Trends Impacting Grid Modernization and Security of the Grid

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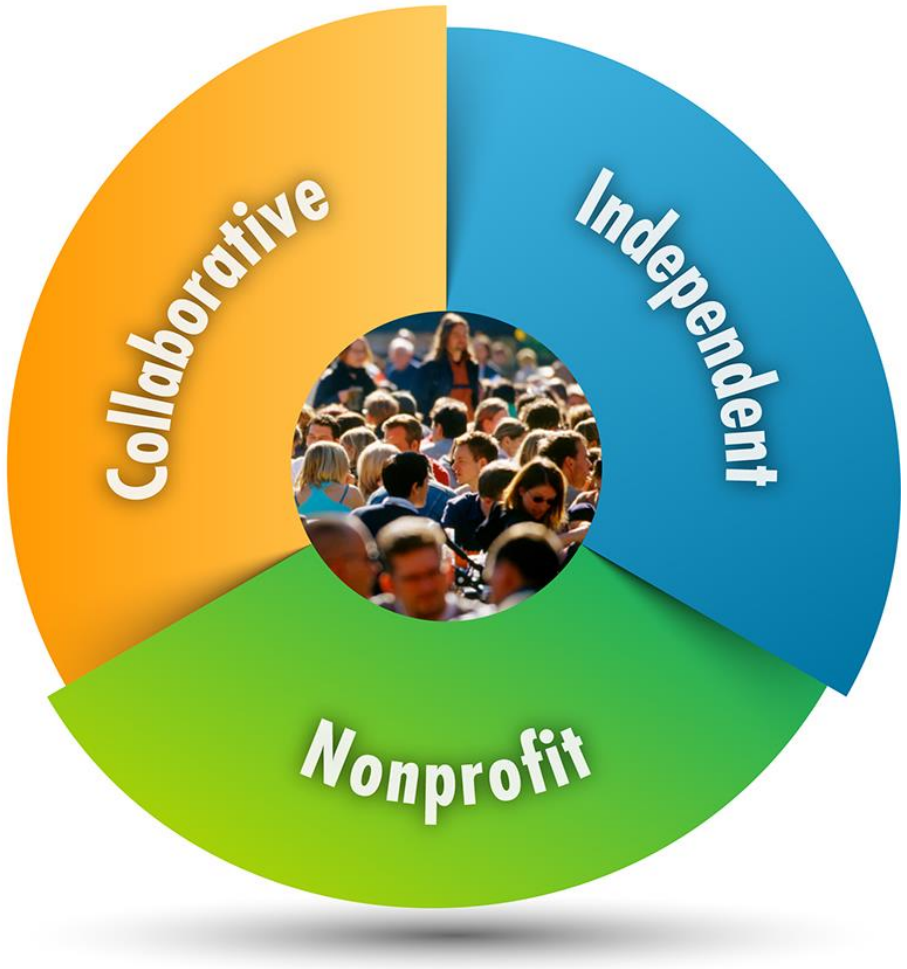
Three Key Aspects of EPRI



Independent

Objective, scientifically based results address reliability, efficiency, affordability, health, safety, and the environment

Nonprofit

Chartered to serve the public benefit

Collaborative

Bring together scientists, engineers, academic researchers, and industry experts

What Drives Security Decisions in the Electric Sector?

- Emerging Technologies & Capabilities
- Reliability & Resiliency
- Regulation
- Privacy
- Financial Risk

CIP Standards have been in place for a Decade

Pros

- Standardized approach to securing the Bulk Electric System
- Transparency and Accountability
  - Compliance Enforcement Authorities have the ability to assess security implementations
  - Stakeholders are aware of the requirements
- To date: No Cyber Security Incidents have impacted the BES
- Significant investments in people, process and technology

Cons

- Significant investments in people, process and technology
- Slow to change
- High O&M costs
- May limit the early adoption of certain proven technologies
- Focus on compliance vs security

