NATIONAL COUNCIL
ON ELECTRICITY POLICY

Annual Meeting 2019

Evolving Transmission, Distribution, and Customer System Coordination

Wednesday, September 11 –
Thursday, September 12

Austin, Texas

Physical System & Operating Essentials

Chris Villarreal, Moderator

Paul Duncan

Paul Alvarez

Lorenzo Kristov

Mark Knight

Interoperability

Communications Across the Grid Panel

Mark Knight

Senior Technical Consultant

National Council on Electricity Policy
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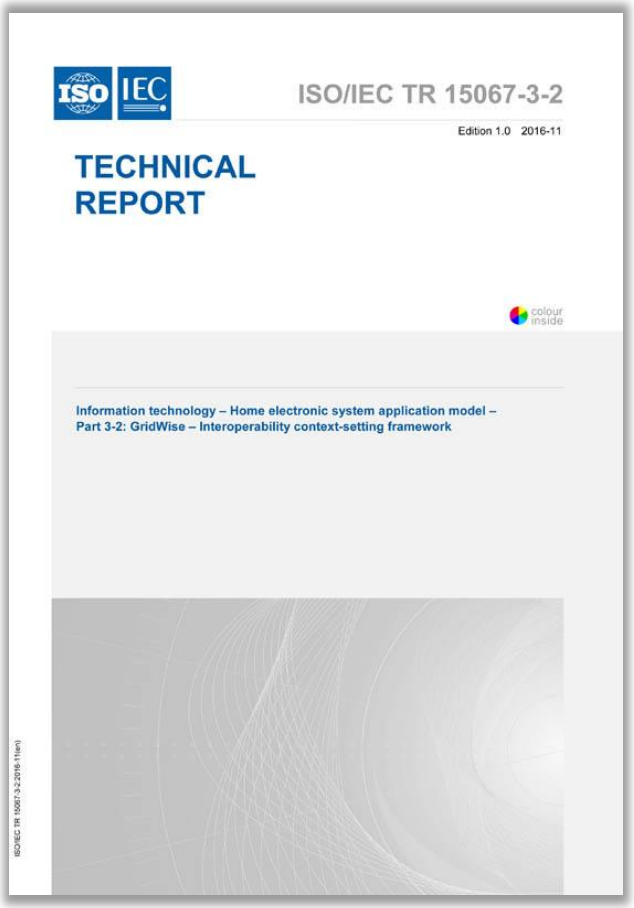
September 12, 2019

