Solutions. Experts. Insights.

SEI TECHNOLOGIES FORUM

Software Engineering Institute | Carnegie Mellon

Smart Grid Maturity Model: A Vision for the Future of Smart Grid

David W. White
Smart Grid Maturity Model Project Manager

White is a member of the Resilient Enterprise Management (REM) team in the CERT Program at the SEI. The REM team performs research and development in the areas of operational resilience, critical infrastructure protection, and smart grid deployment. He is the project manager and a core member of the development team for the SEI Smart Grid Maturity Model (SGMM), a business tool to assist utilities in planning and tracking progress on their grid modernization efforts. *David White photo courtesy of Richard L. Kuper

.

Outline

SGMM Introduction

2011 SGMM Milestones

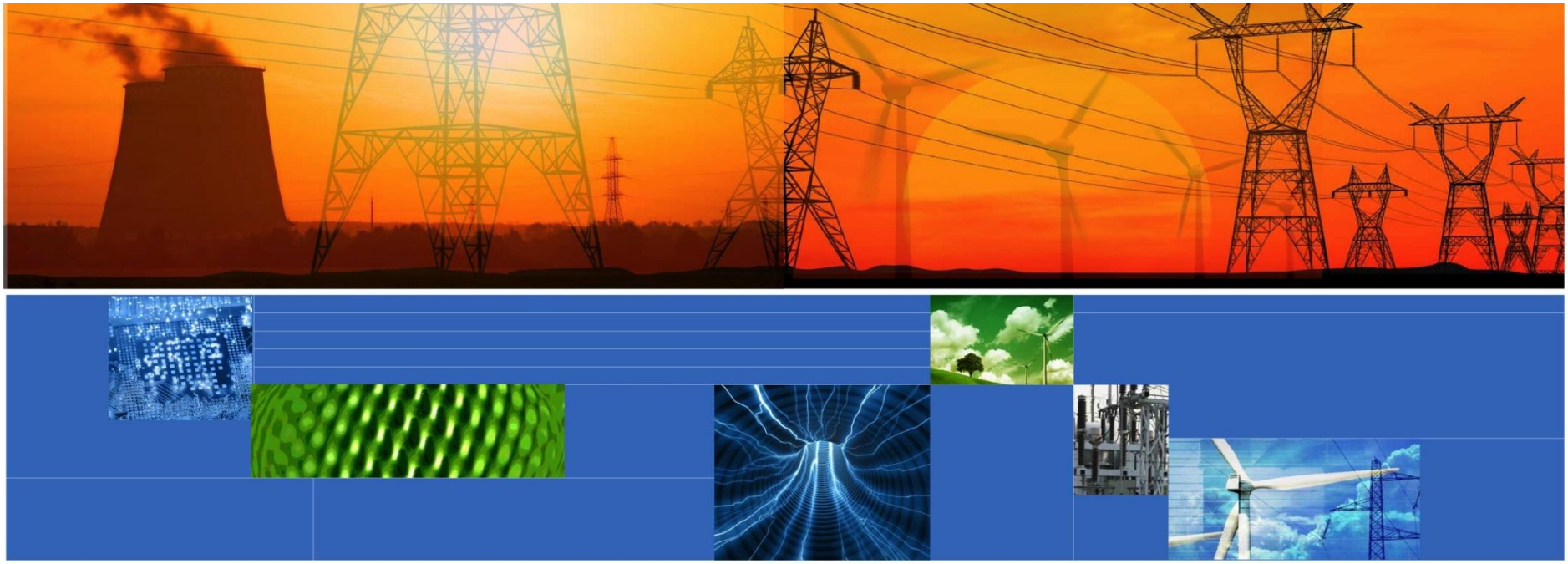
- Version 1.2 release
- Building a community of SGMM Navigators
- SGMM usage highlight: the California-SAIC project
- SGMM community data as of September 2011

Conclusion and discussion

A major power grid transformation is underway

Utilities use the SGMM to:

- Develop effective roadmaps
- Track progress
- Understand their posture in comparison to peers



What is the Smart Grid Maturity Model?

SGMM is a

MANAGEMENT TOOL

that provides a

COMMON LANGUAGE & FRAMEWORK

for defining key elements of

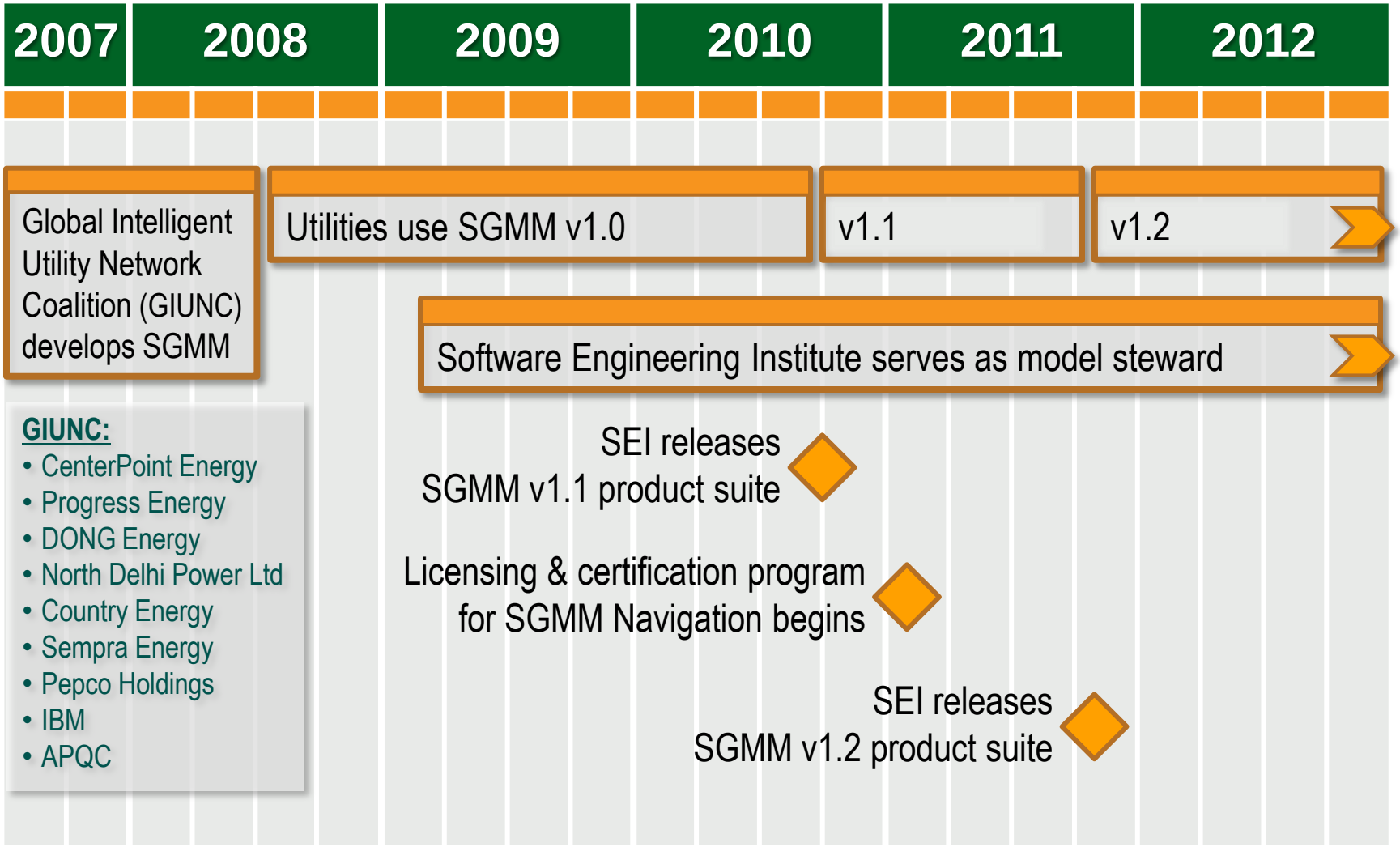
SMART GRID TRANSFORMATION

and helps utilities develop a

PROGRAMMATIC APPROACH

and track their progress.

