

# CIMSpy

## Its Past, Present, and Future

The screenshot displays the CIMSpy software interface, which is used for power system analysis. The interface is divided into several panels:

- Geographical Diagram:** A map showing the geographical layout of the power system, including stations and transmission lines.
- ACLineSegment Table:** A table listing the parameters of AC line segments. The table has columns for #, name, BaseVoltage, EquipmentCode, x, and bch. The data is as follows:

#	name	BaseVoltage	EquipmentCode	x	bch
1	1-2	132.0KV	1-2	5.27947235	17.4065761566
2	1-3	132.0KV	1-3	2.24789616	7.3877759797
3	100-101	132.0KV	100-101	4.82644796	21.989080584
4	100-103	132.0KV			
5	100-104	132.0KV			
6	100-106	132.0KV			
7	101-102	132.0KV			
8	103-104	132.0KV			
9	103-105	132.0KV			
10	103-110	132.0KV			
11	104-105	132.0KV			
12	105-106	132.0KV			
13	105-107	132.0KV			
14	105-108	132.0KV			
15	106-107	132.0KV			
16	108-109	132.0KV			
17	109-110	132.0KV			
18	11-12	132.0KV			
19	11-13	132.0KV			
20	110-111	132.0KV			
21	110-112	132.0KV			
22	114-115	132.0KV			
23	12-117	132.0KV			
24	12-14	132.0KV			
- Substation Diagram:** A diagram showing the internal structure of a substation, including buses, breakers, and loads.
- Control Panel:** A panel with buttons for "A Model File" and "A Configured Model", and a tree view for "Model Depositories".
- Summary of Version V2.0:** A table showing the history of updates to the software. The table has columns for Sequence, Submitted, Time, and Description. The data is as follows:

Sequence	Submitted	Time	Description
1	Modeler	Fri Oct 20 21:51:07 2017	Add a new transmission line between station Parkhill and station BVILLE
2	Modeler	Fri Oct 20 21:51:27 2017	Decommission of generator G1 at hydro plant MOSEL
3	Modeler	Fri Oct 20 21:51:47 2017	Remove capacitor bank C3 at station BVILLE
4	Modeler	Fri Oct 20 21:52:05 2017	Change parameters for line T354
5	Modeler	Fri Oct 20 21:52:24 2017	Add a new substation AIRPORT and a transmission line
6	Modeler	Fri Oct 20 21:53:11 2017	Add new breakers and loads at station CEYLON
7	Modeler	Fri Oct 20 21:53:27 2017	Correct transformer parameters at station PARKHILL
8	Modeler	Fri Oct 20 21:53:44 2017	Model cleaning at station COBDEN and GOLDEN
9	Modeler	Fri Oct 20 21:54:04 2017	Reconnect transformer T4 at station KINCARD
10	Modeler	Fri Oct 20 21:54:24 2017	Delete station PICTON and transmission line 5632_1
11	Modeler	Fri Oct 20 21:55:37 2017	Add a new bay at station AIRPORT
12	Modeler	Fri Oct 20 21:57:08 2017	Update external models with WSM Release 1875
13	Modeler	Fri Oct 20 21:57:47 2017	Put line 3746_2 in service.

## General Info

- ❑ Specialized in providing standard-based IT solutions to utilities and vendors in electric power industry
- ❑ Founded in 2007 by engineers from GE & Microsoft
- ❑ Located in Seattle, Washington, USA

## Products

- **CIMSpy/CIMdesk**: designed to support CIM-based model exchange
- **grid-IE**: A RESTful grid visualization component that can be readily integrated with 3<sup>rd</sup>-parties
- **M<sup>3</sup>** : A multi-dimensional model maintenance & management tool
- **Model Engineering Toolkit (MET)**: A set of collaborative application components that can be rapidly and seamlessly integrated to address various model-related engineering requirements.