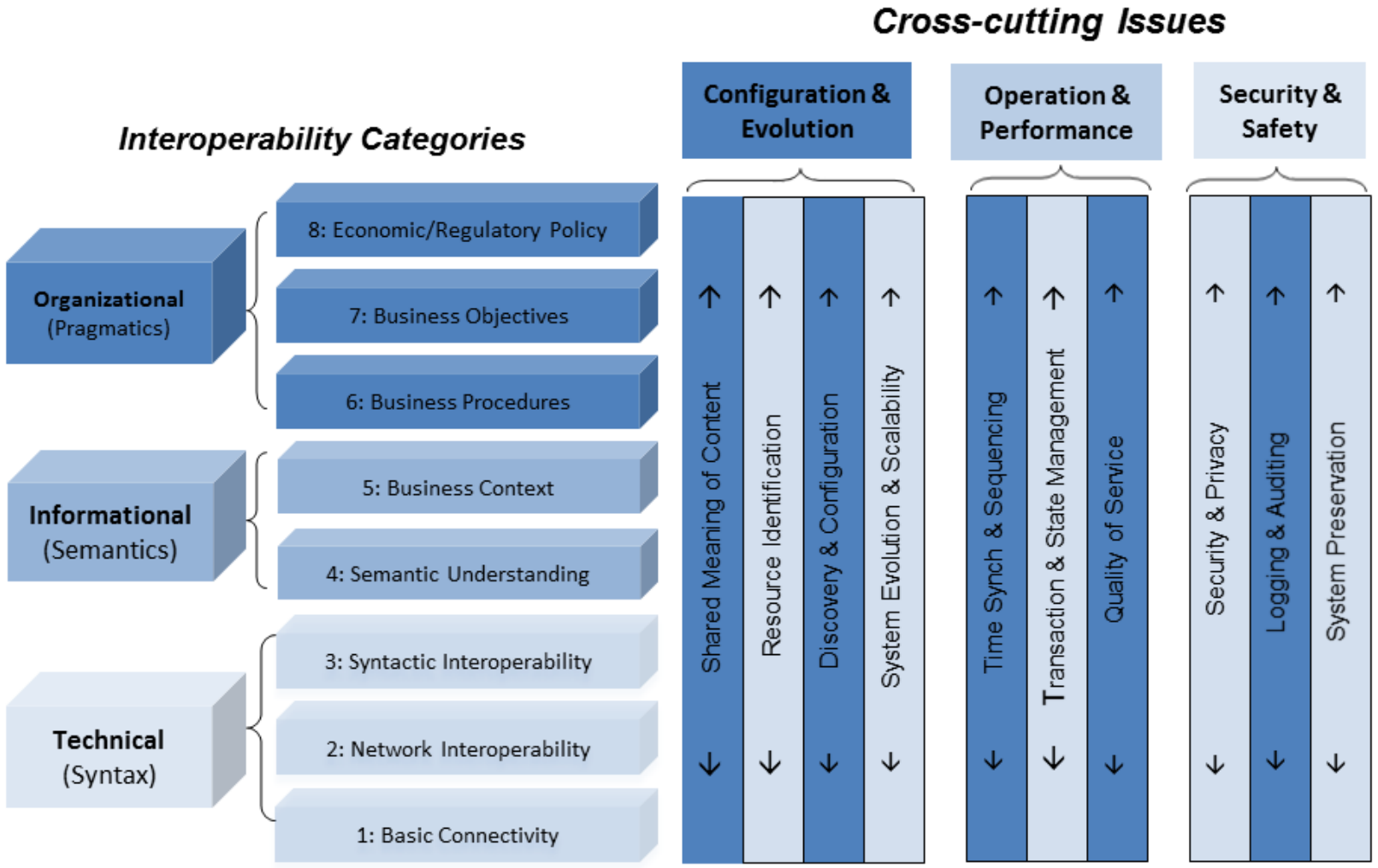
in·ter·op·er·a·bil·i·ty

- Interoperability is ***"The ability of two or more systems or components to exchange information and to use the information that has been exchanged"****
- Who wouldn't want that?
- Interoperability with quicker and cheaper integration.
- How do we do that?
- It's not as simple as just specifying standards
- *Interoperability is the desired result, integration is the process to get there*
- That depends on what you buy and how you bolt it together