SGMM timeline



Developed by utilities for utilities

SGMM

Smart Grid Maturity Model

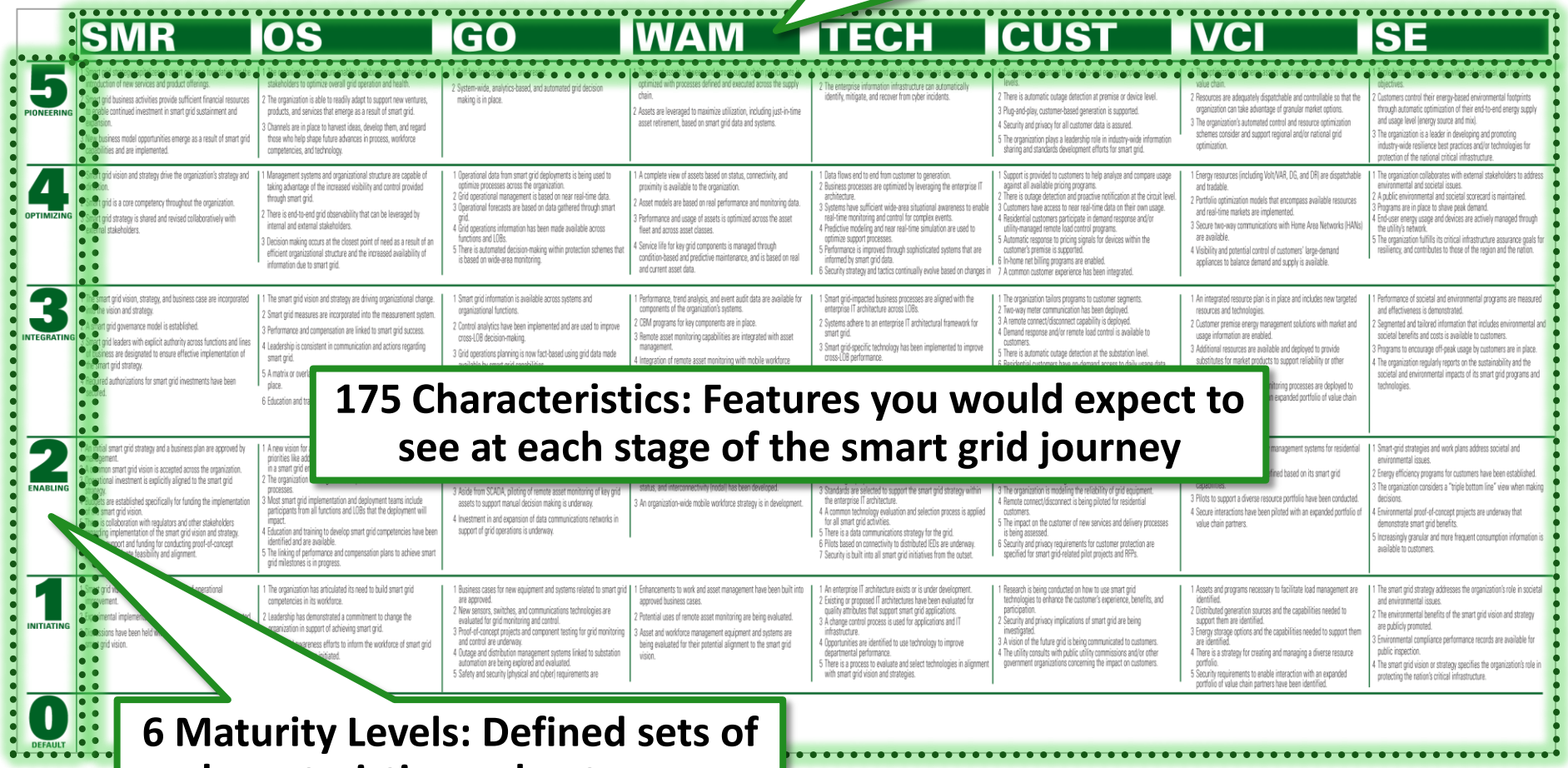
V 1.2 Product Suite

Model	• Model Definition document • Matrix
Compass Survey	• Compass survey yields maturity ratings and performance comparisons
Navigation Process	• Facilitated completion and interpretation of Compass, led by a certified "SGMM Navigator"
Training	• Overview Seminar • SGMM Navigator Course
Licensing	• License organizations and certify individuals to deliver Navigation process

www.sei.cmu.edu/smartgrid

SGMM at a glance

8 Domains: Logical groupings of smart grid related capabilities and characteristics



175 Characteristics: Features you would expect to see at each stage of the smart grid journey

6 Maturity Levels: Defined sets of characteristics and outcomes

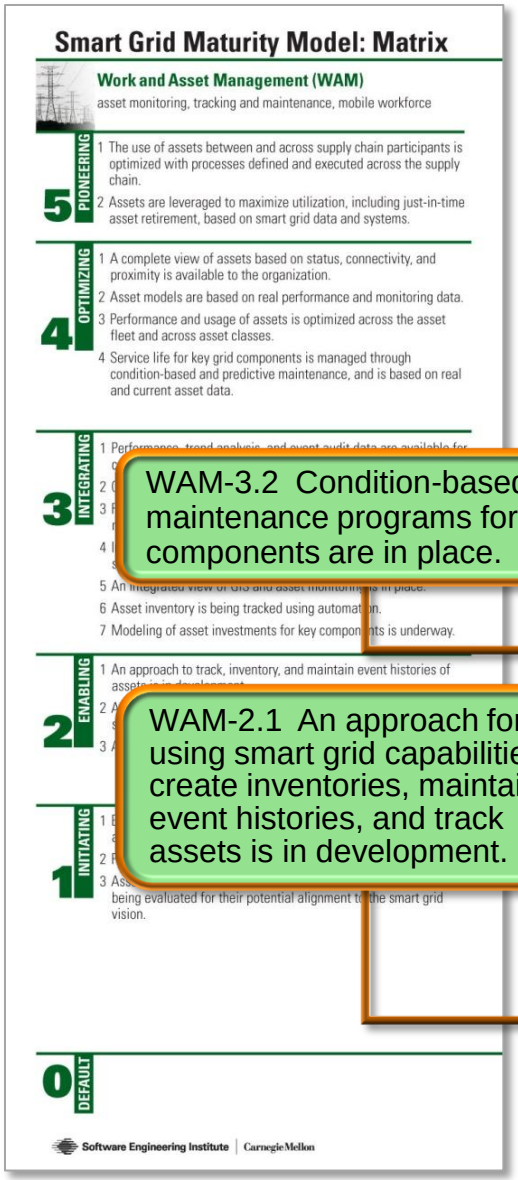
Smart Grid Maturity Model – levels

PIONEERING **5**	Breaking new ground; industry-leading innovation
OPTIMIZING **4**	Optimizing smart grid to benefit entire organization; may reach beyond organization; increased automation
INTEGRATING **3**	Integrating smart grid deployments across the organization, realizing measurably improved performance
ENABLING **2**	Investing based on clear strategy, implementing first projects to enable smart grid (may be compartmentalized)
INITIATING **1**	Taking the first steps, exploring options, conducting experiments, developing smart grid vision
DEFAULT **0**	Default level (status quo)

Smart Grid Maturity Model – domains

SMR	**Strategy, Mgmt & Regulatory** *Vision, planning, governance, stakeholder collaboration*	TECH	**Technology** *IT architecture, standards, infrastructure, integration, tools*
OS	**Organization and Structure** *Culture, structure, training, communications, knowledge mgmt*	CUST	**Customer** *Pricing, customer participation & experience, advanced services*
GO	**Grid Operations** *Reliability, efficiency, security, safety, observability, control*	VCI	**Value Chain Integration** *Demand & supply management, leveraging market opportunities*
WAM	**Work & Asset Management** *Asset monitoring, tracking & maintenance, mobile workforce*	SE	**Societal & Environmental** *Responsibility, sustainability, critical infrastructure, efficiency*

SGMM Compass Survey



Contains

- One question for each expected characteristic in the model and
- Attribute and performance questions

Example questions:

WAM-3.2 Condition-based maintenance programs for key components are in place.

WAM-3.2 For what percentage of key components have you implemented condition-based maintenance?

- ☐ A. 0%
- ☐ B. 1 - 25%
- ☐ C. 26 - 50%
- ☐ D. 51 - 75%
- ☐ E. 76 - 100%

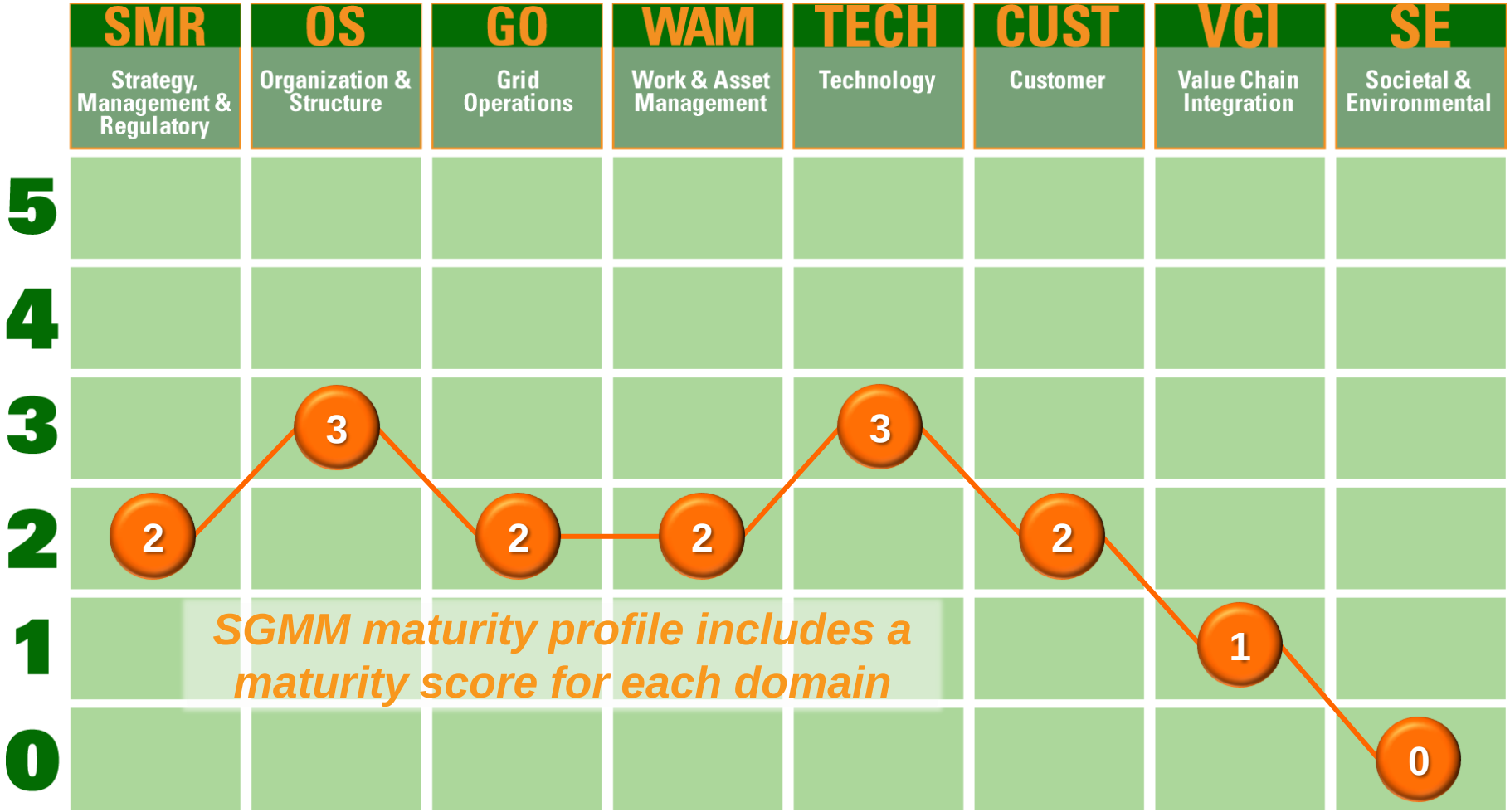
WAM-2.1 An approach for using smart grid capabilities to create inventories, maintain event histories, and track assets is in development.

