Common Information Model Update

Smart Grid Information Sharing Webcast
April 24, 2013
Agenda

• CIM Primer
  – Background
  – EPRI’s CIM Strategy
  – Walkthrough – What’s New?
• CIM Success Stories
• CIM 2013 Survey
What’s new with the EPRI CIM Primer?

Gerald R. Gray, PhD
Principal Technical Leader
Enterprise Architecture & Integration
Smart Grid Information Sharing Webcast
April 24, 2013
Agenda

- Background
- EPRI’s CIM Strategy
- Walkthrough – what’s new!
- Final Thoughts
CIM History

- EPRI Operator Training Simulator work in early 90s
  - Initial goal: allow utilities to procure “best of breed” subsystems for their Energy Management Systems

- Provided electric utility model as first wave of “enterprise application integration” hit in mid-90s

- Became IEC standard in 1996

- Mandated by NERC and first IOP test in 2000

- CIM Users Group established 2005
CIM as an IEC Standard

• Actually 3 standards:
  – 61970 (network model, XML file exchange)
  – 61968 (asset, meter, messaging)
  – 62325 (Markets)

• 3 Working Groups
  – WG13 – 61970
    Convener: Terry Saxton tsaxton@xtensible.net
  – WG14 – 61968
    Convener: Greg Robinson grobinson@xtensible.net
  – WG16 – 62325
    Convener: Jim Waight jim.waight@siemens.com

• IEC “owns” paper documents
• CIMug “owns” the UML
CIM and EPRI

• Early sponsorship
  – EPRI OTS
  – Control Center Application Programming Interface (CCAPI)

• Extensions
  – Planning models (61970)
  – Dynamic models (61970)
  – Environmental Data (62325)

• Harmonization
  – 61850
  – MultiSpeak

• Testing
  – 16 standards-vetting IOPs
  – Test harness
  – Support for UCA testing activities

• Education
  – CIM Primer  (www.epri.com – search for “CIM Primer”)
EPRI’s CIM Strategy

• **Advancing the standard**
  – Developing specific models/profiles, addressing gaps
    (eg. CIM for Dynamics, DER, CIM for Environmental Data, Asset Health modeling)
  – Support interoperability testing

• **Technical Guidance**
  – CIM maintenance and upgrade strategies
  – Use Case Integration
  – Standardized CIM-related RFP language

• **Education**
  – CIM Primer 2nd Ed
The IntelliGrid Program conducts research, development and demonstrations on the Information and Communications Technologies (ICT) that Enable Smart Grid applications.
Highlights of Changes

• Learning objectives
• Case Study
• Questions to reinforce learning
• New section on application integration
• CIM “success stories”
Learning objectives

• What the student is expected to understand at the conclusion of each section

Section 2: General Background

Section 3: CIM Background

Section 4: Core Technologies

Section 5: CIM UML

Learning Objectives

- Understand how CIM handles unique identities
- Understand CIM inheritance and see examples of class hierarchy
- Understand the basics of converting a circuit diagram into a CIM model
- Understand how the CIM incorporate geospatial information into the model
- Understand the classes of the CIM diagramming layout meta-model
- Understand the overview of CIM packages
Case Study

- Fictionalized account; based on real world experiences

Jeff Kimble has mentioned to some of his colleagues that he is interested in CIM and learning how Electric Innovation Utility could leverage the model for their operations and integration. Unfortunately, the responses from his colleagues have run the gamut from a lack of awareness, to several negative impressions, such as:

“It takes too long for the CIM to be updated”

“Nobody uses that.”

“Don’t we have our own common model?”

“The standard is always changing, how could we possibly deal with that?”

What would explain some of these perceptions and questions that Jeff colleagues have?
Example Section Questions...

