

***Smart Grid: PES Activity Update
and Orientation***

PES Intelligent Grid Coordinating Committee

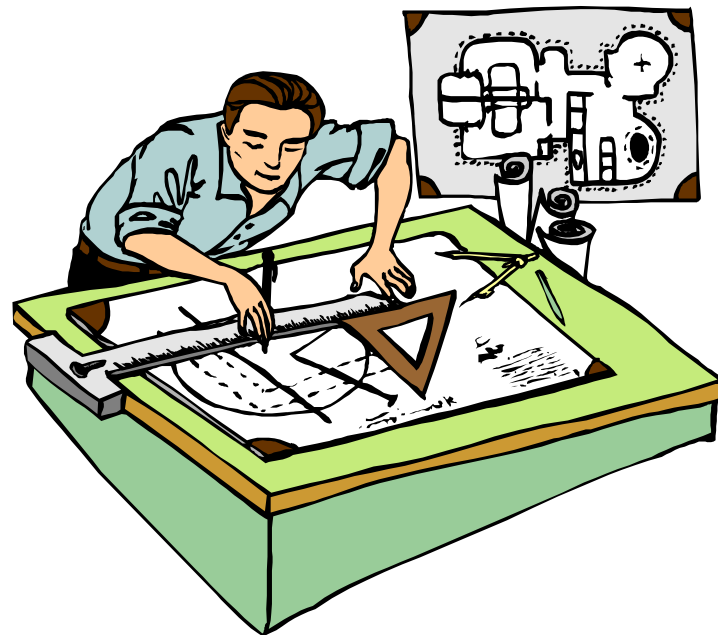
***Smart Grid 101:
Utility Applications and Roadmaps***

IntelliGrid Project Stages and the Roadmap

Like any engineering project, we:

- Plan the Project
 - High-level business case
- Define Requirements
 - Develop use cases
 - Identify business value
- Design an Architecture
 - Build in security
 - Build in network management
- Select Technologies
 - Trade-offs
 - Cost-Benefit Analysis
 - Final business case
- Deploy