WAM-2.1 Have you established an approach to track, inventory, and maintain event histories of assets using smart grid capabilities?

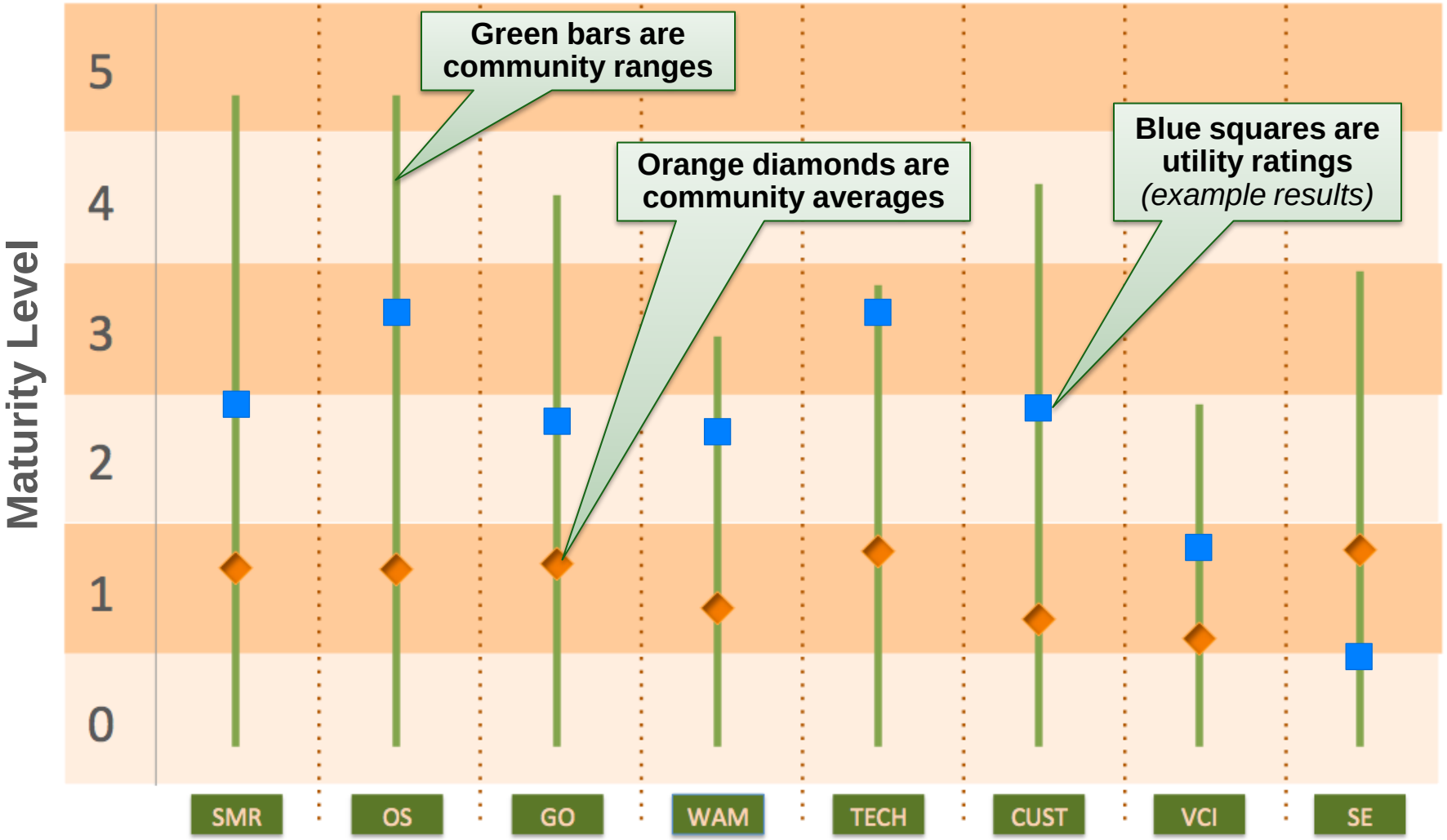
- ☐ A. No
- ☐ B. In documented plan including committed schedule and budget
- ☐ C. In development
- ☐ D. Being piloted
- ☐ E. Completed

