Decision Marker's Work Shop

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Agenda

- Introduction to workshop
- GridWise Architecture Council (GWAC)
- Smart Grid Dealing with Change
- GWAC Decision Maker's Checklist

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Background

- Insure that everyone has at least the same basic understanding about:
  - GWAC
  - GWAC documents
- Want to try and make the workshop portion more interactive

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GWAC

- Explain about GWAC and some of the material that GWAC has developed

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Regulatory

- Talk about smart grid technology and some of the issues facing regulators
- Technology is still being developed and improved
- Standards are being developed
- When is the “right” time to invest in new technology?

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Decision Maker's Checklist

- Walk you through the Decision Maker's Checklist using a couple of sample situations
- I hope that you find the session informative and interesting

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GridWise Architecture Council (GWAC)

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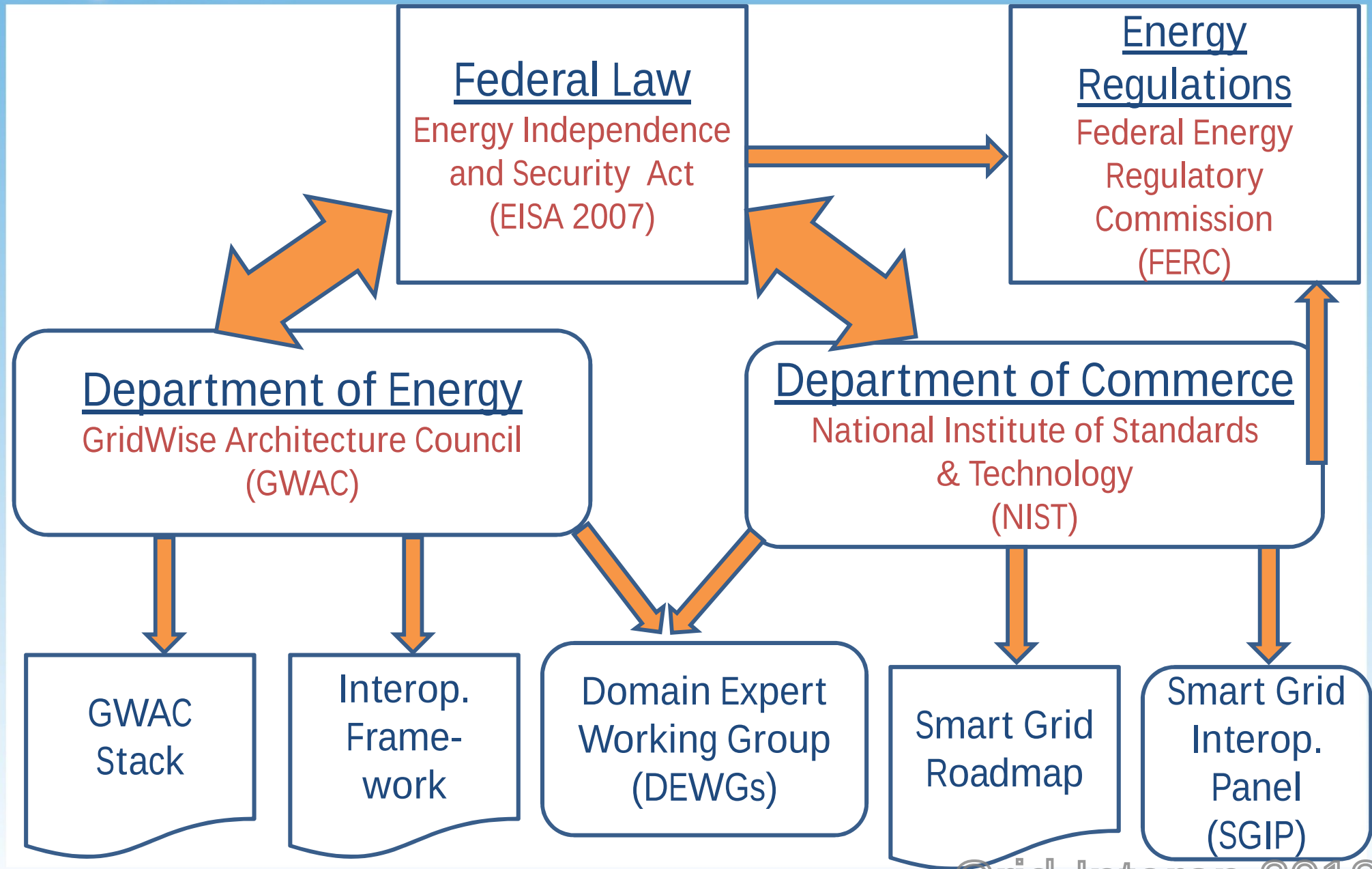
Federal Role In Smart Grid