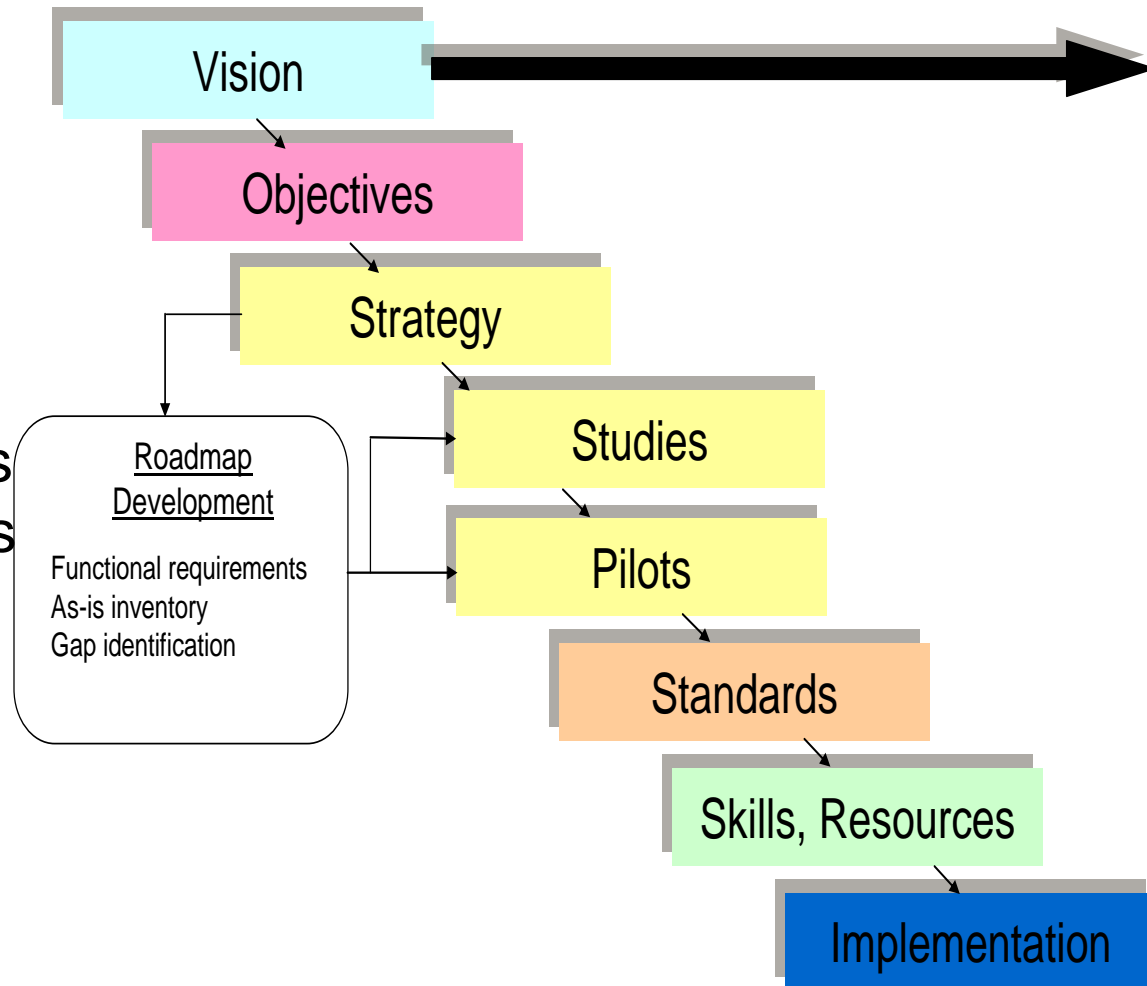
Roadmap



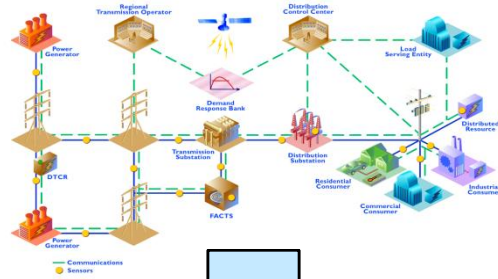
The Role of the Roadmaps

EPRI

- Every utility will take a unique path in creating their smart grid
- Initial high level and project level implementation plan
- Roadmap recommends technology investments to be made over time
- Guidance on establishing leadership teams and governance models



Roadmap Development Process



Management Vision, Challenges, Initial Ideas and Concepts

Use Case Workshops



Draft Use Cases for Roadmap



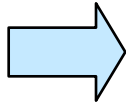
Scenarios of vision and future operations functions



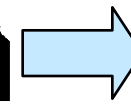
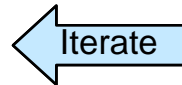
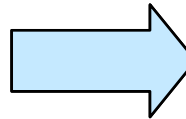
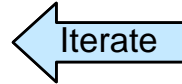
Stakeholders Review



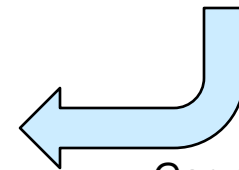
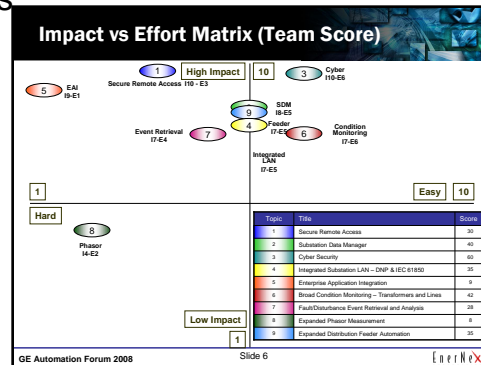
IntelliGrid Use Cases and other Reference Requirements Sources



Project Team Develop Initial Narratives and Drafts



Roadmap with Key Recommendations



Gap Analysis, Initial Technology Recommendations and Ranking

Typical Roadmap Project Objectives

- Plan for development of a Smart Grid Communications Architecture roadmap
- Identify important applications that will utilize the communications architecture
 - Linked to Utility Smart Grid Vision Statements
 - Linked to existing Utility project plans
- Use these to identify requirements for the architecture
- Recommend technologies that could be part of the architecture
- Draft an implementation plan for each recommendation
- Establish strong VP level support for the Roadmap and a Smart Grid Technology Leadership Team

