VOLUME 3

SGMM | 2011

Smart Grid Maturity Model Update

Software Engineering Institute | Carnegie Mellon

About the Smart Grid Maturity Model

The Smart Grid Maturity Model (SGMM) is a management tool that utilities can leverage to plan their smart grid journeys, prioritize their options, and measure their progress as they move toward the realization of a smart grid. The SGMM was created by utilities, for utilities when the Global Intelligent Utility Network Coalition, a smart grid collaboration of 11 utilities, saw the need in the industry for this tool. The model describes eight domains, which contain logical groupings of incremental smart grid characteristics and capabilities that represent key elements of smart grid strategy, organization, implementation, and operation. Utilities use the SGMM to assess their current state of smart grid implementation, define their goals for a future state, and generate inputs into their roadmapping, planning, and implementation processes. As more and more utilities around the globe participate and the SGMM experience base grows, the SGMM becomes an increasingly valuable resource for helping to inform the industry's smart grid transformation.

Announcing the SGMM V1.2 Product Suite

In the third year of stewardship of the Smart Grid Maturity Model, the SEI is releasing version 1.2 of the SGMM product suite, making the technology more accessible to a larger community of utilities, partner organizations, and government stakeholders. Over the past three years, the SEI has confirmed that the model is applicable to utilities of various types, sizes, and geographical settings. Additionally, the SEI has developed products to train and qualify Navigators to improve the worldwide availability of the model while maintaining the integrity of its use.

A substantial change in V1.2 is the revision of sections 1 through 4 of the SGMM Compass survey. These sections collect information about the utility completing the survey and the current performance of its grid. The new data collected from these sections will:

- enable more sophisticated peer-to-peer comparisons
- facilitate evaluation of the effectiveness of the model
- inform Aspirations during a Navigated assessment

This release also marks the end of the pilot licensing period, expanding the opportunity for any organization to apply to become a licensed partner for SGMM.

All other product suite items were updated based on lessons learned from the use of the prior versions. A number of updates were made to the model to improve the interpretation of various characteristics. These updates are not significant changes, so organizations will be able to compare their V1.2 results to those obtained using earlier versions of the model.

SGMM | Smart Grid Maturity Model

V 1.2 PRODUCT SUITE		ENHANCEMENTS
Model	• Definition document • Matrix	• Updated expected characteristics and explanatory material to improve understanding and enable consistent application of the model
Compass Survey	• Questionaire-based assessment survey yields maturity ratings and performance comparisons	Updated organizational attribute questions to • facilitate peer comparisons • collect data to test the effectiveness of the model • help scope aspirations setting
Navigation Process	• Expert-led workshops to complete Compass and use results to inform objectives	• Enhanced to provide better guidance on analysis and improve the usability of the licensed templates
Training	• Overview seminar • SGMM Navigator course	Improved to enable more efficient and effective class participation and to provide • clearer instructions • improved materials
Licensing	• License organizations and certify individuals to deliver Navigation process	• Concluded pilot licensing program, opening license opportunity to all • Transitioned to universal license agreement for easier long-term agreement maintenance and to make SGMM more available to existing SEI Partners

Figure 1: V1.2 product suite enhancements

NEWS

Smart Grid Maturity Model Helps California's Publicly Owned Utilities Develop a Vision for the Future of Smart Grid

Steven Rupp
Vice President at SAIC
Sacramento, California

SAIC Energy, Environment & Infrastructure, LLC is one of the initial licensees for the Smart Grid Maturity Model (SGMM) Navigation process. Their work in California is being led by Steve Rupp, who is one of the first SEI-Certified SGMM Navigators. SAIC and the California Energy Commission (CEC) are using the SGMM to develop a roadmap to the 2020 smart grid for California's publicly owned utilities. A key challenge of this research is to develop a perspective of the future smart grid that can represent the diverse range of concerns among the thirteen participating utilities. These perspectives range from the emerging visions of Alameda Municipal Power and City of Palo Alto Utilities to the advanced visions of Sacramento Municipal Utility District, Los Angeles Department of Water and Power, and Glendale Water and Power.

The CEC selected SAIC to conduct the research based in part on its proposed use of the SGMM to evaluate the existing activities and future aspirations of the utilities. Members of the participating utilities take part in SGMM Survey workshops, providing SAIC with Compass survey results that are used to develop comprehensive assessments of current-state activities. The results are shared with utilities in SGMM Aspirations Workshops – providing a baseline from which future-state visions are elicited. To bridge the gap between the as-is state and the to-be vision, SAIC is developing implementation roadmaps driven by the actions and obstacles that are identified as part of the Aspirations workshops.

Utilities participating in the research are seeing an immediate benefit from the SGMM. The Survey and Aspirations workshops provide, for some of the utilities, a first opportunity to gather as a team to formally review and plan their smart grid activities. For some, the results of the surveys have benchmarked tremendous progress in advancing the maturity of their smart grid planning and deployment efforts – essential evidence needed to maintain financial support for their initiatives. For others, the survey has been the benchmark they were looking for to help support their 'go-slow' approach to smart grid deployment. Eight of the 13 participants have elected 'go-slow' strategies and the SGMM has helped to articulate the purposeful nature of their nascent maturity levels.