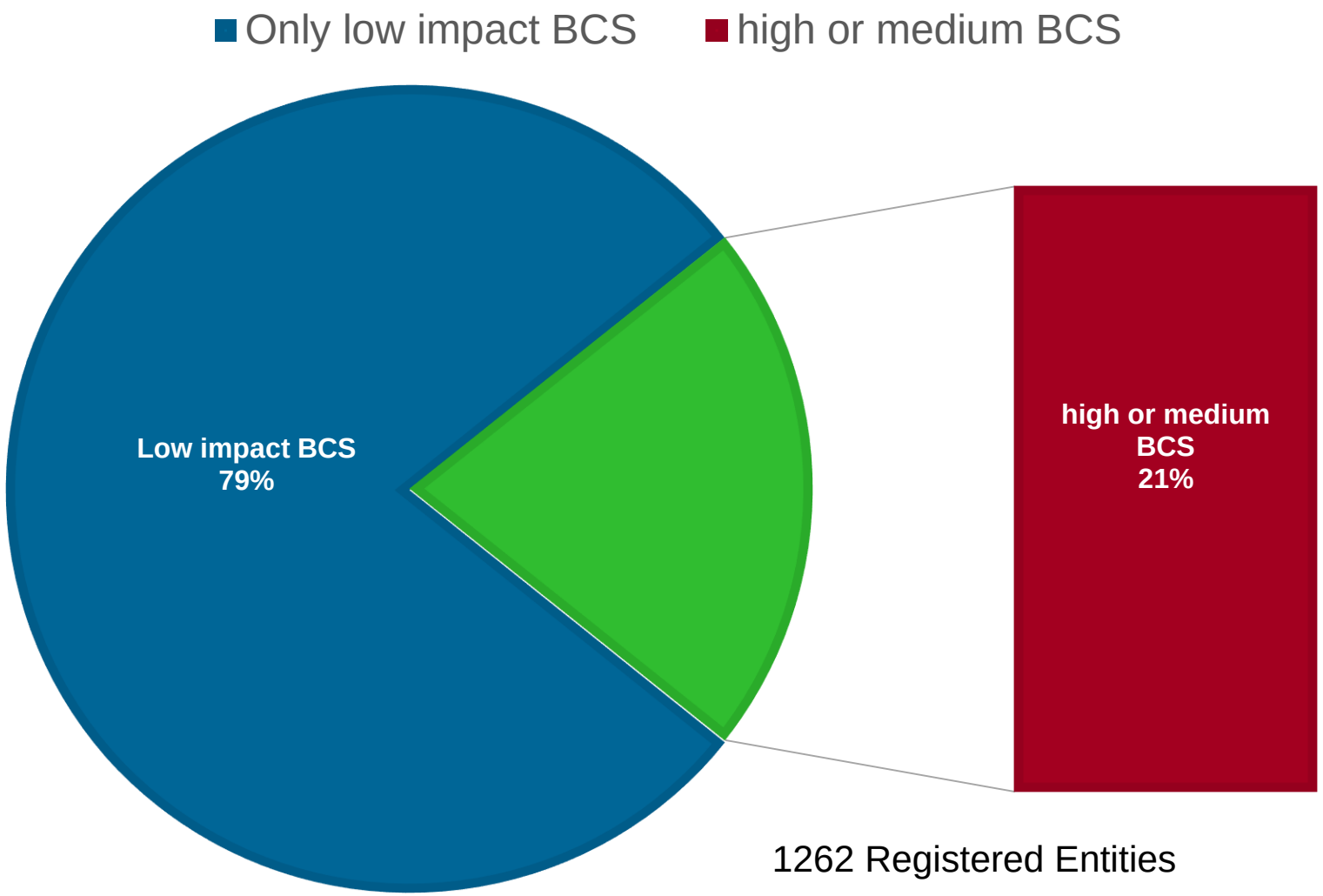
CIP Standards Applicability – BES Cyber Systems

