The Standards Based Integration Company

Systems Integration Specialists Company, Inc.

Windpower/DER and Standards

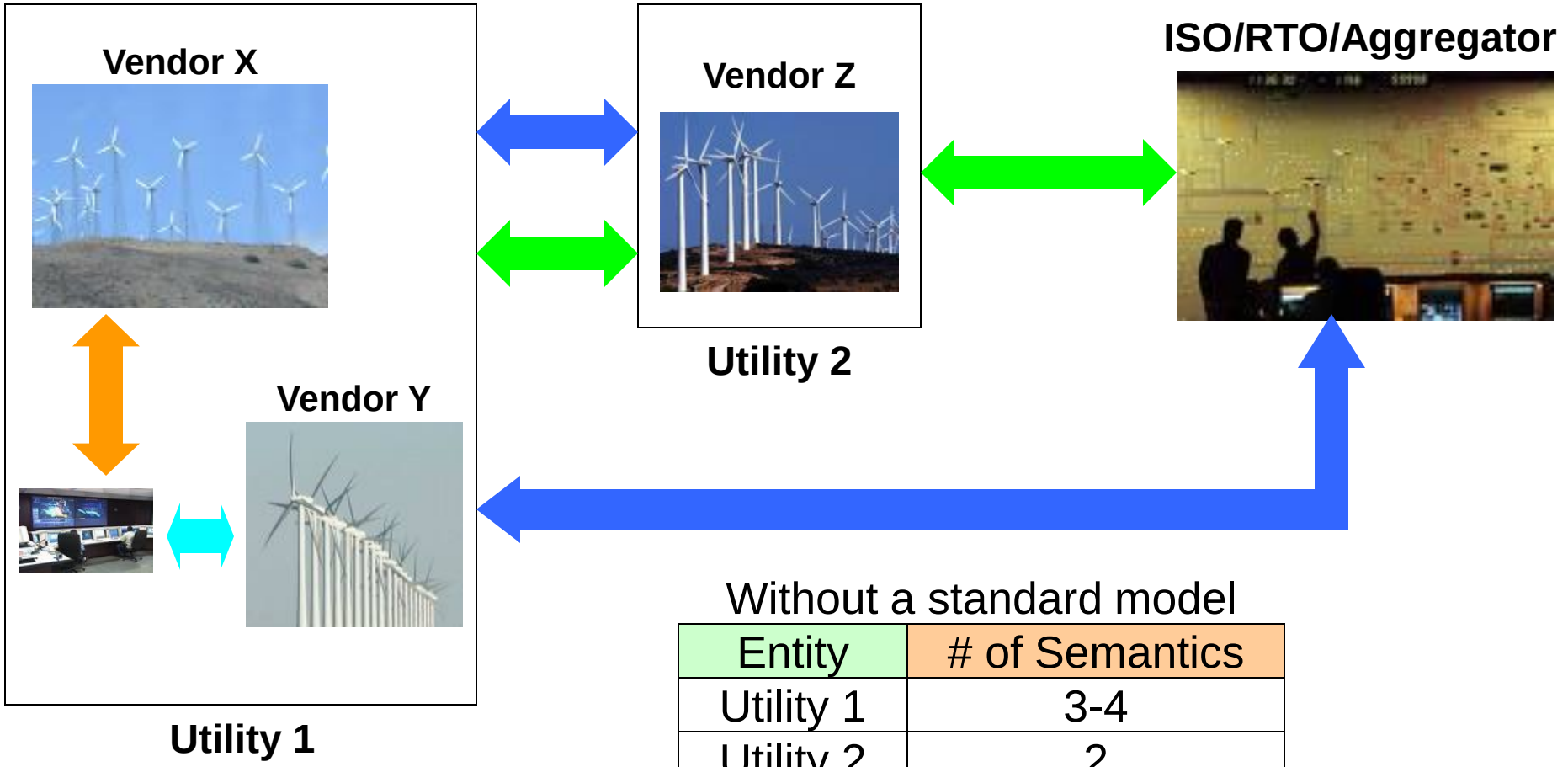
Report to OSIsoft Renewable Energy Group

Last time we talked:

Discussion Points:

- Why standards
- Nexsus of standards
- What was to be next

Why use standards and object modeling?



Without a standard model

Entity	# of Semantics
Utility 1	3-4
Utility 2	2
ISO/RTO	2

The possible solutions….