SAIC's research has also illuminated areas where the SGMM can benefit from the applied lessons of its participants. While the SGMM has proven beneficial to researchers and participants, it is apparent that expanding the scope of the model definition and survey to better accommodate the nature of publicly-owned utilities would broaden its appeal in the industry; especially to those utilities whose smart grid decisions must encompass the non-energy elements of their water and natural gas service responsibilities. Future versions of the SGMM product suite will incorporate improvements based on the field experiences of SAIC and other partners.

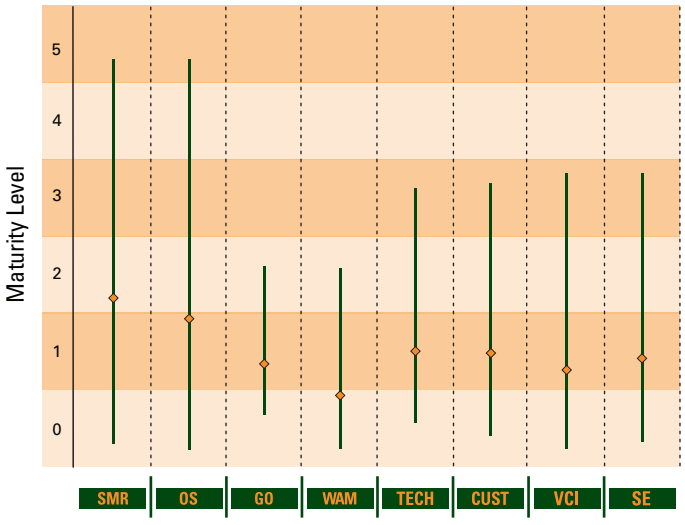


Figure 2: The average and range of maturity scores for the thirteen participating California publicly-owned utilities

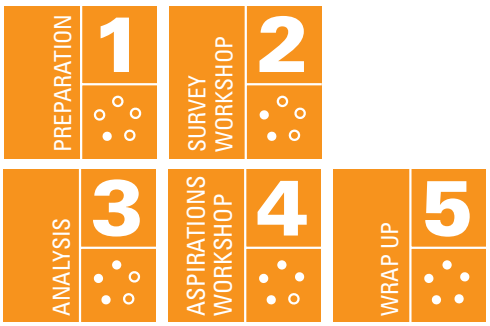


Figure 3: SAIC is using the 5-step Navigation process to help California utilities

Trends in Repeat Use of the SGMM to Track Progress

A growing number of utilities have now taken the SGMM Compass survey more than once. The figure below summarizes the first and second maturity profiles of these organizations. The average maturity ratings across all eight SGMM domains show an increase in the second use, which suggests that utilities are making progress in their grid modernization efforts.

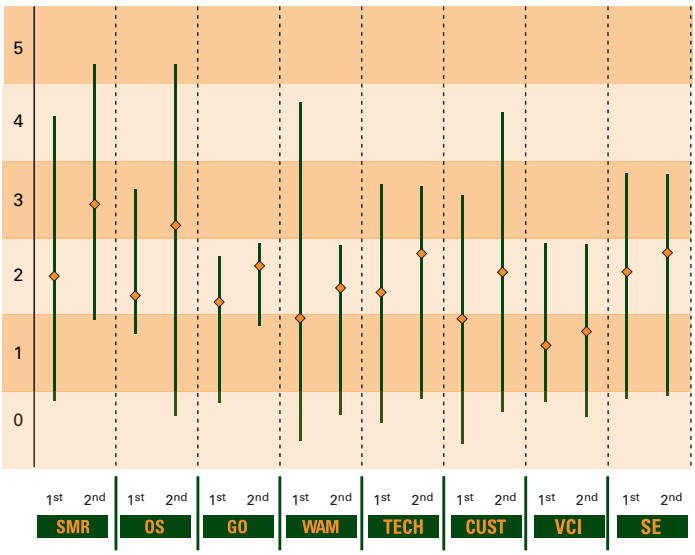


Figure 4: Average and range of maturity scores for utilities that have completed the SGMM Compass survey twice