Example results
Fictitious organization

Compass results: maturity profile

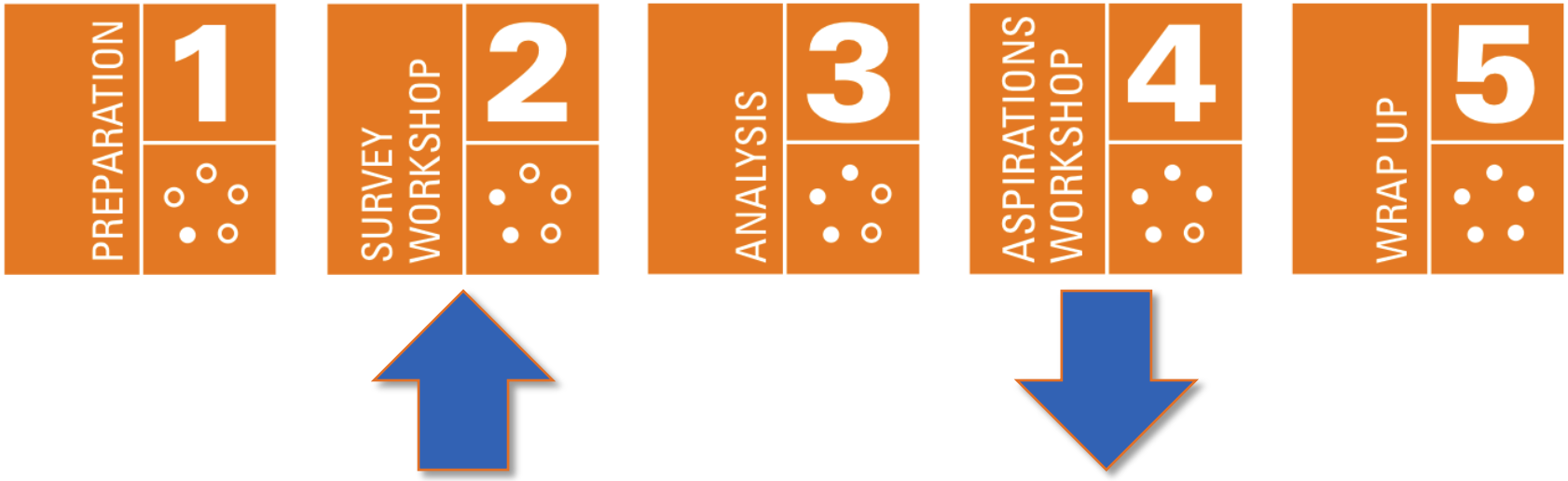


Compass results: summary community data provided for comparison



Community data as of September 2011

SGMM Navigation: five-step, expert led process



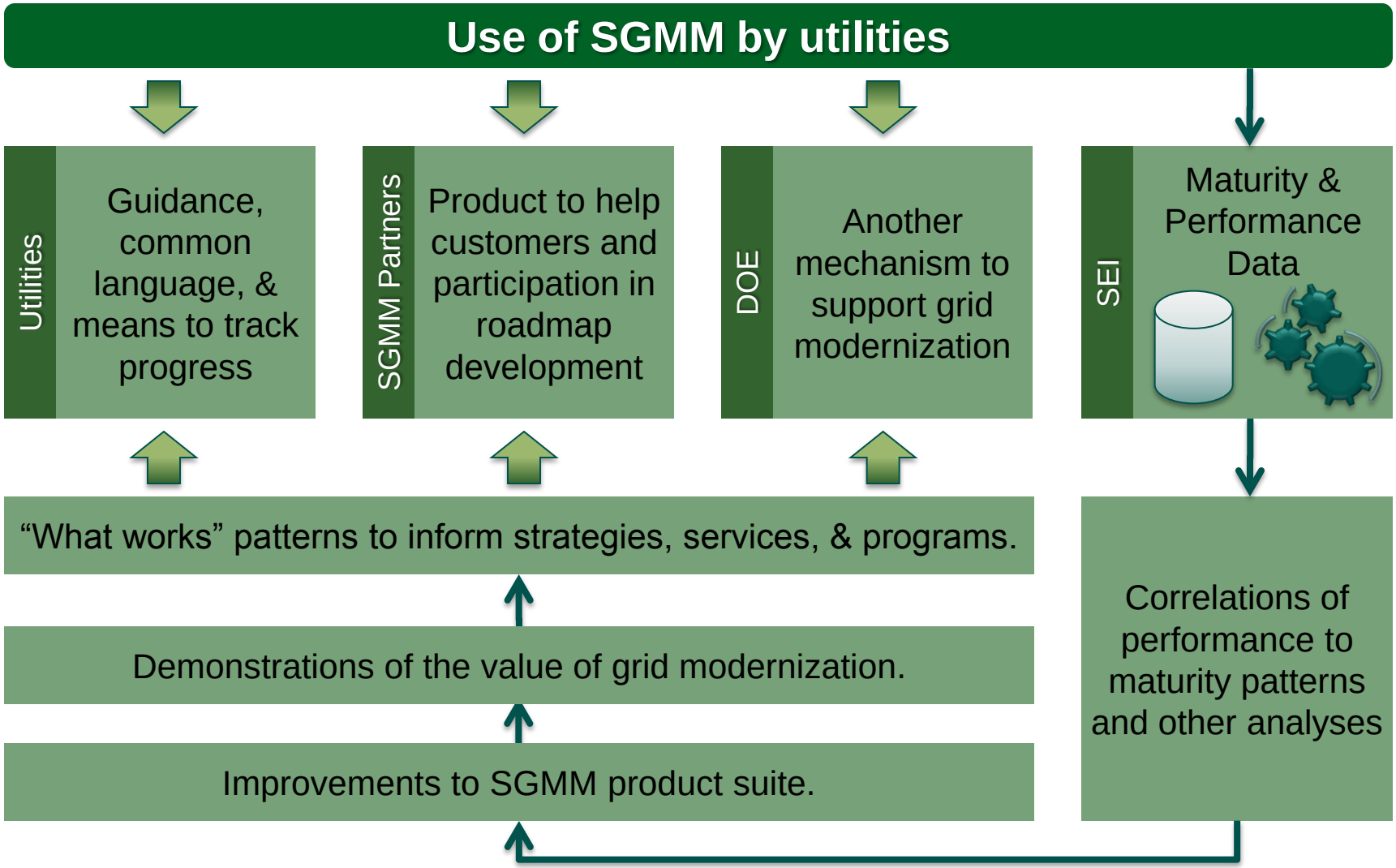
Stakeholders complete SGMM Compass survey

Discussion and consensus answers lead to internal alignment on current state

Stakeholders review survey findings & set aspirational profile

Consensus on aspirational state and identification of motivations, actions, and obstacles to achieve it

SGMM benefits – a community view



Outline

SGMM Introduction

2011 SGMM Milestones

- Version 1.2 release
- Building a community of SGMM Navigators
- SGMM usage highlight: the California-SAIC project
- SGMM community data as of September 2011

Conclusion and discussion

SGMM Version 1.2

Released in September 2011

Changes:

- New and revised SGMM Compass questions about utility attributes and performance
  - Enable better segmentation
  - Inform Aspirations workshop
- End of pilot licensing period — licensing now open to all qualified applicants
- Updates to all product elements based on community feedback

Outline

SGMM Introduction

2011 SGMM Milestones

- Version 1.2 release
- Building a community of SGMM Navigators
- SGMM usage highlight: the California-SAIC project
- SGMM community data as of September 2011

Conclusion and discussion

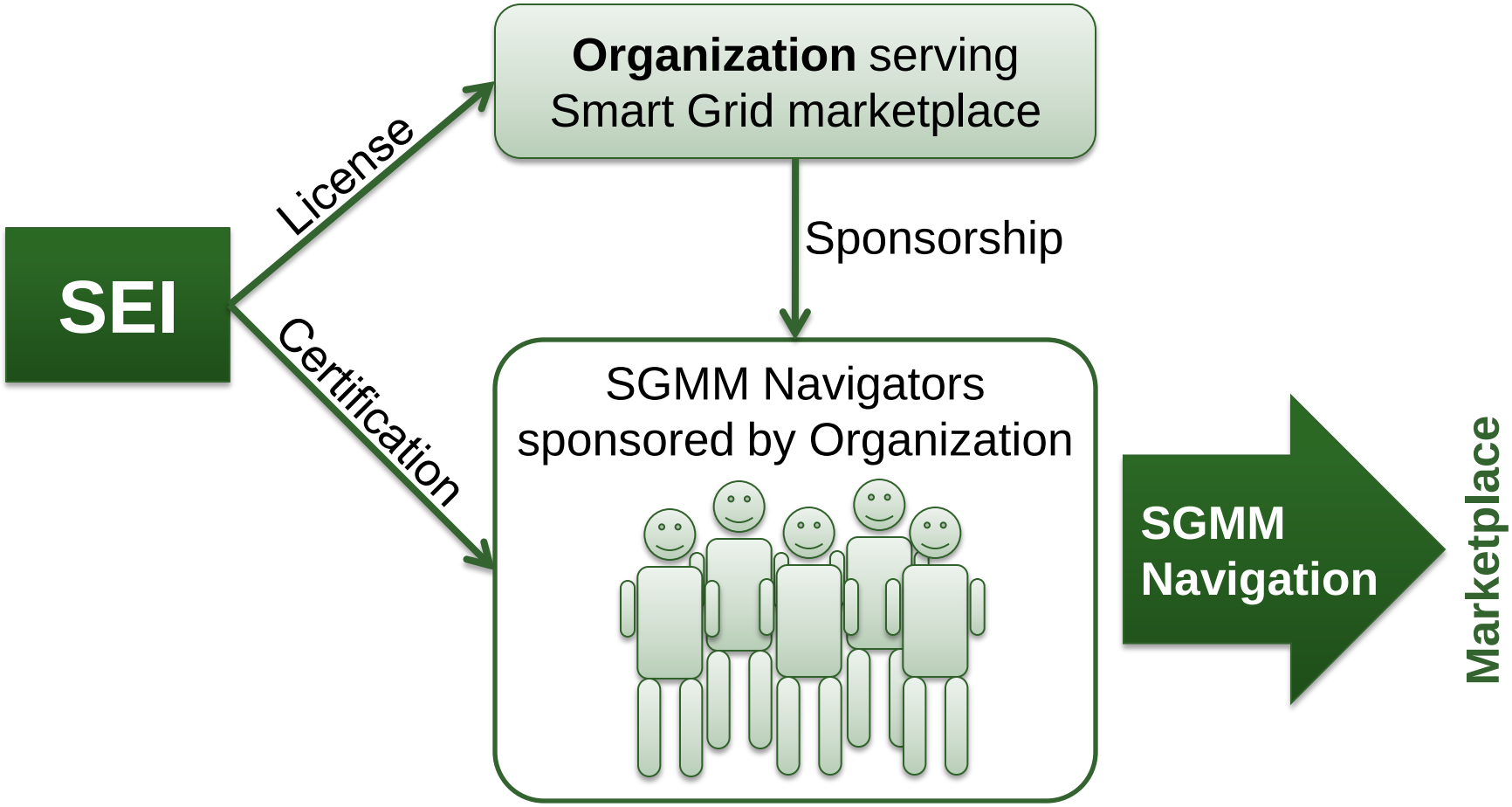
SGMM licensing & certification

Licensing and certification are core elements of our strategy to promote and enable broad adoption and use of the SGMM.

Licensed organizations (SGMM Partners) are able to

- Offer SGMM Navigation as a service, which must be delivered by SEI-Certified SGMM Navigators
- Sponsor individuals to become SEI-Certified SGMM Navigators
- Participate in the ongoing evolution of the SGMM product suite

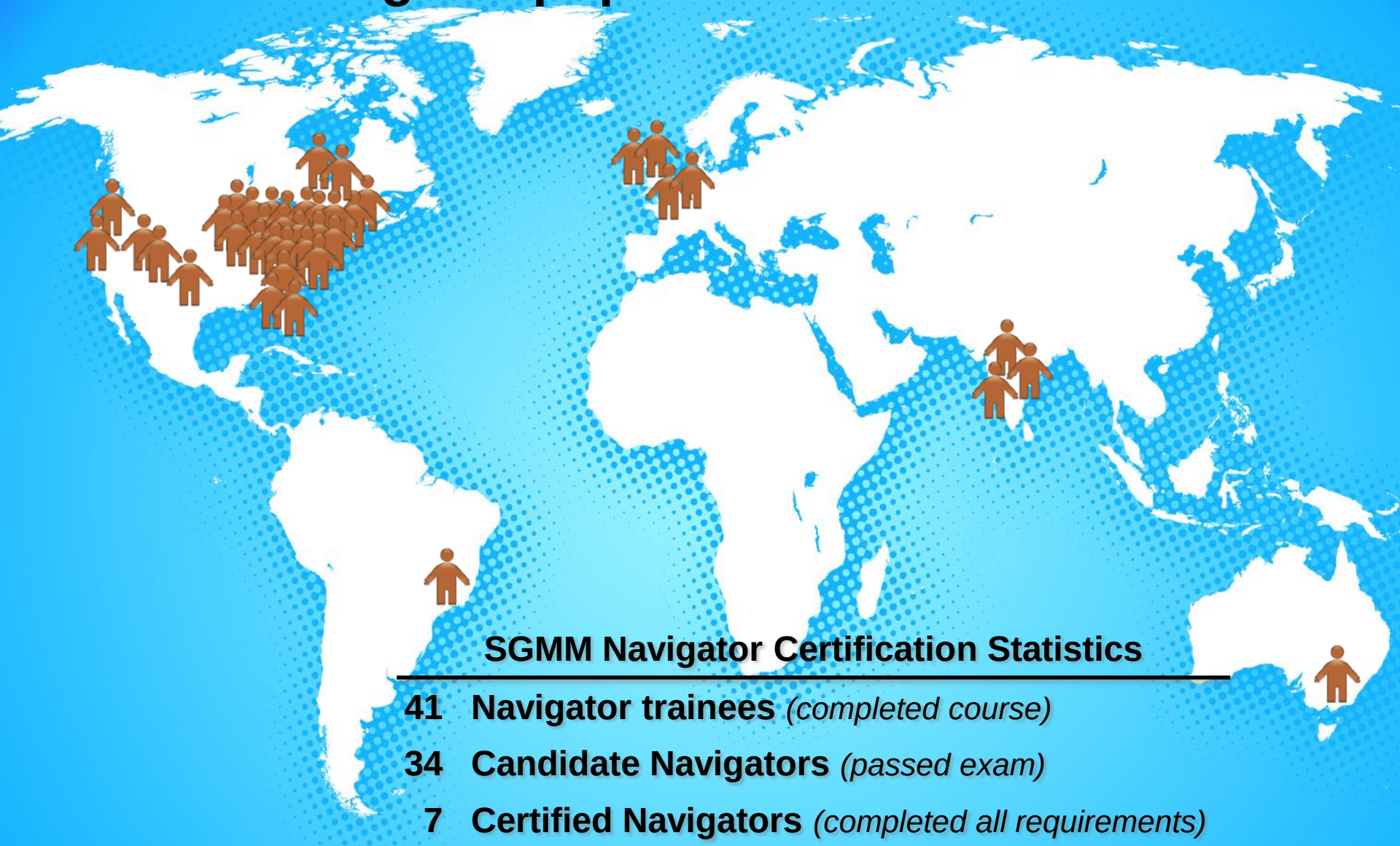
Licensing & certification program structure



