Booz & Company

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The Uncertainty of Smart Grid

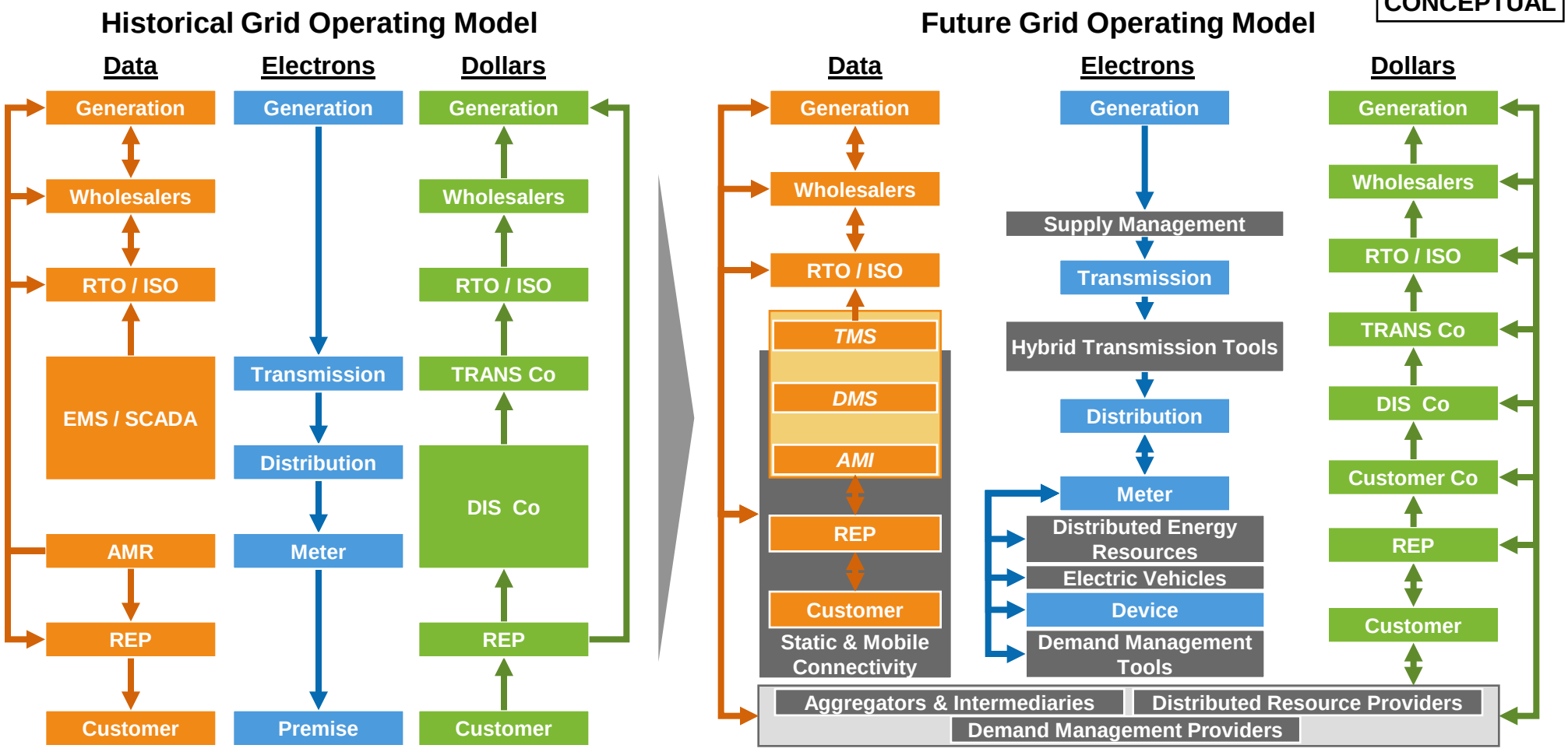
EIA's 2010 Energy Conference

Smart grid has created three fundamentals areas of uncertainty

Market	Regulation	Utility
Who will make money and how?	*How will regulatory compacts change?*	*What needs to change and how can it be justified in a business case?*

Smart grid will change the market, where data will be as important as electrons

CONCEPTUAL



This has attracted many new entrants from across industries - many with promising, and disruptive, technologies

