

# CREW

## (Continuous Reliability Enhancement for Wind) Database and Analysis Program Sandia Blade Workshop July 22, 2010

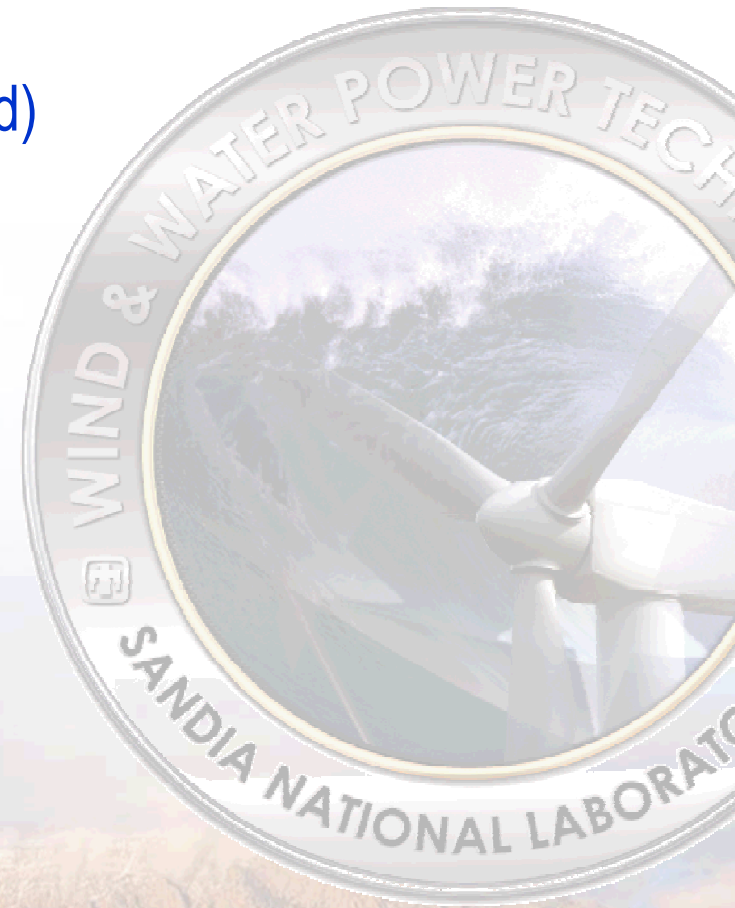
### CREW Database Project Team

Bridget McKenney, Wind Reliability Lead

Alistair Ogilvie, Data Lead

Valerie Peters, Reliability Analyst

Wind & Water Power Technologies  
Sandia National Laboratories

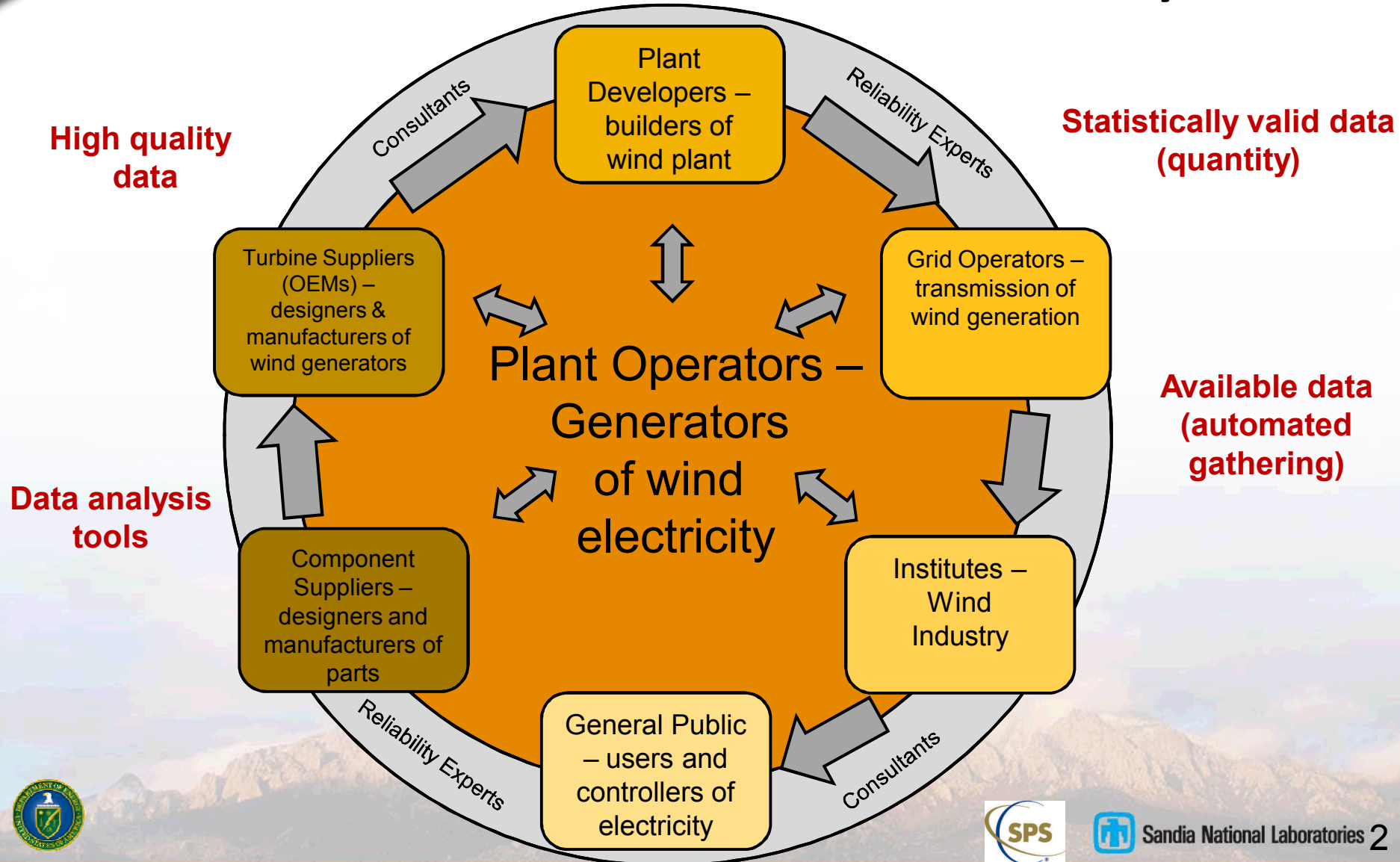


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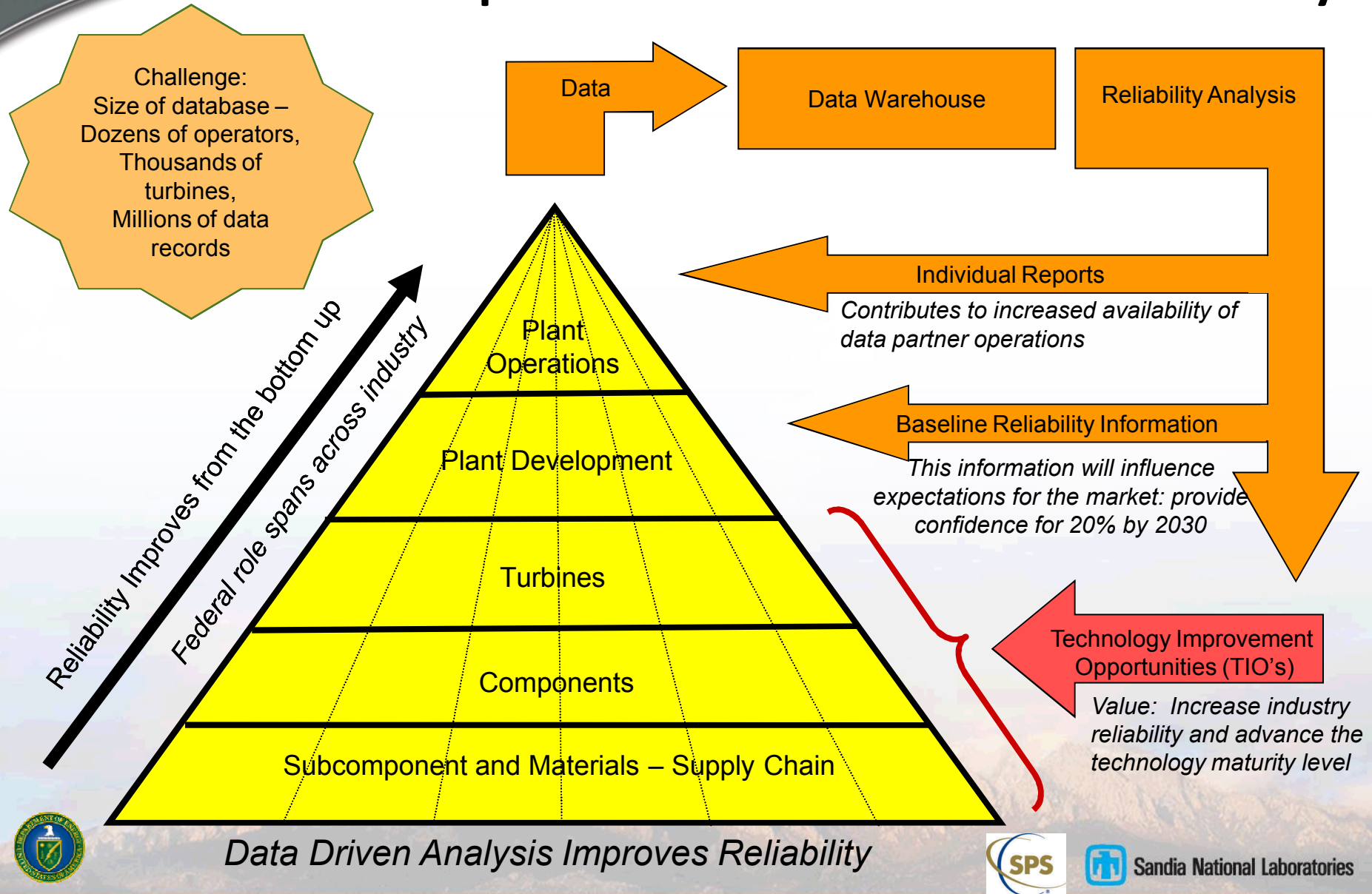


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# Operators are at the hub of all reliability activities