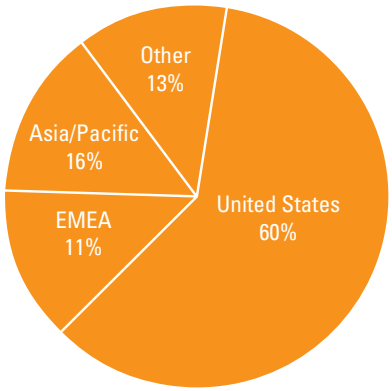


Figure 5: Distribution of SGMM users by region

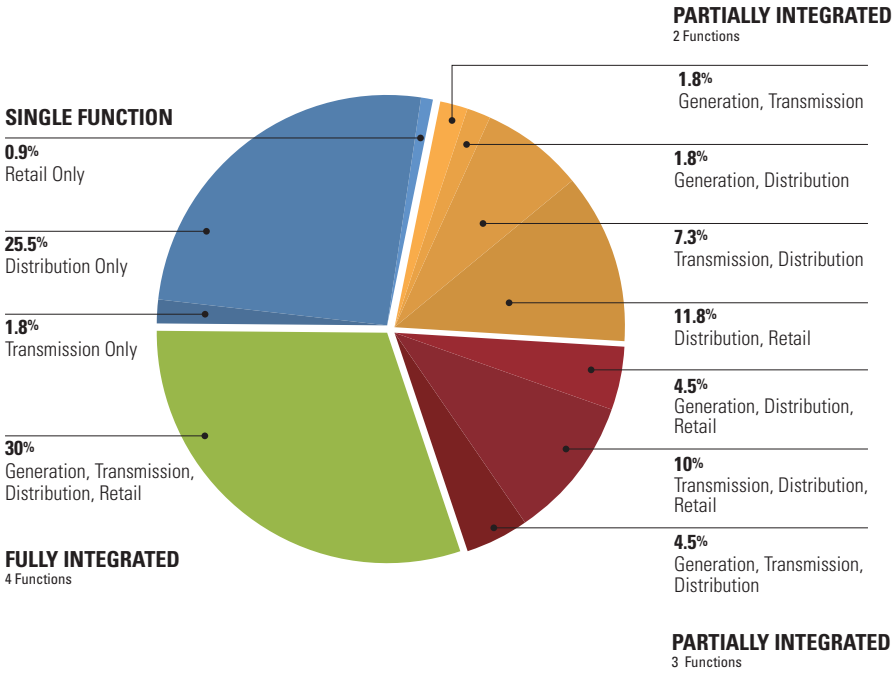


Figure 6: Detailed breakdown of utility type reported by SGMM users

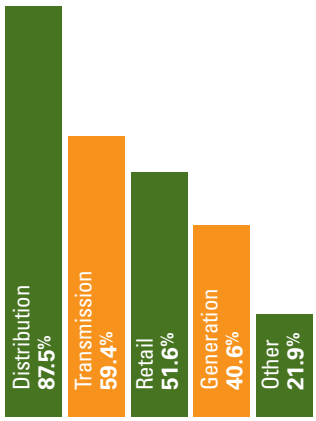


Figure 7: Functions reported by SGMM users (percentages equal more than 100 because many users report multiple functions)

SGMM Community

The SGMM community continues to grow, with more than 120 utilities having participated to date. Figures 4 through 10 show the aggregate maturity profile, geographic distribution, and type of operation for this expanding community.

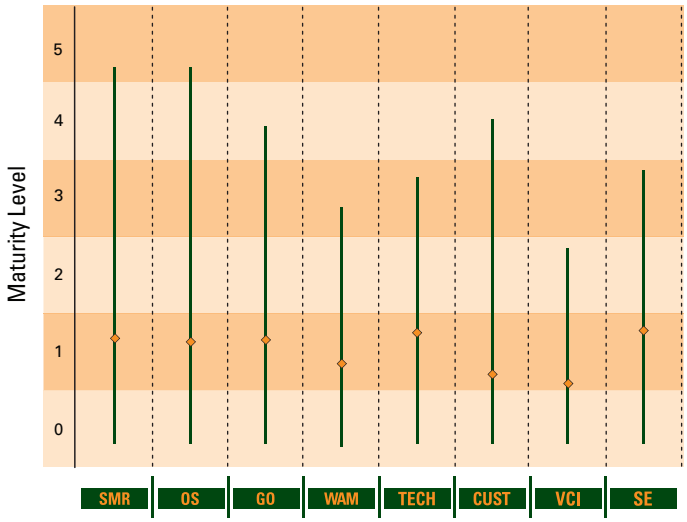


Figure 8: Average and range of maturity scores for all SGMM Compass survey responses

Figure 9: Domain key

NEWS

SGMM Navigation Workshops in India

In the spring of 2011, at the request of the US Department of Energy and US Agency for International Development (USAID), the SEI conducted SGMM Navigation workshops for a group of seven electric utilities in India. This project was conducted under the auspices of the Distribution Reforms, Upgrades and Management (DRUM) initiative of USAID and the Indian Ministry of Power. The original focus of DRUM was to promote centers of excellence to showcase best practices in distribution, workforce training and development, and linkages between Indian and US organizations. The SGMM Navigation project was consistent with these themes and part of an effort to incorporate smart grid into DRUM.

Some 90 individuals from the seven utilities, India's Central Power Research Institute (CPRI), and USAID participated in workshops in Bangalore, Delhi, and Hyderabad in April 2011. The utilities used the SGMM Navigation process first to assess their current smart grid position, and then to discuss and reach consensus on the direction and pace of their smart grid journey. Participants commented that the process was very helpful in framing their smart grid deliberations and guiding their smart grid planning and implementation efforts. The SEI in turn learned a great deal about applying the SGMM in India and similar markets.

