Achieving Critical Power for Critical Loads

The Army's Base of the Future

How to Achieve Resiliency Requirements for Critical Assets?

Do you need to buy an expensive battery?

What Do your Customers Want?

What does the Microgrid need to control?

How do I know what Cybersecurity requirements are required?

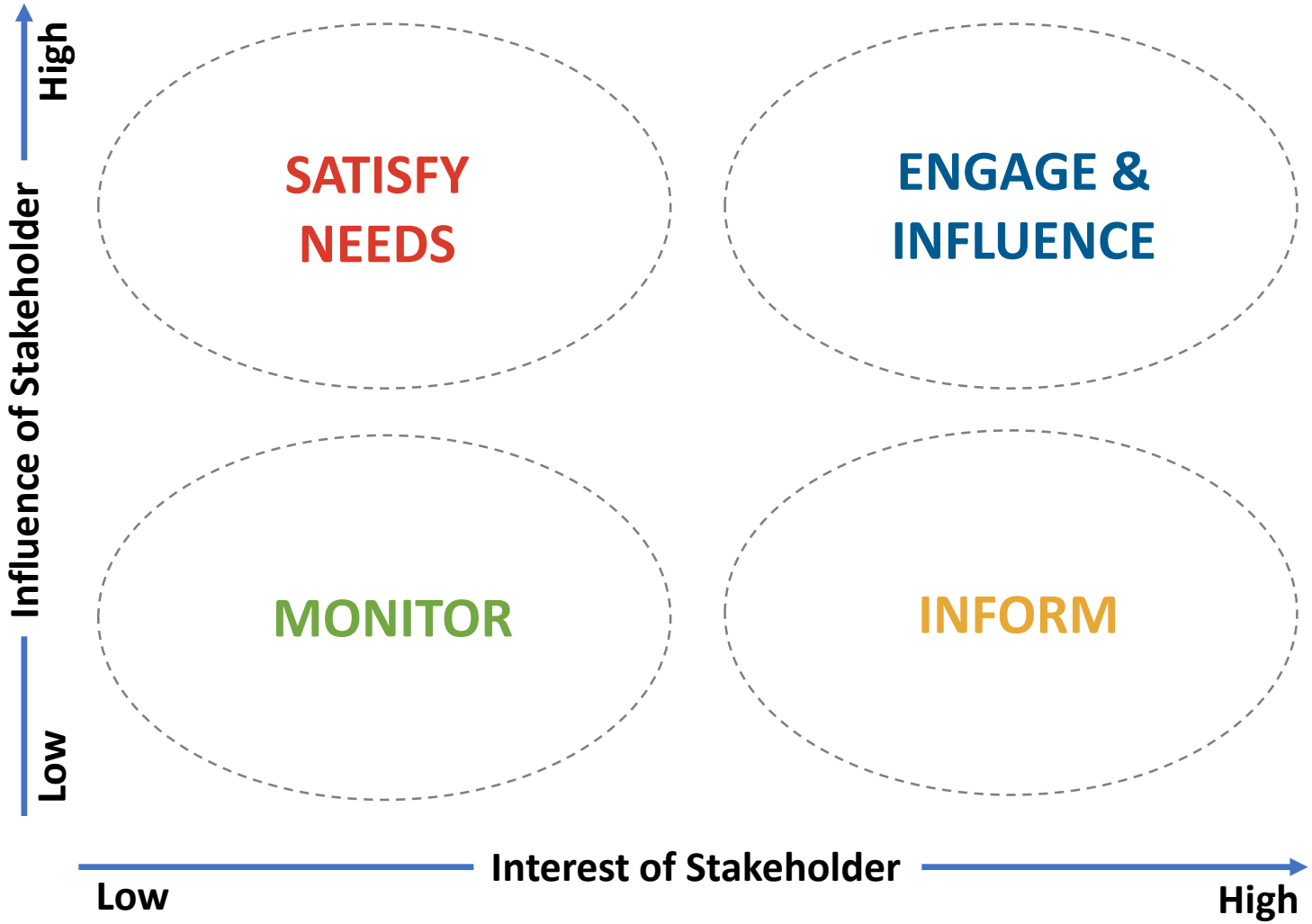
Will my existing infrastructure work with the Microgrid?

Where do I get started?

