CIM Users Group Spring Meeting

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Thank you, National Grid!

Inspired by presentations given at the Fall, 2011 CIM Users Group Meeting in Austin, Texas, a group of National Grid attendees decided, on the plane trip back home to the UK, that it was time to take action. If all those other utilities around the world were implementing the CIM, it was well past time for National Grid to get serious. National Grid had been, in the words of Parry Battr, National Grid’s Manager of Network Modeling and Data Management, “intelligently tinkering” with the CIM ever since Alan McVarran had presented a CIM Workshop several years earlier. But the dramatic increase in the amount of available information was causing National Grid to recognize that information management was a challenge that needed to be actively met. After the Austin Users Group Meeting, National Grid drew up a 10-point plan which included recommendations for cross-work group teams to address the problem of silo’d projects, the creation of an Enterprise Information Management Working group (in the business side, not in Information Systems) to identify requirements and a commitment that the CIM approach would underpin future design solutions. A strategy paper based on the 10-point plan was presented to the National Grid leadership which was enthusiastic in its support. Hosting the Spring, 2012 CIM Users Group in England seemed like a natural next step. Not only was England in a celebratory mood perfect for sharing with international visitors, but a local conference had the potential of attracting local utilities (Distribution Network Operators) and introducing them to the potential of the CIM as well. Our appreciation to National Grid for seizing the opportunity and, in particular, to Alan Smart, National Grid Energy Operations Manager, for sponsoring such a memorable conference!

CIM Implementation and Application To Support the European Smart Grid

May, 2012 was a noteworthy month in Great Britain: the Olympic torch arrived in Cornwall to begin its 8000 mile journey to the London summer games, the Queen celebrated her Diamond Jubilee and the CIM User Group conference was held for the first time in England. Sponsored by National Grid, and located at a hotel just across the street from Windsor Castle, the conference had an attendance of about 70 people, with representation from 12 utilities, 14 vendors, 10 consulting companies, 4 universities, 4 research or standards groups and 1 regulatory agency. Participants came from 18 countries across 6 continents.

As usual, the conference opened with a day-long CIM University, which was followed by the two-and-half conference, full of interesting presentations, an evening of vendor demonstrations and a tour of the National Grid Control Center.

Presentations featured numerous utility success stories and covered multiple projects implementing and/or extending the CIM. Status reports were given on US and European Smart Grid initiatives, IEC TC57 Working Group activities and CIM testing plans and results. Specific highlights included:

- The network model integration and management occurring at ENTSO-E and several of its member TSOs which will support the coordination of the European transmission network as very significant volumes of new generation, including fluctuating renewable generation are integrated into the system
- Distribution initiatives addressing demand response, model exchange and provision of customer information
- Proposed improvements to the CIM including the modeling of environmental data and the dynamic behavior of generators and loads and the extension of the CIM into generation from the plant perspective
- The important role of information architecture in supporting integration efforts.

Slides from CIM University and the CIMug sessions can be downloaded from CIMug website using the following link: London CIMug Meeting Presentations (or click Meetings under Activities on the left quick launch menu on the CIMug website www.cimug.org, then select London 2012, then CIMug Presentations – London 2012). Viewing access is public, download access requires a UCA International Users Group website user ID, which can be created for no cost at www.ucaiug.org.
Keynote
Andy Pearman, National Grid, discussed the significant changes facing National Grid, the Great Britain TSO. A combination of increased renewable generation being implemented to meet decarbonization targets and new interconnectors with the continent and Ireland implies that future power flows on the Great Britain grid will vary more than ever. A number of Drivers, from the changing generation profile to the deployment of new transmission technologies to electric vehicles, lead to specific Challenges like increasing generation and demand volatility, lowered system stability and increased UE interaction. The Challenges call for the development of Operational Capabilities many of which rely on computer system interoperability which could be facilitated by use of the CIM. National Grid has increased its IT investment significantly in the last year, recognizing the need to leverage new approaches to data exchange, security and analytics which will be needed to make National Grid’s already smart Transmission network even smarter. Slides: AM1-Keynote Speech_Pearman_National Grid under Wednesday Presentations.

