CERT'S PODCASTS: SECURITY FOR BUSINESS LEADERS: SHOW NOTES

Introducing the Smart Grid Maturity Model (SGMM)

Key Message: The SGMM provides a roadmap to guide an organization's transformation to the smart grid.

Executive Summary

"The Smart Grid Maturity Model was developed by IBM and the Global Intelligent Utility Network Coalition with the assistance of APQC. As of March 2009, it is under the stewardship of the SEI where its development and evolution is ongoing.

"The Smart Grid Maturity Model is a management tool that an organization can use to appraise, guide, and improve its smart grid transformation. While the model is focused on helping an organization improve its own "smartgridness," it can also enable the industry by providing a common language and vision of the key elements for smart grid transformation. For electric utilities, the Smart Grid Maturity Model provides a roadmap of activities, investments, and best practices for smart grid evolution along with guidance on related technological, regulatory, and organizational issues." [1]

In this podcast, Ray Jones, a senior consultant in the Custom Solutions group at APQC, discusses SGMM, why it was developed, and how it is being used. Ray was originally the project executive with IBM for the SGMM, and filled this role until it was transitioned to the SEI in March 2009.

PART 1: BACKGROUND, OBJECTIVES, AND STRUCTURE

Participation and Motivation

The Smart Grid Maturity Model was originally created by the following organizations:

- U.S. Utilities
  - CenterPoint Energy
  - Progress Energy
  - Pepco Holdings
  - Sempra Energy
- International Utilities
  - DONG Energy, Denmark
  - North Delhi Power and Light, India
  - Country Energy Australia
- IBM
- APQC

The motivation for creating the model was to identify and document best practices that could be used by all utility companies to improve and accelerate their transition to the smart grid.

What Is the Smart Grid Maturity Model?

Primarily, it's a management tool – a guide or roadmap to appraise, measure, and improve a utility's transformation to smart grid operations. It also serves as a framework to determine

- current practice
- future practice

- practices that may need to be added
- a useful sequence of practices to adopt
- a means for prioritizing practices

A utility company has many different departments such as IT, asset management, and customer support. The model helps each part of an organization understand the goals using a common language and structure.

SGMM Structure

SGMM has eight domains (picture these as columns) described at five levels of maturity (picture these as rows). The domains are:

- strategy, management, and regulatory – vision, planning, decision making, strategy execution, disciplines, regulatory, and investment
- organization and structure – communications, culture, knowledge management, training, and education
- technology – information, engineering, integration of information and operational technology, standards, and business analytics tools
- societal and environmental – conservation and green initiatives, sustainability, economics, and ability to integrate alternative and distributed energy
- grid operations – advanced grid observability, control, quality, and reliability
- work and asset management – optimized assets and resources (i.e., people and equipment)
- customer management and experience – retail, customer care, pricing options and control, advanced services, visibility into utilization, quality, and performance
- value chain integration – enabling demand and supply management, distributed generation and load management, and leveraging market opportunities

There are more than 200 characteristics described for each domain/maturity level combination.

PART 2: MATURITY LEVELS AND CHARACTERISTICS

SGMM Maturity Levels

Moving towards higher levels of maturity is based on business objectives and your operational environment; not everyone should shoot for level 5.

The maturity levels are as follows:

- Level 0: where most organizations start
- Level 1: exploring and initiating. You may have a vision but not a complete strategy and are likely doing experiments.
- Level 2: functional investing, which may include Automatic Meter Management (AMM) or Automatic Metering Infrastructure (AMI). Some organizations focus on reliability and demand/response at this level as well as proof of concepts and developing a defined strategy.
- Level 3: integrating – cross functional. This is where the smart grid first appears in terms of operational linkages and shared information across business lines.
- Level 4: optimizing enterprise-wide. Here you start deriving the benefits of end-to-end visibility across the grid. You can optimize your operations, for example, by correcting in real time.
- Level 5: innovating the next wave of improvements. This level is not yet defined but may include new business models and other improvements yet to be discovered.