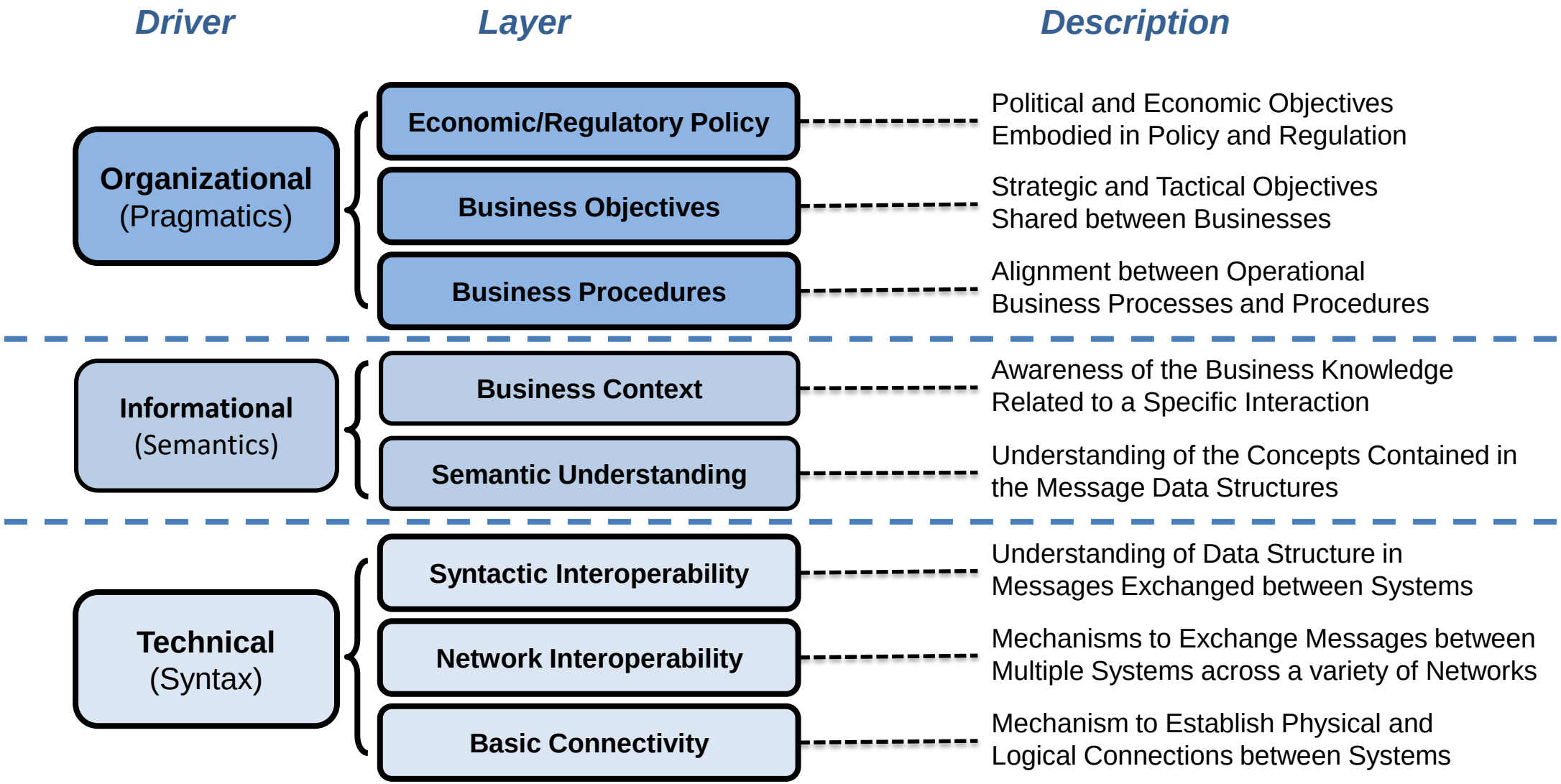
* Source: ISO/IEC/IEEE 24765: Systems and software engineering — Vocabulary. International Organization of Standards. 2010.