Utility Project Stories
A TSO Perspective on CIM (Norway)
Sigbjørn Sorbotten, Statnett, talked about the EMS and System Development planning model integration efforts which have been underway at Statnett for the last 2 years. The number of different tools employed for various planning and operation functions at Statnett creates challenges in maintaining the correct power system data which is a cornerstone for reliable grid operation. The CIM is being used as the basis of a strategy that will improve data consistency and quality, enable exchange of model case data between tools and encourage a common power system modeling practice. A small scale deployment allowed Statnett to both validate that the strategy was achievable and to identify the standard and tool improvements needed to fully support the project’s integration goals. Slides: AM3_A TSO perspective on CIM_Sorbotten_Statnett under Wednesday Presentations.

A Perspective on European TSOs Migration to CIM Data Exchange (France)
Youssef Akel, RTE, shared the experiences that RTE has had in using the CIM to exchange network model information with its neighboring utilities and with ENTSO-E, the European Network of Transmission System Operators for Electricity. RTE uses an in-house tool to maintain both its planning and operations models. Along with the rest of the European TSOs, RTE has migrated from the previous UCTE DEF format for exchanging model information to the CIM format as described in the ENTSO-E profile. Advantages of the CIM include object identification, separation of equipment, topology and state variables and support for the idea of data mastership (ownership). Challenges RTE has experienced in implementing include the need for validation (both before and after network reduction) and the lack of clarity in CIM instance rules. Slides: AM4_A perspective on European TSOs migration to CIM data exchange_Akel_RTE under Wednesday Presentations.

CIM Within an Overall Information Architecture (Britain)
Monica Howat, National Grid, overviewed the National Grid perspective on Information Architecture and the role of the CIM. Technology is not the big focus now; its information and how it’s managed that provides business advantage. Information architecture structures the what, why, who, where and how of managing information. Four different levels of data definition (the “what” part of the architecture) are useful in describing integration solutions: Enterprise Information Model, Platform Agnostic Model, System Data Models and IT Systems & Components. The CIM fits in the Platform Agnostic Model layer. Mapping between each level is important to identify services and promote integration. Governance, tailored to each level, must be applied to each model to ensure consistent application. Slides: PM2_CIM Within an Overall Information Architecture_Howat_National Grid under Thursday Presentations.

Current Initiatives with National Grid (Britain)
Martin Bradley, National Grid, discussed National Grid’s CIM strategy, three of its CIM-based projects and the challenges encountered (and learning gained) during the implementation of those projects. National Grid published a CIM strategy in 2010 which includes a near-term focus on Information Systems projects in the operations area and a longer-term plan that contemplates an Enterprise System Bus and extension to the gas business area. In the Data Historian and Market Management projects, the EMS is providing the CIM equipment profile (.EQ) of the full network model to other systems, with related measurement exchange in both cases being done using non-CIM strategies. In its exchange with Coreso, a regional coor-
CIM in Distribution

CIM usage in ADDRESS (France)

Cyril Effantin, EdF R&D, provided a comprehensive update on the Active Distribution network with full integration of Demand and Distributed energy RESourceS (ADDRESS) European Project, which supports CIM-based data exchange for the offering and sale of energy by aggregators into the market. The project started in 2008 and will wrap up in 2013. An architecture has been designed and a technical and commercial framework developed for Active Demand, the participation of domestic and small commercial consumers in system markets. Use cases, influenced by the emerging standard IEC TC8 PAS 62559, were relied on heavily to identify actors, interactions and requirements. From UML use cases, textual message payloads were defined (WG14 verb + payload), and a CIM-ADDRESS UML information model was created. XML XSDs were generated from CIM-ADDRESS message payloads which were then encapsulated in services (WSDL) and plugged into an Enterprise Service Bus. Currently three prototypes are implemented: one each in Spain, Italy and France. Slides: AM6_CIM usage in ADDRESS_Effantin_EdF under Thursday Presentations.

CIM Topologydata Enterprise Service Bus (Germany)

Michael Gründler, BTC AG, described the integrated power grid topology model implemented at EWE, a major electric distribution company in Germany. Information about lines comes from the Geographic Information System (GIS) and information about transformers, substations, breakers, bays and plants from other sources. A topologydataCache component is responsible for creating and maintaining the topology model. The appropriate information is exported to the different target systems: CAEWIN, PowerFactory and several online network analysis tools. EWE is doing transformer security (loading) management, leveraging a neural network to forecast wind power, photovoltaics and consumer load. Visualization displays allow operators to clearly see the trends and to react appropriately. By moving to a publish/subscribe approach, EWE was able to reduce its message traffic by more than 80%. Slides: AM6_CIM Topologydata Enterprise Service Bus_Gründler_EWE under Thursday Presentations.