High and Medium Impact

- Most rigorous
- Approx. 100 controls

Low Impact

- Less rigorous
- Approx. 10 controls
- *Most of the grid's modernization effort take place on the low or no impact categories*



Industry Trends Impacting Cyber Security Risk

Transmission & Distribution

- Energy Storage
- Microgrids
- Dynamic supply / demand balancing with Distributed Energy Resources
- Mobile workforce
- Increased automation and communications

Customer

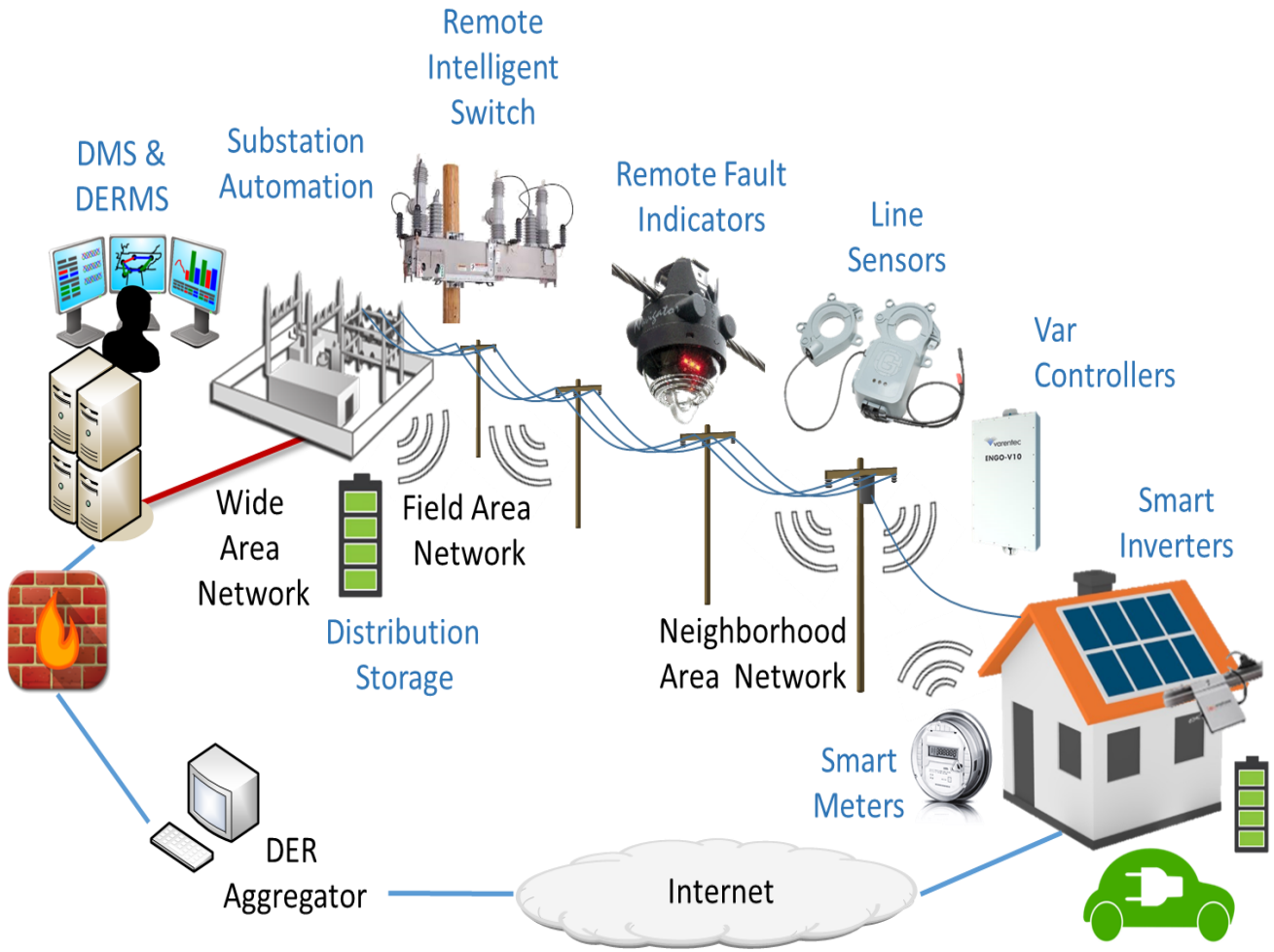
- Self generation (Solar PV, Storage)
- Electric vehicle and related charging
- IoT devices