GWAC Interoperability Context Setting Framework



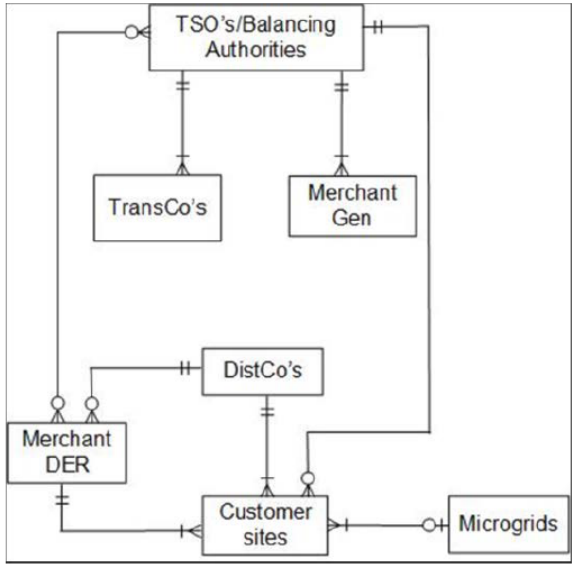


GWAC STACK

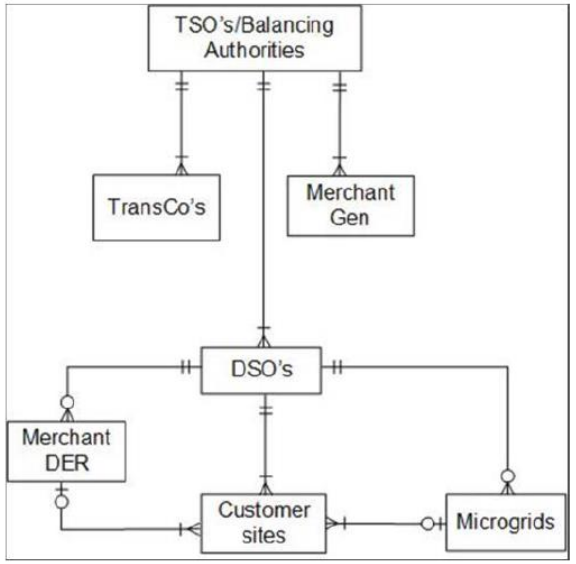

Driver
Layer
Description
Organizational
(Pragmatics)
Economic/Regulatory Policy
Political and Economic Objectives
Embodied in Policy and Regulation
Business Objectives
Strategic and Tactical Objectives
Shared between Businesses
Business Procedures
Alignment between Operational
Business Processes and Procedures
Informational
(Semantics)
Business Context
Awareness of the Business Knowledge
Related to a Specific Interaction
Semantic Understanding
Understanding of the Concepts Contained in
the Message Data Structures
Technical
(Syntax)
Syntactic Interoperability
Understanding of Data Structure in
Messages Exchanged between Systems
Network Interoperability
Mechanisms to Exchange Messages between