## Services

- ❖ CIM-based Model Exchange
- ❖ Model Maintenance and Management
- ❖ EMS Model Merging and Equivalencing
- ❖ Integrated Power Grid Visualization

# About CIMSpy



- Initiated during the CIM User Group Meeting 2005 and started as an open source project
- Re-engineered and commercialized in 2008
- Selected by UCTE (now part of ENTSO-E) to build a customized tool in support of Pan-European model exchanging in 2009
- Funded by US Department of Energy (DOE) under three-phase Small Business Innovation Research (SBIR) Grant of \$2.15 million since 2012
- Currently licensed by more than 90 utilities, TSOs/RSCs, RTOs, vendors, and energy trading companies

# One of the Most Adopted Tools in the CIM Community



**ENTSO-E**  
**RTE**  
**Tennet**  
**Elia**  
**Statnett**

**PJM**  
**CAISO**  
**ERCOT**  
**MISO**  
**ISO-NE**

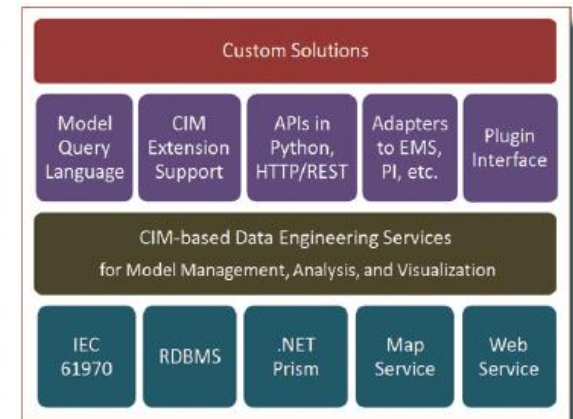
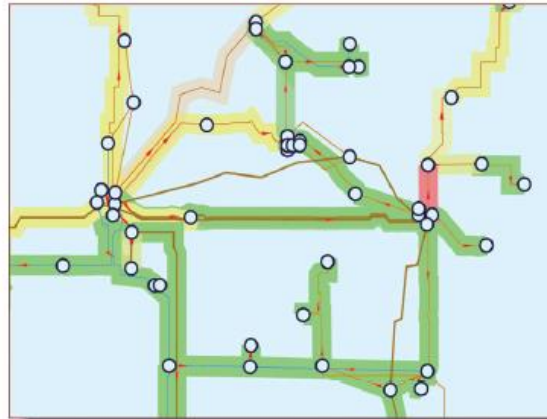
**PG&E**  
**AEP**  
**TVA**  
**Duke**  
**FPL**

**GE**  
**Siemens**  
**Shell Energy**

# Three BIG Things about CIMSpy

/iec.ch/TC57/2009/CIM-schema-cim14#  
CIMSpyEE\Models\Cases\SuperGrid.xml

Class	# of Objects	Description
ACLineSegment	<a href="#">35157</a>	A wire or combination single electrical system power system.
Breaker	<a href="#">123870</a>	A mechanical switching under normal circuit breaking currents under circuit.
ConnectivityNode	<a href="#">245181</a>	Connectivity nodes are connected together with
PowerTransformer	<a href="#">14148</a>	An electrical device with magnetic core, for inter Transformers can be used
Substation	<a href="#">21594</a>	A collection of equipment through which electric modifying its character



## Broad Engineering Support

CIMSpy offers a complete suite of data engineering functions in support of CIM-based model sharing and management.

- CGMES/CPSM model validation
- Full, partial, incr. model assembling
- Exploratory data analysis & reporting
- MRID-enabled model comparison
- Metadata-driven model transformation
- Time-based model management

## State-of-the-art Graphics

CIMSpy delivers intuitive and interactive user experience by leveraging cutting-edge data-driven visualization technology.