Third Parties

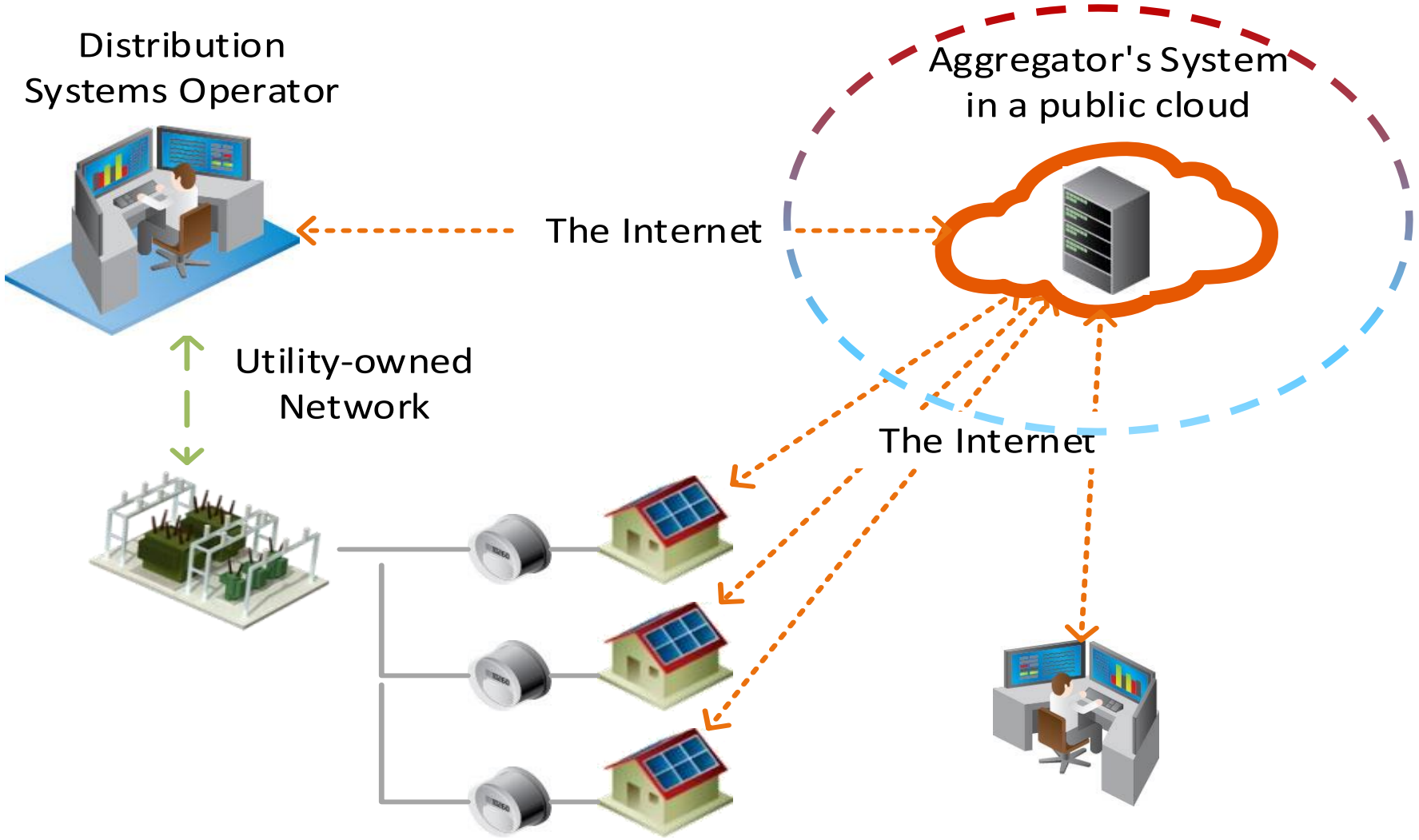
- DER and DR aggregators

Protecting Critical Infrastructure

- Malicious attack
- System Misoperation
- Identity Theft
- Financial Integrity



Introducing a New Energy Stakeholder