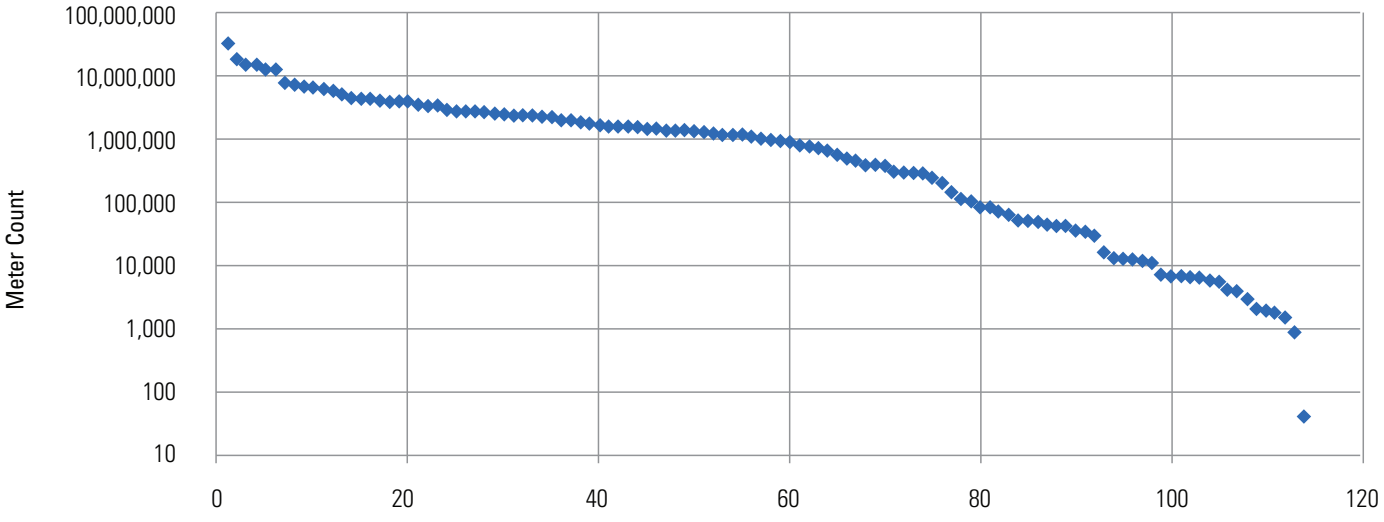


Figure 10: Meter count for SGMM users

SGMM Navigators

SEI-Certified SGMM Navigators help utilities understand and use the SGMM by leading them through a process of assessing where they are against the SGMM and setting their aspirations for grid modernization. The Navigation process helps to build consensus and understanding within the utility about its smart grid status and goals. The Navigator facilitates the completion of the SGMM Compass survey with smart grid stakeholders from throughout the utility. Because the answers collected in the Survey workshop reflect the collective view from people across the utility; and because they are generated with guidance from a skilled Navigator, a more accurate description of the utility's current smart grid status is produced. Once the Compass is scored, the Navigator analyzes the utility's SGMM data to provide findings that yield valuable insights that draw on the Navigator's expertise, knowledge of the SGMM, and familiarity with the utility. During the Aspirations Workshop, the Navigator presents the findings to the organization, and leads utility participants through a process to establish consensus aspirations for grid modernization expressed in SGMM terms and to identify motivations, actions, and obstacles for achieving those aspirations. The output of the Navigation process serves as a strong basis for roadmapping and detailed strategy development at the utility. SGMM Navigators possess the skills and knowledge to assist utilities with their overall plan, using the Navigation process as the starting point.

Figure 11: The 5-step SGMM Navigation process

Become an SEI Partner for SGMM
SEI Partners are the only organizations licensed to provide SEI services. As an SEI Partner for SGMM, your organization will be licensed to provide smart grid services by sponsoring SEI-Certified SGMM Navigators. www.sei.cmu.edu/partners/become/sgmm/

Become an SEI-Certified SGMM Navigator
SEI-Certified SGMM Navigators are industry experts who have been trained and certified to guide utilities through the SGMM Navigation process. Sponsored SEI-Certified SGMM Navigators deliver official licensed SEI SGMM Navigation process services on behalf of SEI Partner organizations. To be eligible to apply for SGMM Navigator certification, you must have experience in the electric power or electric utility domain, as well as proven facilitation skills. Once you have sponsorship and a recommendation from an SEI Partner organization, you can apply, attend training, lead an initial navigation event, and receive your certification. www.sei.cmu.edu/certification/sgmm/navigator/

Visit the SEI SGMM Partner Network
The most current list of SGMM Partners and additional information about them is available online. Use this list to identify SGMM Partners that can help your organization use the SGMM. www.sei.cmu.edu/partners/sgmm

EBIZ LABS™
Information >> Integration >> Intelligence

Horizon Energy Group

IBM

Infotech
Creating Business Impact

SAIC
From Science to Solutions

TATA
TATA CONSULTANCY SERVICES

WIPRO
Applying Thought

SEI Partners for SGMM

EBiz Labs, Inc.

EBiz Labs, Inc. is a full-service technology and management consulting firm serving public and private sector clients in the fields of energy, environment, infrastructure, and global development. Their consultants are key partners to clients in the power industry, providing subject matter expertise and services in support of Their solutions cover business and technology strategy, business process management, enterprise information architecture, systems integration, and control center automation. Learn more at www.ebizlabs.com.

Horizon Energy Group, LLC

Horizon Energy Group (HEG) is a smart grid thought leader and was named a 'Company to Watch' in the book, *Perfect Power* by former Motorola Chairman, Bob Galvin, and former EPRI CEO, Kurt Yeager. HEG leads DOE's Smart Grid Implementation Strategy (SGIS) team at the National Energy Technology Laboratory (NETL). The SGIS team is currently focused on promoting the sharing of smart grid experiences through its new initiative, 'Sharing Smart Grid Experiences through Performance Feedback.' In support of this initiative, HEG and the SGIS team have been trained and certified to assist utilities in evaluating their smart grid strategies through the SGMM Navigation process. Learn more at www.horizonenergygroup.com.