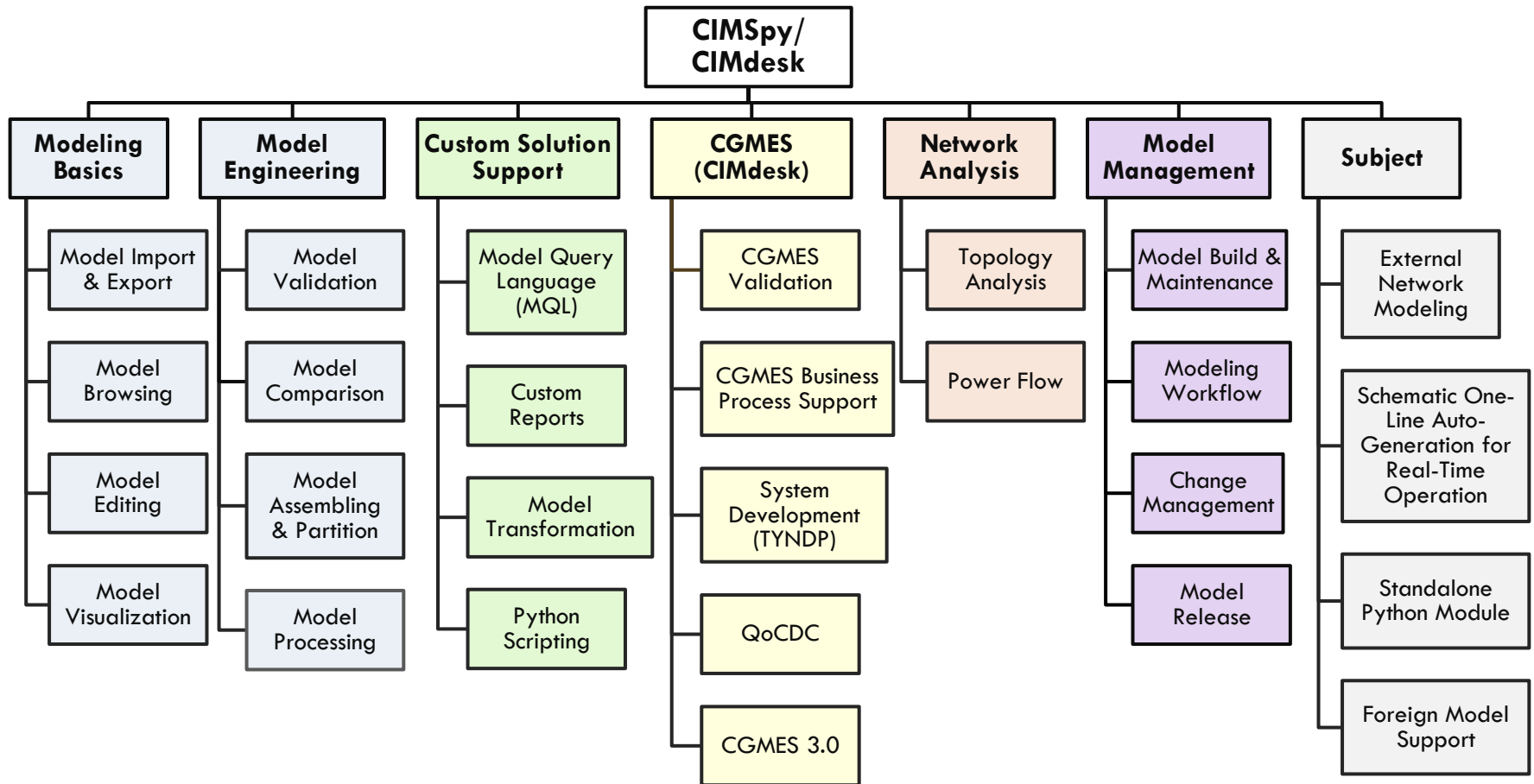
- Schematic one-line auto-generation
- Rich data visualization over a wide area
- Power flow/state estimation animation
- CIM-based diagram exchange
- Query-driven visual data mining
- WYSIWYG graphical model editing

## User-centered Design

CIMSpy provides comprehensive infrastructure support, enabling end-users to rapidly derive business-driven solutions.

- Desktop, Client/Server, Web-based
- Oracle, MS SQL Server, MySQL
- Open Street Map, Esri-Leaflet
- Adapters to EMS, PI, planning tools
- CIM profile extension, Python scripting
- Plugin interface, RESTful Web API

# Function Profile



# Overview of CIMSpy Use Cases

CIMSpy was designed to support multiple use cases within or among utility organizations.

## □ **CIM-Based Model Exchange**

- Pan-European Model Exchange
- West Interconnection Model Exchange

## □ **Data-Driven Grid Visualization**

- Study Case/Real-time Visualization for Situational Awareness
- Schematic One-Line Auto-generation for Real-time Operation