Anticipated Benefits

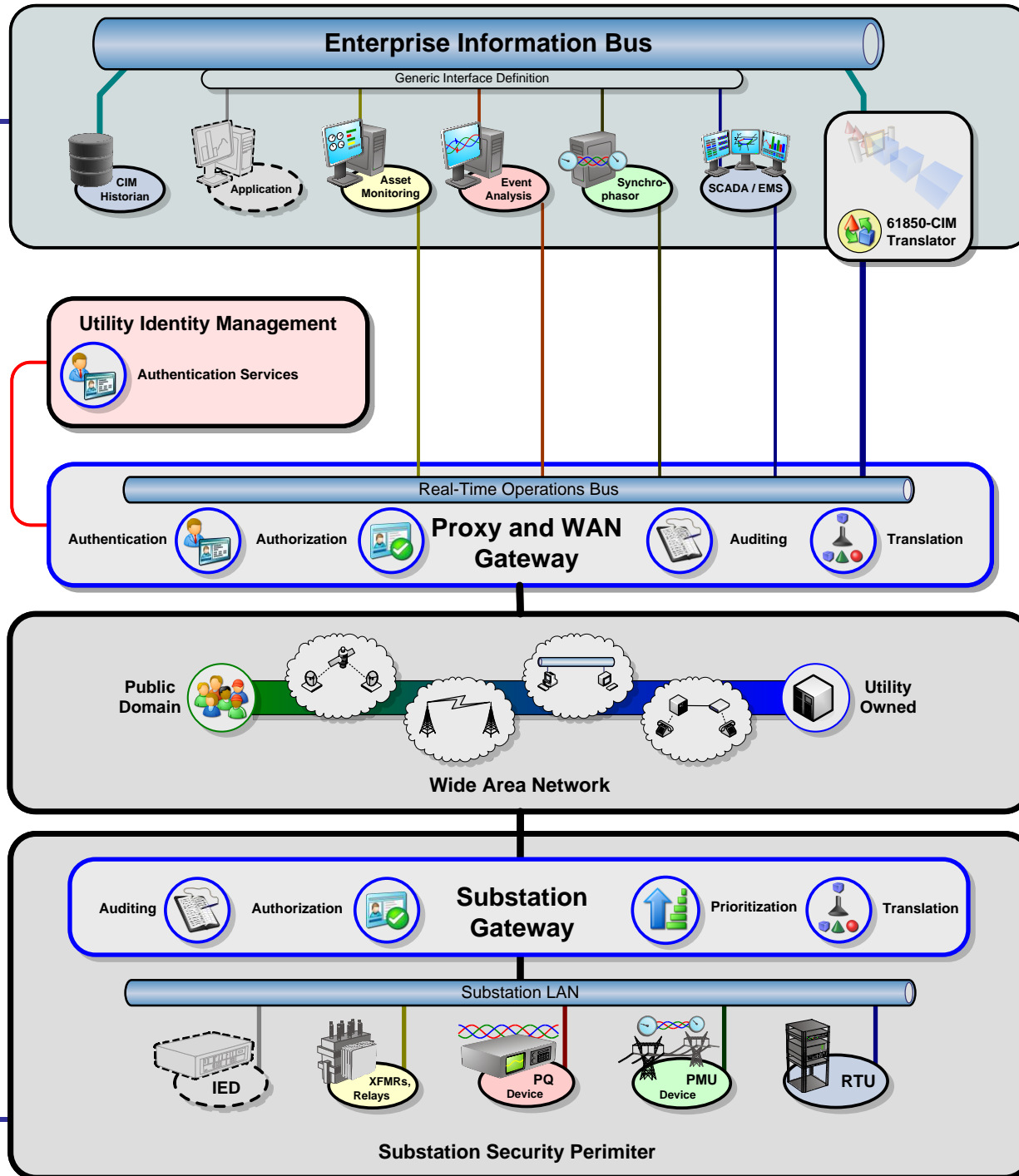
- Increase Reliability
 - Operational reliability & improvements
 - Compliance with NERC
 - Increased customer satisfaction
- Value Enhancement (Economic)
 - Deferred cost of resources
 - Multiple benefits enterprise wide
 - Growth management
 - Cross functional cooperation
 - Efficiency
 - Mitigate rate increases
- Security/Safety Compliance
 - Risk mitigation
 - Minimize/avoid negative PR

Typical Technology Investment Objectives

- Retrieve, store and disseminate non-operational data to all authorized users in a secure manner
- Comply with NERC standards
- Reduce outage durations
- Reduce and/or defer capital costs
- Integrate EMS, DMS (GIS) and OMS
- Implement IP communications to all bulk transmission substations
- Enhance cyber security at required facilities and plan for future scope changes
- Obtain equipment condition information to enable condition based maintenance and enhance reliability
- Utilize equipment condition data and new applications to provide dynamic rating information of transmission lines and transformers to system operators