ENTS0-E

ENTS0-E IOP

Chavdar Ivanov, ENTSO-E, gave an overview of recent ENTSO-E standards decisions and a preview of the status, profiles and test procedures of the upcoming ENTSO-E Interoperability test. Recent decisions include: the draft 2nd profile based on CIM15 is not approved as it should be further developed, 1st profile based on CIM14 remains the official ENTSO-E profile used for data exchanges, this year’s IOP will again test both the implementation of the 1st profile and the correctness of the new draft of the 2nd profile based on CIM16, launching a Network Modeling Database project and issuing a statement on 61850. Two IOPs are scheduled for July, 2012 in Brussels: CIM for System Development and Operations (SDO) and CIM for Energy Market.
The SDO IOP currently has nearly 20 registered vendors. Test model preparation is a critical issue in the preparing for the IOP. The Energy Market IOP will cover 62325-451-1 (Acknowledgement process) and 62325-451-2 (Scheduling process). Slides: AM1_ENTSO-E IOP _Ivanov_ ENTSO-E under Thursday Presentations.

**ENTSO-E CIM Migration Status**

Jesus Mendiola, ENTSO-E, presented the highlights of the internal interoperability testing being done by ENTSO-E. Bi-weekly tests cover validating, importing, exporting and performing a load flow on all available files are intended to allow the testing of real planning models, including dealing with issues of confidentiality. The 1st profile (the official ENTSO-E CIM profile) based on CIM14 is being used. 35 TSOs and 10 vendors were involved in an additional IOP held in May 2012 and many (more than 200) issues have been recorded, some of which were resolved in real-time. Solutions for profile interpretation differences were addressed. Slides: AM2_ENTSO-E CIM Migration Status_Mendiola_ENTSO-E under Thursday Presentations.

**ENTSO-E Network Modeling Database Requirements**

Chavdar Ivanov, ENTSO-E, discussed the requirements of ENTSO-E’s Network Modeling Database (NMD) which is currently under development. Various data exchanges, at varying frequencies, occur among ENTSO-E, its projects, the TSO Consortium and Regions. The goal of the project is a central platform to handle the complexity of Network Model preparation and management which will support a “single source of information” approach and will make electric network model data accessible and visible, while preserving confidentiality. ENTSO-E currently handles lots of database and spreadsheet inputs and problem identification and correction are time-consuming, often involving going back to TSOs or vendors for updated inputs. It is expected that the NMD will improve efficiency, support automated validation and provide a solid foundation for consolidating and analyzing network model data. Slides: AM3_ENTSO-E Network Modeling Database Requirements_Ivanov_ENTSO-E under Thursday Presentations.

**ENTSO-E Network Modelling Database**

Petr Svoboda, Unicorn Systems, overviewed the ENTSO-E NMD project, with its central model storage strategy, and the use cases related to it. The NMD information system, slated to go live at the end of May, 2012, will support the maintenance of the ENTSO-E long-term planning network model and the tie-line boundary sets. The NMD will be used by all member TSOs and will provide the reference system for the July ENTSO-E interoperability tests related to the 1st profile of ENTSO-E. Use cases for network model submission, approval, assembly, for solution submission and for model downloading drove the design of a domain model with support for data mastership, time-based delta increments, versioning, multiple profiles and handling of a variety of combinations of situations, cases and scenarios. Information about tie-lines between TSOs is also maintained in the NMD where it is used to support the tie-line approval process and generate Boundary sets. Slides: AM4_ENTSO-E NMD and Beyond

**Worldwide CIM and Smart Grid**

**European Smart Grid Mandate Status**

Eric Lambert, EdF, explained the status of work on the M/490 Mandate, one of the three European mandates related to Smart Grid. Four Working Groups have been established to address M/490: Sustainable Processes, Reference Architecture, Information Security and First Set of Standards. The four Working Groups will deliver their final report by the end of
The Sustainable Processes Working Group is focusing its efforts on developing a solid base for use cases spanning the range of Smart Grid-related standards. This Working Group has done actor identification, started use case collection/organization and has organized two workshops in May on the following topics:

- Use Cases related to the market and technical processes for the use of flexible Demand and Generation
- Use Cases related to EV Charging and EV infrastructure management

Coordination across multiple IEC TCs (8, 22, 13, 69, 82, 88, etc.) is essential and help is needed from utilities which can provide their Smart Grid use cases through IEC TC8 AdHoc WG4. The Reference Architecture Working Group has leveraged the work of IEC TC57 and others and has developed an architecture model (the Smart Grids Architecture Model (SGAM)) and established a liaison relationship with SGIP. The Security Working Group has analyzed the current landscape of relevant standards and defined an organizational approach to its work. Slides: AM2_M490 Smartgrid Mandate Status_Lambert_EdF under Wednesday Presentations.

_Preparing for the Green Button: Not Impossible, CIMpossible_

Gerald Gray, EPRI, reviewed the recently announced, White House-sponsored US Green Button initiative, whose goal is allowing easy customer access to their utility usage information. The exact requirements are still be defined, but will address: data acquisition, data provisioning and data authorization. Both CIM and Multi-Speak provide standards definitions to support data provisioning: CIM provides both a data model and message definitions for meter reading and control and MultiSpeak provides equivalent messaging interface definitions. With respect to data security, access authorization has been addressed by both Open ADE and by NAESB standard Retail Electric Quadrant 21 (REQ 21). Slides: AM6_Green Button – Not Impossible CIM-Possible_Gray_EPRI under Wednesday Presentations.

_NIST SGIP Status_

Jay Britton, Alstom, co-chair of the Semantic Working Party of the SGIP Smart Grid Architecture Committee, provided an update on the alignment among the reference architectures being put forth by three major entities: the US NIST Smart Grid Interoperability Panel (SGIP), the EU M490 Reference Architecture Work Group (RAWG) and that of IEC TC57. There is common agreement that a canonical data model is key to success and most standards include semantic modeling definitions, though scope methodology, purpose and usage vary widely. Basing future work on a broad spectrum of industry use cases will support the understanding of domain models and their requirements. That understanding is central to addressing the challenges being considered by the current reference architecture efforts, which include: profile specifications, change management, versions, number and scope of domain models, modeling languages, ‘data of record’ use cases, data mastership and the enterprise information model. Slides: PM6_NIST SGIP_Britton_Alstom under Wednesday Presentations.

_CIM Related Developments_

_Transformer Modeling for Asset Health with CIM15_

Pat Brown, EPRI, discussed a recent EPRI demonstration project that implemented a standard-based solution for integrating transformer asset health data for visualization to Operators and field personnel. Both 61850 and CIM were utilized and CIM modeling covered Equipment, Measurements, Connectivity, Assets and Asset Information. Data sources included historic real-time information from utilities and DGA sample test data in addition to real-time data from a transformer simulator. Learnings related to CIM instance modeling and profile requirements were documented and have been presented to WG13. Slides: AM5_Transformer Modeling for Asset Health with CIM 15_Brown_EPRI under Wednesday Presentations.
CIM for Environmental Data

Alan McMorran, Open Grid Systems, over-viewed the work of a joint Southern California Edison, EPRI, Open Grid Systems project to extend the CIM to cover environmental data. Use of environmental data (atmospheric, geospheric, hydrospheric and space) is pervasive throughout utilities. The goal of the project was to allow information gathered from multiple disparate sources to be made available to multiple consuming applications within a utility by means of a common interface. A data model supporting the identified requirements was created based on a large sample of utility use cases. The model includes classes related to measured values, phenomena, observations, forecasts, events and alerts. Multiple profiles and supporting transformations were created as part of the project and are being submitted to WG16 for inclusion into the CIM. Slides: PM2_CIM for Environmental Data_McMorran_OpenGrid Systems under Wednesday Presentations.