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GridWise View

- The electricity challenges
  - Ensure reliable electricity
  - Integrate local generation
  - Accommodate energy storage
  - Adjust demand to meet available supply
- The GridWise solution
  - Overlay IT and sensors on the power gird
  - Include end-devices in the power grid
  - Incorporate high-tech and innovative products

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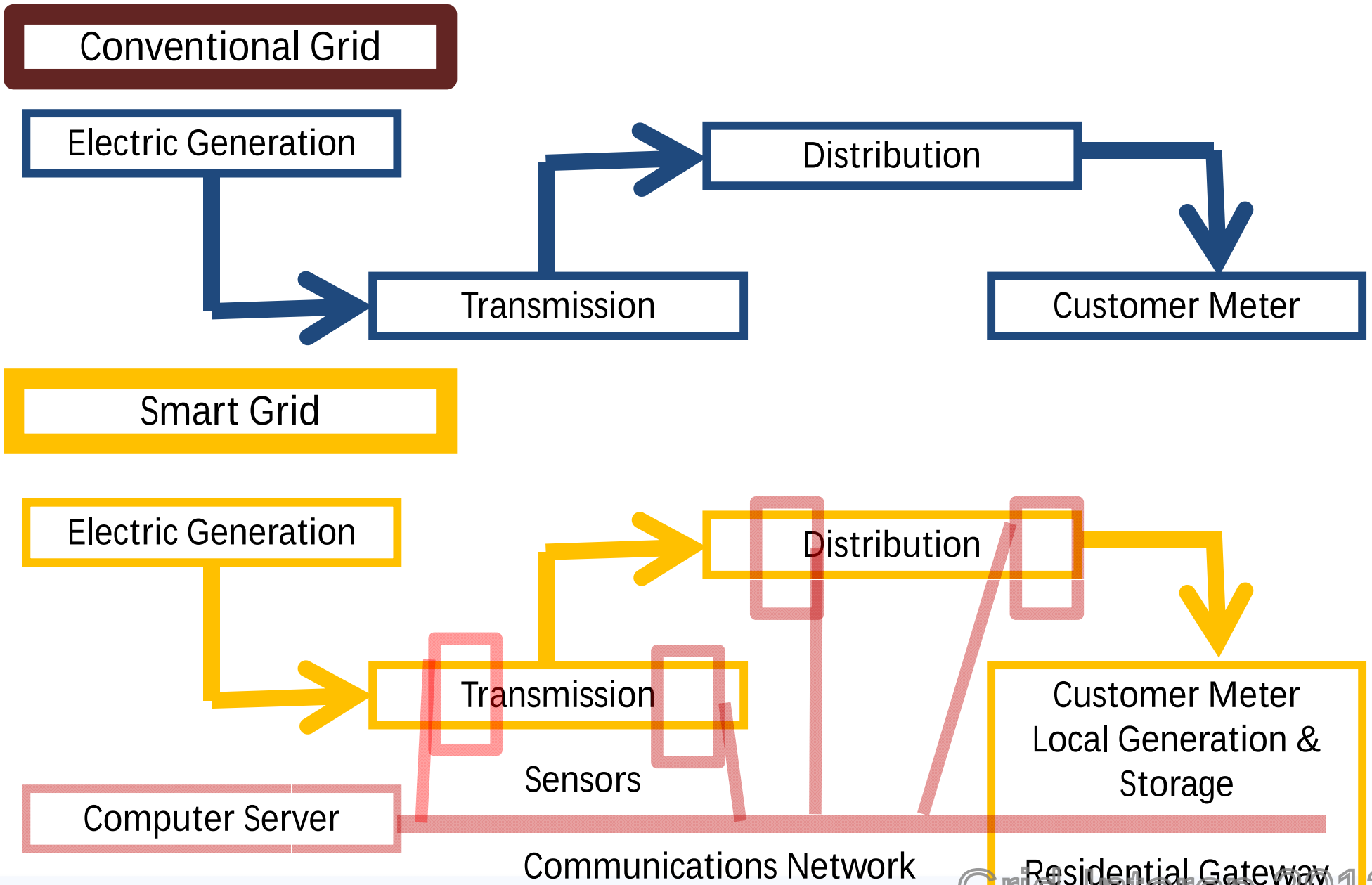
Creating A Smart Grid