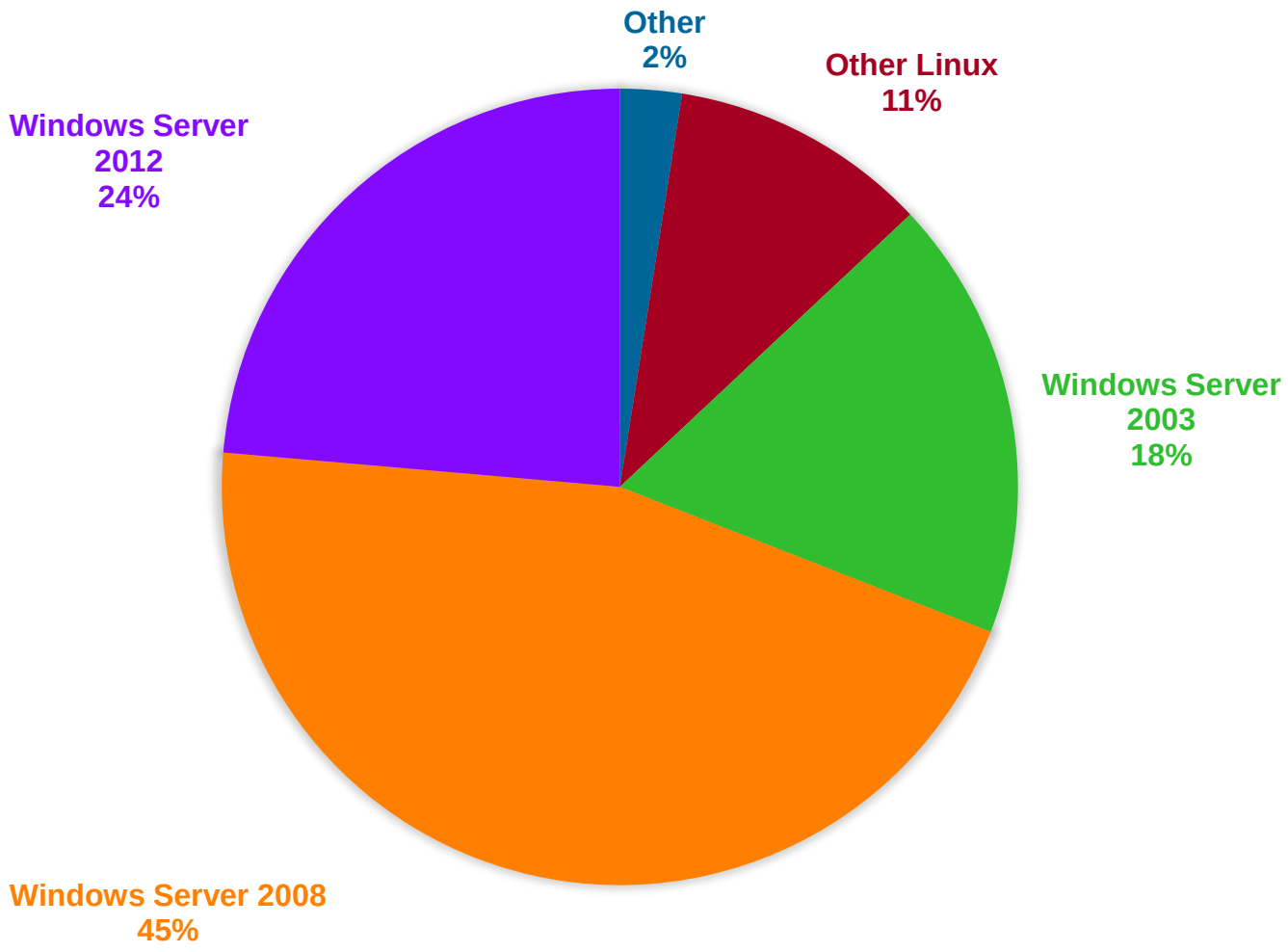
Supply Chain Security Risks

- Supply Chain security risks impact the procurement of products of services used on the grid.

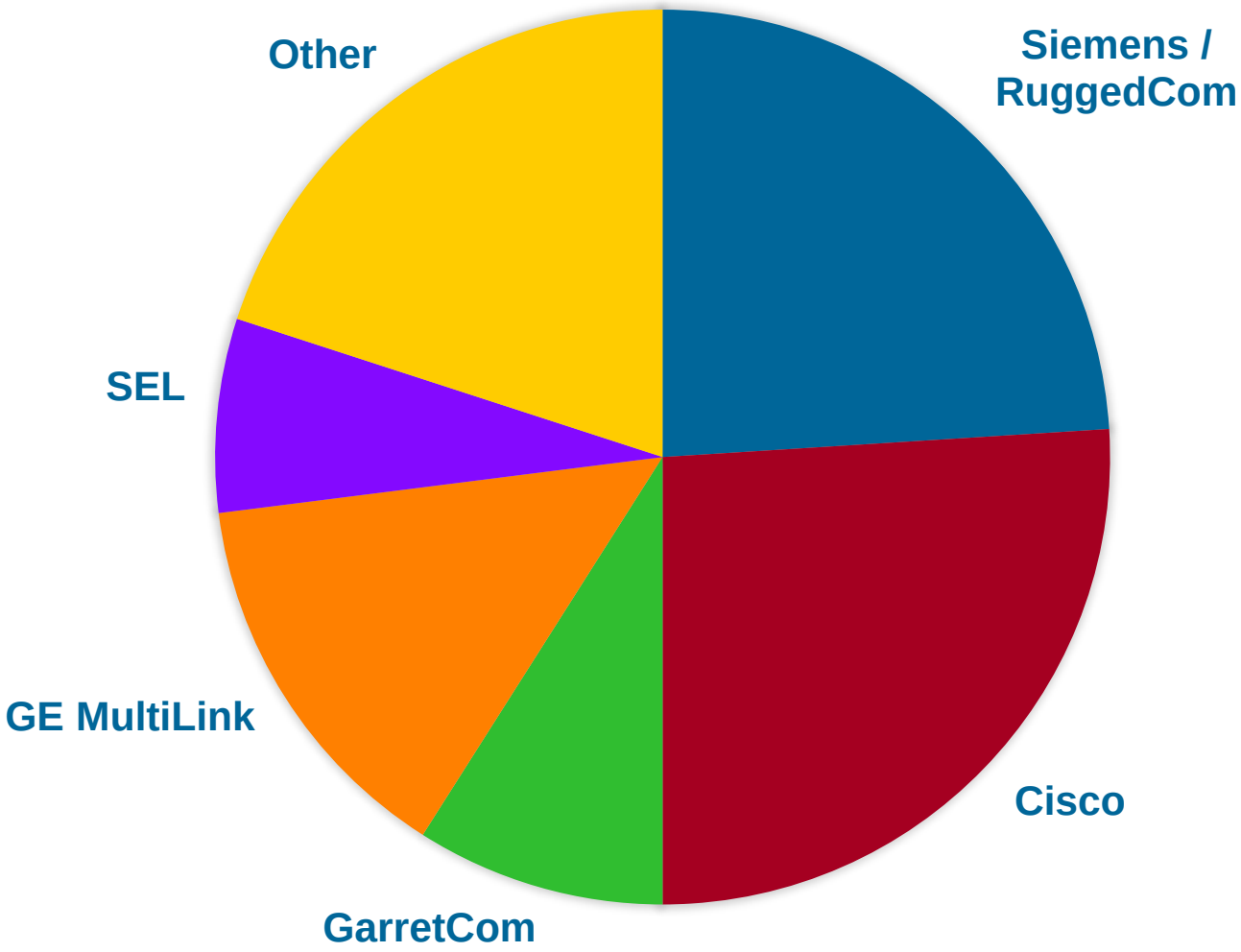
- Planning and Operations staff should be aware of security considerations in the procurement process - especially key systems such as:
  - EMS and Control Center systems
  - Relays/RTUs and COMM processors
  - Grid Edge Devices