IBM

IBM is involved in more than 150 smart grid engagements around the world, in both mature and emerging markets. More about IBM's vision to bring a new level of intelligence to how the world works—how every person, business, organization, government, natural system, and man-made system interacts, can be found at www.ibm.com/smarterplanet/grid.

(IBM and the IBM logo are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide.)

Infotech Enterprises America, Inc.

Infotech Enterprises provides leading-edge engineering solutions, including product, process, network, and content engineering to major organizations worldwide. With nearly two decades of continuous growth, Infotech leverages a "Global Delivery and Collaborative Engineering Model" to achieve measurable and substantial benefits for our clients.
Learn more at www.infotech-enterprises.com.

SAIC Energy, Environment & Infrastructure, LLC

In today's challenging market, driving performance requires innovative solutions that overlap energy, environmental, infrastructure, and business considerations–all in a capital-constrained market. From integrating technologies to designing, building, and operating infrastructure systems, SAIC helps its customers mitigate their costs and risks by bringing the right people, technology, and systems together and leveraging knowledge across the business life cycle to deliver the innovative, integrated solutions their customers require. At SAIC, they solve hard problems and deliver sustainable solutions that can support a better quality of life for generations to come. Learn more at www.saic.com.

TCS America

Tata Consultancy Services is an IT services, business solutions, and outsourcing organization that delivers real results to global businesses, ensuring a level of certainty that no other firm can match. TCS offers a consulting-led integrated portfolio of IT and IT-enabled services delivered through its unique Global Network Delivery Model™ (GNDM™), recognized as the benchmark of excellence in software development. TCS is part of the Tata group, one of India's largest industrial conglomerates and most respected brands. TCS is backed by significant breadth and depth of experience from working in the power sector across various geographies. Its strong domain focus, relevant investments in developing its strengths, and strong partner ecosystem make it a partner of choice. Learn more at www.tcs.com.

Wipro

Wipro Technologies is a global services provider delivering technology-driven business solutions that meet the strategic objectives of its clients. It is the leading provider of integrated business, technology, and process solutions on a global delivery platform with a presence across North America, Europe, Japan, and Asia. With combined IT practitioners and domain consultants of 72,000, serving 647 global clients, it has 54 development centers across the globe. Wipro delivers capabilities across healthcare, banking, financial services, insurance, securities, retail, energy, utilities, manufacturing, product engineering and telecom.
Learn more at www.wipro.com.

Smart Grid Maturity Model: Matrix

The Matrix offers a summary view of the Smart Grid Maturity Model. It has an easy-to-access format with shortened versions of the expected characteristics contained in the model and is an excellent reference for SGMM users.

	Strategy, Management, and Regulatory (SMR) vision, planning, governance, stakeholder collaboration	**Organization and Structure (OS)** culture, structure, training, communications, knowledge management
PIONEERING **5**	1 Smart grid strategy capitalizes on smart grid as a foundation for the introduction of new services and product offerings. 2 Smart grid business activities provide sufficient financial resources to enable continued investment in smart grid sustainment and expansion. 3 New business model opportunities emerge as a result of smart grid capabilities and are implemented.	1 The organizational structure enables collaboration with other grid stakeholders to optimize overall grid operation and health. 2 The organization is able to readily adapt to support new ventures, products, and services that emerge as a result of smart grid. 3 Channels are in place to harvest ideas, develop them, and reward those who help shape future advances in process, workforce competencies, and technology.
OPTIMIZING **4**	1 Smart grid vision and strategy drive the organization's strategy and direction. 2 Smart grid is a core competency throughout the organization. 3 Smart grid strategy is shared and revised collaboratively with external stakeholders.	1 Management systems and organizational structure are capable of taking advantage of the increased visibility and control provided by smart grid. 2 There is end-to-end grid observability that can be leveraged by internal and external stakeholders. 3 Decision making occurs at the closest point of need as a result of an efficient organizational structure and the increased availability of information due to smart grid.
INTEGRATING **3**	1 The smart grid vision, strategy, and business case are incorporated into the vision and strategy. 2 A smart grid governance model is established. 3 Smart grid leaders with explicit authority across functions and lines of business are designated to ensure effective implementation of the smart grid strategy. 4 Required authorizations for smart grid investments have been secured.	1 The smart grid vision and strategy are driving organizational change. 2 Smart grid measures are incorporated into the measurement system. 3 Performance and/or compensation are linked to smart grid success. 4 Leadership is consistent in communication and actions regarding smart grid. 5 A matrix or overlay structure to support smart grid activities is in place. 6 Education and training are aligned to exploit smart grid capabilities.
ENABLING **2**	1 An initial smart grid strategy and a business plan are approved by management. 2 A common smart grid vision is accepted across the organization. 3 Operational investment is explicitly aligned to the smart grid strategy. 4 Budgets are established specifically for funding the implementation of the smart grid vision. 5 There is collaboration with regulators and other stakeholders regarding implementation of the smart grid vision and strategy. 6 There is support and funding for conducting proof-of-concept projects to evaluate feasibility and alignment.	1 A new vision for a smart grid begins to drive change and affect related priorities. 2 Most operations have been aligned around end-to-end processes. 3 Smart grid implementation and deployment teams include participants from all impacted functions and LOBs. 4 Education and training to develop smart grid competencies have been identified and are available. 5 The linking of performance and/or compensation plans to achieve smart grid milestones is in progress.
INITIATING **1**	1 Smart grid vision is developed with a goal of operational improvement. 2 Experimental implementations of smart grid concepts are supported. 3 Discussions have been held with regulators about the organization's smart grid vision.	1 The organization has articulated its need to build smart grid competencies in its workforce. 2 Leadership has demonstrated a commitment to change the organization in support of achieving smart grid. 3 Smart grid awareness efforts to inform the workforce of smart grid activities have been initiated.
DEFAULT **0**		