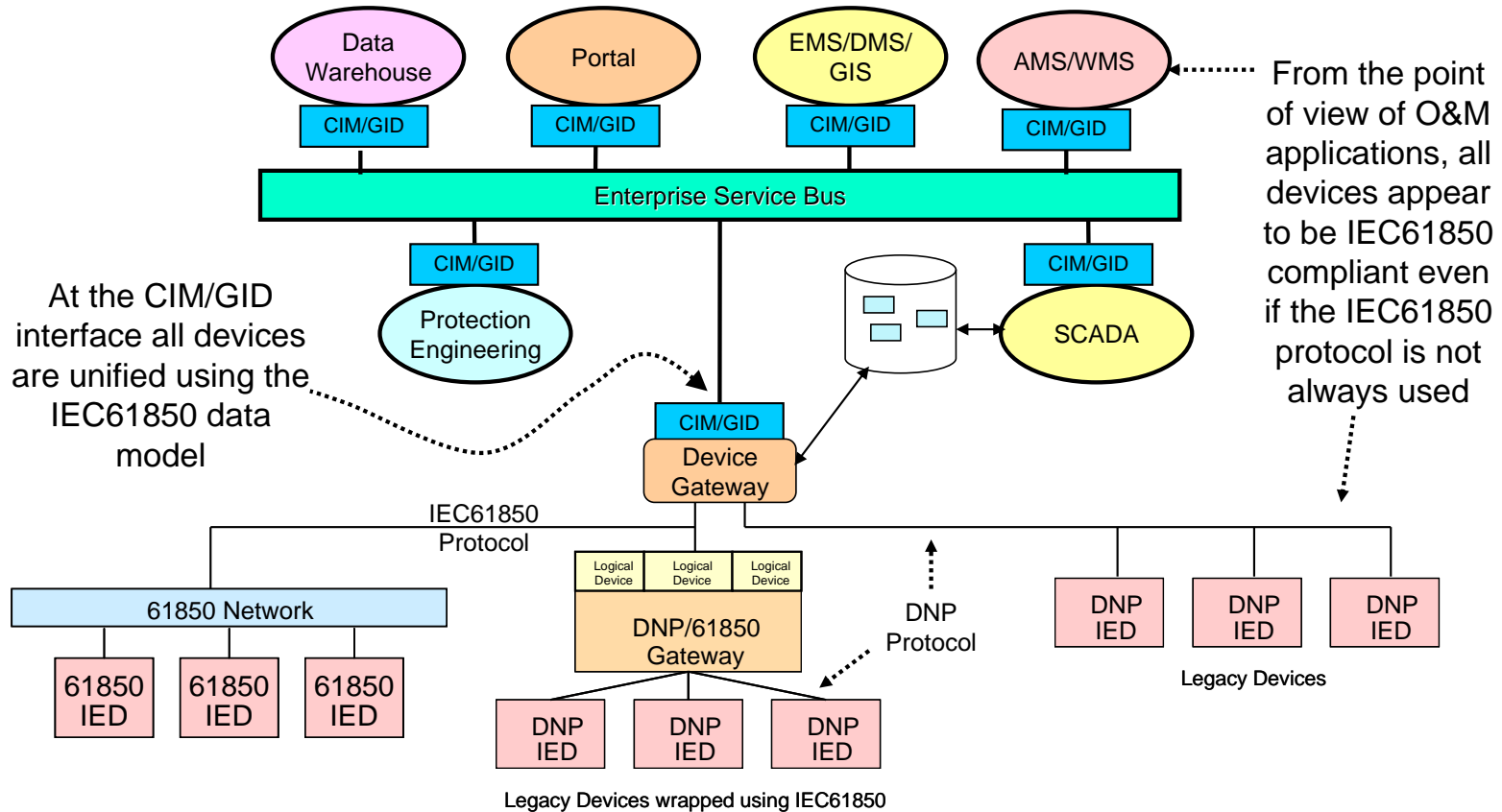
Intelligent Grid Communications Architecture

Key Components



1. Enterprise Information Bus
2. Generic Interface Definition (GID)
3. IEC 61850 to CIM Translator
4. Operational applications
5. Real-Time Operations Bus
6. Utility Identity Management
7. Proxy & WAN Gateway
8. WAN
9. Cyber security
10. Substation Gateway
11. Substation LAN
12. Substation IEDs
13. Feeder IEDs
14. Consumer devices
15. Mobile work force