There are a number of large companies with the savvy and resources…

Google — *Market Cap: ~$196B*

CISCO — *Market Cap: ~$138B*

verizon — *Market Cap: ~$95B*

LOCKHEED MARTIN — *Market Cap: ~$27B*

When listing Smart Grid as a priority for Cisco, John Chambers, its CEO, said," Almost all devices won't only be connected to the electrical grid, they're going to be connected to the data grid, aren't they?" 5/19/ 2009 WSJ

…as well as a number of promising 'start ups' with focused solutions…

SILVERSPRING NETWORKS

- Assumed 24% market share in ~2 years
- Secured $100M in financing in December

TENDRIL

- GE made equity investment in October in the tens of millions of dollars

…who can all change established interactions along with the usual suspects

GE · SIEMENS · IBM · Johnson Controls

Potential Impact Areas

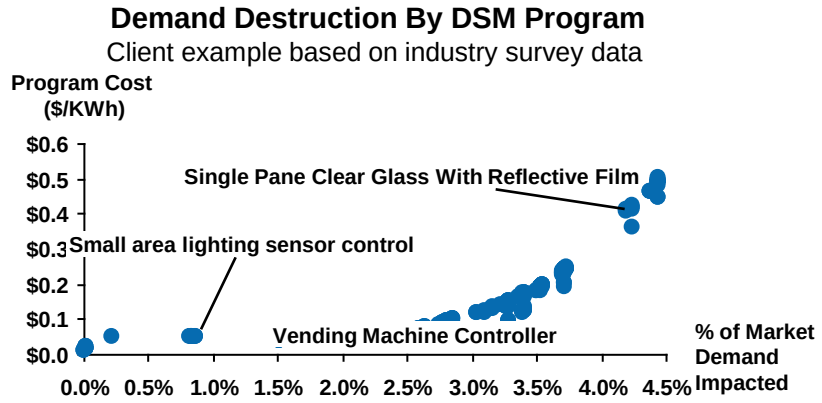
- Access Decisions
- Investment Priorities
- Resources Dispatch
- Demand Management
- Electrification

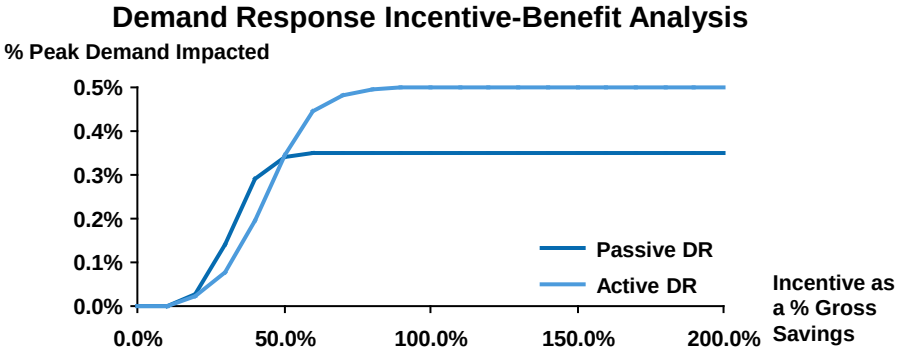
Rapid technological innovation and uncertainty around customer response creates much variability in smart grid business cases

New products introduce technology, interoperability and security risks

Technology Readiness Level	Description
Initial Technology Conception	Lowest "level" of technology maturity. Scientific research begins to be translated into applied research and development.
Proof Of Concept In Laboratory Environment	Basic proof of concept in laboratory. Basic technological elements must be integrated to establish that the "pieces" will work together to achieve concept-enabling levels of performance for a system.
System Prototype Demonstration In A Relevant Environment	Proof of technology in its relevant environment outside the laboratory environment - proven at pilot scale
Initial Demonstration Of Scaled Solution	Proof of solution in relevant environment to operational scale no proven commercial model
Commercialized Scaled Solutions	Mature technology proven multiple times to scale in operational settings and with proven business model

Demand reduction/ management tools will test customers' acceptance of behavior changes

