



# DOE/OE Transmission Reliability Program

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## Curated Power Grid Data Center

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**CERTS** CONSORTIUM *for*  
ELECTRIC RELIABILITY  
TECHNOLOGY SOLUTIONS

# Motivation

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- No infrastructure to easily share utility power system information with research and education community to enable future power systems research.
- No automated process providing tracking of who has what types of data.
- Time wasted by researchers to repeatedly ask for data and to perform common tasks – such as removing erroneous readings from a sensor stream.
- Non-automated data access and data cleaning increases recurring cost and manual staff labor.
- Operational burdens on utility staff related to data access.





# Project Objective

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- Power grid data repository (PGDR) will provide researchers and developers with access to **fully-curated** data sets with **known data quality** handled in an automated process using well-tested and **well-documented** algorithms.
- The PGDR will provide a flexible web portal and workbench for users:
  - Explore the data
  - Create suitable subsets
  - Download data to local system



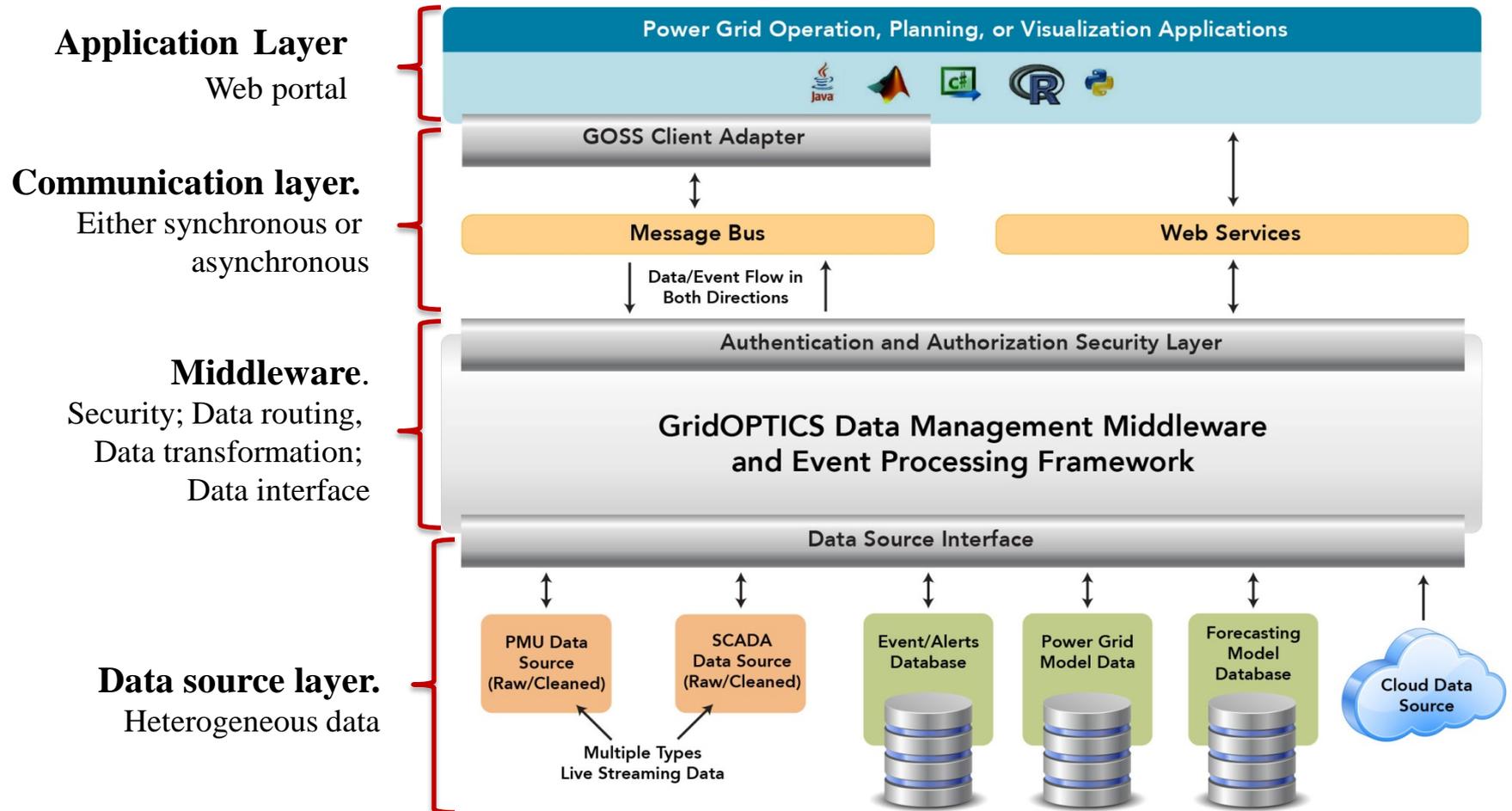
# GOSS Summary

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- GOSS is an open-source middleware architecture designed as a prototype future data analytics and integration platform
- Benefits
  - Supports **heterogeneity** – ease of integration with new/existing power grid applications developed in different languages
  - **Data source abstraction** – separates data sources from applications and provides a unified application programming interface (API) for access
  - **Rapid development** – Quickly make new data/events available to other applications integrated with GOSS
  - **Real-time** – subscription to streaming data and events
  - **Reliability** – provides redundant data access for improved reliability
  - **Security** – role and data based access control
  - **Scalability & Performance**