Future DNP3 and IEC 61850 Integration



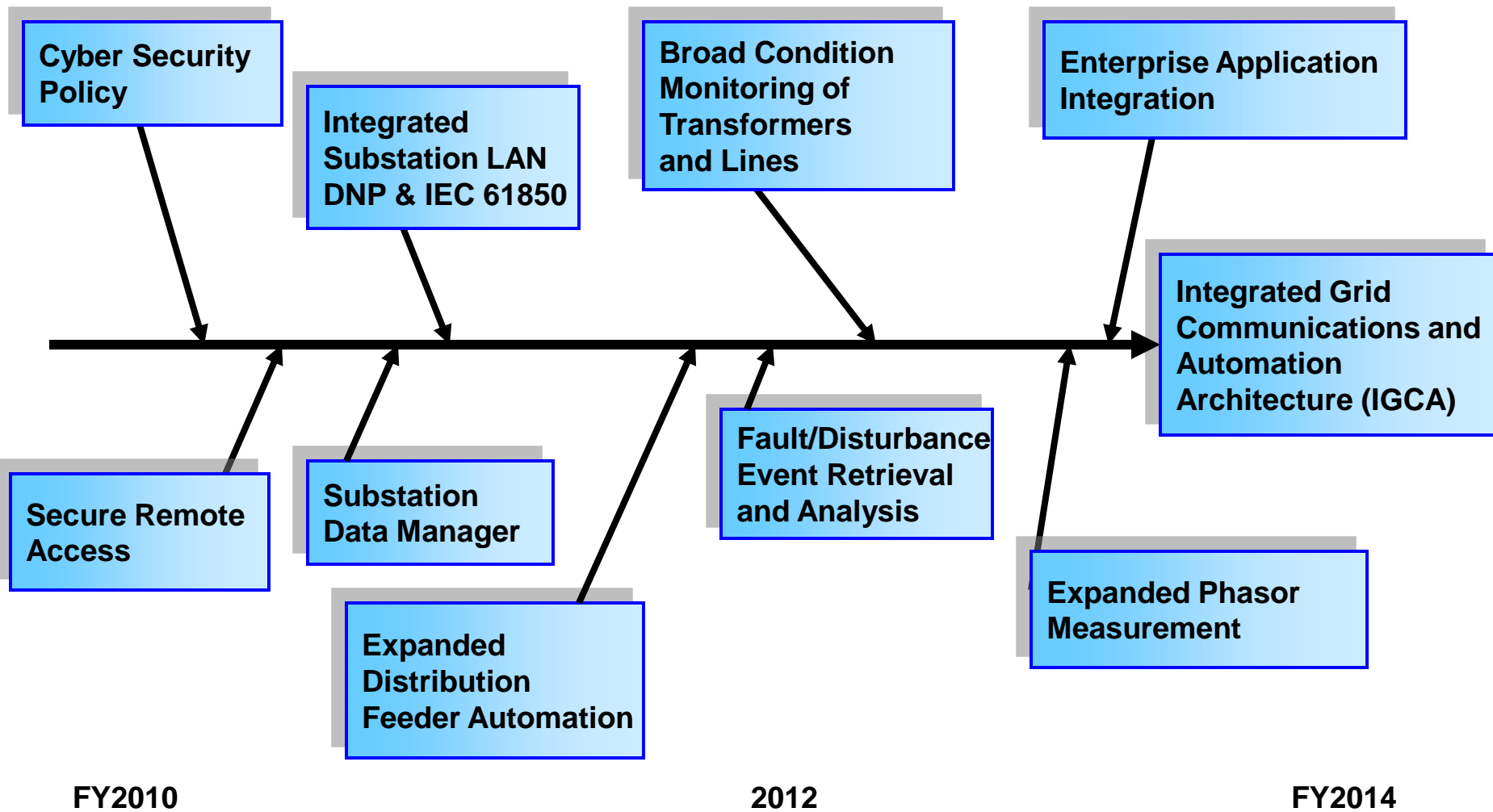
CIM – Common Information Model (see Chapter 6) – IEC 61968/61970
 GID – Generic Interface Definition (see Chapter 6)

CASE STUDIES

- First Energy - T&D Automation Roadmap
- Duke Energy - Transmission Automation Roadmap
- Salt River Project – Technology Roadmap (Broad)
- Large Southern US IOU – Distribution Automation Roadmap
- Alliant Energy – Communications Infrastructure Roadmap
- Southern California Edison – AMI
- NYPA – Phasor Measurement Roadmap



Example Project Steps & Time Frames



Conclusions

- Utilities are finding roadmaps useful
- The process itself is often the most valuable
- A governance/leadership committee is key
- The roadmap is a living document
- The roadmap leads to architecture development and eventual design and project implementation

For More Information

IntelliGrid materials

Available on <http://publish.intelligrid.info/>

Thank You!

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