CIM Based Naming Registry

Terry Saxton, Xtensible Solutions, presented the modeling work being done by the OpenSG Enterprise Information Management (EIM) Task Force and by Southern California Edison related to a Business Object Registry. Based on a utility use case involving multiple systems sharing network model and Status/Measurement information, a draft UML model to support a Business Object Registry has been proposed. Slides: PM5_Business Object Registry_Saxton_Xtensible under Wednesday Presentations.

Business Object Registry

CIM for Dynamics

Pat Brown, EPRI, summarized the work of an EPRI project currently underway to extend the CIM to cover the exchange of standard generator and load dynamic behavior models. Dynamic model exchange is useful for transferring data between various transient applications within a utility and for exchange between TSOs and regional transmission system coordinators (ISOs). The proposed Dynamics model utilizes CIM classes to support standard models for a variety of function blocks including generators, motors, exciters, power system stabilizers, loads and wind generators. Class attributes are used to define standard model parameters and the standard models can be exchanged using identified standard interconnection patterns. The project will complete its work this summer and the results will be submitted to WG13. Slides: PM7_CIM for Dynamics_Brown_EPRI under Wednesday Presentations.

Building Dynamic Specifications: Intelligibility and Flexibility Through CIM Profiling Standardization

Youssef Akel, RTE, discussed the approach to the exchange of standardized data used by RTE, the French TSO. With the advent of the CIM, data exchange in ENTSO-E has become both richer and more complex and is now highly dependent on profiles for interoperability. A profile is a subset of the information model, tailored to a specific business context. Utilizing UML itself for the definition of profiles simplifies the processing of interface specifications into code by allowing profile definitions to be directly specified in.xmi and directly processed by tools. The current Profile Task Force’s work is an important step in defining profile rules and usage. Slides: AM8_Building dynamic specifications_Akel_RTE under Thursday Presentations.

Extending the CIM for Generation

Jean-François Cabadi, Alstom, shared the progress that is being made in exploring the extension of the CIM model to model power plants from the Generation Operator, not Network Operator, point of view. Use cases being considered cover power plant operation scheduling, maintenance, performance and condition monitoring and reporting and permit-to-work management. An NWIP (for 61970-458) has been developed and the roadmap calls for assessing the reference architecture and actors, analyzing use cases, developing a canonical information model and developing profiles starting in 2012 and wrapping up in 2013. Slides: AM1_Extending the CIM for Generation_Cabadi_Alstom under Friday Presentations.

CIM/DLMS/COSEM Harmonization

Don Taylor, Itron, reported on the IEC TC57 Joint Working Group 16 CIM/DLMS/COSEM harmonization effort, which is driven by the need for integration of Enterprise Resource Planning (ERP), Smart Grid and Smart Meter systems. Head-end systems are the logical translation point between CIM and DLMS/COSEM. Current work is focused on the mapping of Meter Reading messages, including Verbs, Data Types, enumerations and codes. Slides: PM3_CIM DLMS COSEM Harmonization_Taylor_Itron under Wednesday Presentations.
CIM – 61850 Harmonization

Ralph Mackiewicz, SISCO, shared the present status of CIM and 61850 harmonization, which currently focuses on the sharing of network model information between network planning applications (which typically implement CIM data exchange interfaces) and substation automation/protection systems (for which 61850 is the appropriate standard). Both productivity and accuracy can be increased by eliminating manual transfer of information between the two types of systems. Progress is being made in the harmonization work: an EPRI project documented an approach to harmonizing the transfer of information between CIM and 61850, the 61850 models are being translated into UML by IEC TC57 WG10, extensions needed for both standards have been identified, WG19 (Interoperability within TC57) has agreed on the general approach and a New Work Item Proposal (NWIP) is being generated by France. A demonstration project is needed.

CIMug CIMug Website Improvements

Pat Brown, EPRI, reviewed user requirements that have been gathered and proposed approaches that are being considered for improving the CIMug website. An on-the-spot survey was conducted and results included the following:

- Half the attendees had downloaded previous CIMug presentations
- A quarter had downloaded a current version of the UML
- A fifth had accessed a draft IEC standard from the website
- A fifth used the website to learn about current IEC work items
- A fifth looked for Interoperability Test results on the website, but many had trouble finding them
- CIM issue submission is rarely done via the website

Testing Recommendations and Research Proposals to IEC TC57

Dean Hengst, ComEd, CIMug utility co-chair, conducted a feedback session for collecting ideas to be communicated to the various CIM-related IEC TC57 Working Groups. Ideas discussed included:

- Modeling user access security
- Extending the CIM model to cover gas
- Modeling for electric vehicle charging networks and stations (it was noted that EV work is being done currently in TC57, TC59 and TC13)

The topic of CIMug to Working Group communication generated lively dialog, with the Model Issues list on the CIMug website being identified as the most effective way for bringing ideas, gaps, concerns and questions to the attention of WG13, WG14 and WG16 members. (The Model Issues link is on the left quick launch bar of the CIMug home page.)