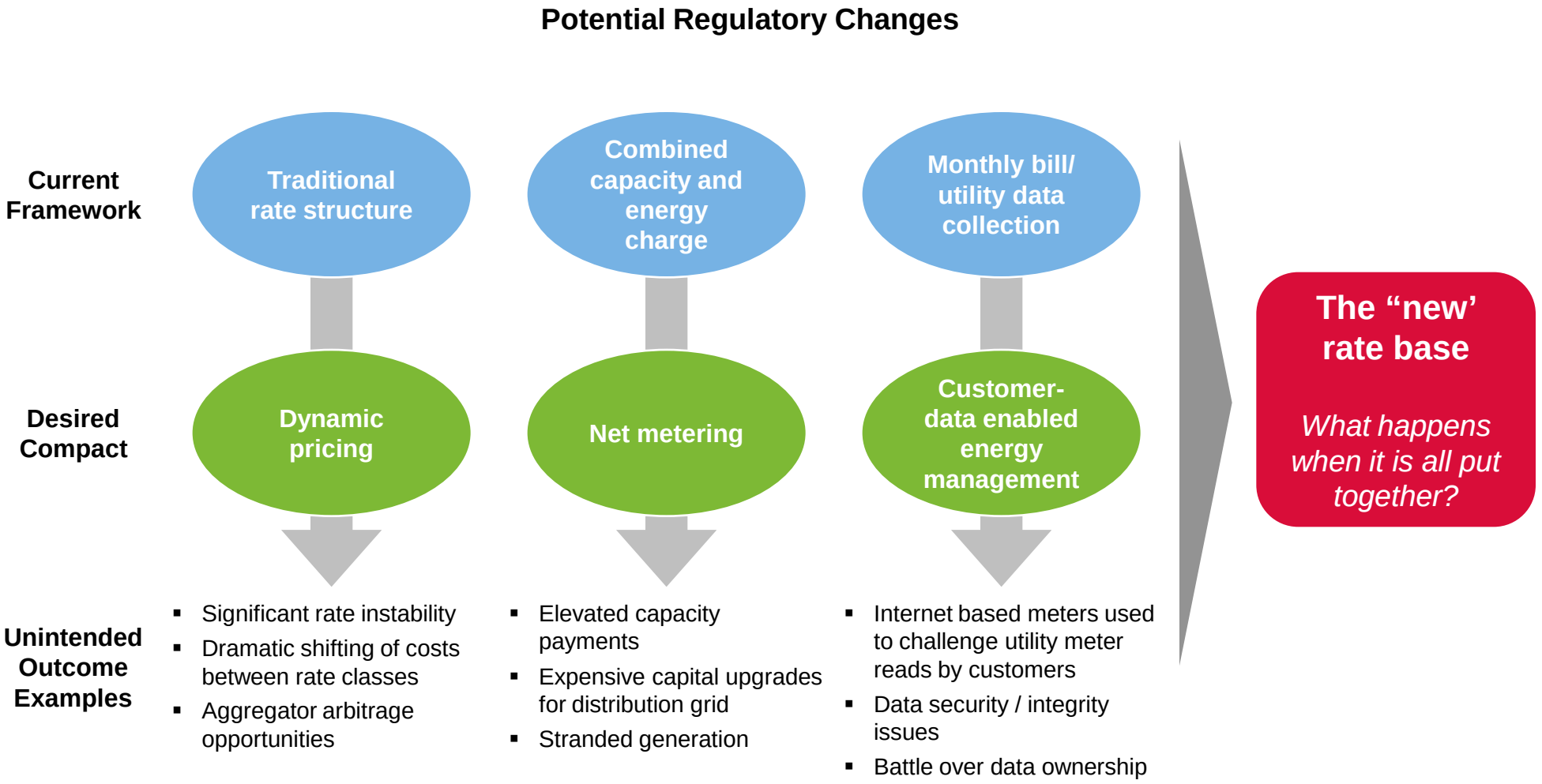




Unclear and untested revenue and cost structures (e.g. one-time versus recurring mix)