Possible Responses	Have only one vendor	Integrate the different systems	Develop or adopt a standard(s)
Vendor	If it is me	Well, OK	I don't do it now it is going to cost you.
Utility	I won't be locked in	This is painful, but I am used to it.	I don't do it now it is going to cost me.
RTO/ISO	I can't mandate this.	This is painful, but I am used to it.	I don't do it now it is going to cost me.

The real solution:

Share the pain and the benefits

User life cycle costs decrease (up to 60-70%)

Vendor equipment cost may increase but their sales could increase as well

Nexus of Standards

- Why Standards should be the focus
- What standards could/should be used
  - 61850
  - 61400
  - Integrating Wind with CIM Topology
  - Integration of 61850 and CIM
- What can be accomplished

From 2008 – What was next

- Convince turbine control vendors to utilize standards.
- Procurement specifications, including standards, from utilities.
- Further the standards process with involvement.

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to 2010

NIST Smartgrid (and other SmartGrid Initiatives):

Develop a Common Semantic Model (Metering)– NIST should work with IEC TC57, NEMA, ASHRAE SPC 135, and OASIS to devise a common semantic model using XML Schema and XML. The objective will be to unify the models of CIM (IEC61970, IEC61968) and IEC 61850 including correspondences with ANSI C12.19 and ASHRAE 135 to form a common representation of information models constructed by these standards efforts for the Smart Grid.

Extend IEC 61968 standard for DER: IEC 61968 needs DER models, but should be harmonized with the existing DER object models in IEC 61850-7-420, as well as all on-going DER 61850 development. IEC 61850-7-420 has architectural issues to be addressed.

Extend IEC 61850 standard from substation to control center: Since the data in the substation uses the IEC 61850 information model, this data should be reported to the control center using the same information model. This will also simplify the harmonization efforts between the models of data collected from the field and the CIM.

CIM/61850 “harmonization” critical to Smartgrid!

- Draft Submitted to NIST and IEC.
- Final report due May 2010
- Proved recommendations using PI-AF.

Priority Action Plans:

#	Priority Action Plan	#	Priority Action Plan
0	Meter Upgradeability Standard	1	Role of IP in the Smart Grid
2	Wireless Communications for the Smart Grid	3	Common Price Communication Model
4	Common Scheduling Mechanism	5	Standard Meter Data Profiles
6	Common Semantic Model for Meter Data Tables	7	Electric Storage Interconnection Guidelines
8	CIM for Distribution Grid Management	9	Standard DR and DER Signals
10	Standard Energy Usage Information	11	Common Object Models for Electric Transportation
12	IEC 61850 Objects/DNP3 Mapping	13	Time Synchronization, IEC 61850 Objects/IEEE C37.118 Harmonization
14	Transmission and Distribution Power Systems Model Mapping	15	Harmonize Power Line Carrier Standards for Appliance Communications in the Home
16	PAP16: Wind Plant Communications		

IEC 61970 – Transmission

IEC 61968 – Distribution, Metering Assets

IEC 61850 – Substations

IEC 61850-7-410 – Hydro-electric

IEC 61850-7-420 – DER (photo-voltaic, fuel cells, diesel, etc..)

IEC 61400-25-2 - Windpower

From 2008 – Get Vendors to embrace the standards

- Those turbine controller vendors who have:
  - Bachmann – tested in 2008
  - Repower – tested in 2010
- Third party vendors who have:
  - SISCO
  - OSIsoft
  - IBM

Establishing a connection

- Enhanced security feature of REpower (username/password) required in order to establish a connection.
- Was implemented using a ISO standardized mechanism in the Application Common Service Element (ACSE) protocol.
- SISCO updated our core products to support this feature in March 2010 and tested interoperability successfully.
- Next release of AXS4-MMS will including this enhancement is scheduled for June 2010.