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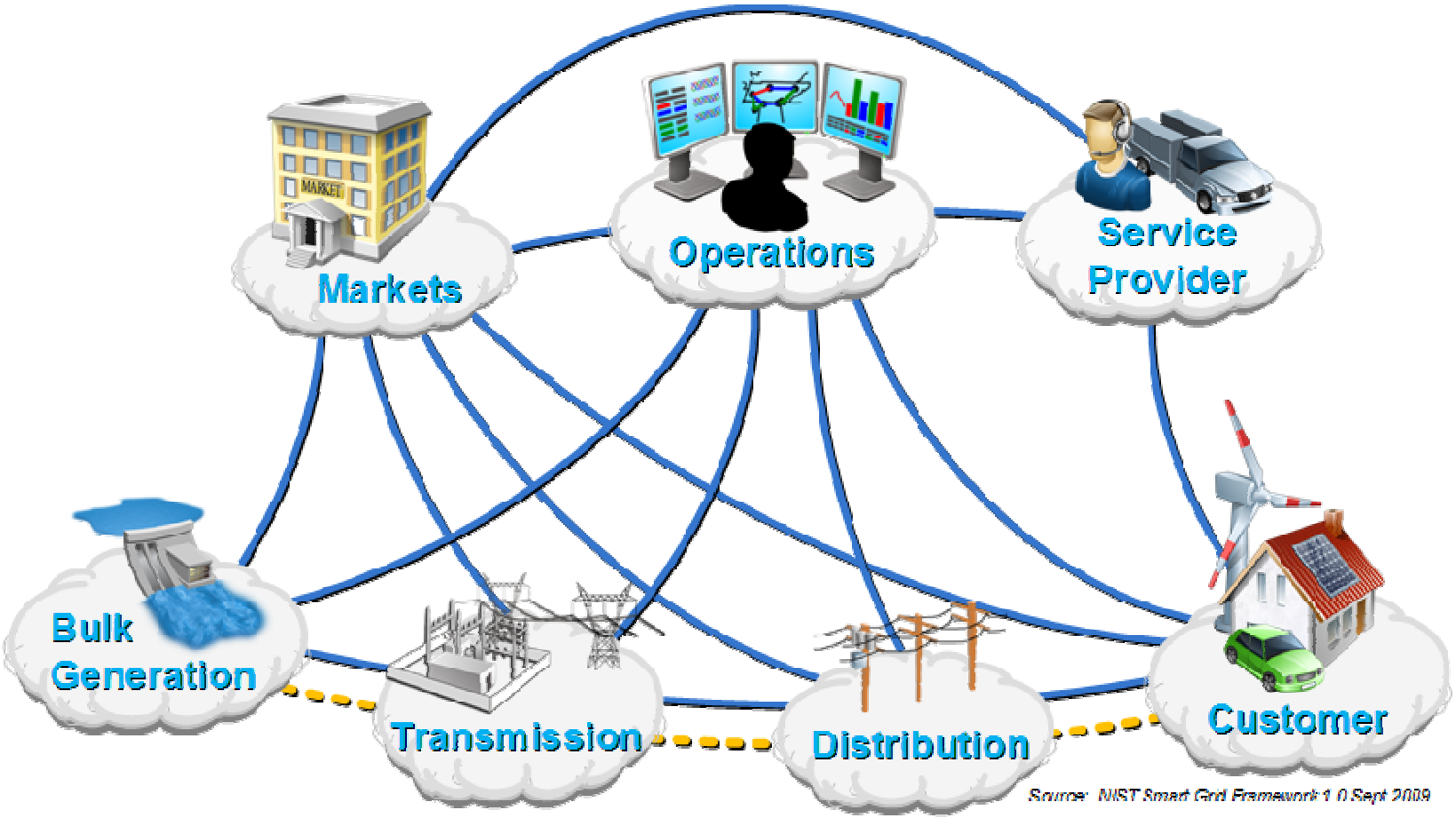
Interoperability Smart Grid Domains



