Future Proofing Your Distribution Management System

An *Intelligent Utility* Reality Webcast

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Future Proofing Your Distribution Management System

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Introductory Remarks

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Agenda

Introduction

The discussion

- Frank Hoss from Accenture explains the considerations that utilities should make with regard to DMS solutions and vendors.
- Jeff Evans from Enspiria describes how utilities can mitigate the risks associated with DMS selection and implementation.
- Mark Knight presents DMS considerations from a support perspective.
- **Q&A**

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Distribution Management System
- Solution & Vendor Considerations -

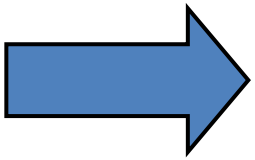
Frank Hoss

September 2010

Why Distribution Management System (DMS)?

Key Business Drivers for Utilities

- Anticipated change in Supply/Loads:
  - Distributed Generation
  - Electric Vehicles
- It's part of the Smart Grid
- Increased Competition from Regulatory Shifts
- Load Growth and Aging infrastructure
- Data Overload
- Aging Workforce
- Desire to Reduce Outage Frequency and Duration
- Need for Increased Visibility
- Reduction of Risk from Disasters
- Increased Pressure to Reduce Costs

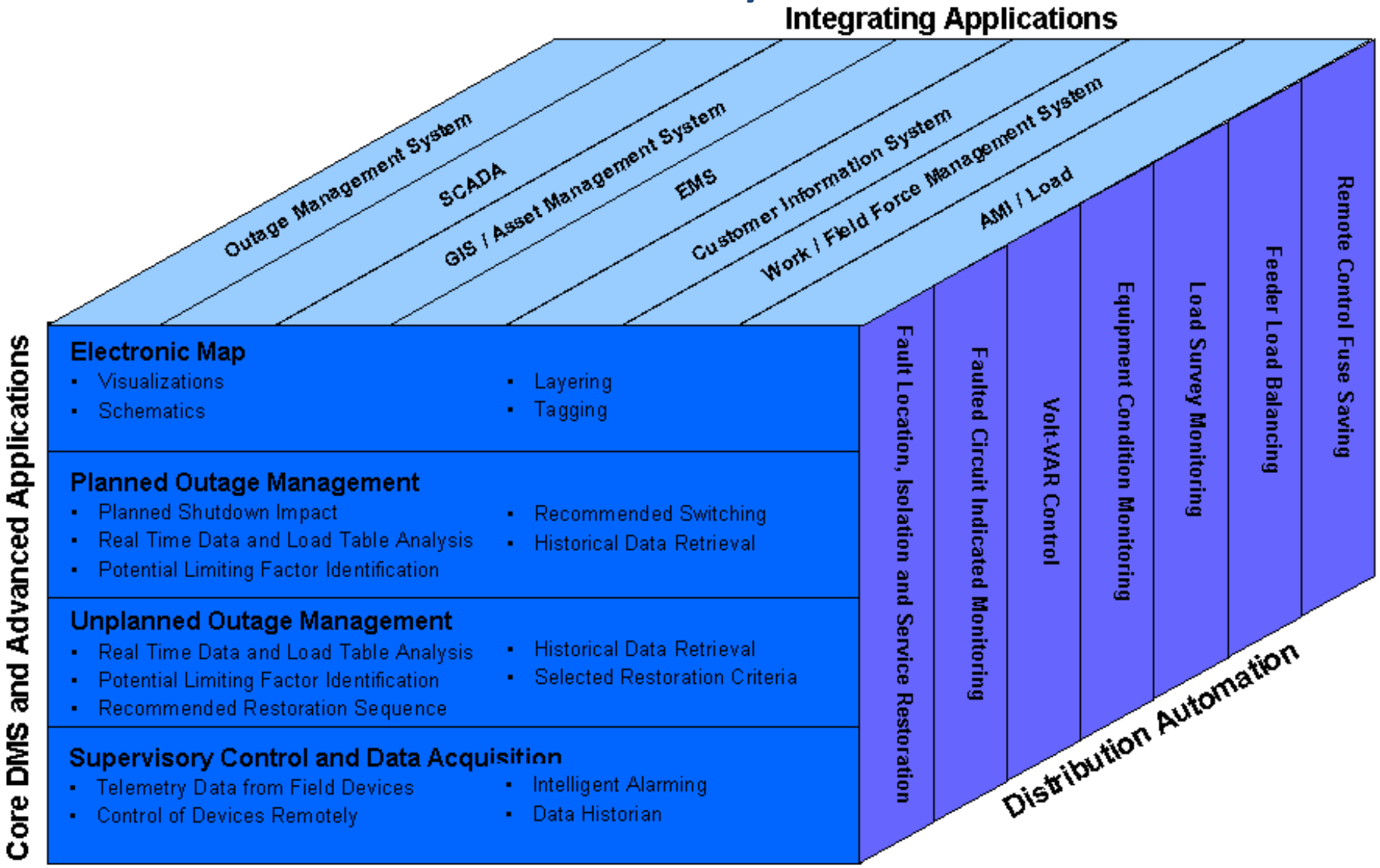


DMS Benefits

- ✓ Greater Standards for Customer Satisfaction
- ✓ Decision Tools
- ✓ Reduced Outage Duration
- ✓ Proactive Management of the Distribution System
- ✓ Ability to Process Real-Time Data Quickly
- ✓ Business Continuity
- ✓ Revenue Management

Is it the time right for DMS?

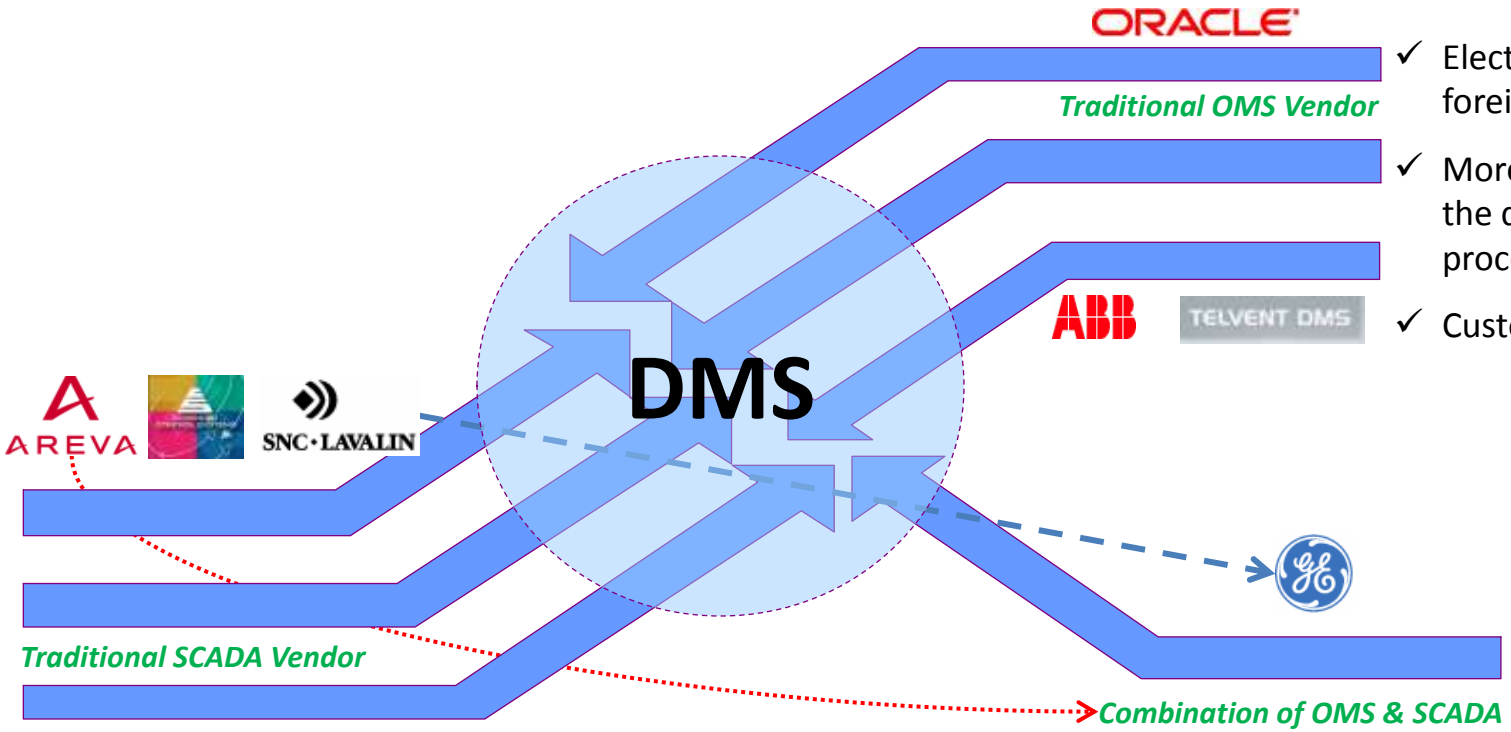
Functionality of DMS



What do You Expect from Your DMS?