Conformance Statement

Annex C- Mapping to MMS

Annex C - MMS		M/O	Client	Server	Value/comments
A.1 Association model					
A.1.1	Associate	M	x	x	
A.1.2	Release	O	x	x	
A.1.3	Abort	O	□	x	
A.2 Server model					
A.2.1	GetServerDirectory	O	x	x	
A.3 Logical Device model					
A.3.1	GetLogicalDeviceDirectory	O	x	x	
A.4 Logical Node model					
A.4.1	GetLogicalNodeDirectory	O	x	x	
A.5 Data model					
A.5.1	GetDataValues	M	x	x	
A.5.2	SetDataValues	M	x	x	
A.5.3	GetDataDirectory	O	x	x	
A.5.1	GetDataDefinition	O	□	x	
A.6 DataSet model					
A.6.1	GetDataSetValues	M	x	x	
A.6.2	SetDataSetValues	O	□	□	
A.6.3	CreateDataSet	O	x	x	
A.6.4	DeleteDataSet	O	x	x	
A.6.5	GetDataSetDirectory	O	x	x	
A.7 Report model					
A.7.1	AddSubscription	O	□	□	
A.7.2	RemoveSubscription	O	□	□	
A.7.3	Report	O	x	x	
A.8 BRCB					
A.8.1	GetBRCBValues	O	x	□	
A.8.2	SetBRCBValues	O	x	□	
A.9 URCB					
A.9.1	GetURCBValues	O	x	x	
A.9.2	SetUBRCBValues	O	x	x	
A.10 LOG					
A.10.1	GetLogStatusValues	O	□	□	
A.10.2	QueryLogByTime	O	□	□	
A.10.3	QueryLogByAfter	O	□	□	
A.11 LCB					
A.11.1	GetLCBValues	O	□	□	
A.11.2	SetLCBValues	O	□	□	
A.12 Control					
A.12.1	Select	O	□	□	
A.12.2	SelectWithValue	O	□	□	
A.12.3	Cancel	O	□	□	
A.12.4	Operate	M	x	x	
A.12.5	CommandTermination	O	□	□	
A.12.6	TimeActivatedOperate	O	□	□	

Reporting

Control

What is Reporting

- Ability of the Client to configure what information is to be returned in an unsolicited manner (e.g. no polling).
- Ability to configure Buffered or UnBuffered Reporting
  - Buffered – Server keeps buffering changes even if connection is down.
  - UnBuffered – Server discards configuration and events when connection is down.
- IEC 61850 requires configuration of DataSets and ReportControlBlocks in order to perform reporting.
  - This is not natural for an OSIsoft Interface
  - Capability of Auto-enabling/configuration of reporting is provided by SISCO's AXS4-MMS product.

Configuration of Reporting

ACSI component name
RptID
RptEna
DatSet
ConfRev
OptFlds
BufTm
SqNum
TrgOps
IntgPd

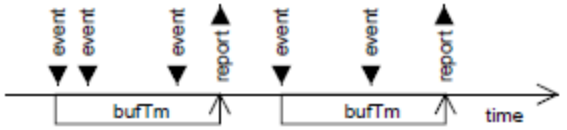
User Assigned Identifier for Reported Data

Turns Reporting On/Off

Defines what information (e.g. variables) are to be reported

Allows detection of configuration changes

Defines what additional information is to be included in the Report



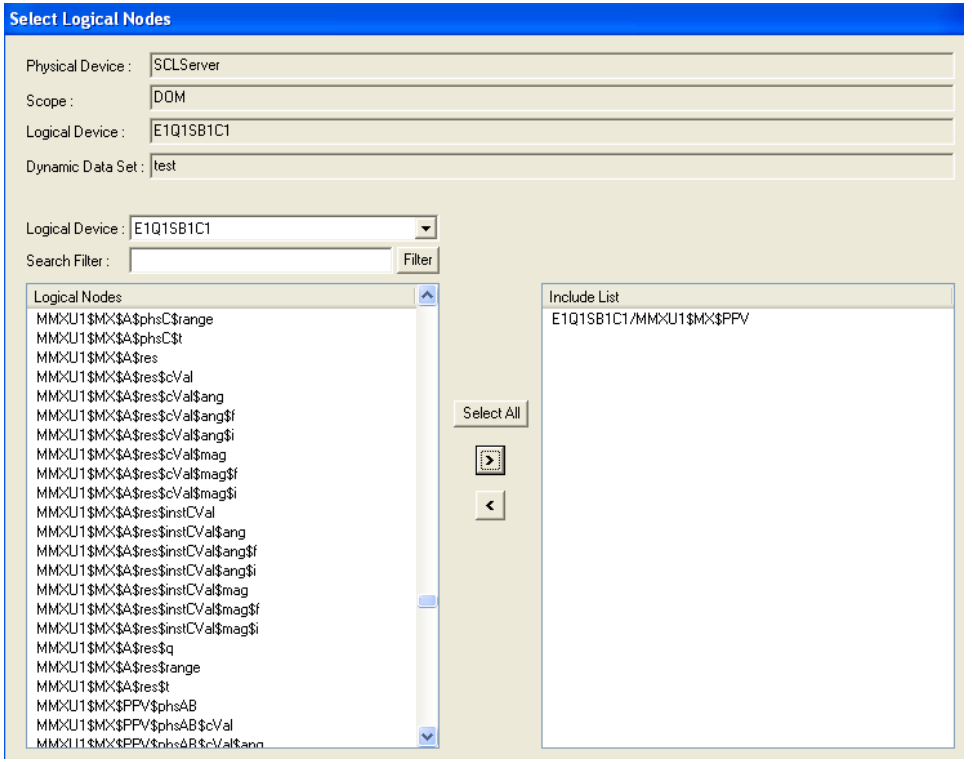
Allows detection of dropped reports (is a status not configuration)