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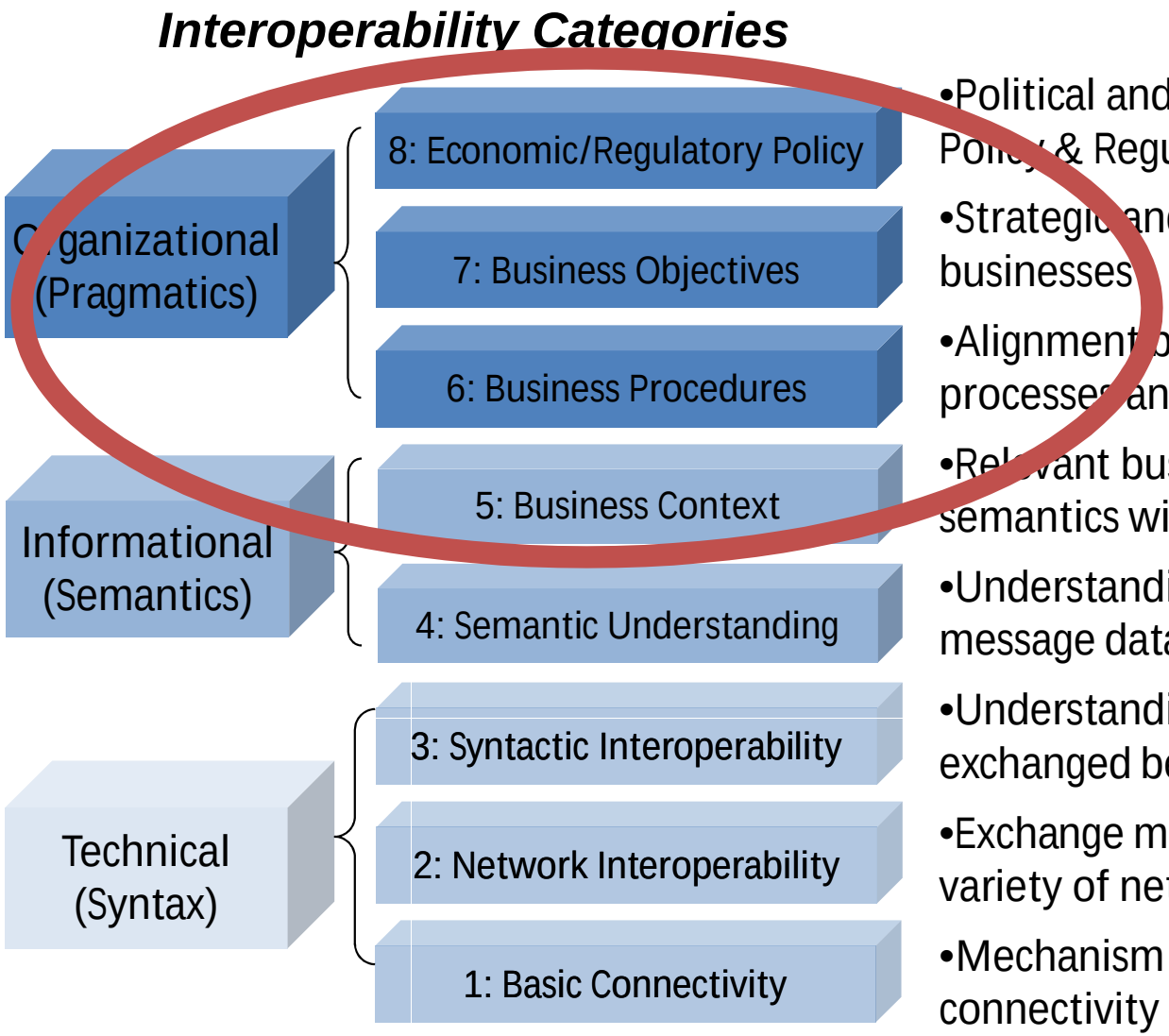
The GWAC Stack



- Political and Economic Objectives as embodied in Policy & Regulation
- Strategic and Tactical Objectives shared between businesses
- Alignment between operational business processes and procedures
- Relevant business knowledge that applies semantics with process workflow
- Understanding of concepts contained in the message data structures
- Understanding data structures in messages exchanged between systems
- Exchange messages between systems across a variety of networks
- Mechanism to establish physical and logical connectivity of systems

GridWise Constitution

- A statement of principles & framework
- Promote consensus on interoperability
- Attributes of principles
  - Simplicity
  - Choice
  - Physical reality
  - Consistency
- Constitution principles
  - Business, Usability, Information Technology, Regulatory, Policy, Governance

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Constitution Principals: Regulators

- Context: "Business interactions … are monitored by regulatory bodies … to ensure a viable electric system that supports our economy and balances issues of social equity."
  - Interoperability must be understandable
- Interoperability enables regulators to:
  - Verify business rules; audit transactions
  - Verify cost-effectiveness of transactions
  - Provide consumer choices of services
  - Offer reliable, safe service & privacy
  - Define information & skills for consumers