The 5 Critical Lessons for Critical Assets

- Coordination of Stakeholders
- Cybersecurity
- Challenges integrating with existing infrastructure
- Ensuring operational requirements are met
- Multi-level contingency handling

1: Coordination of Stakeholders



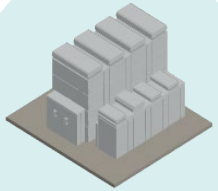
Municipal Utility-Owned Microgrid

Minster, OH

Solar plus storage microgrid – Completed 2015

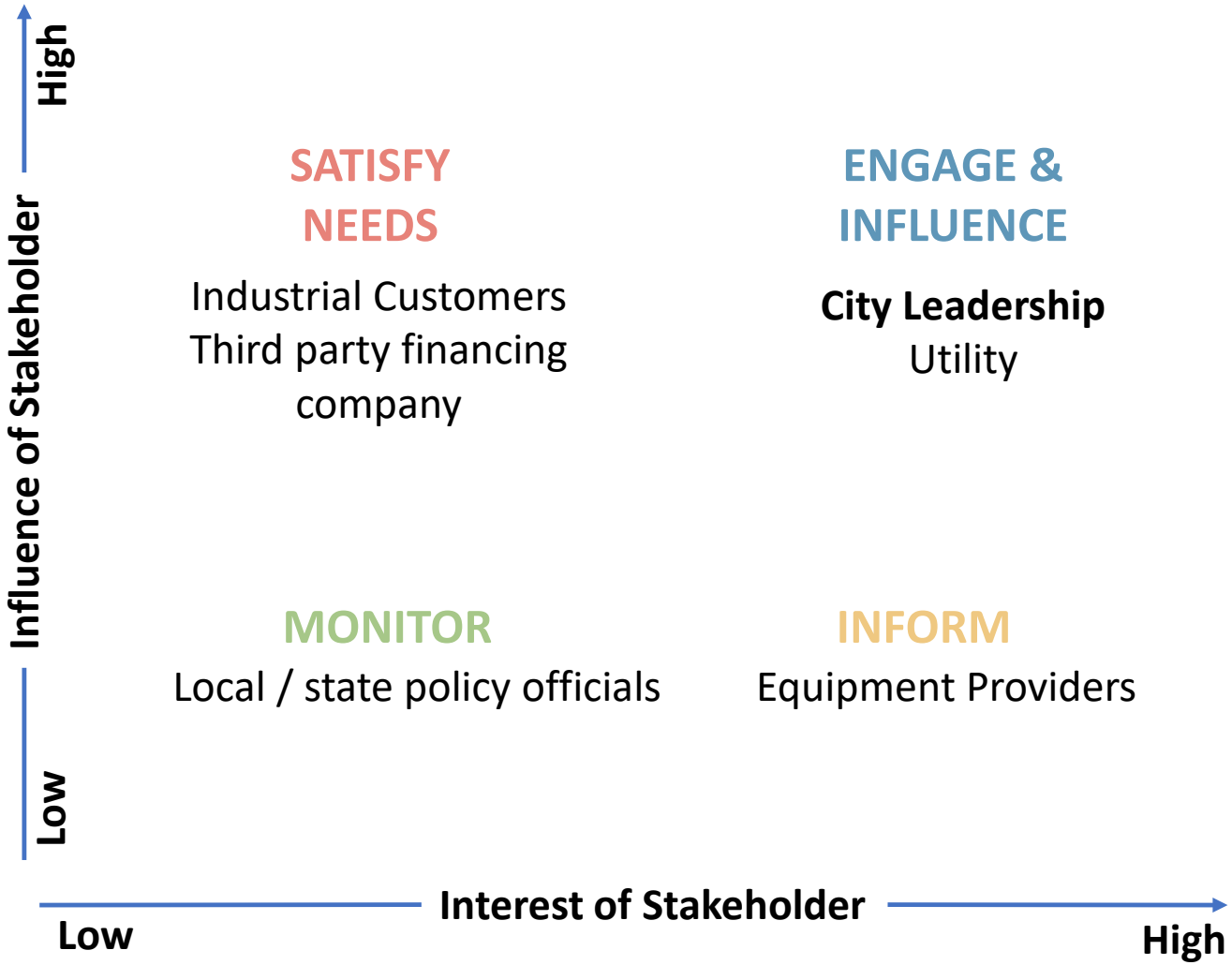
10

Megawatts



Storage
7 MW

Solar
3 MW



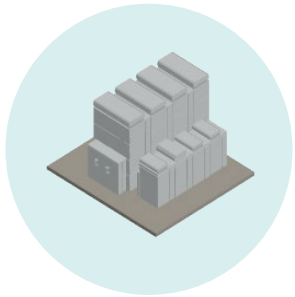
Utility Driven, Consumer Focused Microgrid