	Report generated if:
data-change (dchg)	Data Changes
quality-change (qchg)	Quality Changes
data-update (dupd)	Values or Quality updated
integrity	Ability to report current values periodically

Periodicity of current value reporting

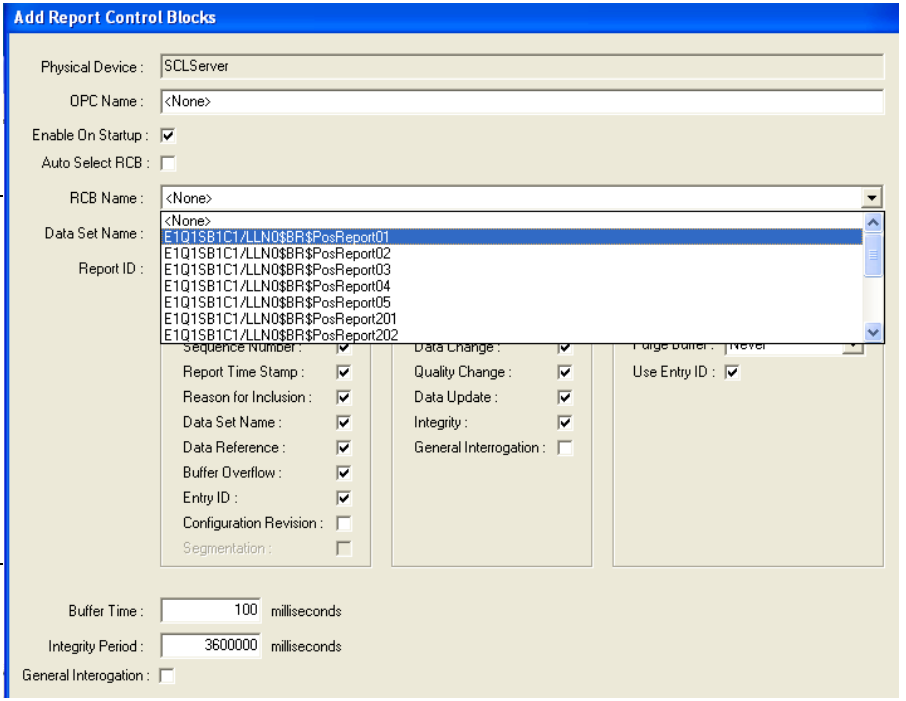
Configuration of non-existent DataSets (June 2010)

Allows creation of DataSets that are created when AXS4-MMS is executed.