Smart Grid Maturity Model: Matrix

	Grid Operations (GO) reliability, efficiency, security, safety, observability, control	**Work and Asset Management (WAM)** asset monitoring, tracking and maintenance, mobile workforce
PIONEERING **5**	1 Self-healing capabilities are present. 2 System-wide, analytics-based, and automated grid decision making is in place.	1 The use of assets between and across supply chain participants is optimized with processes defined and executed across the supply chain. 2 Assets are leveraged to maximize utilization, including just-in-time asset retirement, based on smart grid data and systems.
OPTIMIZING **4**	1 Operational data from smart grid deployments is being used to optimize processes across the organization. 2 Grid operational management is based on near real-time data. 3 Operational forecasts are based on data gathered through smart grid. 4 Grid operations information has been made available across functions and LOBs. 5 There is automated decision-making within protection schemes that is based on wide-area monitoring.	1 A complete view of assets based on status, connectivity, and proximity is available to the organization. 2 Asset models are based on real performance and monitoring data. 3 Performance and usage of assets is optimized across the asset fleet and across asset classes. 4 Service life for key grid components is managed through condition-based and predictive maintenance, and is based on real and current asset data.
INTEGRATING **3**	1 Smart grid information is available across systems and organizational functions. 2 Control analytics have been implemented and are used to improve cross-LOB decision-making. 3 Grid operations planning is now fact-based using grid data made available by smart grid capabilities. 4 Smart meters are important grid management sensors. 5 Grid data is used by an organization's security functions. 6 There is automated decision-making within protection schemes.	1 Performance, trend analysis, and event audit data are available for components of the organization's systems. 2 CBM programs for key components are in place. 3 Remote asset monitoring capabilities are integrated with asset management. 4 Integration of remote asset monitoring with mobile workforce systems, in order to automate work order creation, is underway. 5 An integrated view of GIS and asset monitoring is in place. 6 Asset inventory is being tracked using automation. 7 Modeling of asset investments for key components is underway.
ENABLING **2**	1 Distribution substations are automated and linked to some form of remote distribution automation. 2 Advanced outage restoration schemes are being implemented, which resolve or reduce the magnitude of unplanned outages. 3 Aside from SCADA, piloting of remote asset monitoring of key grid assets to support manual decision making is underway. 4 Investment in and expansion of data communications networks in support of grid operations is underway.	1 An approach to track, inventory, and maintain event histories of assets is in development. 2 An integrated view of GIS for asset monitoring based on location, status, and interconnectivity (nodal) has been developed. 3 An organization-wide mobile workforce strategy is in development.
INITIATING **1**	1 Business cases for new equipment and systems related to smart grid are approved. 2 New sensors, switches, and communications technologies are evaluated for grid monitoring and control. 3 Proof-of-concept projects and component testing for grid monitoring and control are underway. 4 Outage and distribution management systems linked to substation automation are being explored and evaluated. 5 Safety and security (physical and cyber) requirements are considered.	1 Enhancements to work and asset management have been built into approved business cases. 2 Potential uses of remote asset monitoring are being evaluated. 3 Asset and workforce management equipment and systems are being evaluated for their potential alignment to the smart grid vision.
DEFAULT **0**		