Vendor Evolution to DMS

Vendors typically build their product from either a SCADA or Outage Management base and evolve toward a DMS application. Although the vendors call their products a "DMS", no one is quite there yet but with many more implementations, DMS applications will begin to mature.



- ✓ Electronic map is not foreign
- ✓ More experience in the distribution processes
- ✓ Customer-centric

- ✓ Switch execution linked to supervisory control systems
- ✓ Advanced supervisory control device configuration capabilities
- ✓ Real-time architecture for more robust performance
- ✓ Device-centric

Key Considerations – Solution Fit

Key Considerations - Functional:

- What functionality does the solution currently provide out of the box?
- How complete are the core functional components and do they meet the requirements?
- How much Distribution Automation functionality does the solution need to incorporate?
- What SCADA functionalities are required?
- What OMS functionalities are required?

Related Considerations:

- How well maintained are the SCADA-enabled devices?
- Does the solution provide tools for drawing substation diagrams?
- Is AMI integration required?
- What is the budget?

Key Considerations - Technical:

- Does the solution utilize a technical architecture that is acceptable to the company?
- How does the solution meet the technical requirements set by the company? How does it integrate with the rest of the enterprise application architecture?
- How does the solution meet the performance requirements, with a possibly high volume of real-time transactions going back and forth between OMS, GIS, SCADA and EMS?
- How well does it integrate with the backend GIS system? OMS? SCADA? EMS? WMS?
- Can the solution handle the size of the utilities network grid?
- What are the cyber security requirements?
- Does the solution utilize open standards (e.g., CIM)?
- Does the solution have a service oriented architecture?

Related Considerations:

- How extensible is the solution?
- Does the solution employ an open architecture that can be enhanced?
- What is the track record of the solution supporting large volumes of data?
- What platforms does the product support?

Key Considerations – Vendor

Key Considerations – Business:

- Can the vendor support the company's timeline?
- What is the breadth and depth of the vendor's experience in the distribution environment?
- What is the vendor's market leadership in related environments?
- What is the vendor's track record in jointly developing or extending its product along with its clients?
- What are considered to be the key success criteria for joint development at the company by the vendor? By the company? Do they align?
- How well does the vendor understand electric utility business operations?

Related Considerations:

- Can the vendor provide staff augmentation necessary to meet the company's timeline?
- Can the vendor provide sufficient training and knowledge transfer to internal resources?
- Does the vendor demonstrate their understanding of the business?
- Does the vendor have relevant implementation experience? In SCADA? In OMS? In EMS?
- Is the product homegrown or acquired and integrated into the vendor's suite?
- How active is the vendor in various industry consortia?

Key Considerations - Technical:

- What level of experience does the vendor have in similar environments (e.g., large volumes of data processing, complex interfaces, etc.)?
- What is the vendor's product development lifecycle and release strategy?
- How well-positioned is the vendor to provide incremental development to the product in the timeline required by the company?
- How many systems has the vendor delivered and size?
- Is the vendor product a single system or part of a larger suite of applications?

Related Considerations:

- Can the vendor provide any benchmarking studies in regards to scalability?
- How does the vendor plan to archive data?
- What level of experience does the vendor have in managing large volumes of data?

Key Considerations for DMS

- Many utilities still operate off of **paper maps**. How much change does the project want to manage in the first release of the DMS on top of transitioning away from the paper maps?

- DMS includes **advanced applications** and potentially **Distribution Automation** functionality giving the operator more than a simple **electronic map**.

- **DMS solution providers** continue to build **more and more functionality into their core systems** that have traditionally been associated with other utility applications like Outage Management and SCADA.

- The network model (for the most part) is provided by the **Geographic Information System (GIS)**, which becomes a very important enabler of the electronic map. The GIS and its **related asset systems provide the foundation for electronic mapping**. What is the status of GIS and the data? Are key asset and attribute information available for download from the GIS? How will network data be downloaded from GIS? What is the process laid out by GIS for pre-mapping?