It was suggested that the CIM University session needs to be at the discovery level, though there was interest in sessions covering more advanced topics as well.

Testing UCA Test Committee, UCA ITCA Status

Margaret Goodrich, SISCO, reported on the current state of testing activities in UCA International Users Group (UCAug). Previously, UCAug testing addressed only 61850, but the scope is now being expanded to cover Open Smart Grid conformity testing and CIM conformance and interoperability testing. A Testing Subcommittee has been created, with representation from each Users Group under UCAug. UCAug is pursuing certification as an Interoperability Testing/Certification Authority (ITCA) for both 61850 and CIM as outlined by the SGIP. An Informal IOP Vetting Sub-Committee is being established which will help coordinate CIM pre-standard interoperability tests.

CIM for Distribution and AMI Interoperability Testing

Margaret Goodrich, SISCO, presented the overviews of several recent 61968 Interoperability tests. The 61968-3 (Network Operations) and 61968-6 (Maintenance & Construction (Work)) tests were performed remotely, utilized multiple ESB products and resulted in successful execution of all planned scenarios by all Product and ESB vendors. The 61968-9 (Meter Reading & Control) test was performed...
remotely, utilized multiple ESB products and included 3 messages (Meter Reading, End Device Control, End Device Event). The 61968-4 (Assets) and 61968-13 (Network Model – CDPSM) tests were performed jointly on site at EdF and included Power Flow (Functional, Electrical Properties), GIS (Functional, Asset) and Solution (State Variables, Topology) model exchanges. All vendors imported at least one Profile Group for one or more of the tests. Reports on the tests will be posted to the UCAIug web site. Slides: AM2_CIM for Distribution and AMI Interoperability Testing_Goodrich_SISCO under Friday Presentations.

IEC Reports

CIM Messaging Profiles Task Force

Kurt Hunter, Siemens, reviewed the work being done by the CIM Messaging Profiles Task Force, formally sponsored by WG19, which has been meeting nearly weekly for the last 14 months. The three CIM Working Groups define exchanged data (profiles) using different approaches reflective of their modeling histories and the differing natures of their exchange use cases. The Task Force is an effort to understand the different Working Group approaches and needs and to coordinate a more consistent usage of the CIM. Topics covered in Task Force discussions range from the life cycle business drivers informing its work to profile definition and management, versioning, the relationship between external model harmonization and profiles, datatyping and handling of object identifiers. Work is ongoing, with a draft WG19 standard, 62361-101, slated to be delivered in December, 2013. Slides: PM1_CIM Messaging Profiles Task Force_Hunter_Siemens under Thursday Presentations.

CIM Model Manager Report

Kurt Hunter, Siemens, current WG13 CIM Model Manager, provided an update on the recent work and current status of the CIM UML model. The final 61970 CIM15 version (33) includes a number of major additions, including phase unbalanced models, the naming model, cuts and jumpers and aux equipment. It is part of the current CIM model posted on the CIMug website: iec61970cim15v33_iec-61968cim11v13_iec62325cim01v07.eap. Each Working Group keeps an issues list which drives its work and log of changes made to its Packages in the UML. Changes are coordinated according to a documented model assembly process which helps ensure changes are not lost and potential conflicts are resolved. 61970 CIM16 additions will include: Peterson coil, HVDC and Dynamics models and a host of corrections and enhancements arising from the ENTSO-E interoperability test process. Slides: AM3_CIM Model Manager Report_Hunter_Siemens under Friday Presentations.

This CIM User Group Summary was prepared by Pat Brown, IEC TC57 WG13 member. Pat works in EPRI’s IntelliGrid Program, which funded the production of the Summary.