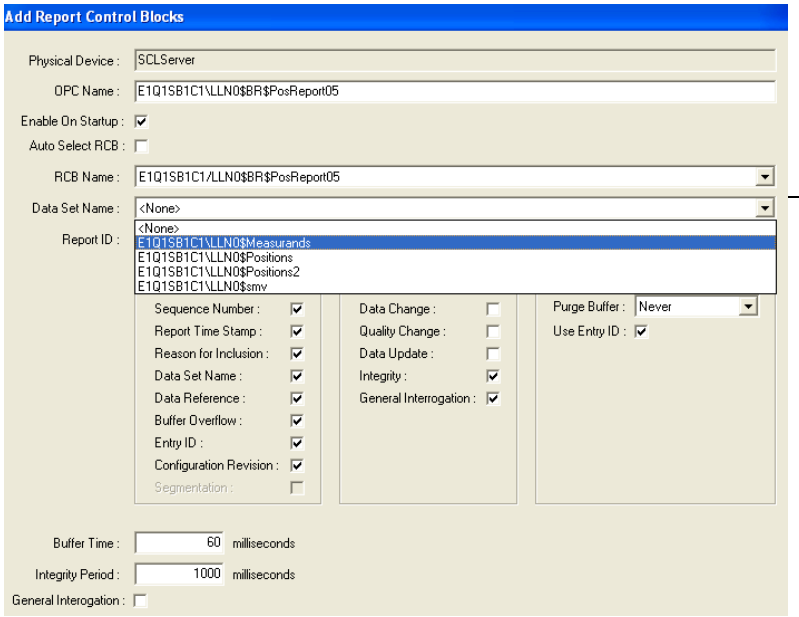


Configuration of Reports

Selects what RCBs to enable

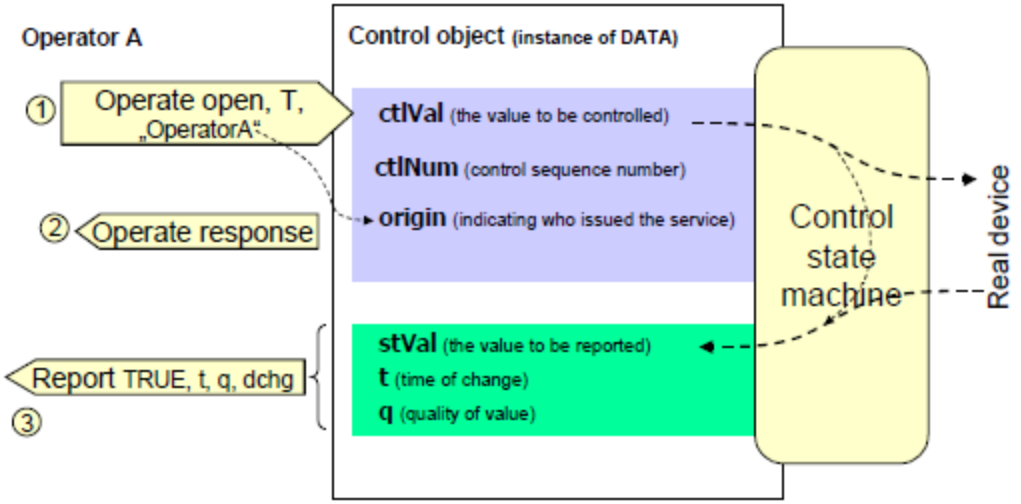


Selects what DataSets to use for RCB



When AXS4-MMS executes, appropriate RCB parameters are set and then the RCB is enabled.