# A Comprehensive Data Model for Reliability



# A Feasible Future Scenario

Industry Aggregated Data / Benchmarks for US Fleet

Company-Wide Wind Plant Data: Single Owner/Operator

Wind Plant Data: Single Owner/Operator

Turbine Level

Improving Reliability



Improvements



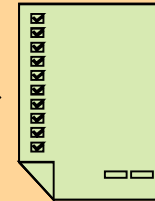
Actions  
&  
Operations



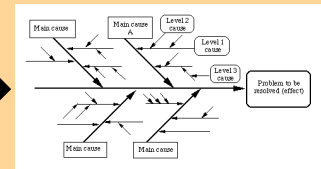
Power  
Production



Tag/Fault  
(symptom)



Work Order  
(resolution)



Root Cause  
Analysis



# CREW: Continuous Reliability Enhancement database for Wind

- ♦ Create national reliability database of wind plant operating data to enable reliability analysis
  - ♦ System, component, and part levels – identify root cause of failures
  - ♦ Identify issues and technology improvement opportunities
  - ♦ O&M cost reduction
  - ♦ Industry RAM benchmarks
- ♦ Protect proprietary information
- ♦ Increase confidence: financial sector and policy makers



# Industry Challenges

## Three types of data needed:

### ■ SCADA Data (time series and events)

- Lack of data consistency and completeness across SCADA systems

### ■ Maintenance Data

- Paper work orders not scalable to high volume data analysis; low deployment of CMMS systems and data historians