Differing Maturity Levels by Domain

While it may be more effective to be at the same level of maturity in all 8 domains, the model does support being at

different levels based on business needs.

SGMM Characteristics

Here are a few examples of SGMM characteristics, which occur at the intersection of a domain and a maturity level:

Work and Asset Management

- Level 1: conduct value analysis for new systems; explore remote asset monitoring beyond SCADA.
- Level 2: develop your approach to track asset inventory and event history (when an asset is likely to break, when it needs maintenance). Having this supports condition-based monitoring, which is at a higher level of maturity.

Organization and Structure

- Level 3: link executive performance and compensation to smart grid success; have consistent smart grid leadership across lines of business.

Value Chain Integration

- Level 1: develop a strategy for managing a diverse resource portfolio.
- Level 2: redefine your value chain.
- Level 3: develop an integrated resource plan.
- Level 5: include dispatchable resources available for increasingly granular market options; locational marginal pricing; power on demand.

PART 3: CURRENT PRACTICE: SURVEYS, RESULTS, & BUSINESS CASE

SGMM Surveys

Most utilities are willing to share their current practices as they typically do not compete with one another.

There are two SGMM surveys that an organization can use to capture its current state of practice:

- Assessment Survey: This 180 question survey can be completed by one knowledgeable person in two to three hours. Send results to the SEI or APQC and they will provide a report indicating your levels of maturity in each domain.
    - Questions include: Has your smart grid vision, strategy, and business case been incorporated into your corporate vision and strategy?
- Results Survey: This survey collects hard data about your organization such as:
    - Number of line miles
    - Number, frequency, and length of interruptions
    - SAIFI (System Average Interruption Frequency Index) and MAIFI (Momentary Average Interruption Frequency Index)

Survey Participation

As of the time of this podcast, 60 utilities have participated – half in the U.S. and half in Japan, China, Australia, Europe, and South America.

Participants represent 100 million customers and $100B in global revenue.

Survey Results

You can use survey results to

- determine the requirements to achieve the next level of maturity from where you are
- identify gaps between your current state and your desired state
- compare your organization with others
- identify deficiencies
- determine whether you are emphasizing one domain at the expense of others

The objective is to use SGMM and survey results to

- help run your business
- make better informed decisions
- point out areas requiring more attention

Roughly 50 percent of organizations are at levels 0 and 1, respectively. There are a few at level 2 and one at level 3.

Other results are as follows:

- The leading domain seems to be Technology.
  - 88 percent have or are piloting connectivity to intelligent electronic devices.
  - 79 percent have a data communication strategy.
  - 70 percent have aligned technical IT investment to enterprise IT technology.
  - 29 percent have aligned their business processes and IT architecture.
  - 11 percent have applied smart grid technologies to improve performance across lines of business.
  - 8 percent have distributed intelligence and analytics across lines of business.
- For societal and environmental, 90 percent have active programs.
- For value chain integration, 17 percent have a strategy for managing their diverse resource portfolio

Making the Business Case

The purpose of the Results Survey is to justify investment in improving smart grid maturity as hard data is important to have, for example, when dealing with Public Service Commissions on service rate increases.

SGMM is designed to assist in making a compelling business case. Motivations include:

- Global climate change
- Efficiency: Real dollar savings can result from the ability to better choose and use sources of electricity.
- Improved reliability: If you can demonstrate that there are fewer interruptions at a higher level of maturity, this is hard data.

Resources

[1] SEI's Smart Grid Maturity Model web site

- Getting Started
- Research
- Tools & Methods (including the SGMM model and surveys)

CERT Podcast: The Smart Grid: Managing Electrical Power Distribution and Use

How the Smart Grid Promotes a Greener Future. U.S. Department of Energy, Office of Electricity Delivery and Energy Reliability.

Smart Grid Cyber Security Strategy and Requirements. Draft NISTIR 7628, U.S. National Institute of Standards and Technology, September 2009.