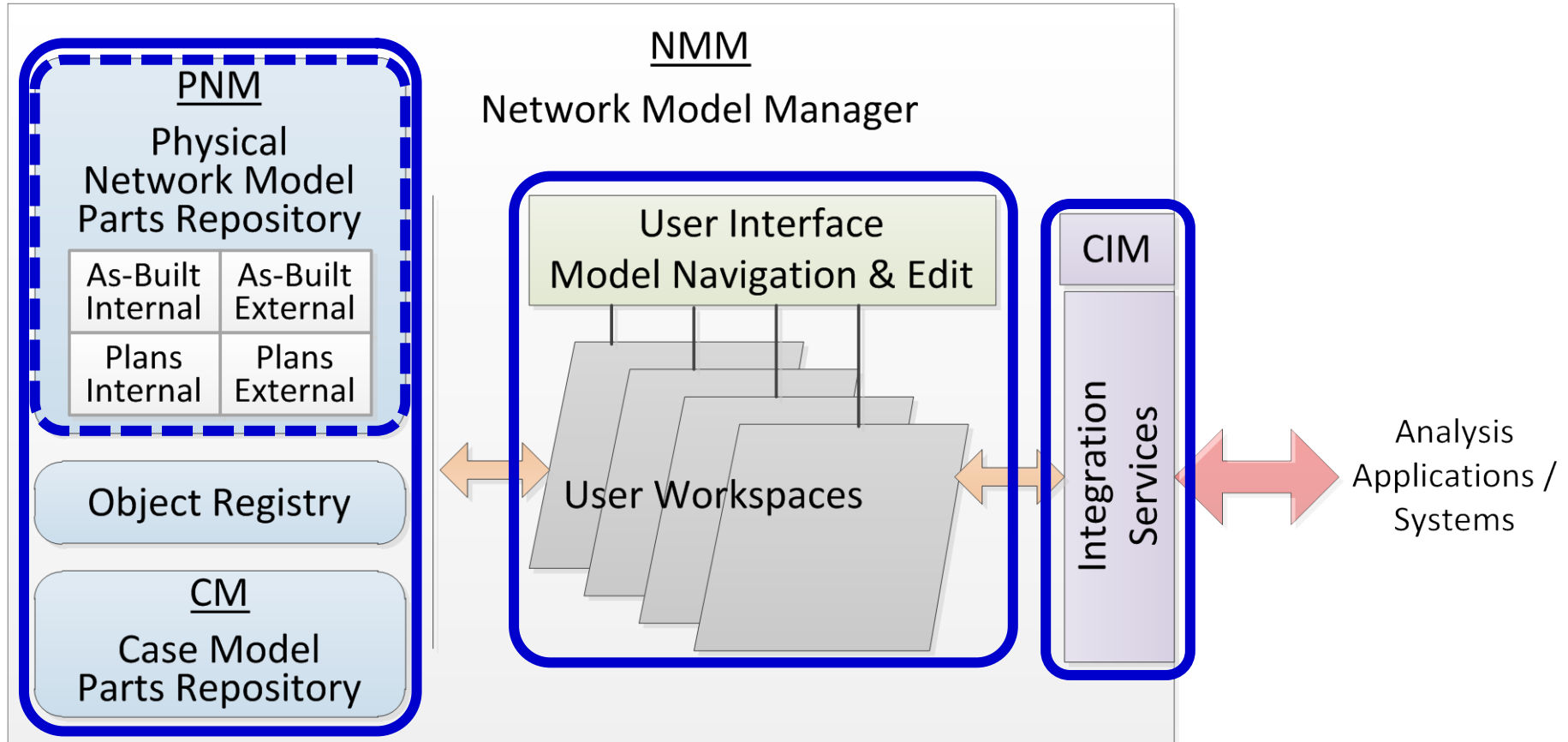
# NMM Requirements Overview Project

## Use Cases to Identify Requirements



# NMM Requirements Overview Project

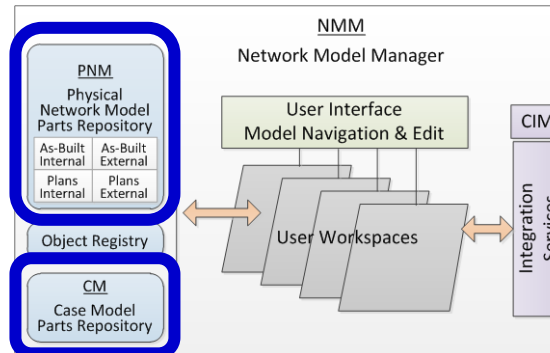
## NMM Functional Overview



# NMM Requirements Overview Project

## NMM Requirements

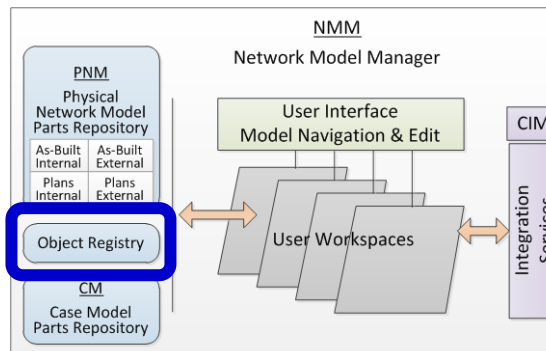
1. Model Part Management Requirements: Provide permanent store for model parts



# NMM Requirements Overview Project

## NMM Requirements

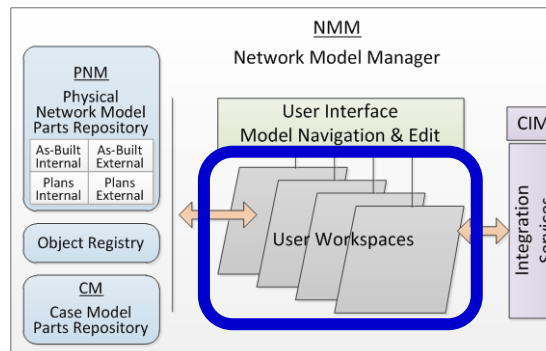
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2. Object Registry Requirements: Provide services to manage object identities across applications



# NMM Requirements Overview Project

## NMM Requirements

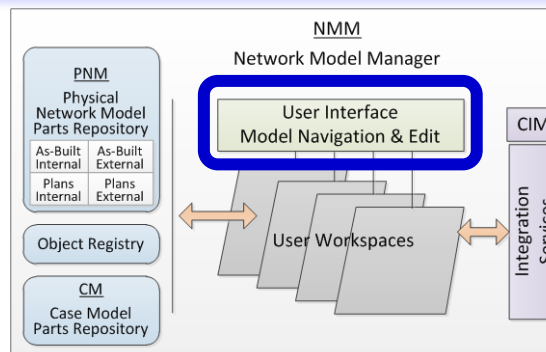
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3. Workspace Requirements: Support concurrent modeling activity by multiple users



# NMM Requirements Overview Project

## NMM Requirements

1. Model Part Management Requirements: Provide permanent store for model parts
2. Object Registry Requirements: Provide services to manage object identities across applications
3. Workspace Requirements: Support concurrent modeling activity by multiple users
4. User Interface Requirements: Provide the ability to create and manage Model Parts in NMM