Multiple Systems across a variety of Networks
Basic Connectivity
Mechanism to Establish Physical and
Logical Connections between Systems

Why is interoperability important

- The grid is a cyber physical system.
- Smart systems that consist of highly interconnected networks of physical and computational components [NIST]



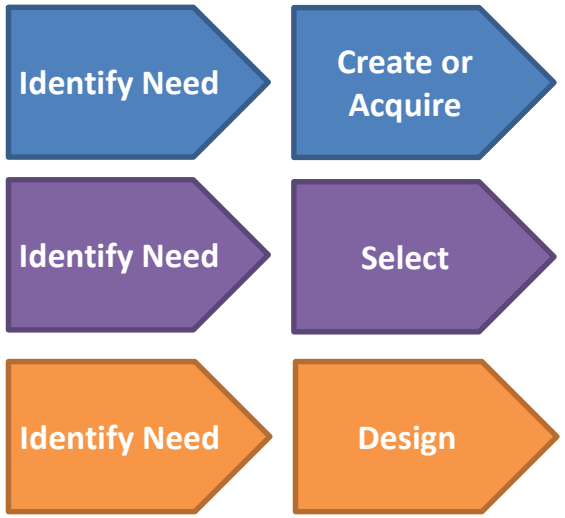
- More devices plus more communication = more simple?
- How do we do that?
- How do we secure that?
- It's an obvious need yet it's not a budget line item so how to get traction?



- Improved interoperability increases potential for customer engagement

Tip: Start at the Beginning

Afterthoughts and add-ons are less effective and more expensive



How do you acquire assets? Procurement language

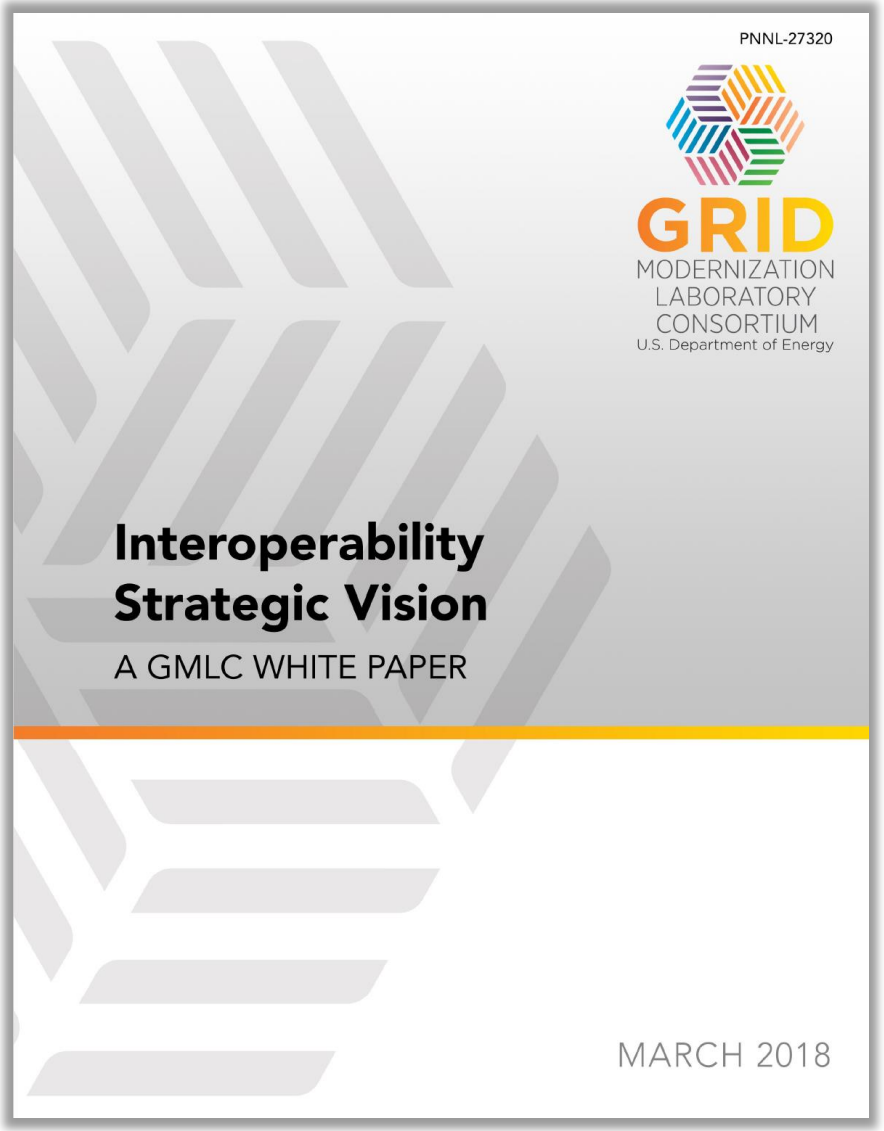
How do you select assets? RFP process and procurement language

