# Software Architecture Breakout Session

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# Breakout Session

**Software infrastructure: data management, workflow support, and numerical methods.**

**Data infrastructure: what data sets are needed and how can they be collected or synthesized, curated, and shared**

- What are the driving business problems that will drive changes in software infrastructure?
- What changes are needed to existing operational and planning systems? What patterns for software from other domains can be reused for power grids?
- What changes are needed in data management and information exchange?
- How do we acquire/share datasets to drive research and validate approaches?
- How do we work together to maximize progress and transfer new technologies out of research?

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# General Summary

**Presentations**
- **Russell Robertson** – Data issues
- **Adam Wynne** – GridOptics (middleware)
- **Robin Podmore** – Training (operator driven)

- General consensus on volume of data and rates expected
- Importance of operator (decision) driven rather than technology driven
- Open source issues and building a community or researchers (how to do it)
- Data
  - high volume streaming vs. very large data sets
  - Mapping between different models
- Middleware
  - Open source issues
  - Resolving different simulators – granularity, multi-time
  - Privacy issues – sharing system views

# General Summary

- Middleware
    - Open source issues
    - Resolving different simulators – granularity, multi-time
    - Privacy issues – sharing system views
- Training
    - Operator centric
    - Importance of simulation testbeds
    - Regulation driven (or constrained)

# Communication Barriers

**Operator**
- Node Breaker
- Real-time decisions, SCADA

**Engineer (Planner/Operator)**
- Bus Branch
- Powerflows, contingency analysis, transient studies.

**Application Engineer**
- Build Power System Application (i.e. powerflow)
- Fortran, Matlab, C

**IT / CS**
- Build infrastructure
- C++, Java, OOD, OODB

# Report Out – Software Architecture

- Do we really agree on the requirements?
- Will industry be regulation driven or innovation driven?
- What are some of the systems views that really have a chance to come together?
  - Transmission and distribution – maybe
  - Operations and planning – maybe
  - Business and operations – probably not
- Need to really look at streaming as it is (not batch data)
- Can we push analytics out to the sensors?

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# Report Out – Software Architecture

- Community
  - What is the open source model that can truly get the community to work together?
  - Must support the vendors and not compete
  - Need to identify open/common architectures for all (academics, national labs, vendors, etc.)

# Report Out – Software Architecture

- Drive effort by use cases
  - Helps to quantify user requirements
  - Helps define the users
  - Helps make the business case
  - Helps define the open source model that will work best
- **Select a few activities to kick start cooperation and can show something in the 12-18 month time frame. For example:**

  - **Streaming data problem with some data analytics**

  - **Modeling across domain boundaries – e.g., communication and power system, transmission and distribution**

  - **Predictive simulation for contingency analysis**

- **Workshop 6 month time frame – early adopters**

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