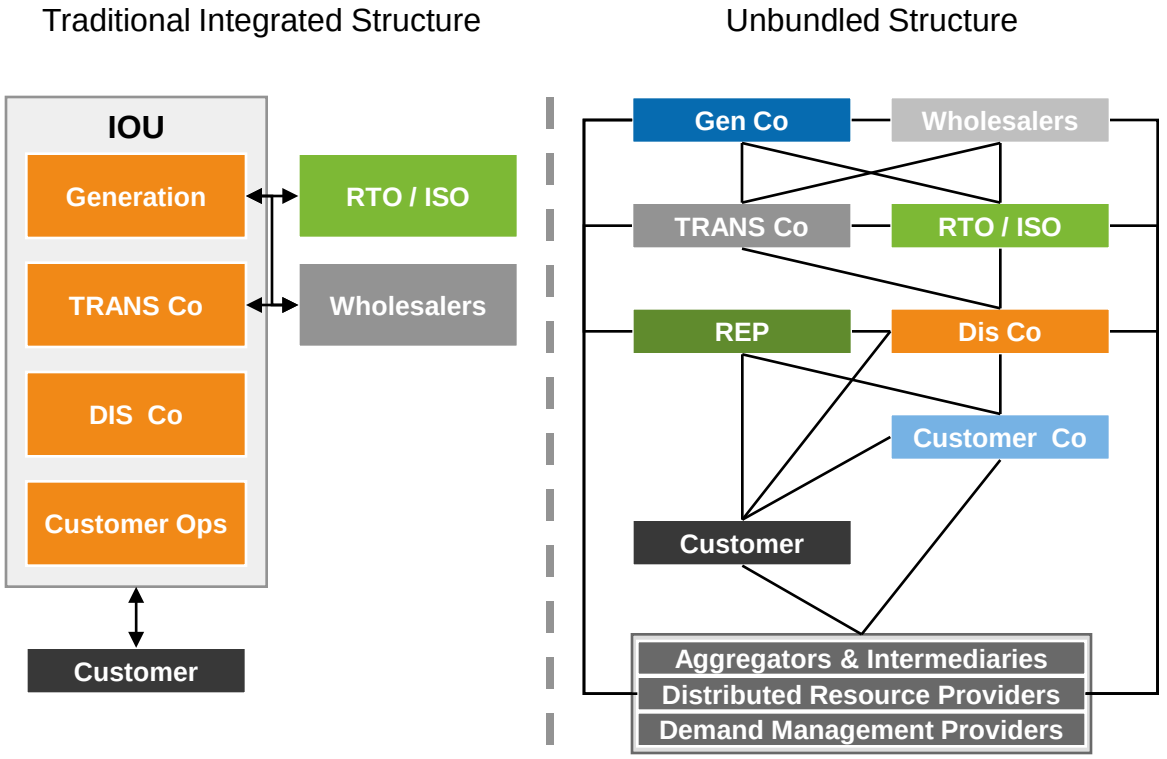
Note: Adapted from the National Aeronautics and Space Administration (NASA) Technology Readiness Levels

As new revenue streams are unlocked, traditional regulatory constructs may be challenged by intended and unintended actions



Interest in unbundled market structures may increase so power organizations can specialize on core competencies