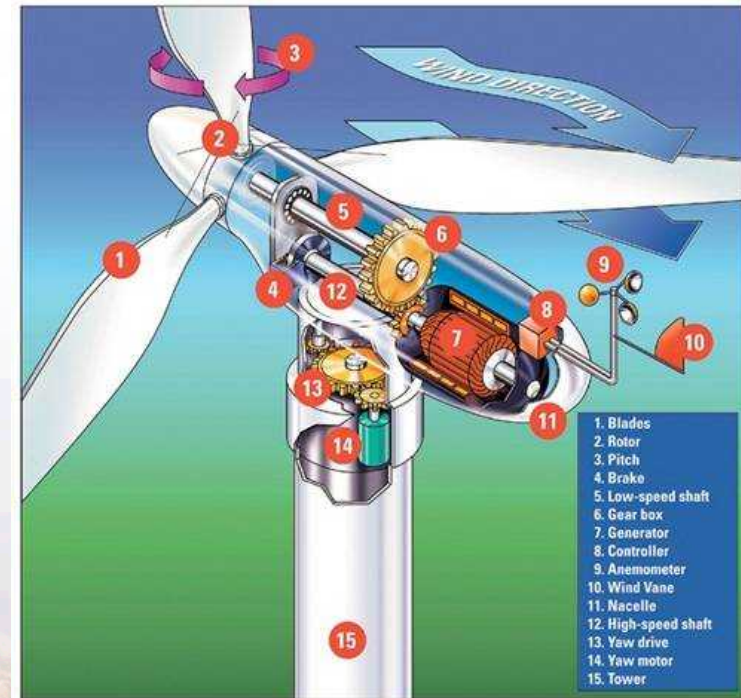
## Operational support and business growth

- Data support requires bandwidth from sparse internal resources
- Cultural: “just fix it” attitude
- Concern regarding sharing of proprietary data



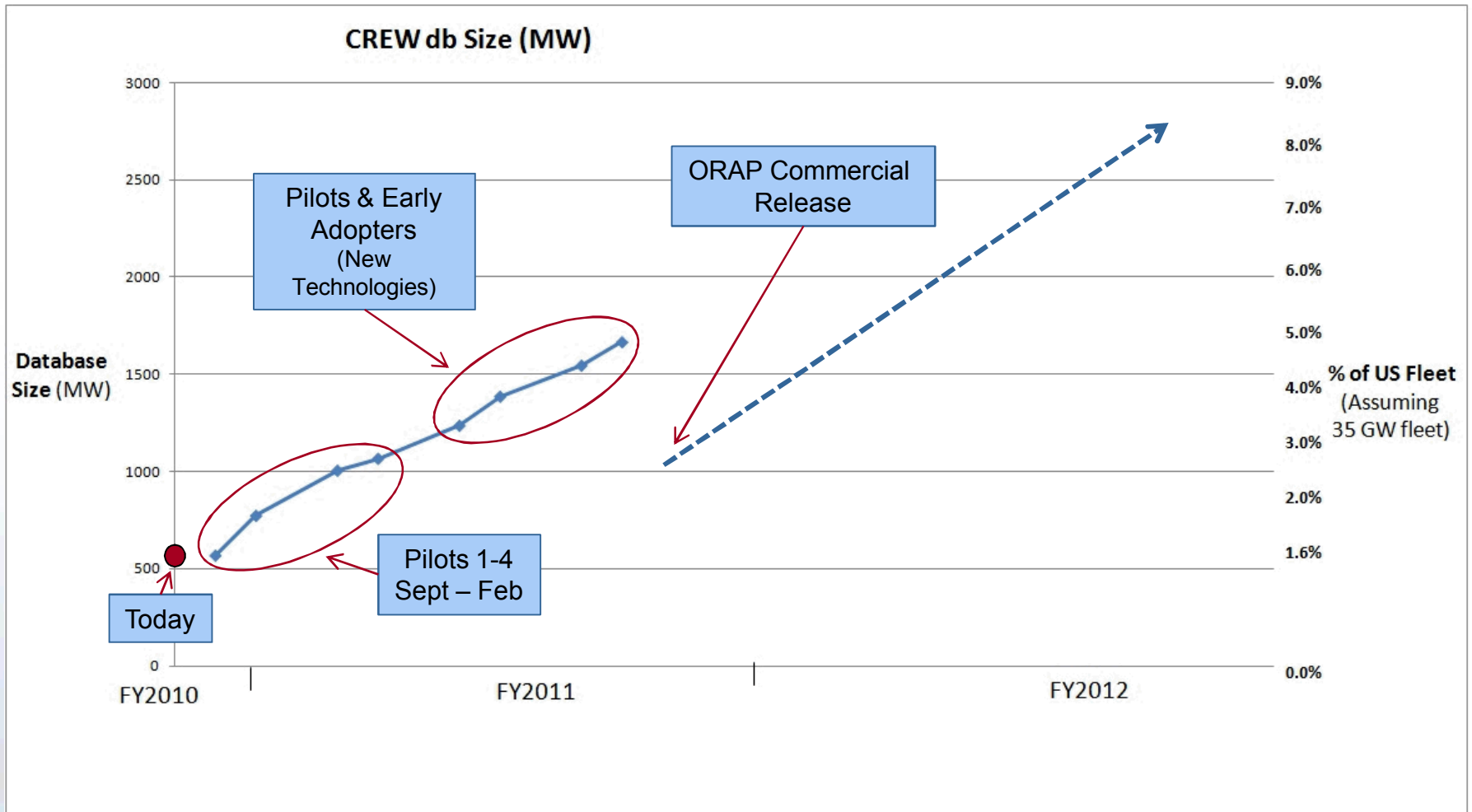
# FY10: Partnership - Sandia & Strategic Power Systems (SPS)