- EPRI performed an assessment of Supply Chain Risk for NERC in light of the recently developed CIP-013-1 Supply Chain Standard.

Operating Systems



Substation Communication Equipment



Key Recommendations to Mitigate Supply Chain Risks

- Third-Party Accreditation Processes – verifying that standardized processes and measures were achieved to mitigate supplier risks.

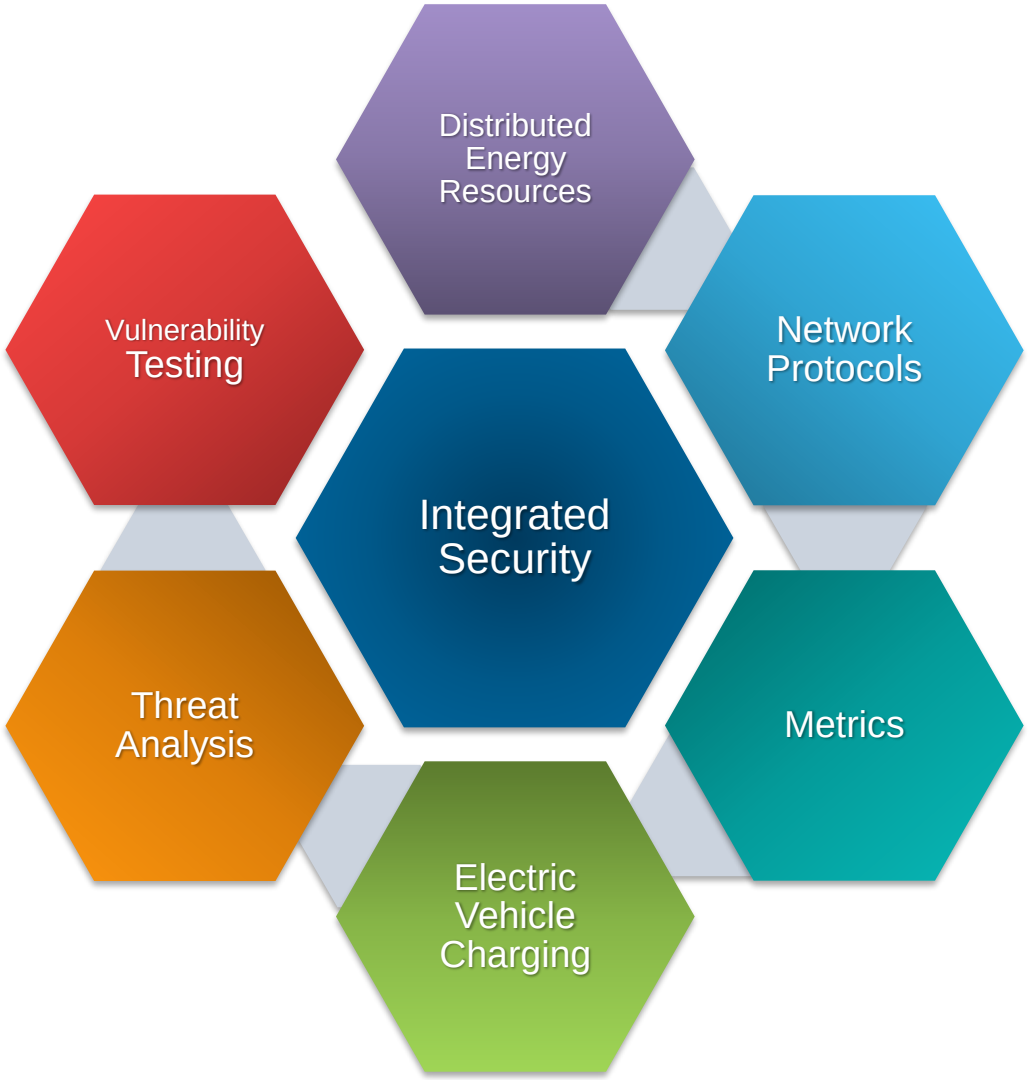
- Secure Hardware Delivery – protecting hardware and software during physical transport.