Current SGMM Partners: seven total

www.sei.cmu.edu/partners/sgmm

SGMM Navigator population



SGMM Navigator Certification Statistics

41 **Navigator trainees** *(completed course)*

34 **Candidate Navigators** *(passed exam)*

7 **Certified Navigators** *(completed all requirements)*

Outline

SGMM Introduction

2011 SGMM Milestones

- Version 1.2 release
- Building a community of SGMM Navigators
- SGMM usage highlight: the California-SAIC project
- SGMM community data as of September 2011

Conclusion and discussion

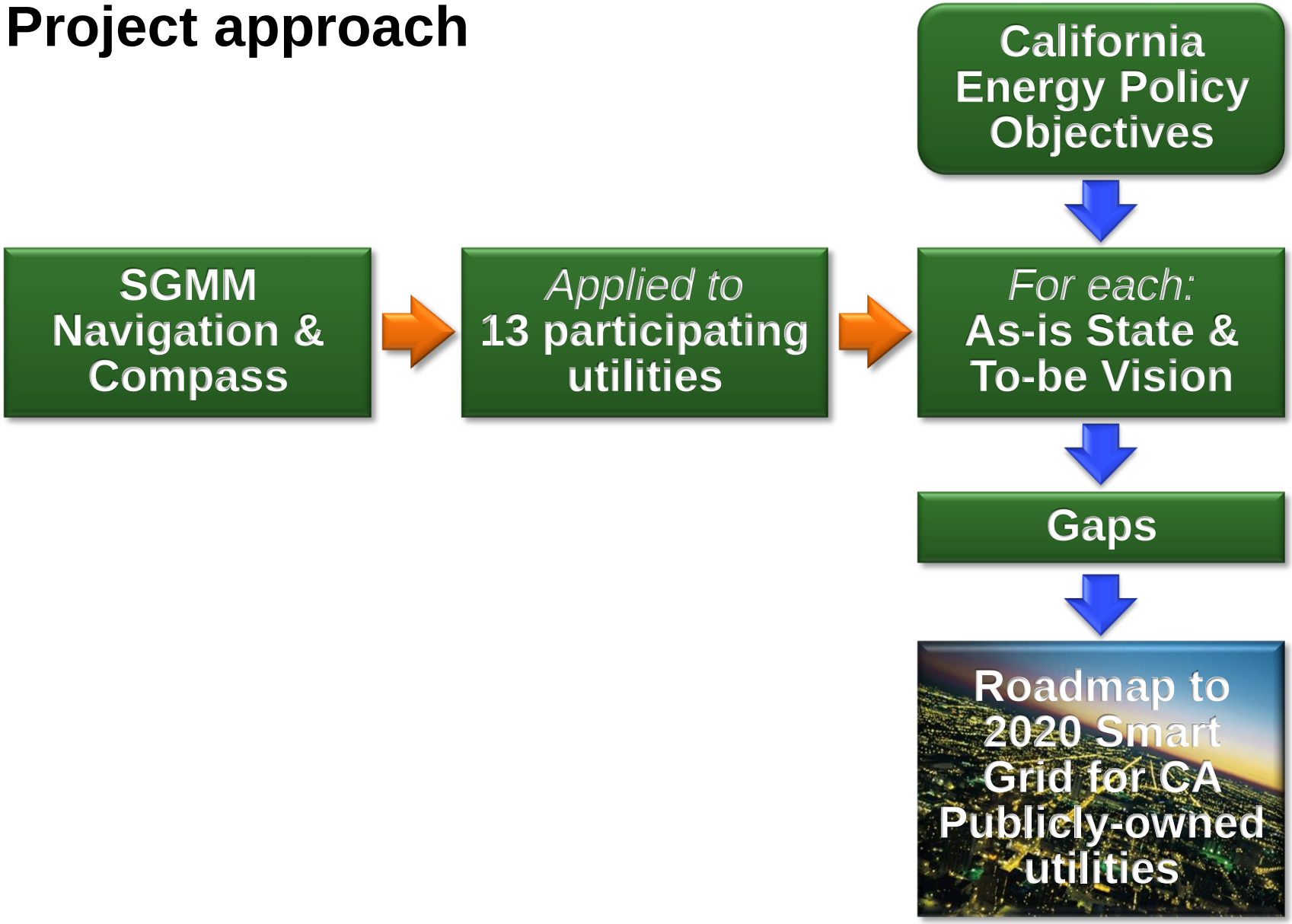
CA public utilities 2020 roadmap project

Project objective: develop a roadmap to smart grid implementation in 2020 for California's publicly-owned utilities (POUs) that helps to achieve state energy policy objectives

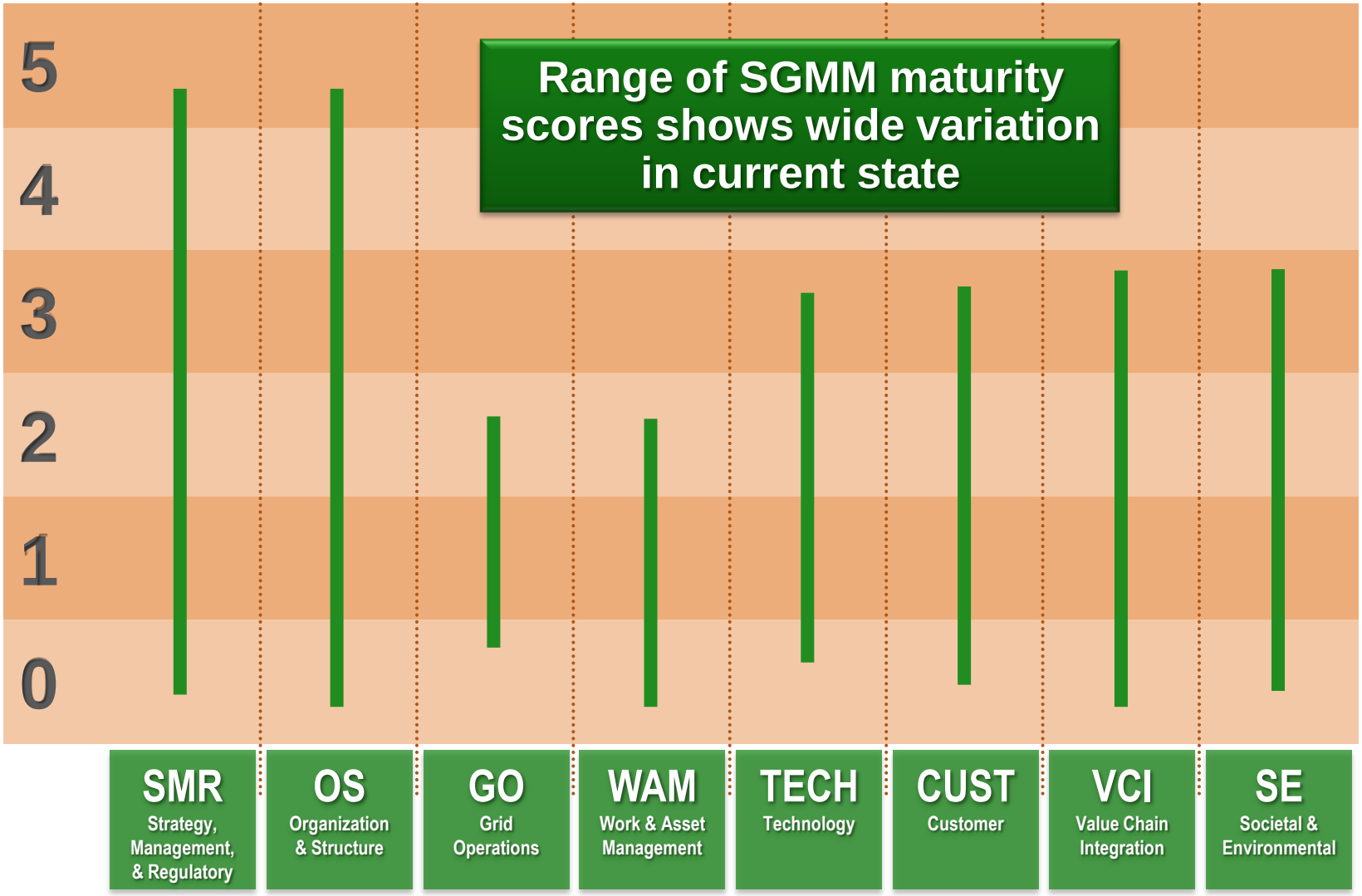
Project details:

- Commissioned by California Energy Commission
- Performed by SAIC, an SGMM Partner
- Led by Steven Rupp, an SGMM Navigator
- Focused on 13 publicly-owned utilities
- Using SGMM to support roadmap development

Project approach



SGMM results for participating CA POUs



Visions for 2020

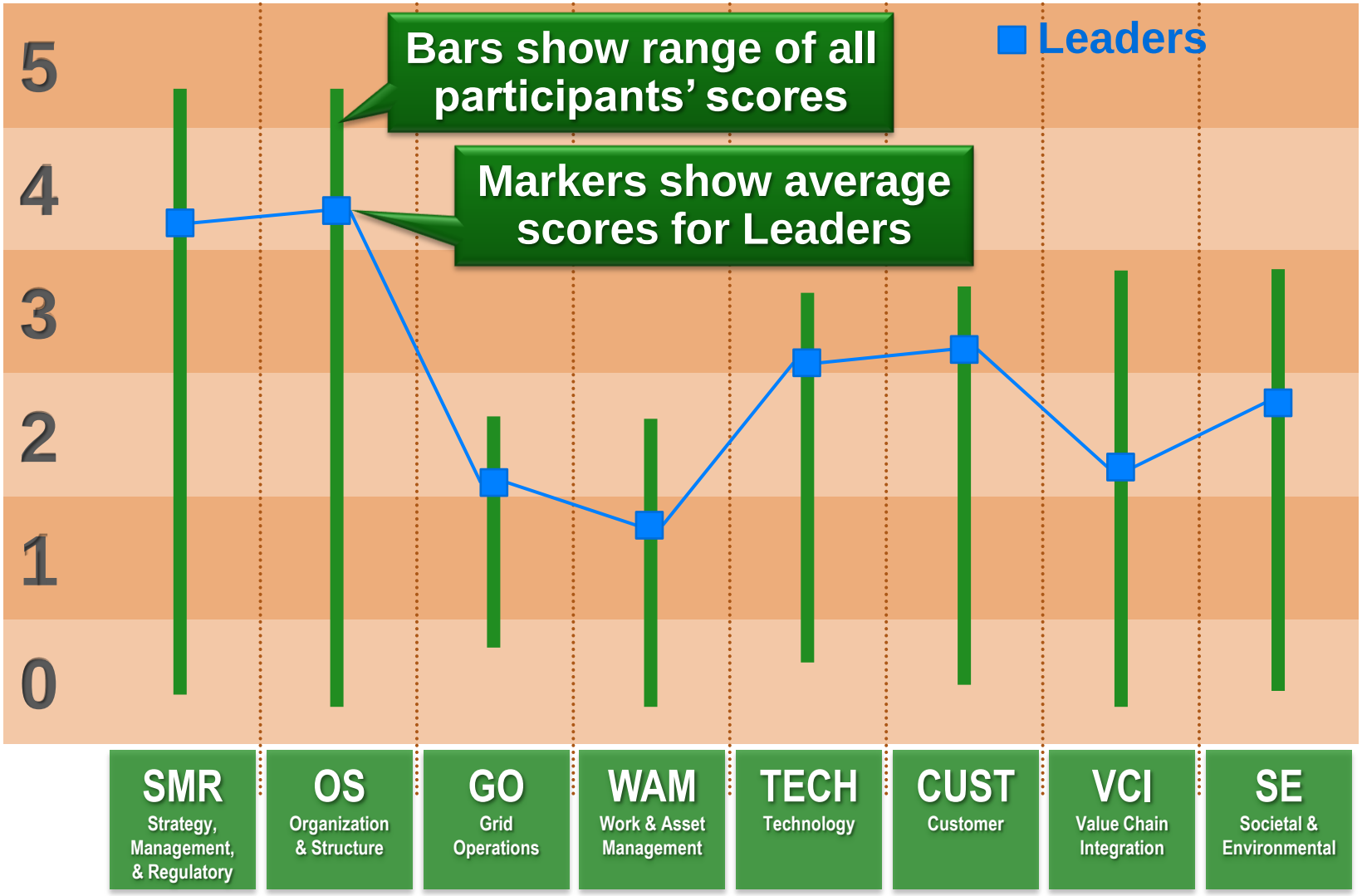
Three distinct visions emerged for the participating utilities:

- **Leaders**
- **Fast Followers**
- **Followers**

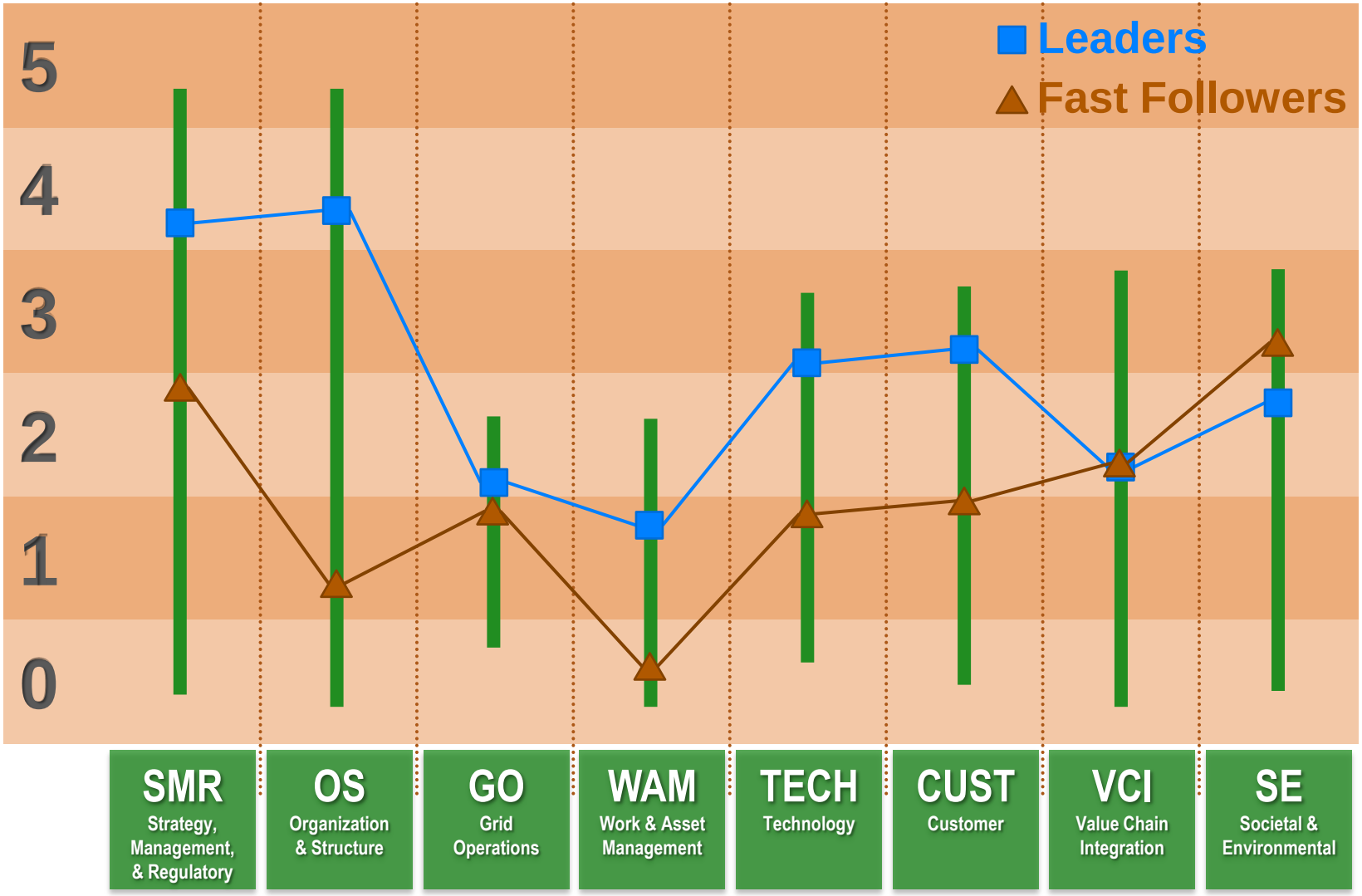
The visions are characterized by

- Differences in planned pace and scope of smart grid deployment
- Varying financial, environmental and social priorities of the communities that govern and are served by local POUs