Smart Grid Maturity Model: Matrix

	Technology (TECH) IT architecture, standards, infrastructure, integration, tools	**Customer (CUST)** pricing, customer participation and experience, advanced services
PIONEERING **5**	1 Autonomic computing and machine learning are implemented. 2 The enterprise information infrastructure can automatically identify, mitigate, and recover from cyber incidents.	1 Customers can manage their end-to-end energy supply and usage levels. 2 There is automatic outage detection at the premise or device level. 3 Plug-and-play, customer-based generation is supported. 4 Security and privacy for all customer data is assured. 5 The organization plays a leadership role in industry-wide information sharing and standards development efforts for smart grid.
OPTIMIZING **4**	1 Data flows end to end from customer to generation. 2 Business processes are optimized by leveraging the enterprise IT architecture. 3 Systems have sufficient wide-area situational awareness to enable real-time monitoring and control for complex events. 4 Predictive modeling and near real-time simulation are used to optimize support processes. 5 Performance is improved through sophisticated systems that are informed by smart grid data. 6 Security strategy and tactics continually evolve based on changes in the operational environment and lessons learned.	1 Support is provided to customers to help analyze and compare usage against all available pricing programs. 2 There is outage detection and proactive notification at the circuit level. 3 Customers have access to near real-time data on their own usage. 4 Residential customers participate in demand response and/or utility-managed remote load control programs. 5 Automatic response to pricing signals for devices within the customer's premise is supported. 6 In-home net billing programs are enabled. 7 A common customer experience has been integrated.
INTEGRATING **3**	1 Smart grid-impacted business processes are aligned with the enterprise IT architecture across LOBs. 2 Systems adhere to an enterprise IT architectural framework for smart grid. 3 Smart grid-specific technology has been implemented to improve cross-LOB performance. 4 The use of advanced distributed intelligence and analytical capabilities are enabled through smart grid technology. 5 The organization has an advanced sensor plan. 6 A detailed data communication strategy and corresponding tactics that cross functions and LOBs are in place.	1 The organization tailors programs to customer segments. 2 Two-way meter communication has been deployed. 3 A remote connect/disconnect capability is deployed. 4 Demand response and/or remote load control is available to residential customers. 5 There is automatic outage detection at the substation level. 6 Residential customers have on-demand access to daily usage data. 7 A common experience has been implemented across two or more customer interface channels. 8 Customer education on how to use smart grid services to curtail peak usage is provided. 9 All customer products and services have built-in standards based on security and privacy controls.
ENABLING **2**	1 Tactical IT investments are aligned to an enterprise IT architecture within an LOB. 2 Changes to the enterprise IT architecture that enable smart grid are being deployed. 3 Standards are selected to support the smart grid strategy within the enterprise IT architecture. 4 A common technology evaluation and selection process is applied for all smart grid activities. 5 There is a data communications strategy for the grid. 6 Pilots based on connectivity to distributed IEDs are underway. 7 Security is built into all smart grid initiatives from the outset.	1 Pilots of remote AMI/AMR are being conducted or have been deployed. 2 The organization has frequent (more than monthly) knowledge of residential customer usage. 3 The organization is modeling the reliability of grid equipment. 4 Remote connect/disconnect is being piloted for residential customers. 5 The impact on the customer of new services and delivery processes is being assessed. 6 Security and privacy requirements for customer protection are specified for smart grid-related pilot projects and RFPs.
INITIATING **1**	1 An enterprise IT architecture exists or is under development. 2 Existing or proposed IT architectures have been evaluated for quality attributes that support smart grid applications. 3 A change control process is used for applications and IT infrastructure. 4 Opportunities are identified to use technology to improve departmental performance. 5 There is a process to evaluate and select technologies in alignment with smart grid vision and strategies.	1 Research is being conducted on how to use smart grid technologies to enhance the customer's experience, benefits, and participation. 2 Security and privacy implications of smart grid are being investigated. 3 A vision of the future grid is being communicated to customers. 4 The utility consults with public utility commissions and/or other government organizations concerning the impact on customers.
DEFAULT **0**		