- **Without data on the internals of distribution substations, a DMS system cannot effectively run a load flow analysis.** What data source will provide the DMS the substation internals? Are all the devices and attributes including SCADA enabled devices contained in this data store?
- Utilities must make IT architecture decisions that reduces duplication of functionality across systems ("**division of labor**"). Key considerations include:

  - Selected DMS and Outage capabilities
  - Economics - Practicality of pulling out/turning off functionality
  - Usability of systems for end user (e.g., ease of use, number of systems used by DOs)
  - Rationalization of data (i.e.,"what do you need the data for and where do you store it?")
  - Systems Integration – SOA to maximize flexibility and lower TCO

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Risk Mitigation with Distribution Management Systems

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General

- A Distribution Management System is a fundamental tool for managing the Smart Grid.
- Risks associated with selection and implementation of a DMS can be mitigated:
  - During selection and contract negotiation with your selected DMS vendor
  - During deployment of your DMS system
  - During operation of your DMS system

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Key questions about DMS Technologies

- DG/DER aware – does native DMS data model 'know' about latest greatest field devices and their behavior? Are they part of core data model and all applications or a 'bolt' on?
- Training Simulator – does DMS provide a comprehensive training simulator?
- Device Catalog – does DMS vendor maintain their own device catalog complete with operating characteristics that gets updated yearly as part of standard maintenance?
- Does DMS vendor have a DSCADA heritage? Does its software architecture naturally scale to millions of field data points?

DMS Implementation Reference Model

- To maximize investment in suite of SG apps, many integrations are required (30+ across the enterprise, control center, and mobile workforce)
  - Understand integrations that you may want to implement in the future
- Requirements are comprehensive and applications are integrated
  - Managing heterogeneous mix of DG types will be a key: PV, Wind, Bio-Mass, etc…

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DMS Implementation Reference Model

- Changes to a network data model must occur at 'zero' latency to the utility
- All of the utility's business processes that need to be updated to support the sustainability of a DMS network model
- Implement a new 'operational' planning paradigm that doesn't exist today at most utilities
- Allocate the 'right' amount of intelligence to other smart grid related technologies such as substation automation and distribution automation (example: fast vs slow VVO)

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DMS Implementation Reference Model

- DMS should be able to discover and configure a new device as it detects them in the field while installation crew is present
- Take a highly automated approach to configuring control center related integrations – when a new device gets installed and commissioned in the field that will be part of an EMS and DMS, make sure both systems can have the device added to their ICCP interface programmatically
- Let EMS own devices that are going to be controlled by both systems – their security paradigm is followed and logged for control actions

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DMS Implementation Reference Model

- From day one, establish the enterprise infrastructure (Smart Grid Data Repository) to support ad-hoc mining of the historical DMS and related operational and non-operational IED data available
- DMS and distribution planning system are different. Understand the differences.

DMS Implementation Reference Model

- Let the DMS vendor function as a software vendor, not wear two hats as a system integrator and product vendor – Need a 'control room' system integrator
- DMS and DRMS – know when to invest money into which technology
  - Be ready to easily monitor changes in behavior and, more importantly, know where changes in customers behavior are a win/win for company and customer

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DMS T&Cs

- Get one to three 'major' DMS releases included as part of purchase price – needs to include required services
  - No need to go back to the well for seven figure upgrades…
  - Get 'services' included for point releases in maintenance $s
- Get source code escrowed
- Ask for amount they spend on R&D
  - Visit vendor's R&D facility
- Perform due diligence with fellow utility companies on their experiences with functional releases and user groups
- Look for single product story – not hodgepodge of thrown together purchased technologies
- Get vendor to publish and commit to their roadmap

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Questions?

Thank you!

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Future Proofing Your Distribution Management System

What to Consider from a Support Perspective

Mark Knight
Director, Grid Applications

Experience you can trust.