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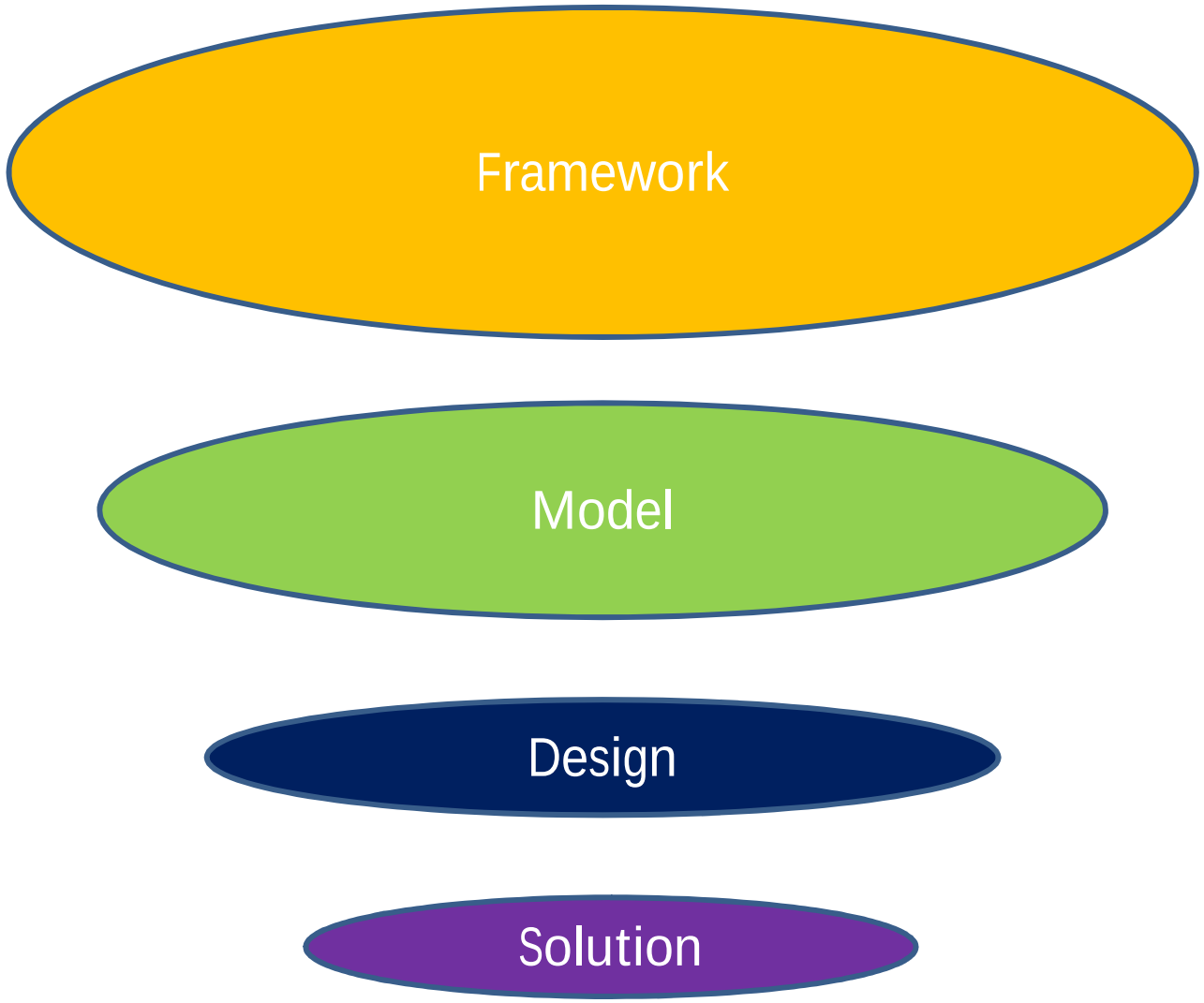
Context Setting Framework