Regulated Market Structures



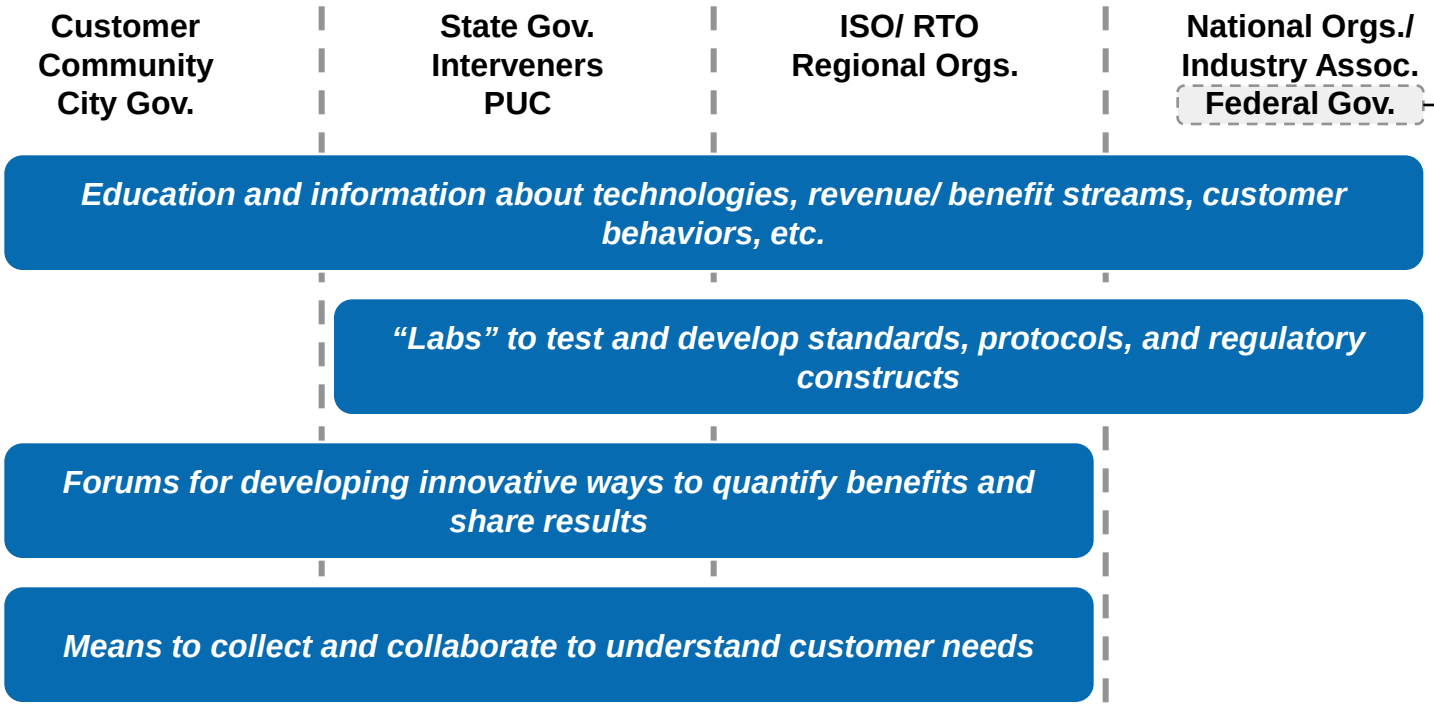
Strategic Concerns

- Will increased competition force specialization?
- Who will be best positioned to compete and where?
- What products and services will be bundled - unlocking untapped revenue?
- Where will platforms emerge for further innovation, growth, etc?

A more collaborative approach is required at all levels if market actors seek regulatory solutions in a timely fashion

NON-EXHAUSTIVE

Utility and Smart Grid Provider Engagement Approach



- **Federal promotion**: develop Smart Grid Data Clearinghouse to identify and share best practices to:
  - Ensure ARRA awardees capture stated benefits
  - provide actual data for those struggling today to make their business cases positive

Within utilities, this uncertainty is impacting smart grid business cases…

Benefits Quantification

- Calculating the costs seem to be the easy part
- Identifying where in business processes smart grid benefits will appear is difficult, for example:
  - *Reliability*: what can be cut from OpCo operating budgets
  - *Behind the meter:* understanding and estimating customer behavior impacts