# GOSS Architecture



# Accomplishments

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- Drafted a report for system design requirements and specification for full scale system
- Reviewed initial draft of requirement and specifications report with BPA
- Developed a bench-scale version of the system leveraging GridOPTICS Software System (GOSS) testing key features of the PGDR
- Established business practices for data access
- Completed the final version of report after incorporating comments from BPA





# PGDR Implemented Features

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- Data Management
- Data Upload
- Meta Data Capture
- Data Quality
- Application & Tools Integration
- HPC Integration
- Web Portal
- Data Format Transformation
- Data Download
- Multiple Format Support
- Data Publication
- User Accounts & Security
- Performance and Scalability





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\* Features added by CERTS funding

# PGDR Prototype Implementation

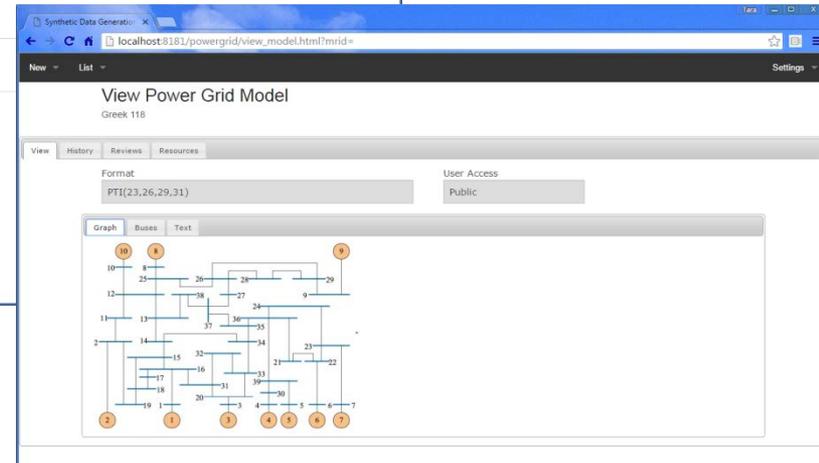
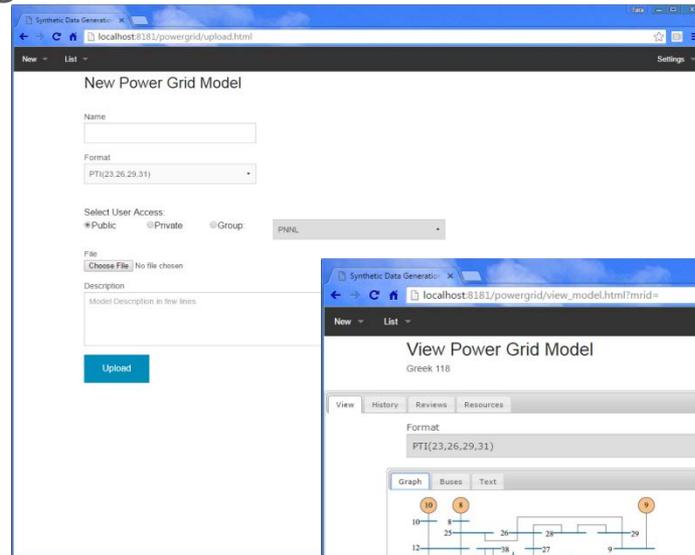
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- Developed bench scale prototype system.
- Implemented a subset of the requirements using GOSS middleware platform.
- PGDR report includes listing of requirements against GOSS capabilities explaining how GOSS fulfills those requirement.



# Web Portal

- Developed a web based user interface for researchers to use data repository capabilities.
- Allows easy data upload, download and tracking.
- Built on top of GOSS using web services.
- User can upload a power grid model file and tag metadata.
- User can edit model – changes are tracked and displayed.
- User can view/download the data associated with a model.



# Deliverables

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Type	Title	Date
Internal	Confirm Utility Partnership	11/20/2015
Internal	Requirements document/specification	4/11/2016
External	Bench scale system to prototype PGDR	4/15/2016
External	Final Report	7/31/2016





# Planned Activities and Schedule

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- Possible Future Tasks:
  - Move from a bench scale system to full scale data repository.
  - Implement new capabilities in PGDR:
    - Provenance
    - Converting aggregated data in to raw
    - Ensemble of power flow cases
- Follow on work in GRID DATA ARPA-E program
  - Synthetic scenario creation (SDET)
  - Model data repository (DR POWER)