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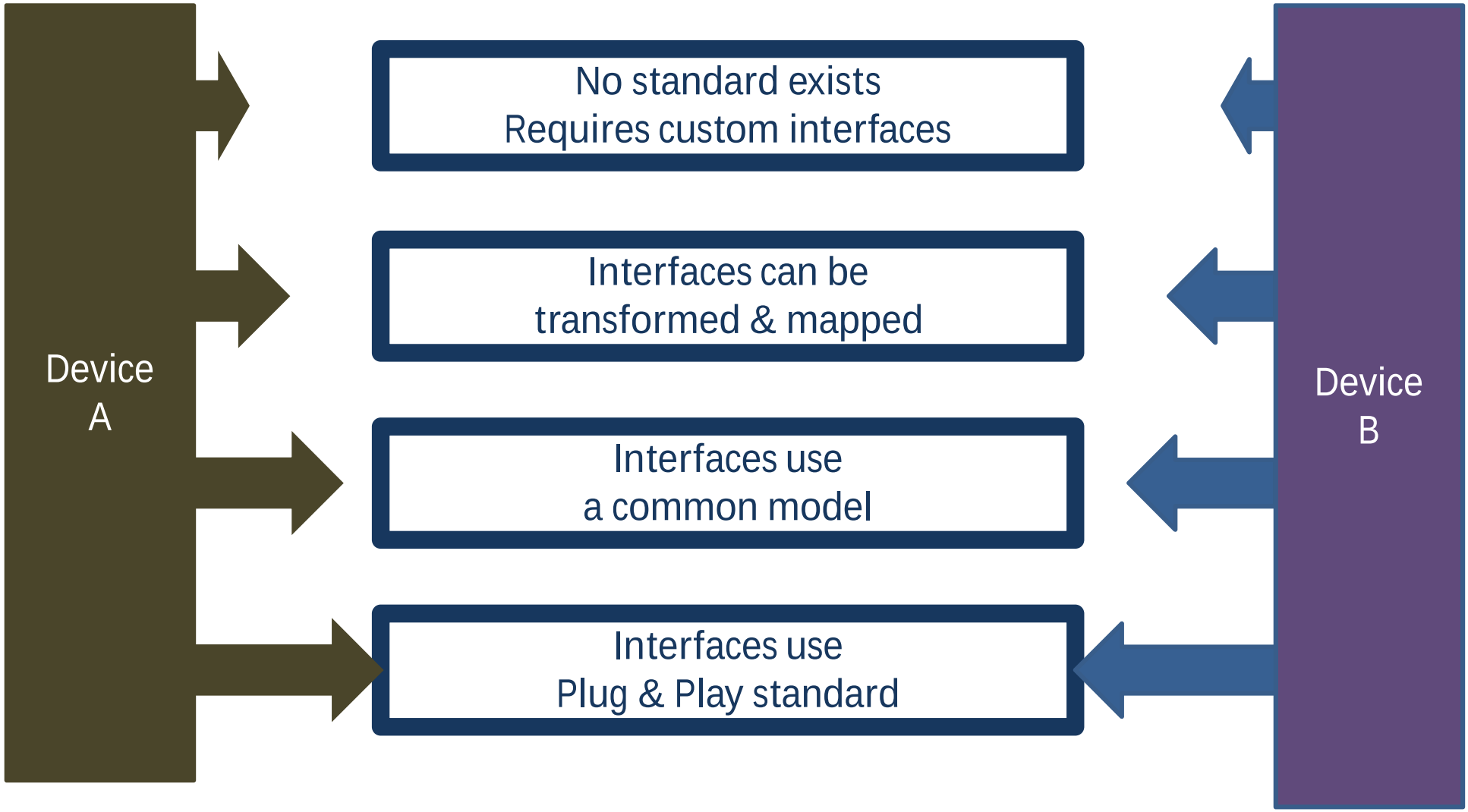
Interoperability Options



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Interoperability Checklist

- GWAC guidance for utility decision-makers
  - Energy equipment X
  - Information technology X
  - Investments and finance X
- Does the project advance interoperability?
- 14-point checklist
  - Architecture & design X
  - Interconnectivity & security X
  - Evolutionary capability & service life X
  - Collaborator independence X
- 10-point supplemental checklist for utilities & vendor

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Checklist Topics

- Architecture
  - Clear interfaces
  - Open architecture
  - Technology neutral
  - Multiple vendors
  - Standards-based
- Interconnectivity & Security
  - Link capability
  - Standard protocols & models
  - Data accessibility
  - Manage devices & users
  - Security & privacy
  - Redundancy & fail safe
- Evolutionary capability & service life
  - Device updates
  - Integrated legacy devices
- Collaborator independence

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Verifying Vendor Claims

- Cannot expect checklist users to verify claims
- Key verification elements
  - Dependence on national & international standards
  - Test conformance to standards
  - Test interoperability
  - Independent testing preferred over self-certification
- Decision Makers must challenge the answers
  - Are the checklist answers accurate?
  - Are the checklist answers verifiable?
  - Does the vendor actively support standards?
  - Are there multiple sources from competing vendors?