Control Definition – for Direct Operate

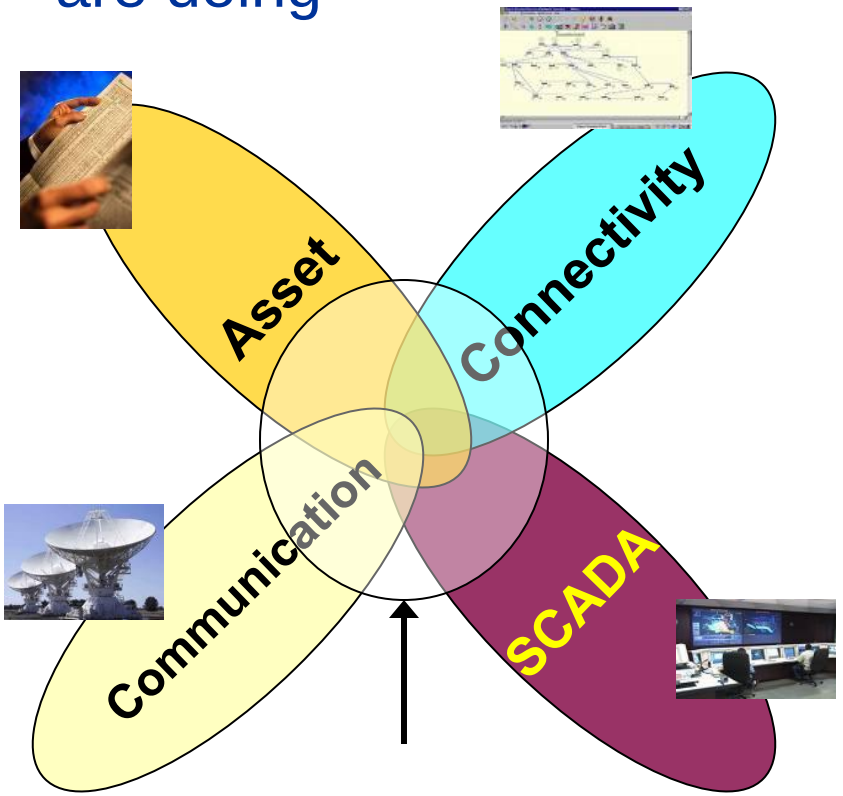


Control Model requires:

- ID of who is performing control
- A control sequence number
- Value of the control

With AXS4-MMS and OSIsoft, only need to use a single Output tag to write the control value. AXS4-MMS automatically fills in the rest.

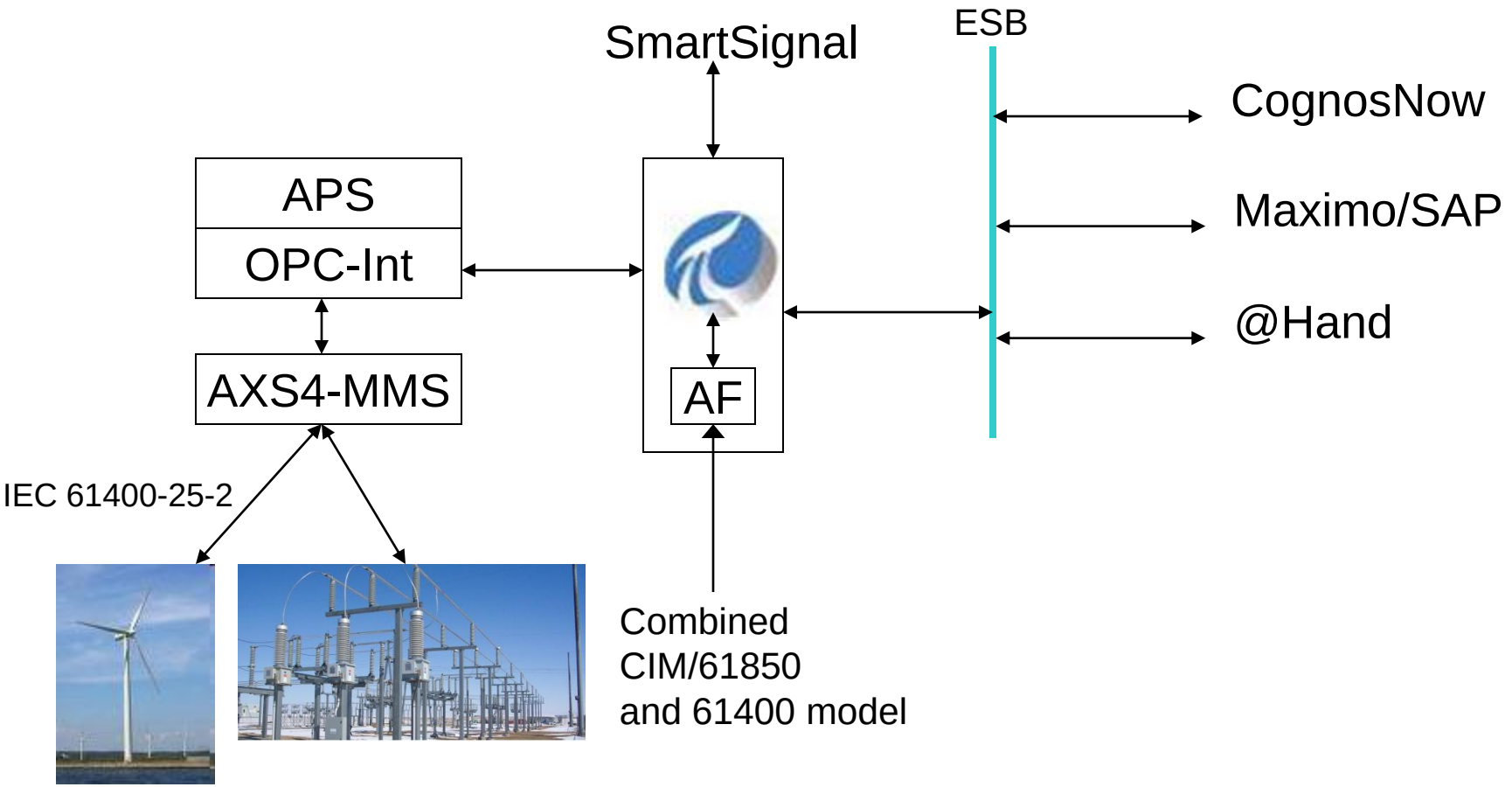
And now for something different: What IBM, SISCO, OSIsoft are doing