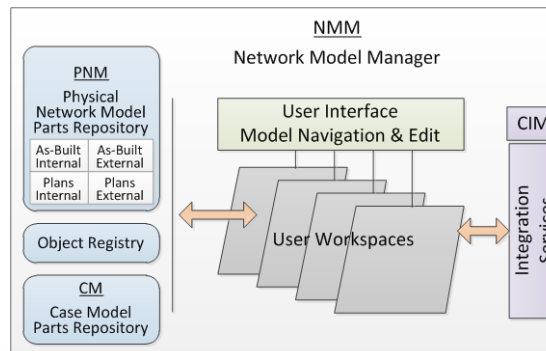




# NMM Requirements Overview Project

## NMM Requirements

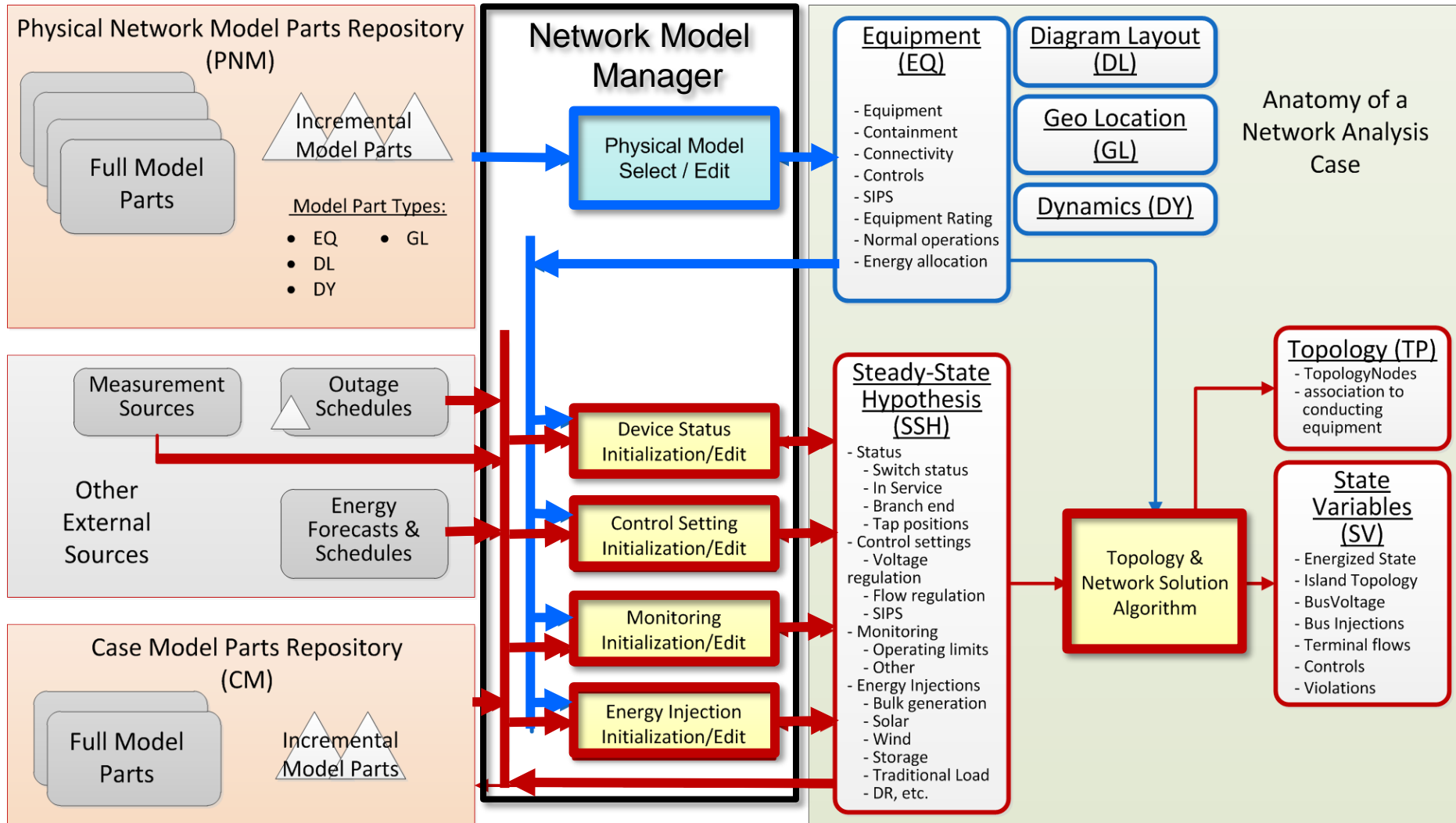
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5. Model and Case Assembly Requirements: Support CIM modular concept for assembling network models and cases