GWAC Work Products & Communications

- Work Products
  - Decision-Maker's Interoperability Checklist (V1.5) (PDF 98KB)
  - GridWise® Interoperability Constitution (PDF 73KB)
  - GridWise® Interoperability Context-Setting Framework (v1.1) (PDF 805KB)
  - Interoperability Maturity Model (IMM)
- Communications
  - Interoperability 101 Introduction and Overview (PDF 2.40MB)
  - Mission & Structure (PDF 249KB)

Available at: http://www.gridwiseac.org/about/publications.aspx

GWAC Whitepapers & Benefits Papers

- Other Reports and Whitepapers
  - Electrical Power Engineering Academic Landscape (PDF 892KB)
  - Interoperability Path Forward Whitepaper (PDF 77KB)
  - GWAC Summary of Constitution Interview Process and Feedback (PDF 2.25MB)
  - GridWise Architecture Tenets and Illustrations (PDF 271KB)
- Benefits Papers
  - Environmental Benefits of Interoperability (PDF 900KB)
  - Financial Benefits of Interoperability (PDF 1.59MB)
  - Reliability Benefits of Interoperability (PDF 675KB)

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DECISION MAKER'S CHECKLIST

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Architecture and Design

Checklist Question	Case Study Proposal	Score
Architecture and Design		
Does the proposal specify the points of interface, where this part of the system interacts with other elements (whether that interaction is with grid equipment, software, the market, other business organizations, or human users or operators)? Does the proposal lay out what information or functionality will flow across these interfaces? Does the proposal specify technology and information requirements only at the points of interface (and not inside the subsystem at issue)?		
Does the device/project use an open architecture?		
Does the proposal maintain technology neutrality, in that it specifies performance results and outcome requirements rather than prescribing a specific technology or method to achieve those results?		
Can the device or project be supplied by multiple vendors?		
Does the system or device rely on open, published standards? Does the device or project connect to the electric system and communications network elements in ways that comply with applicable national or international standards for its type?		

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Interconnectivity and Security

Checklist Question	Case Study Proposal	Score
Interconnectivity and Security		
Does the device have the physical and electronic capability to interconnect with communications media (e.g., serial data ports or broadcast capabilities to access Ethernet or telecom lines or other communications capabilities)? Can the communications networks used by the system or device coexist or exchange data with the networks used by other devices or systems, built by other vendors or electricity providers?		
Does the device/project use standard communications protocols? Is there a single standard specification for the data formats (the information model) used by the system or device so it can be understood by a variety of communications technologies and devices?		
Does the device or system make basic data or information available to all authorized devices and users, such as energy usage and costs over metered intervals, grid condition metrics, or operational instructions?		

Interconnectivity and Security (cont.)

Checklist Question	Case Study Proposal	Score
Interconnectivity and Security		
Can the system manage multiple devices (or influence multiple users) within the system using a common command or information feed from a central source?		
Does the device/project use at least the basic cyber-security measures as recommended by the NERC Critical Infrastructure Protection standards? Does the device/project follow industry consortia (e.g. Utility AMI, CEC PCT Reference Design) security and privacy recommendations?		
If the device or system is mission-critical to the delivery of electricity or the well-being of the user, does it have sufficient redundancy or design to fail in a way that does not harm the system or the user?		

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Evolution and Collaboration

Checklist Question	Case Study Proposal	Score
Evolutionary Capability and Service Life		
Can the device be updated or have its functionalities upgraded by downloading new software and configuration information?		
Can the device or project integrate easily with earlier versions and equipment on the system?		
Collaborator Independence		
Does the device or project allow collaborators or users to make independent decisions (within defined parameters such as contractual provisions, NAESB wholesale agreements, electric market rules, or tariff)?		

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EXAMPLE

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Example 1: Vehicle 2 Grid

Problem Statement: Electric vehicle charging at primary location (e.g., residence) and other local areas such as work and community charging stations.

Proposed Solution:

Utility X is proposing an electric vehicle charging approach using proprietary technology supplied by CarCharge, Inc. This approach allows Utility X customers to charge their vehicles at home, work or at Utility X owned public charging stations. The proposed system has a limit of 50 charging stations with each charging station capable of handling one vehicle at a time. The charging stations will have a minimum availability of 60%. The charging stations may be upgraded by a field technician swapping the read-only-memory. Previous CarCharge owner plug adaptor kits are compatible with the current charging stations. Customers will have to buy or lease a CarCharge station for their home or business.