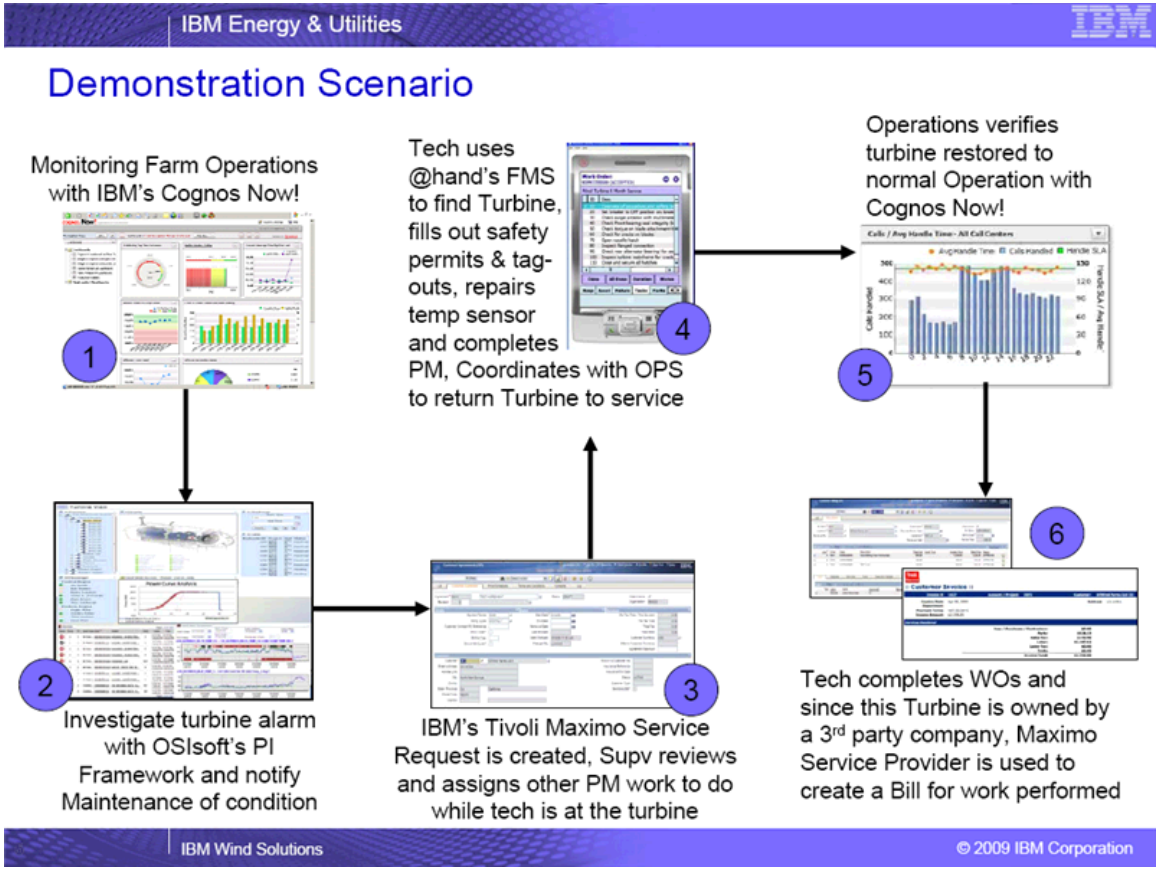
- Operations
- Condition Based Maintenance

Properly designed intersection facilitates myriads of business applications.

Diagram of solution



A little presentation on the solution



Summary

- Have made progress since 2008
- Vendors are starting to embrace the standards for DER/Wind
- Utilities still need to press the issue
  - Need to specify not only controllers but SCADA systems.

Questions ?