Inter-Dependence

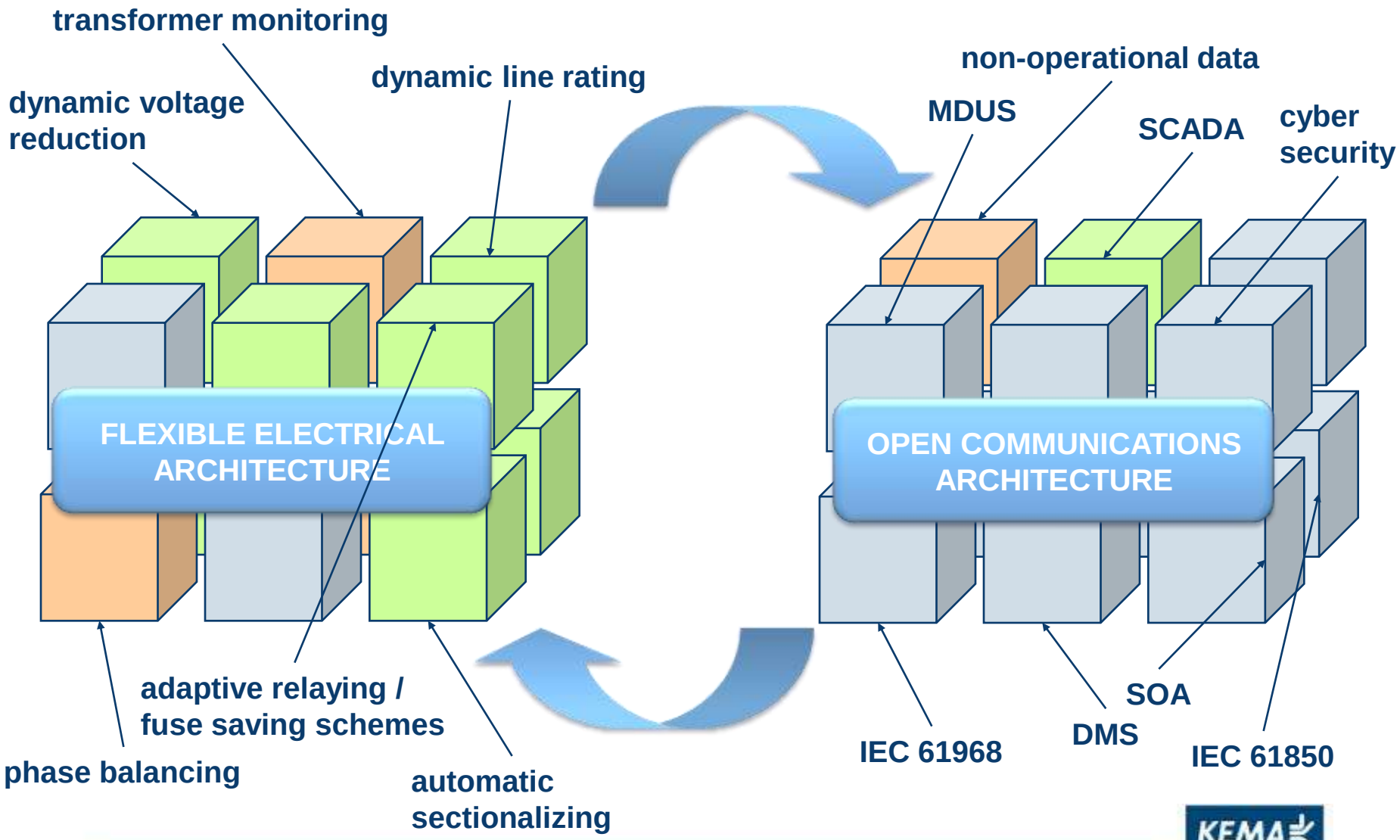
The advances in electrical and electronic technologies enable the flexible electrical architecture and associated functions, but they are only achievable with the advanced communication and information technologies to supervise them.

FLEXIBLE ELECTRICAL ARCHITECTURE

OPEN COMMUNICATIONS ARCHITECTURE

Architecture and enabling technologies are impotent to make any difference without corresponding changes to the distribution system.

Inter-Dependence



Support Allocation

System	User	Support	Mission Status	
EMS	Systems Operations	Systems Operations	Critical	Mission Critical
DMS, DSM	Systems Operations	Systems Operations	Critical	
Gas SCADA	Gas Operations	Gas Operations	Critical	
Substation Automation	Substation	Field Operations	Critical	
Distribution Automation	Distribution	Field Operations	Critical	
Field LAN	Field Operations	Field Operations	Critical	
Backhaul	Systems Operations	Systems Operations	Critical	
GIS	Field Operations	Systems Operations	Signficant	
OMS	Outage	Systems Operations	Signficant	
Operational Data Mart	Shared	IT	Signficant	
Work Force Management	Field Operations	IT	Signficant	
CIS	Customer Service	IT	Signficant	
Meter Data Management	Customer Service	IT	Business	Business Critical
Billing	Customer Service	IT	Business	
Work Management System	Field Operations	IT	Business	
Asset Management	Engineering	IT	Business	
Meter Data Acquisition	AMS	IT	Business	
Settlement	CFO	IT	Business	
Forcasting and Scheduling	Trading	IT	Business	