How do you identify and communicate design needs? Procurement language

Adapted from: Asset Management – an Anatomy V3, The Institute of Asset Management

GMLC Interoperability Project

- Interoperability Strategic Vision
- Interoperability Maturity Model
- Interoperability Roadmap
  - IEEE 2030.5 ecosystem:
    driven by PV smart inverter integration in CA, HI
  - EV charging ecosystem:
    driven by EV charging systems integration in US and EU
- Reference Interop Procurement Language
- Plug & Play DER Challenge (SEPA, EPRI, NIST)

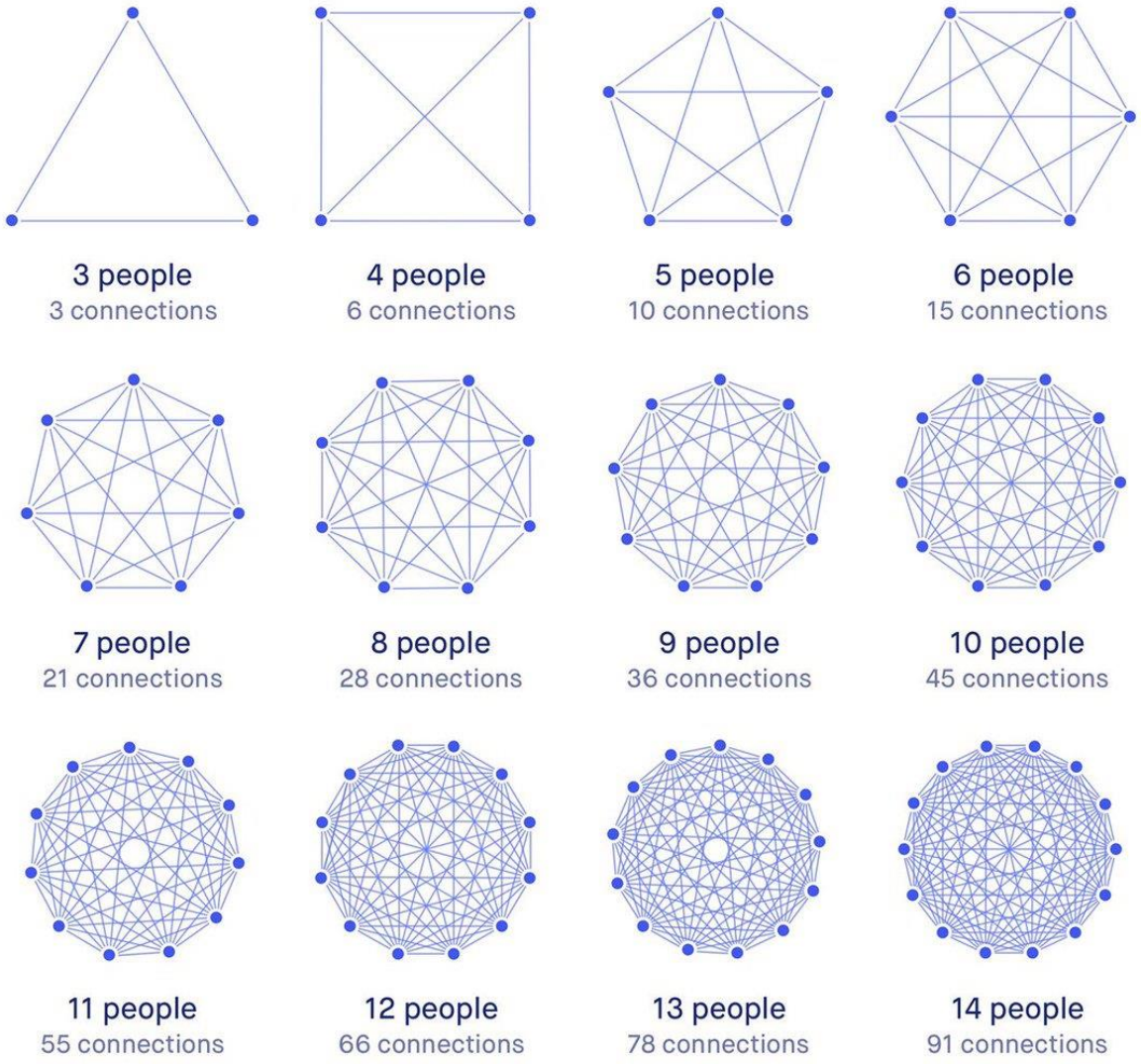


Energy Independence and Security Act of 2007

1. Increased use of **digital information** and controls technology to improve reliability, security, and efficiency of the electric grid.
2. **Dynamic optimization** of grid operations and resources, with full cyber-security.
3. Deployment and **integration of distributed resources** and generation, including renewable resources.
4. Development and **incorporation** of demand response, demand-side resources, and energy-efficiency resources.
5. Deployment of "smart" technologies (real-time, automated, interactive technologies that **optimize** the physical operation of appliances and consumer devices) for metering, **communications** concerning grid operations and status, and distribution automation.
6. **Integration** of "smart" appliances and consumer devices.
7. Deployment and **integration** of advanced electricity storage and peak-shaving technologies, including plug-in electric and hybrid electric vehicles, and thermal-storage air conditioning.
8. Provision to consumers of **timely information and control options**.
9. Development of standards for communication and **interoperability of appliances** and equipment connected to the electric grid, including the infrastructure serving the grid.
10. Identification and **lowering of unreasonable or unnecessary** barriers

Metcalfe’s Law

Metcalfe's law states the value of a telecommunications network is proportional to the square of the number of connected users of the system (n^2).



Thank You

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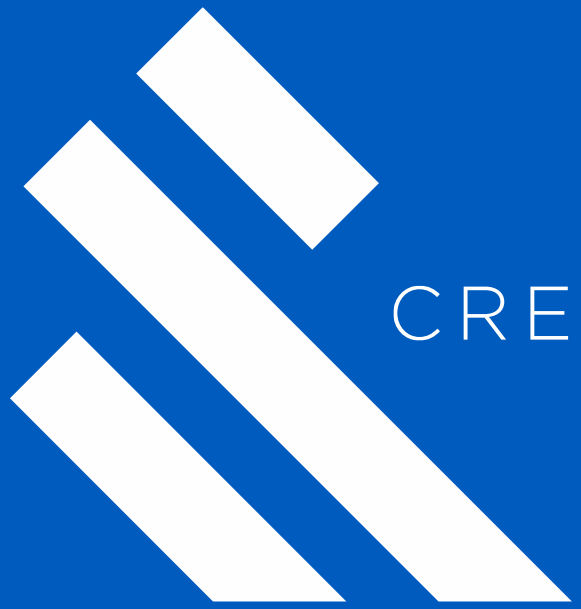
BURNS McDONNELL

CREATE AMAZING.



CREATE AMAZING.

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