## □ **Building Business-Addressing Custom Solutions**

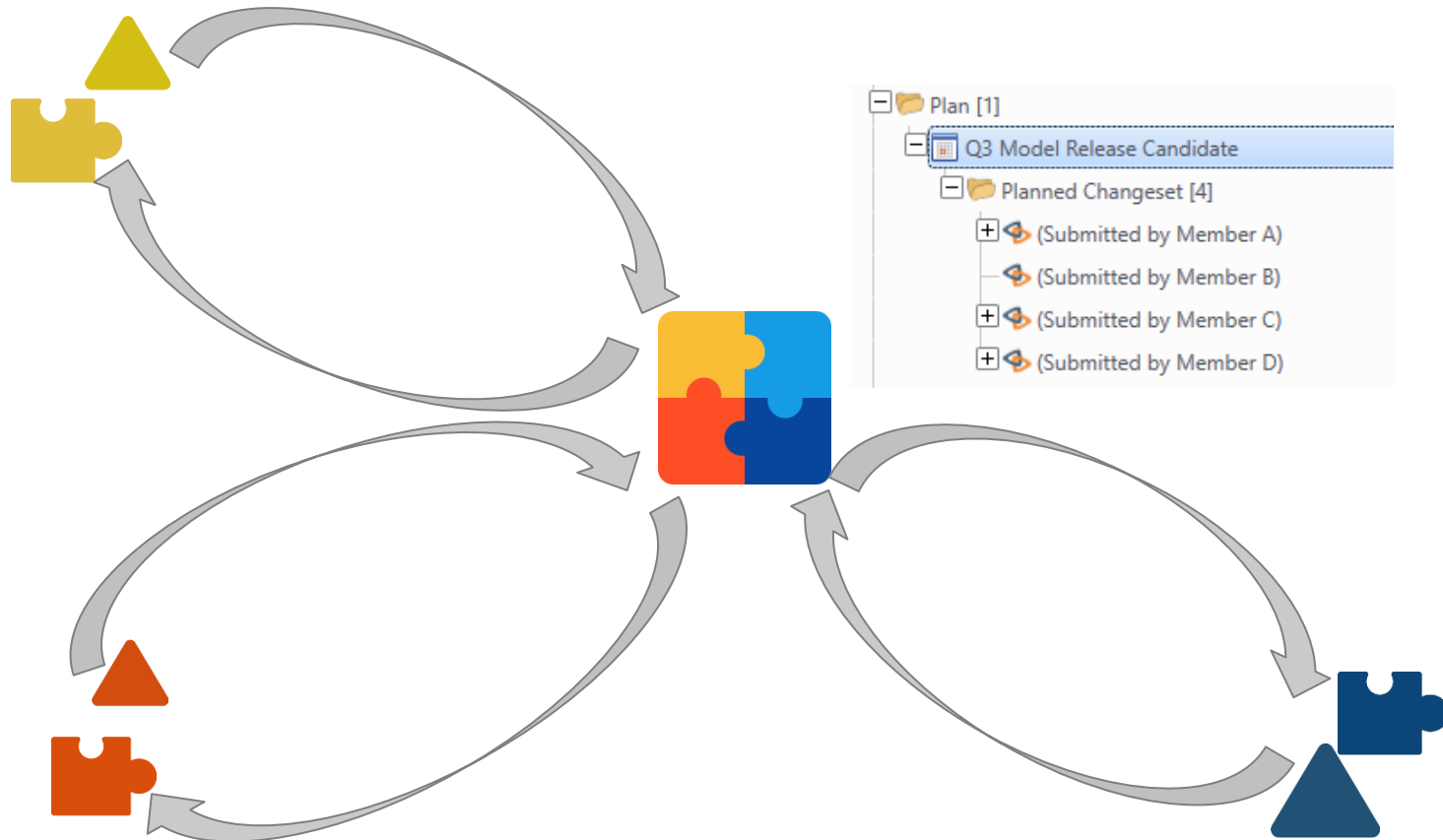
- |                             |                               |
|-----------------------------|-------------------------------|
| ■ External Network Modeling | ■ Data Mining & Analytics     |
| ■ Model Conversion          | ■ Business Process Automation |
| ■ Custom Model Processing   | ■ ...                         |