Note: "Mission Critical" refers to those systems that require the level of support that is most suited to a business-unit level technology approach

Mission Critical Systems

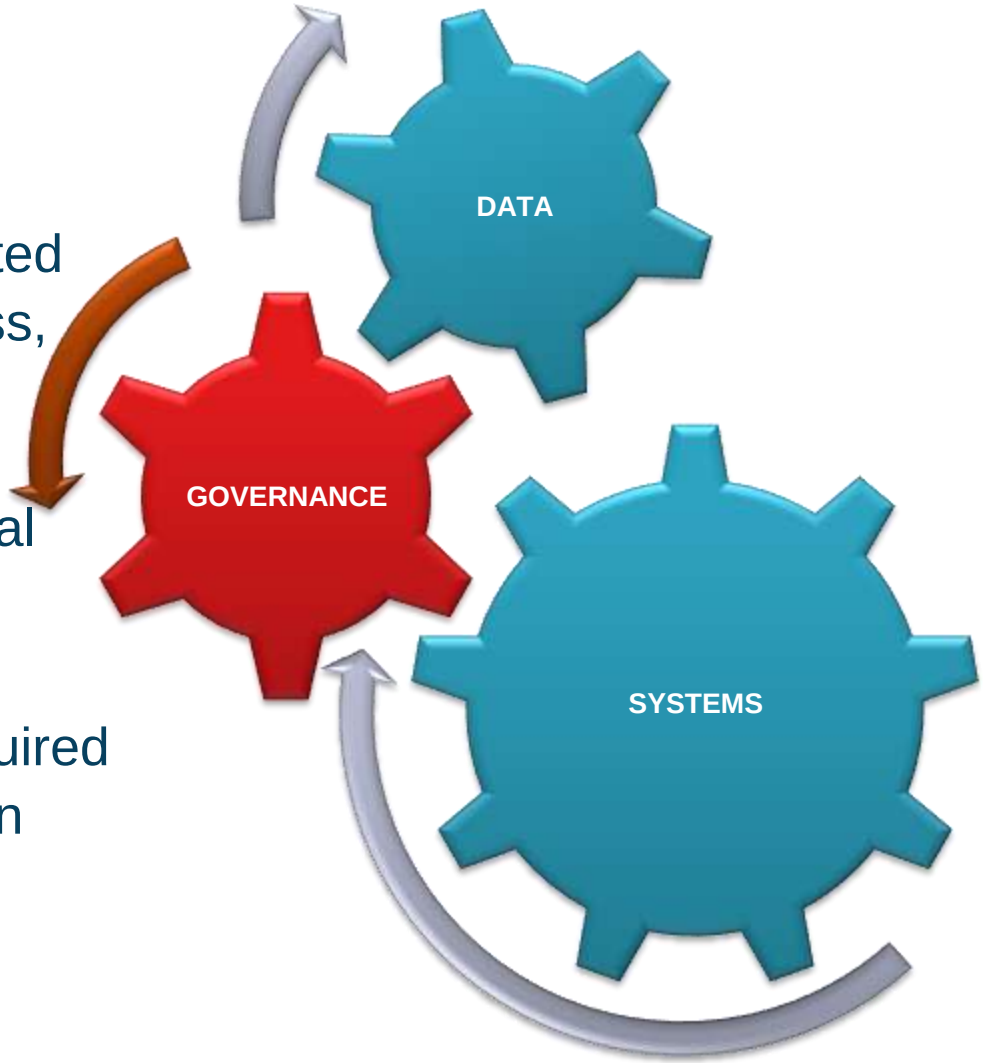
- **Deterministic response**.
  - The users expect response to their inputs in a second or less. Application response (e.g., interaction with a remote device) is often measured in milliseconds. The entire environment must act in concert to reliably and consistently provide the deterministic level of response under all system conditions.
- **Ultra-high Availability**.
  - The systems must be operational 24 X 365. Users are reliant on these systems continuously, and even small periods of downtime mean that the associated critical system is unobservable. In the case of an energy utility, response to primary system events is therefore impaired, with associated liabilities.
- **Proprietary Environments**.
  - Meeting the response and availability requirements often requires the use of special purpose hardware, software, and communications. The intelligent devices and communications networks are typically resource constrained, and may rely heavily on fixed prioritization and predictable system resource response.
- **Safety**.
  - These super-critical systems are used to remotely control field equipment. Special operating procedures and care must be taken to ensure that personnel maintaining or repairing equipment within the substation are protected against an accidental operation that can result in a fatal accident.