- Threat-Informed Procurement Language – tailoring security specifications to the specific risk of the purchaser's environment.

- Unsupported or Open-Sourced Technology Component Processes – to mitigate residual risks for patch/vulnerability management processes for unsupported systems

Mitigating the Integrated Grid Risks

- Research and test cyber security vulnerabilities for the Grid Edge
- Standardize communication and security protocols
- Recognize that new companies may provide value to the grid and may challenge legacy policies
- Understand the inherent capabilities, benefits and risks of cloud operations
- Development meaning security metrics and benchmarking capabilities



Upcoming EPRI PDU Advisory Meetings in 2019

2019 Winter Advisory

February 11-13, 2019 (Programs)

February 13-14, 2019 (Sector Council)

La Cantera Resort

16641 La Cantera Parkway

San Antonio, Texas 78256

La Cantera Resort

Group Rate: $239

2019 Fall Advisory

September 9-11, 2019 (Programs)

September 11-12, 2019 (Sector Council)

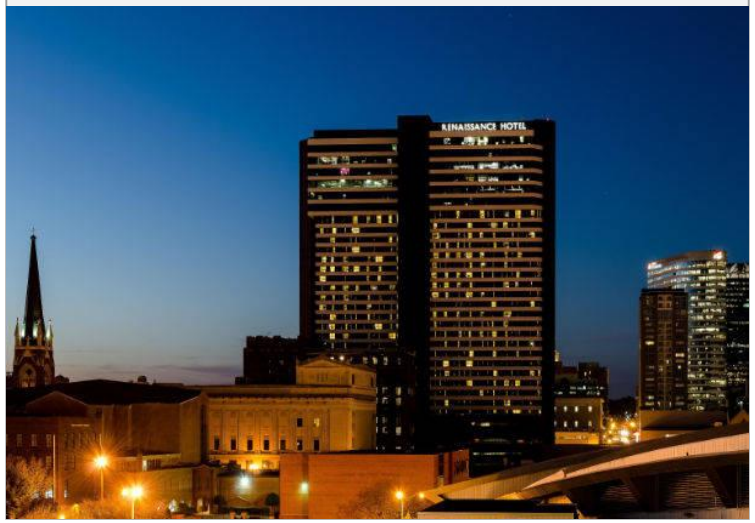
Renaissance Nashville Hotel

611 Commerce Street

Nashville, Tennessee 37903

Renaissance Nashville Hotel

Group Rate: $239



Together…Shaping the Future of Electricity