Smart Grid Maturity Model: Matrix

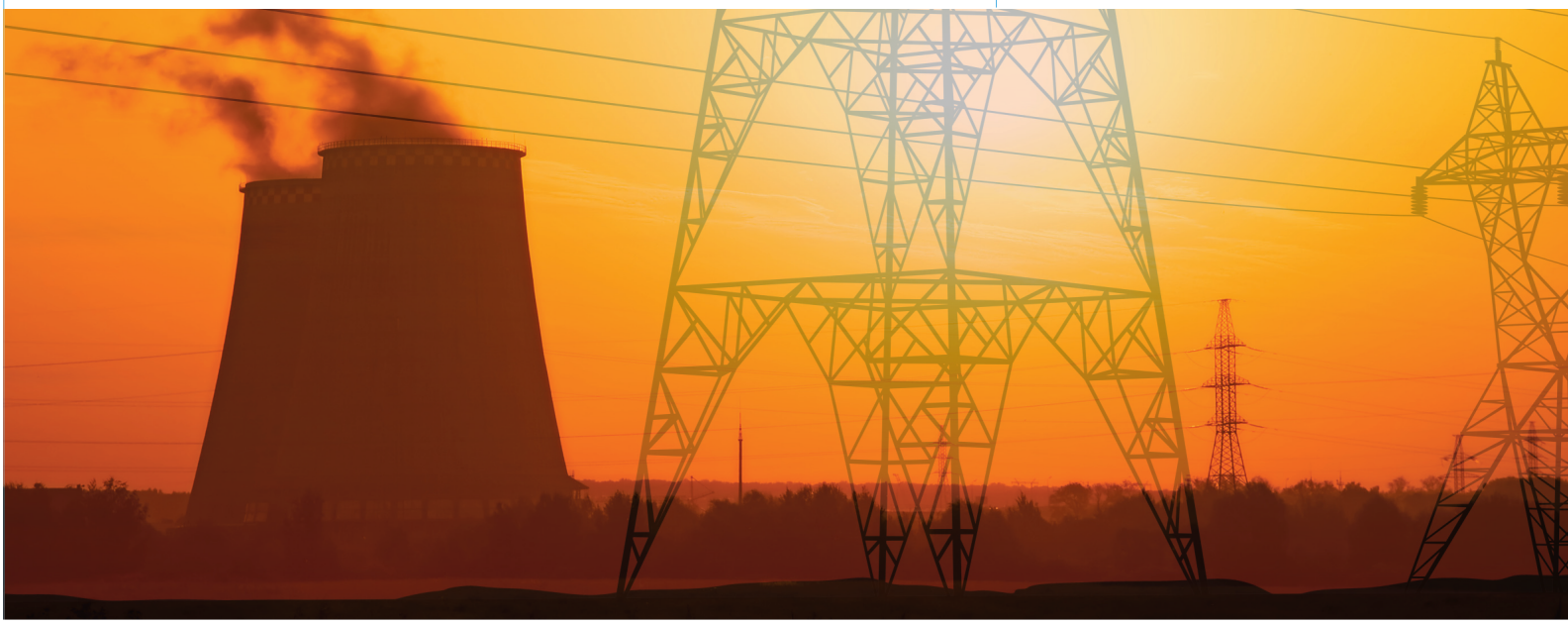
	Value Chain Integration (VCI) demand and supply management, leveraging market opportunities	**Societal and Environmental (SE)** responsibility, sustainability, critical infrastructure, efficiency
PIONEERING **5**	1 The optimization of energy assets is automated across the full value chain. 2 Resources are adequately dispatchable and controllable so that the organization can take advantage of granular market options. 3 Automated control and resource optimization schemes consider and support regional and/or national grid optimization.	1 Triple bottom line goals align with local, regional, and national objectives. 2 Customers control their energy-based environmental footprints through automatic optimization of their end-to-end energy supply and usage level (energy source and mix). 3 The organization is a leader in developing and promoting industry-wide resilience best practices and/or technologies for protection of the national critical infrastructure.
OPTIMIZING **4**	1 Energy resources (including Volt/VAR, DG, and DR) are dispatchable and tradable. 2 Portfolio optimization models that encompass available resources and real-time markets are implemented. 3 Secure two-way communications with Home Area Networks (HANs) are available. 4 Visibility and potential control of customers' large-demand appliances to balance demand and supply is available.	1 The organization collaborates with external stakeholders to address environmental and societal issues. 2 A public environmental and societal scorecard is maintained. 3 Programs are in place to shave peak demand. 4 End-user energy usage and devices are actively managed through the utility's network. 5 The organization fulfills its critical infrastructure assurance goals for resilience, and contributes to those of the region and the nation.
INTEGRATING **3**	1 An integrated resource plan is in place and includes new targeted resources and technologies. 2 Customer premise energy management solutions with market and usage information are enabled. 3 Additional resources are available and deployed to provide substitutes for market products to support reliability or other objectives. 4 Security management and monitoring processes are deployed to protect the interactions with an expanded portfolio of value chain partners.	1 Performance of societal and environmental programs are measured and effectiveness is demonstrated. 2 Segmented and tailored information that includes environmental and societal benefits and costs is available to customers. 3 Programs to encourage off-peak usage by customers are in place. 4 The organization regularly reports on the societal and environmental impacts of its smart grid programs and technologies.
ENABLING **2**	1 Support is provided for energy management systems for residential customers. 2 The value chain has been redefined based on its smart grid capabilities. 3 Pilots to support a diverse resource portfolio have been conducted. 4 Secure interactions have been piloted with an expanded portfolio of value chain partners.	1 Smart-grid strategies and work plans address societal and environmental issues. 2 Energy efficiency programs for customers have been established. 3 The organization considers a "triple bottom line" view when making decisions. 4 Environmental proof-of-concept projects are underway that demonstrate smart grid benefits. 5 Increasingly granular and more frequent consumption information is available to customers.
INITIATING **1**	1 Assets and programs necessary to facilitate load management are identified. 2 Distributed generation sources and the capabilities needed to support them are identified. 3 Energy storage options and the capabilities needed to support them are identified. 4 There is a strategy for creating and managing a diverse resource portfolio. 5 Security requirements to enable interaction with an expanded portfolio of value chain partners have been identified.	1 The smart grid strategy addresses the organization's role in societal and environmental issues. 2 The environmental benefits of the smart grid vision and strategy are publicly promoted. 3 Environmental compliance performance records are available for public inspection. 4 The smart grid vision or strategy specifies the organization's role in protecting the nation's critical infrastructure.
DEFAULT **0**		

About the Software Engineering Institute

In 2009, Carnegie Mellon University's Software Engineering Institute (SEI) became the steward of the SGMM. A global leader in software and systems engineering, security best practices, process improvement, and maturity modeling, the SEI is partnering with government and industry to improve the security, resiliency, and interoperability of the grid. With the support of the Department of Energy and the National Energy Technology Laboratory, the SEI and its collaborator APQC are maintaining and evolving the SGMM as a resource for industry transformation.

About APQC

APQC is a non-profit, member-based research organization with more than 30 years of systematic quality and process improvement research experience. APQC is working in collaboration with the SEI to evolve the SGMM and to analyze and maintain the data collected from organizations that use the SGMM.



For general information about the SEI and for information about the SGMM

Phone: 412-268-5800
FAX: 412-268-6257
info@sei.cmu.edu

Software Engineering Institute
4500 Fifth Avenue
Pittsburgh, PA 15313-2612
www.sei.cmu.edu

Get the latest release of the SGMM at www.sei.cmu.edu/goto/SGMM

LinkedIn: Smart Grid Maturity Model User Forum

Twitter: @SGMM_Navigator