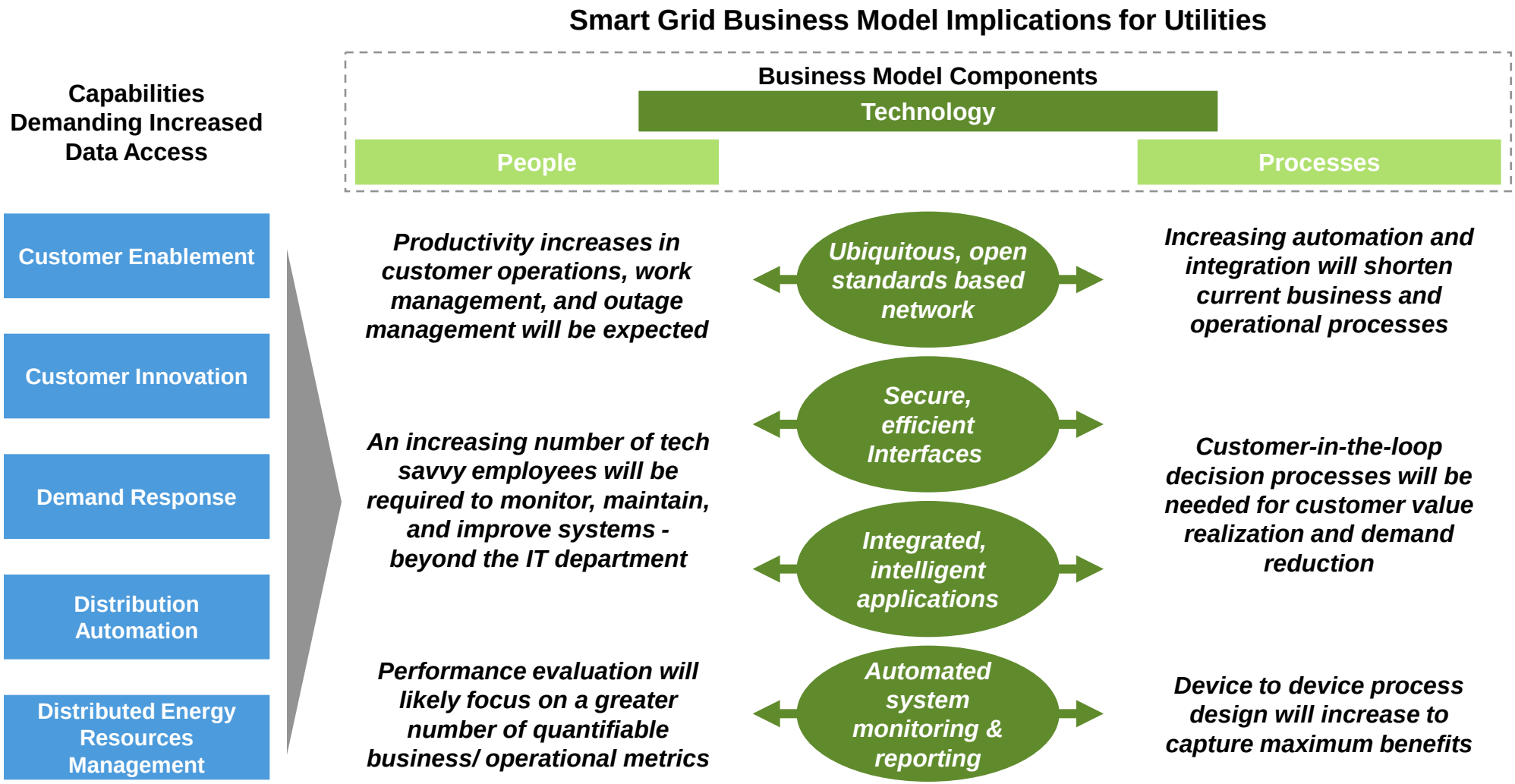
Pace/ Time Before Benefits

- Reaping maximum benefit from smart grid requires investment in network and data management that takes time
- Limited financing forces utilities to decompose smart grid vision into limited projects
- Critical, capital-intensive, lengthy smart grid infrastructure projects are usually front loaded - lengthening the time before benefits are captured

As ARRA financed deployments come on-line the uncertainty around quantification and pace will be reduced

Economic justification challenging

…And, the rising importance of data in a smart grid world is challenging the traditional utility business model



Containing this uncertainty starts with identifying risks, potential impacts, and likely timing to assess positioning

ILLUSTRATIVE

Utility Smart Grid Risk Planning

Risk Areas	Near Term Risks		Far Term Risks	Opportunities	Threats
Technology Readiness	Cyber security standards delayed	Beyond the meter not commercialized	3rd party telecom network unsustainable	▪ Participate in NIST led smart grid standard development	▪ Reliance on outside providers to achieve smart grid vision
Consumer Acceptance	Power prices escalate creating DR market	Non-regulated entrants exploit DR	Consumers do not see utility as DR provider	▪ Consumers see economic benefits in demand management	▪ Regulations require obligation to share data with competitors
Regulatory Structure	Solar industry pushes sizeable DG % in RPS	Current rate structure persists	Carbon regime instituted	▪ Recovering economy attributed to clean tech sector	▪ Politicization of regulatory process pits IOU as 'bad guy'
New Entrant Priorities	Partnership to learn industry	Lobbies to maintain non-regulated status	Take market share in new revenue pools	▪ Partnership opportunities	▪ Financing ▪ Organizational agility to respond to market
Internal Responsiveness	Delays due to competing priorities	Forced by regulators to invest in SG	Effective SG capabilities deployed	▪ Employment base tech-savvy	▪ Smart grid issues secondary to generation's
Financial Resource Availability	Limited	Limited	Increasing	▪ Stimulus funding	▪ Inflation

Developing an effective smart grid road map will hinge on the answers to a number of critical questions

Smart Grid Road Map Framing Questions
Assumes a smart grid vision

Market

- What technology trends and profit drivers are shaping the future?
- Who are the current and emerging players to track?
- What do customer's value and which behaviors are they willing to change?

Regulation

- What changes to the current compact are being promoted and by whom?
- Who will be advantaged under high probability regulatory scenarios?
- What coalitions are needed to achieve regulatory and/ or legislative approvals?

Utility

- What is my current position relative to others?
- What are the business model requirements for enduring success?
- What are the most critical enablers and obstacles?

Thank you for your time

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