# NMM Requirements Overview Project

## Model and Case Assembly Requirements

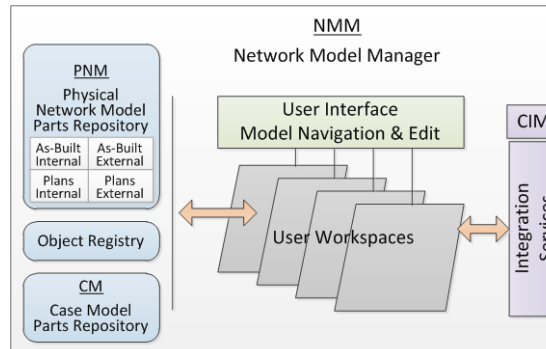


# NMM Requirements Overview Project

## NMM Requirements



6. Validation Requirements: Facilitate testing and validation regimen

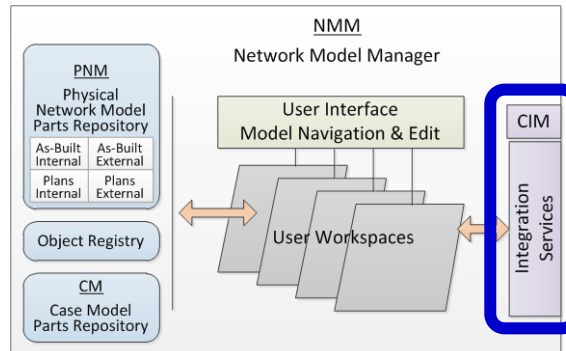


# NMM Requirements Overview Project

## NMM Requirements



6. Validation Requirements: Facilitate testing and validation regimen
7. Integration Requirements: Provide CIM-based interfaces

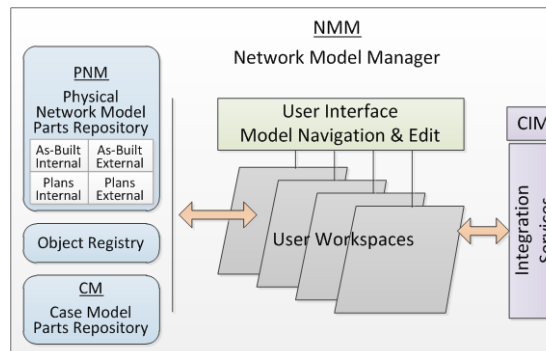
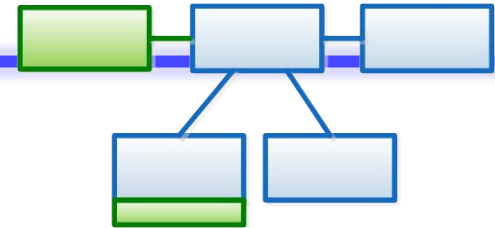


# NMM Requirements Overview Project

## NMM Requirements



6. Validation Requirements: Facilitate testing and validation regimen
7. Integration Requirements: Provide CIM-based interfaces
8. Extensibility Requirements: Model-driven design supporting data structure additions/modification



# NMM Requirements Overview Project

## Deliverable and Contacts

### *Network Model Manager Technical Market Requirements: A Transmission Perspective*

PID 3002003053

[www.epri.com](http://www.epri.com)

- Pat Brown, EPRI, [pbrown@epri.com](mailto:pbrown@epri.com)
- John Baranowski, PJM
- Jay Britton, Britton Consulting
- Margaret Goodrich, SISCO
- Eric Hatter, AEP
- Eric Lambert, Électricité de France
- Durgesh P. Manjuré, MISO
- Qun Qui, AEP
- Amanda Schiro, MISO





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## TSO Footprint Enterprise Data Sources for TSO Consumers

# Transmission Network Model Management Information Flows