No Easy Answers

- Utilities are redesigning business models to leverage new technologies and improve performance.
- Essential to understand differences between IT and OT and how these differences will change over time.
- Also important to realize there is no easy answer for the governance of systems for every utility.
- Every utility is unique and must find its own answer.
- In the past, operating units bought mismatched systems for specific functions.
- IT/OT is a hot button. Push it with Care.

Information and Operation

- IT
  - Tools, processes, methodologies and associated equipment to collect, process, and present information.
  - Manage & monitor
  - Do not control mission critical systems
- OT
  - Mission critical systems required to maintain system operation and reliability
  - Control & monitor
  - Can touch the grid



Knowing and Understanding

- Often (OT and IT working together) the participants are quite emotional about the subject.
- Reason may not be the driver in the conversation.
- In many utilities, there continues to be distrust between the operations and corporate IT.
- What is needed:
  - clear strategy
  - clear requirements
  - definitions to support that strategy
  - clear lines of demarcation concerning roles and responsibilities
  - well-defined ownership

Some Comparisons

- In the OT model priorities and resource allocations are aligned with operational needs.
- Potentially redundant applications and data bases.
- Not necessarily all are of "industrial grade”.
- Multitude of different technologies employed.

- Good corporate IT governance; standard application platforms and technologies.
- Solid corporate cost management hygiene.
- A standard, cost conscience operational IT solution from IT may not be as optimized or timely for operations.
- Doesn't understand business
- Business doesn't understand the extra stuff to implement a system e.g. support, SDLC, etc.

Systems and Services

- Fighting over shared services. – who should own them?
- Historically the OMS hasn't been treated as a true 24x7 system.
- As DR continues to be implemented on the distribution system to operate the gird safely it is imperative that the operators know which portions are energized.