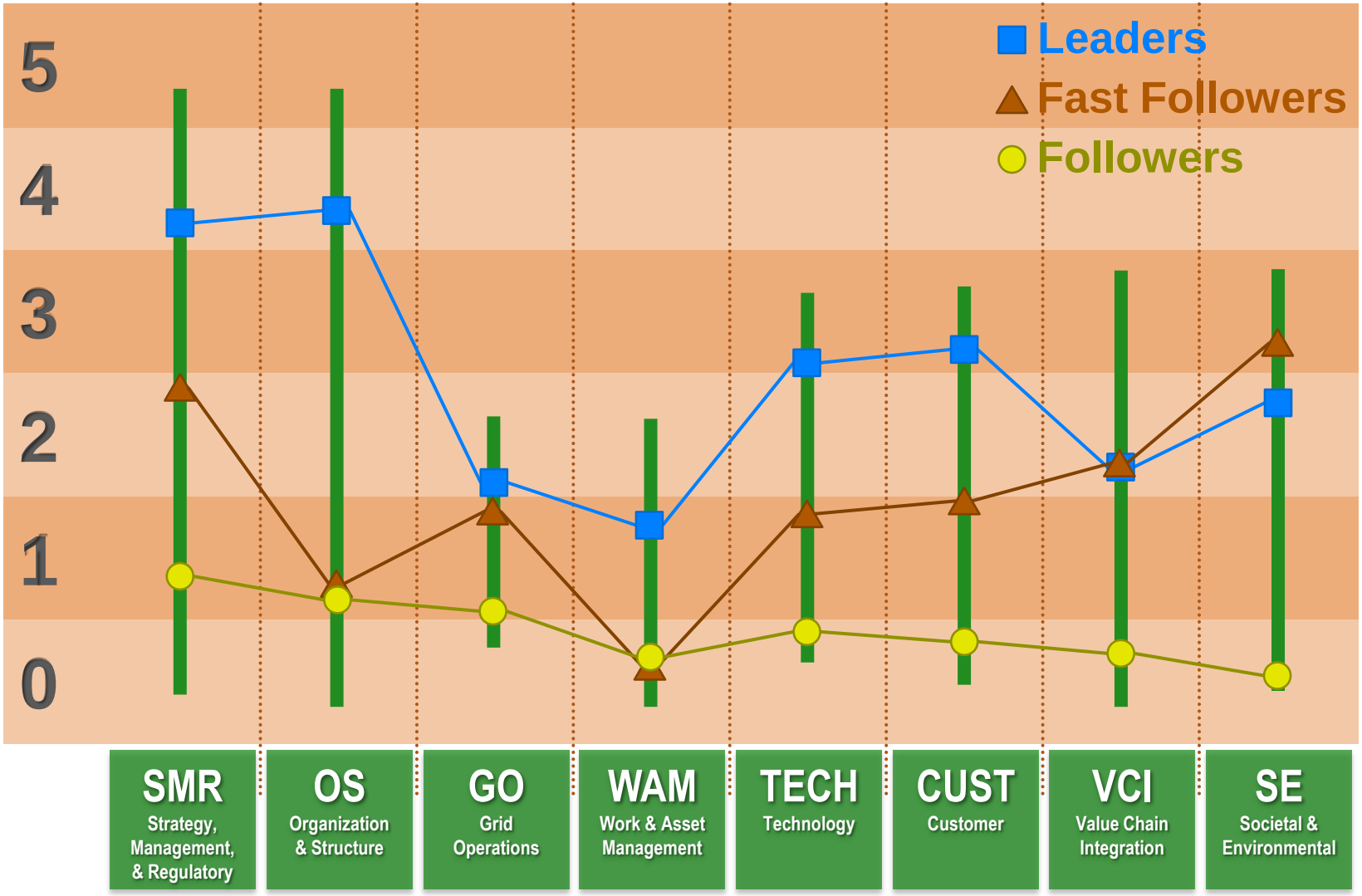
Leaders



Leaders, Fast Followers



Leaders, Fast Followers, Followers



Reported benefits

Planning

- In several instances, SGMM Navigation provided the first opportunity for utilities to have a comprehensive discussion about smart grid among regulators, managers and staff.
- Utilities are aligning smart grid initiatives into their strategic plans using SGMM language.

Executing

- Utilities are using SGMM to evaluate progress and success of current initiatives.

Publicizing

- Utilities are using results to broadcast impact of smart grid programs.
- Project is garnering national interest and attention by public power.

Outline

SGMM Introduction

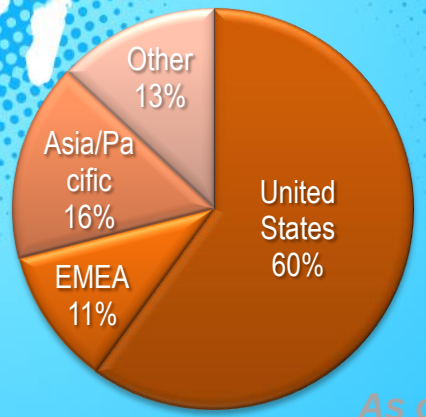
2011 SGMM Milestones

- Version 1.2 release
- Building a community of SGMM Navigators
- SGMM usage highlight: the California-SAIC project
- SGMM community data as of September 2011

Conclusion and discussion

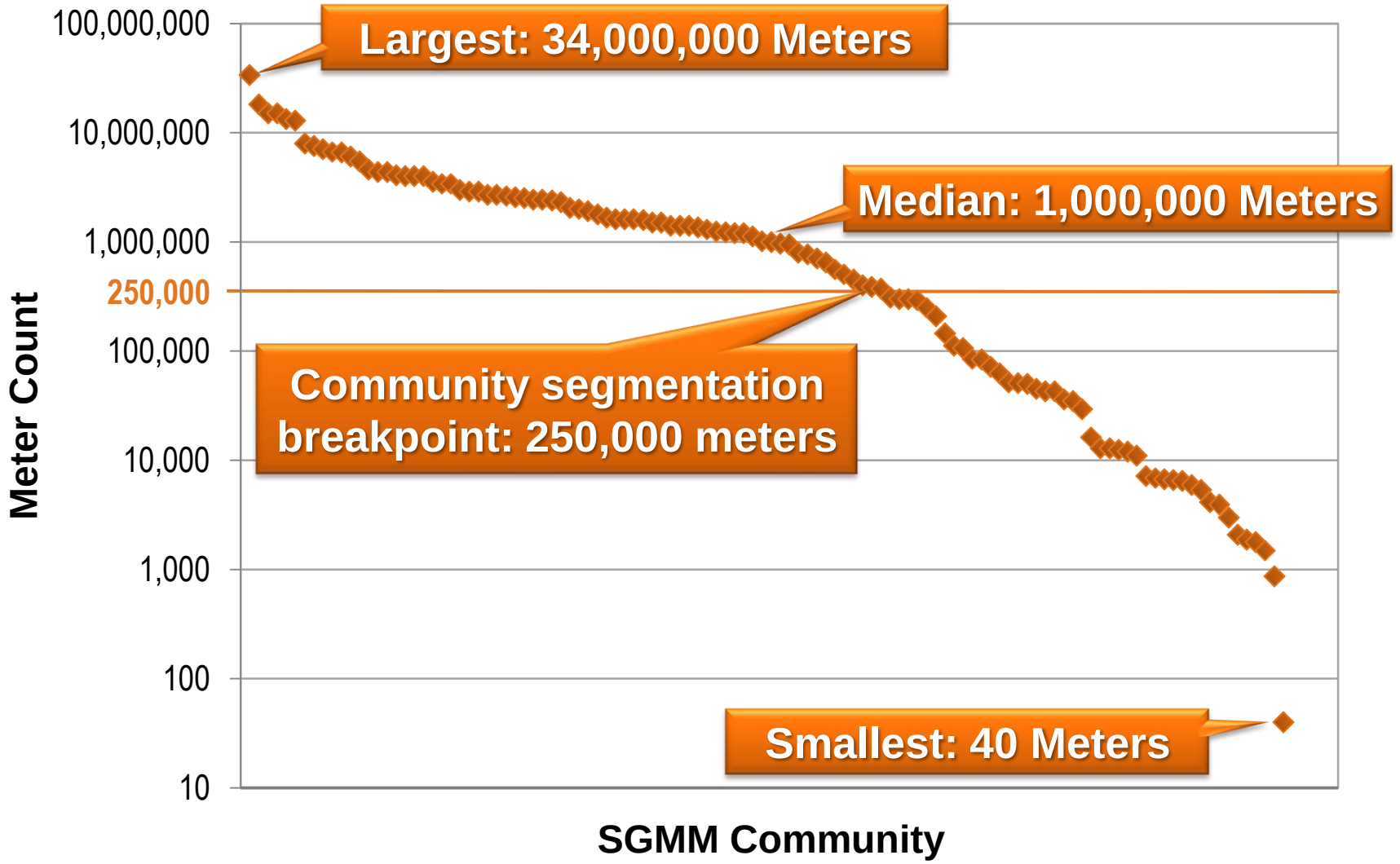
SGMM community: 119 utilities in 21 countries

USA	70	Netherlands	2	Japan	1
Canada	10	Belgium	1	Philippines	1
India	9	Denmark	1	Poland	1
Australia	5	France	1	Spain	1
Brazil	4	Hong Kong	1	Sweden	1
China	3	Ireland	1	Switzerland	1
Mexico	3	Israel	1	UK	1