- **SPS: a reliability engineering and information technology company**
- **Operational Reliability Analysis Program (ORAP)**
  - Over 20 years experience in reliability tracking and benchmarking
  - Gas and steam combustion turbine operations
- **ORAP for Wind**
  - Capture RAM data at component level
  - Close relationship with OEMs and operators
  - Customer-specific data treated as proprietary
  - Minimize human input
  - Internet-enabled reporting and feedback
- **Industry-driven methodology**
  - IEEE, IEC and ISO standards
  - NERC compliant





# CREW Database Growth

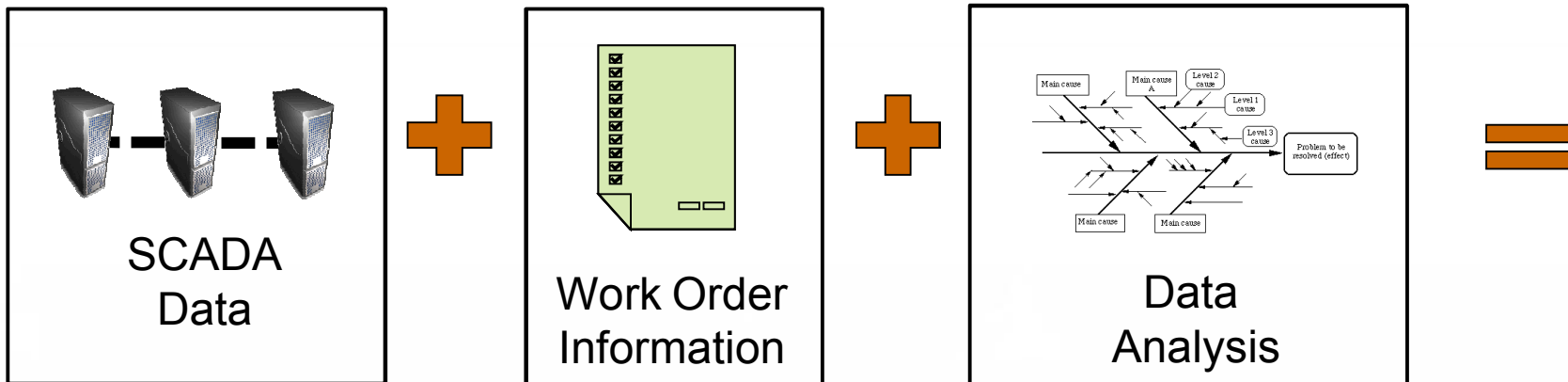


1 plant, 1 year = 138 Gigabytes of CREW data



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### NOW: Owner/Operator

Reduced Downtime
Effective Maintenance
Improved Performance
Better \$ Decisions
Lower Costs

### LONG-TERM: US Fleet

Improved  
Quality of  
Next-Generation  
System and  
Components



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# Development Phase

## ■ Critical Roles:

- Sandia National Labs: manage project and develop CREW database
- Strategic Power Systems (SPS): develop a wind plant version of ORAP
- Pilot Partners: demonstrate high-volume data flow
- Advisory Board: provide input and influence industry adoption
- Early Adopters: demonstrate scalability of ORAP