- OMS i gene orted by the IT sta
- GIS is typic d by the IT aff
  Man ties are w
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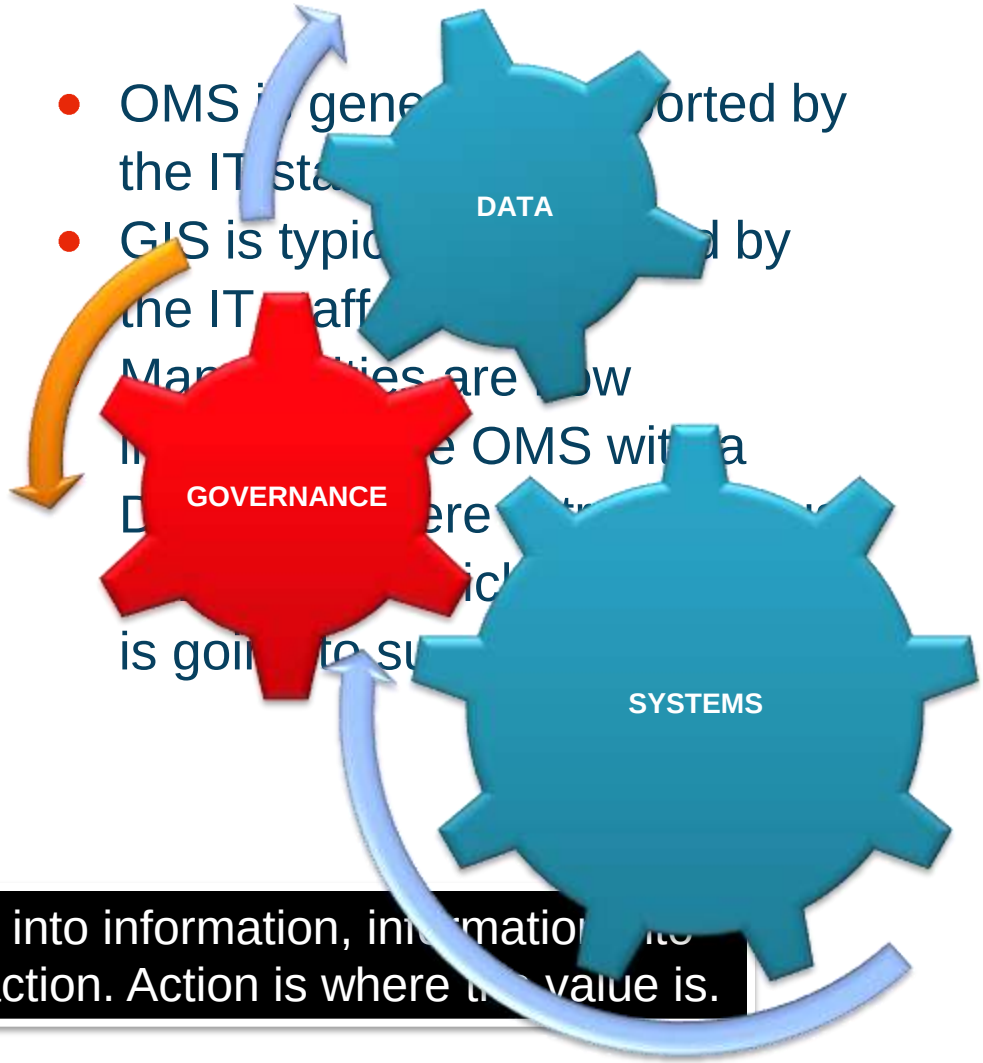
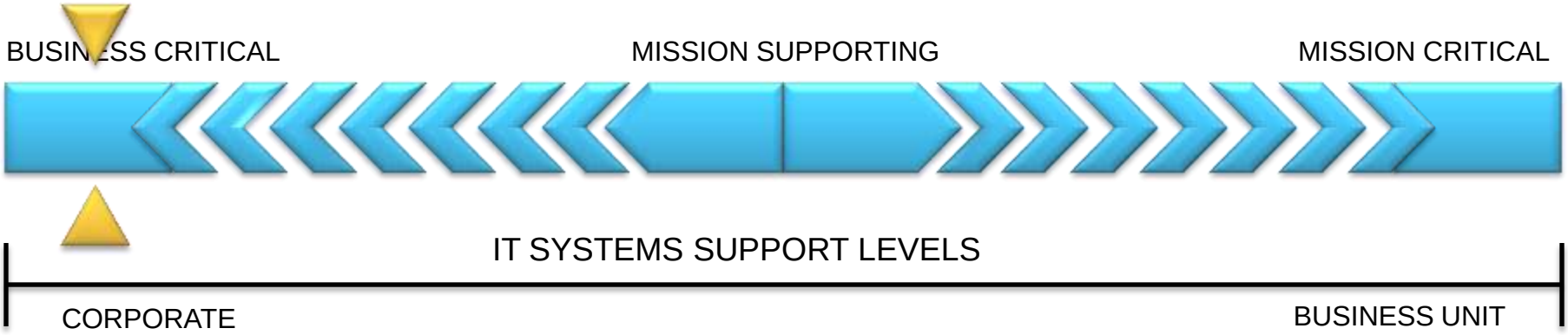


Smart Grid is about turning data into information, inf mation its knowledge, and knowledge into action. Action is where t value is.

Pros and Cons for Support Functions



Benefits

- Application of corporate- or industry-wide standards
- Improved consistency in service quality levels
- Employment of an enterprise-wide perspective
- Lower total ownership costs
- Avoidance of duplication of resources/ efforts

Support Activities

- Program management
- Supplier/vendor relations
- Acceptance testing
- Data content management
- User documentation and training
- Layered application support and interfaces

Benefits

- More rapid response levels
- Greater focus on specific business priorities
- Improvement to compliance to more complex and unit-specific specifications and regulations
- Maintenance of specialized skills

Regardless of the support level, the underlying activities are similar

Key Issues that must be Addressed

- Utilities can no longer afford the liability and maintenance expense of non-integrated, non-standard systems scattered across the organization.
- Smart Grid is a combination of many things including a *flexible* electrical architecture and an open communications architecture.
- IT and OT both have enormous expertise to be leveraged.
- How should IT and OT work together?
- A "federated model", where there's OT(s) delivering on OT priorities working in close concert with IT (common technical infrastructure and IT governance and best practices).
- Architectural design implications of NERC CIP requirements.

Q&A

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Closing Remarks

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a Division of Energy Central

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