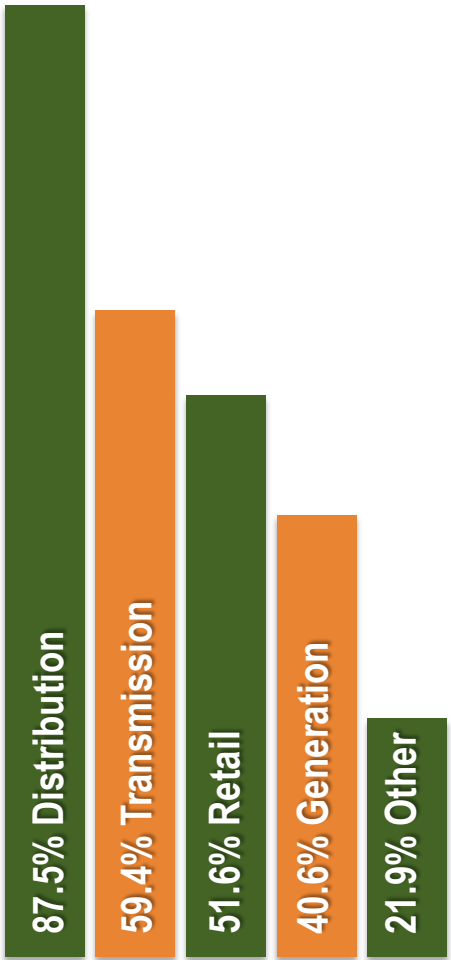
As of September 2011

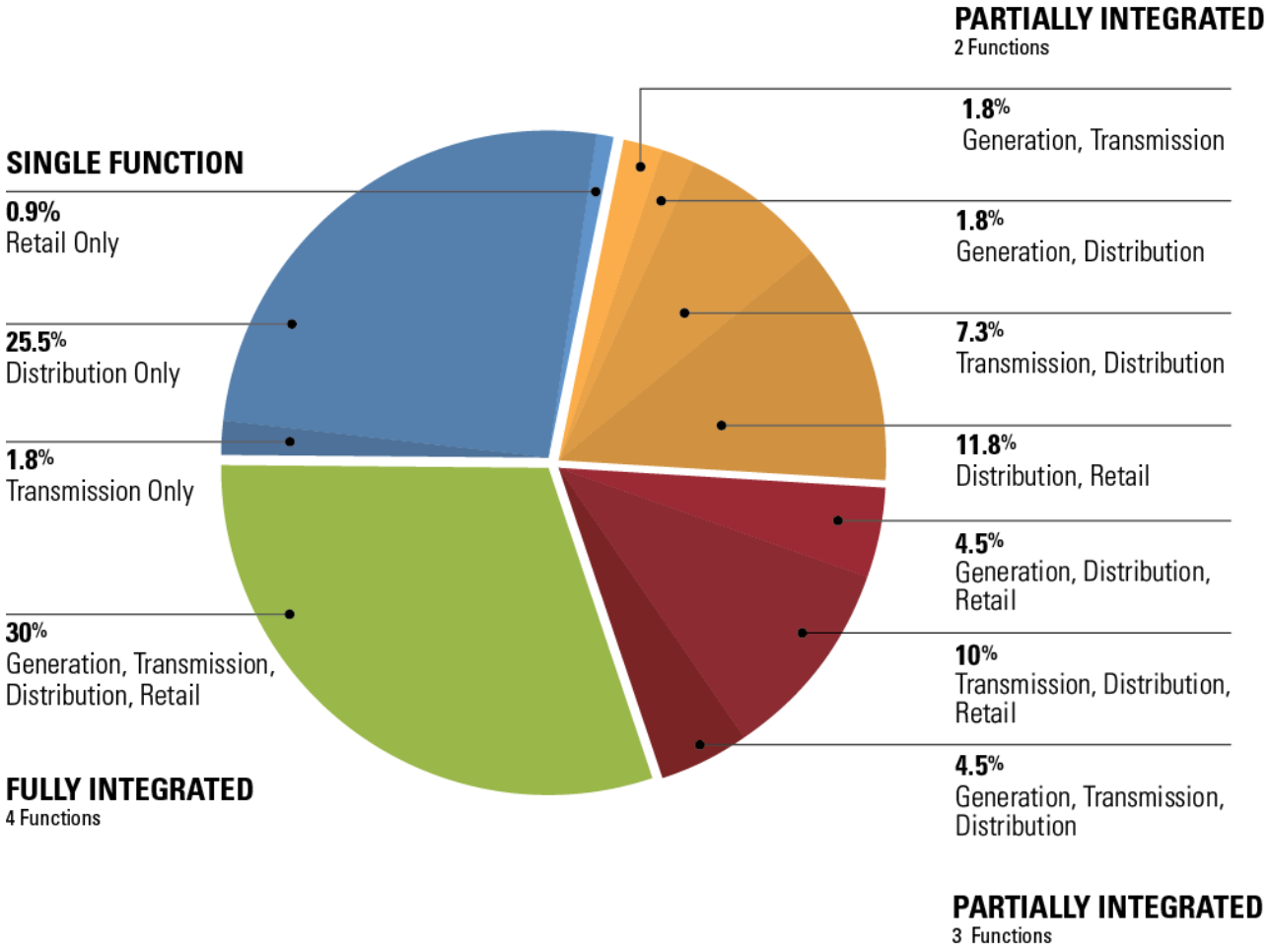
SGMM community – meter count diversity



As of September 2011

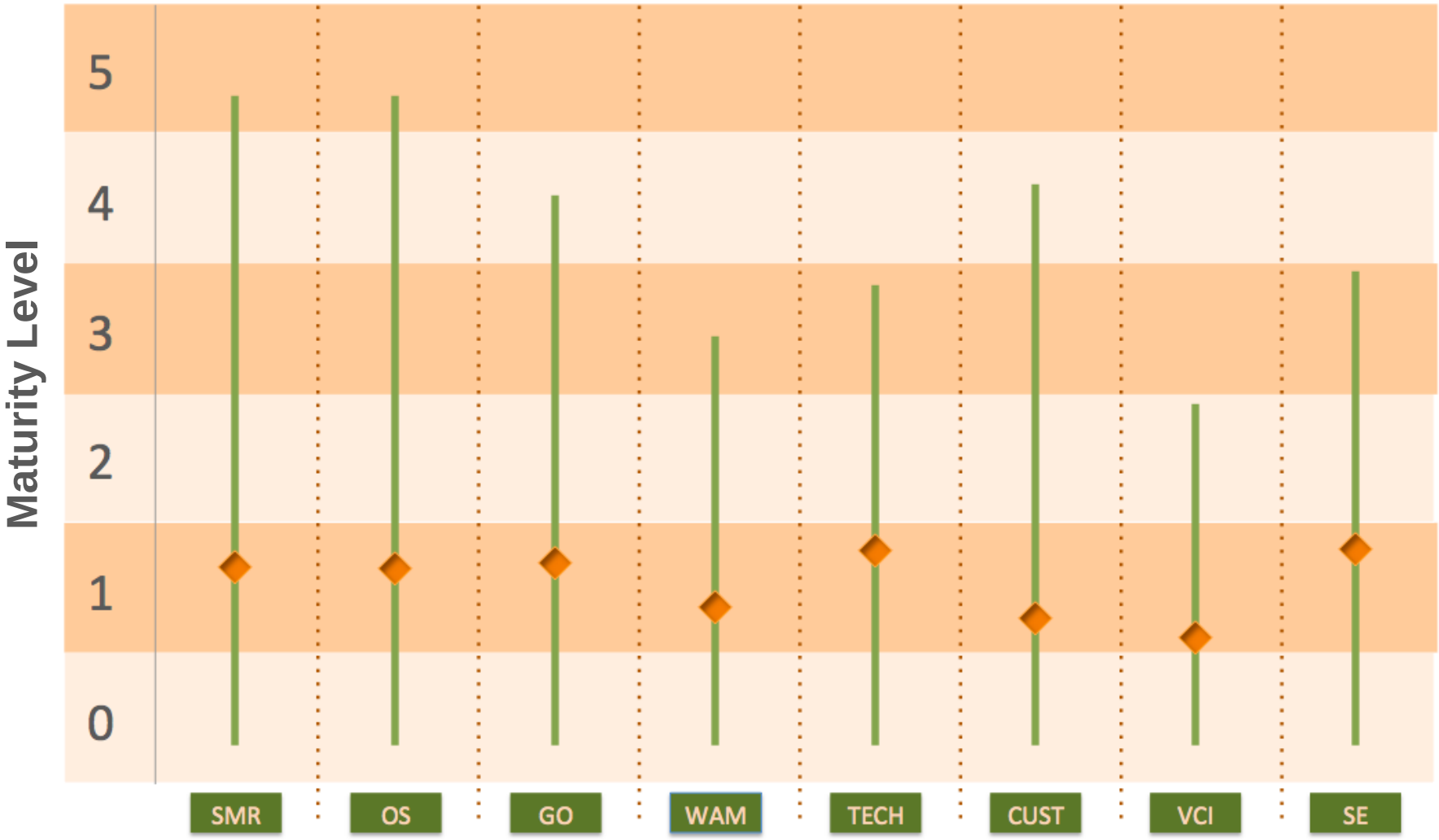
SGMM community – utility type





As of September 2011

SGMM community – maturity average & range



As of September 2011

Outline

SGMM Introduction

2011 SGMM Milestones

- Version 1.2 release
- Building a community of SGMM Navigators
- SGMM usage highlight: the California-SAIC project
- SGMM community data as of September 2011

Conclusion and discussion

Conclusion & questions

SGMM has proven to be a useful tool for utilities of all descriptions in support of planning their smart grid program and tracking progress.

The community of users and practitioners of the model is global and growing. As the community grows, the model becomes increasingly useful as a repository of industry experience.

As demonstrated in the California project, SGMM can be effectively deployed to better understand a group of utilities, and align their efforts with broader policy goals.

Data collected by SEI on the use of the model and the performance of utilities using the model will continue to provide insights and a basis for informative comparison by model users.

For more information

SEI Customer Relations

info@sei.cmu.edu

412-268-5800

www.sei.cmu.edu/smartgrid

Notices

Plug in and Get Connected to the SGMM

@SGMM_Navigator

SEI|CMU

SGMM User Forum