Customers will also have to purchase plug adaptors for their vehicle(s) in order to connect their vehicle to the CarCharge charging station. The proprietary CarCharge electrical outlet meets all applicable electrical safety interconnect standards.

Example 1: Continued

CarCharge will integrate their proprietary system into the Utility X back office systems using proprietary CarCharge interfaces to the Utility X billing system. Only CarCharge charging stations will be supported. CarCharge will provide a proprietary cyber security solution.

Customers must have a utility account in order to use a CarCharge station. The account number will be entered manually on the Charge Station keypad. Out of area customers may call the utility to establish an account.

There is no communication between the CarCharge station and the electric vehicle. All communications between the CarCharge station and the utility is via CarCharge's proprietary protocols.

Customer's utility bills will reflect their total electric vehicle charging for the month.

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Architecture & Design

Checklist Question	Case Study Proposal	Score
Architecture and Design		
Does the proposal specify the points of interface, where this part of the system interacts with other elements (whether that interaction is with grid equipment, software, the market, other business organizations, or human users or operators)? Does the proposal lay out what information or functionality will flow across these interfaces? Does the proposal specify technology and information requirements only at the points of interface (and not inside the subsystem at issue)?	Defined interfaces include: • Vehicle to charging station o Home o Work o Utility owned public charging stations	4
Does the device/project use an open architecture?	No. The utility considers the architecture to be proprietary.	1
Does the proposal maintain technology neutrality, in that it specifies performance results and outcome requirements rather than prescribing a specific technology or method to achieve those results?	This is an implementation proposal so this item may not apply.	
Can the device or project be supplied by multiple vendors?	This is a proprietary solution as a partnership between the utility and CarCharge Inc. Only CarCharge charging stations will be supported.	1
Does the system or device rely on open, published standards? Does the device or project connect to the electric system and communications network elements in ways that comply with applicable national or international standards for its type?	CarCharge implements the solution based on proprietary technology. Standards use is limited to electrical safety interconnectivity standards.	2

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Interconnectivity & Security

Checklist Question	Case Study Proposal	Score
Interconnectivity and Security		
Does the device have the physical and electronic capability to interconnect with communications media (e.g., serial data ports or broadcast capabilities to access Ethernet or telecom lines or other communications capabilities)? Can the communications networks used by the system or device coexist or exchange data with the networks used by other devices or systems, built by other vendors or electricity providers?	The electrical connection is via a CarCharge proprietary connector. Customers must purchase adaptors for their vehicle. There is no information interface between the vehicle and the charging station. The customer must manually enter their utility account number. Out of service area customers may call the utility to establish an account and use the CarCharge stations.	1
Does the device/project use standard communications protocols? Is there a single standard specification for the data formats (the information model) used by the system or device so it can be understood by a variety of communications technologies and devices?	All communications is within the utility system using proprietary protocols and data models.	1
Does the device or system make basic data or information available to all authorized devices and users, such as energy usage and costs over metered intervals, grid condition metrics, or operational instructions?	Customers receive a bill monthly showing their total vehicle charging for the month.	1
Can the system manage multiple devices (or influence multiple users) within the system using a common command or information feed from a central source?	The system can handle up to 50 charging stations. Each charging station can handle one vehicle at a time.	1

Interconnectivity & Security (cont.)

Checklist Question	Case Study Proposal	Score
Interconnectivity and Security		
Does the device/project use at least the basic cyber-security measures as recommended by the NERC Critical Infrastructure Protection standards? Does the device/project follow industry consortia (e.g. Utility AMI, CEC PCT Reference Design) security and privacy recommendations?	CarCharge has implemented a proprietary cyber security solution.	1
If the device or system is mission-critical to the delivery of electricity or the well-being of the user, does it have sufficient redundancy or design to fail in a way that does not harm the system or the user?	The CarCharge solution has a 60% availability requirement.	1

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Evolutionary Capability

Checklist Question	Case Study Proposal	Score
Evolutionary Capability and Service Life		
Can the device be updated or have its functionalities upgraded by downloading new software and configuration information?	Charging stations may be upgraded via an infield ROM replacement by a service technician.	1
Can the device or project integrate easily with earlier versions and equipment on the system?	Yes, as long as they are CarCharge products.	1
Collaborator Independence		
Does the device or project allow collaborators or users to make independent decisions (within defined parameters such as contractual provisions, NAESB wholesale agreements, electric market rules, or tariff)?	No. Use is defined by the CarCharge process and procedures.	1

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