# Launch of CIMSpy.Enterprise

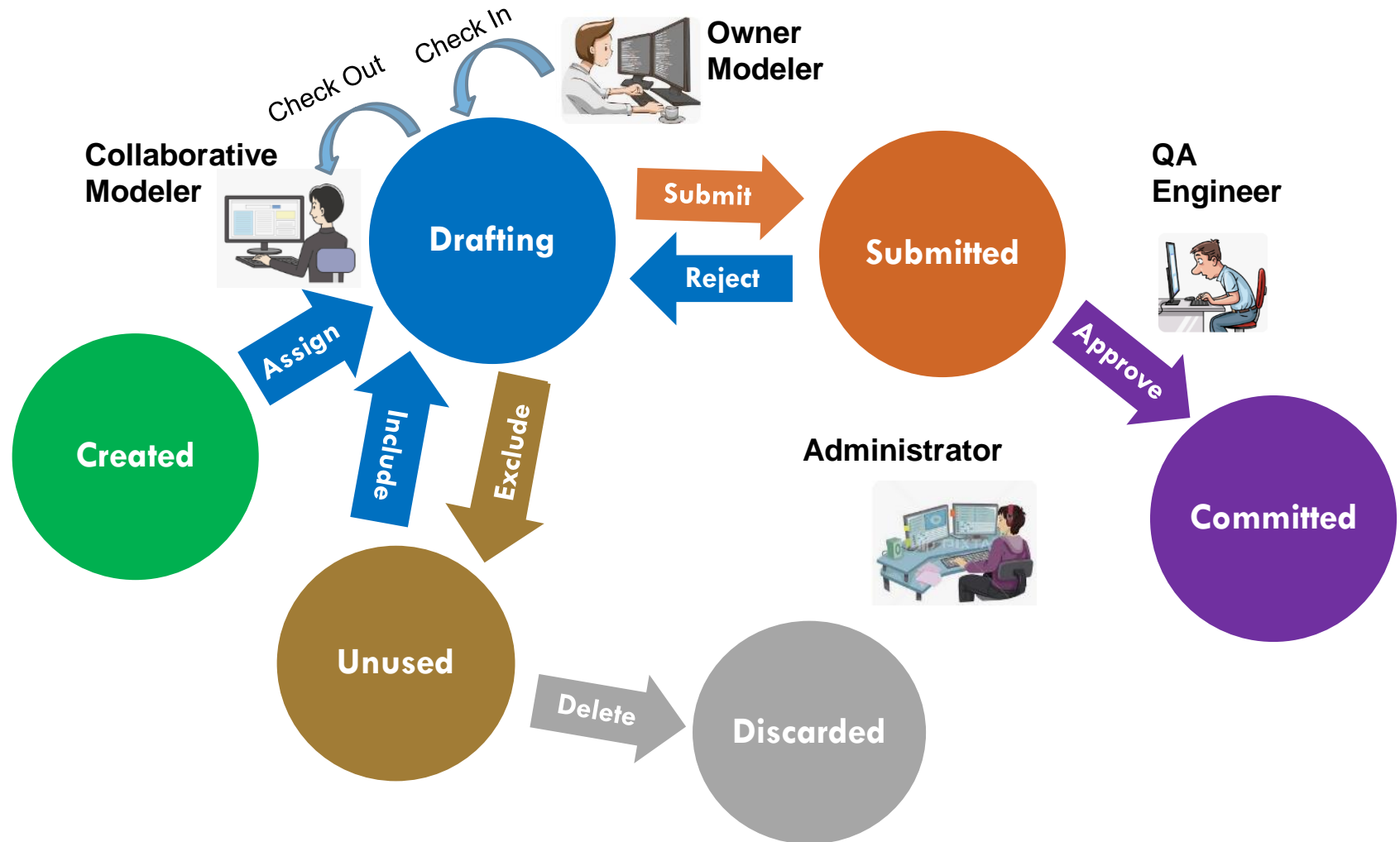
- An enterprise application designed to support model sharing and model management within an organization or a community.
- Derived from CIMSpy.Desktop with additional features:
  - ▣ It is a platform instead of a tool only
  - ▣ Multi-User & Multi-Environment
  - ▣ Authentication & Authorization
  - ▣ Time-based & Collaborative Modeling
  - ▣ User and Model Administration



# Use Case 1: Model Sharing and Model Change Collection within a CIM Community



# Use Case 2: As-Built Model Maintenance and Future (Planning) Model Build



# On-going R&D and Future Plans

- Operation and maintenance (O&M) in a utility organization has become increasingly challenging.
  - ▣ Emerging NERC Standards
  - ▣ More and more operational systems to maintain: SCADA/EMS/MMS/OMS/Pl...
  - ▣ Lack of advanced tools
  - ▣ Aging workforce
- While initially built to support standard-based model exchange, CIMSpy is designed to support multiple business processes in a utility organization. One of the established goals is to derive various advanced tools to support/automate O&M.