1. An XML Schema Definition (XSD), can define:

3. In the examples used in this chapter, \textit{Shape} was what type of class:

3. If the relationship between \texttt{ConductingEquipment} and \texttt{Terminal} is denoted as 1..0* respectively, this indicates that:

5. The difference model provides a mechanism to allow \underline{________} to a network model.

- Additions only
- Deletions only
- Additions and Deletions
- Additions, Deletions, and Updates
Application Integration: Naming Conventions

• Based on *IEC 61968-100 Integration Guidance for 61968*

• Naming convention uses a combination of Verbs and Nouns
  – Actions – Objects

  Example: Query, I need the meter readings for a customer
  – Get (query) MeterReadings

• IEC 61968-100 describes the “how to do it”
• IEC 61968-9 describes the “what”; message XSD for MeterReadings

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<th>Reply Verb</th>
<th>Event Verb</th>
<th>Usage</th>
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</tr>
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</table>
Application Integrations: Patterns

• Integration is represented with sequence diagrams
• One systems sends or asks for something from another systems
• Actors: human, system, application
• Basic: Request-Response
• Complex: Multiple request – response, PUSH, PULL, combination JMS, WS
Final Thoughts

- EPRI and the Common Information Model (CIM)
  - A long history of support
  - Benefit to the utility industry
- CIM Primer is a key deliverable to support the CIM education strategy
- It’s free!

http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002001040&Mode=download
CIM Success Stories


John J. Simmins, Ph.D.
Technical Executive

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CIM Success Stories...

• Green Button
  – CIM-based, core objects and semantics
• Utility usage
  – Enterprise integration
  – Semantic models
  – Enterprise Information Management
  – Governance
• Commercialization
Success Story – Green Button

- **Usage** – how much energy is consumed during a billing cycle or any other period?
- **History** – how much energy is used as a function of time intervals – 15 minutes, hours, days, and months?
- **Cost** – what is the cost associated with energy usage?
Success Story - LIPA

- Processes and Governance
- Centrally Managed Semantic (Data) Model (EXM) based on IEC CIM
- Centrally Managed Exchange Model (EXM)
- Centrally Managed Development and Run-Time Deployment

Long Island Power Authority (LIPA) leverages IEC Common Information Model (CIM) for Enterprise Information Management and Semantic Integration initiatives.
Success Story – Consumers Energy

- Eliminating duplicate work on integration
- Maximizing the reusability of a common data model
- Lowering the cost on overall integration and support
- Facilitating the composition and consumption of information across multivendor landscapes
- Leveraging vendor’s CIM-based solutions and SOA approaches for integration

Consumers Energy leverages IEC Common Information Model (CIM) for Enterprise Integration and a enterprise semantic model.
CIM Success – Commercialization

- AGSI
  - OMS
  - DMS
  - Social Media visualization
  - CIM database
CIM Success – Commercialization

• OpenGrid Software
  – Based on EPRI project
  – GIS
  – OMS
  – Asset Management
  – Augmented reality
  – Implementing at Southern Scotland Electric
CIM Survey of Adoptions
Common Information Model Update for 2013.
EPRI, Palo Alto, CA: 2012.3002003034

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Technical Executive
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Respondents Segmented By Organization Type

2010

Electric Utility: 49%
Technology Provider: 19%
Systems Integrator: 23%
Consultant: 19%

2013

Electric Utility: 83%
Technology Provider: 16%
Systems Integrator: 65%
Consultant: 31%
University/ R&D: 31%
CIM Survey Number of Customers

2010

- 800,000 customers or more
- 200,000 to 799,999 customers
- 50,000 to 199,999 customers
- Less than 50,000 customers

2013

- 800,000 customers or more
- 200,000 to 799,999 customers
- 50,000 to 199,999 customers
- Less than 50,000 customers
- Don't know
Respondents Segmented by Utility Type

- **State/Municipal/Public Utility**: 34%
- **Distribution System Operator**: 19%
- **Transmission Owner/Operator**: 28%
- **Independent System Operator**: 5%
- **Generation Plant Owner/Operator**: 1%
- **Electricity Cooperative**: 1%
- **Other**: 12%
Mean number of application affected

Mean number of applications affected

- Other Business Functions
- Generation Plant
- Meter Reading and Demand Response
- Customer Support
- Network Planning and Analysis
- Maintenance and Construction
- Operational Planning and Optimization
- Records and Asset Management
- Outage Management
- Network/Grid Operation
Number of interfaces based on CIM

- Don't Know
- 50 Interfaces or more
- 30-49 Interfaces
- 20-29 Interfaces
- 10-19 Interfaces
- 1-9 Interfaces
- None

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Migration to progressive CIM versions

We have an ongoing process to stay current with CIM releases.

We have migrated some interfaces to newer releases...

We have not migrated to newer versions of CIM.
Together…Shaping the Future of Electricity