City of Field Microgrid

Utility project highlighting effectiveness of battery storage – Completed 2013

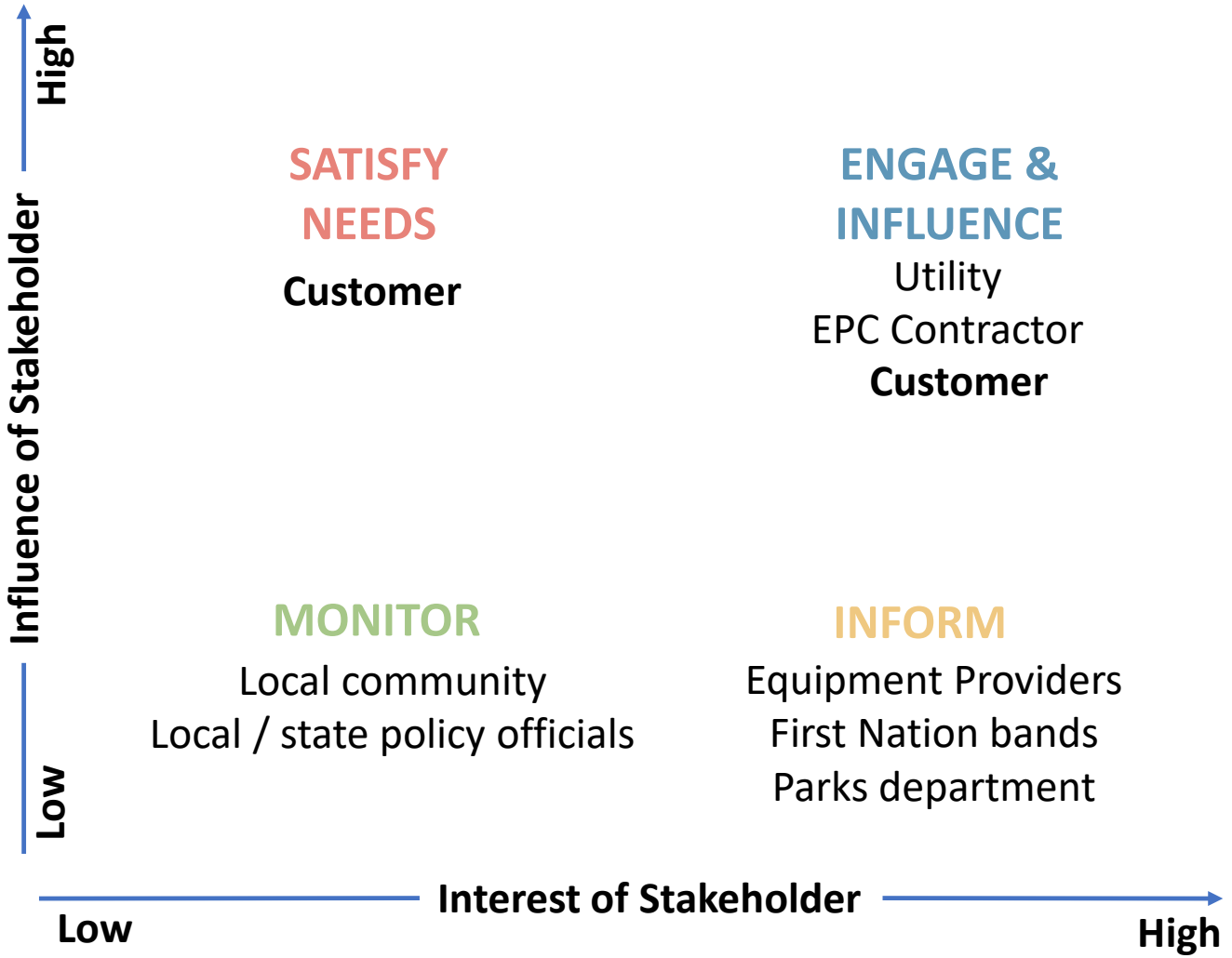
1

Megawatts



Storage

1 MW / 7 MWh



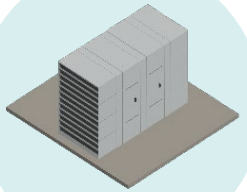
Pushing the Envelope with a Next Generation Utility Microgrid

Ameren Technical Application Center, IL

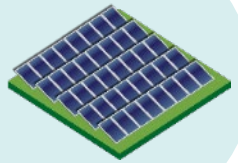
Utility prototype with 15 use cases – Completed 2017

1.5

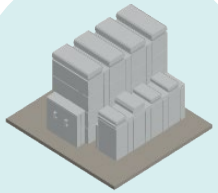
Megawatts



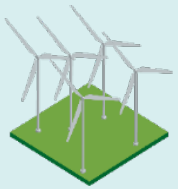
Generators
1.0 MW



Solar
150 kW

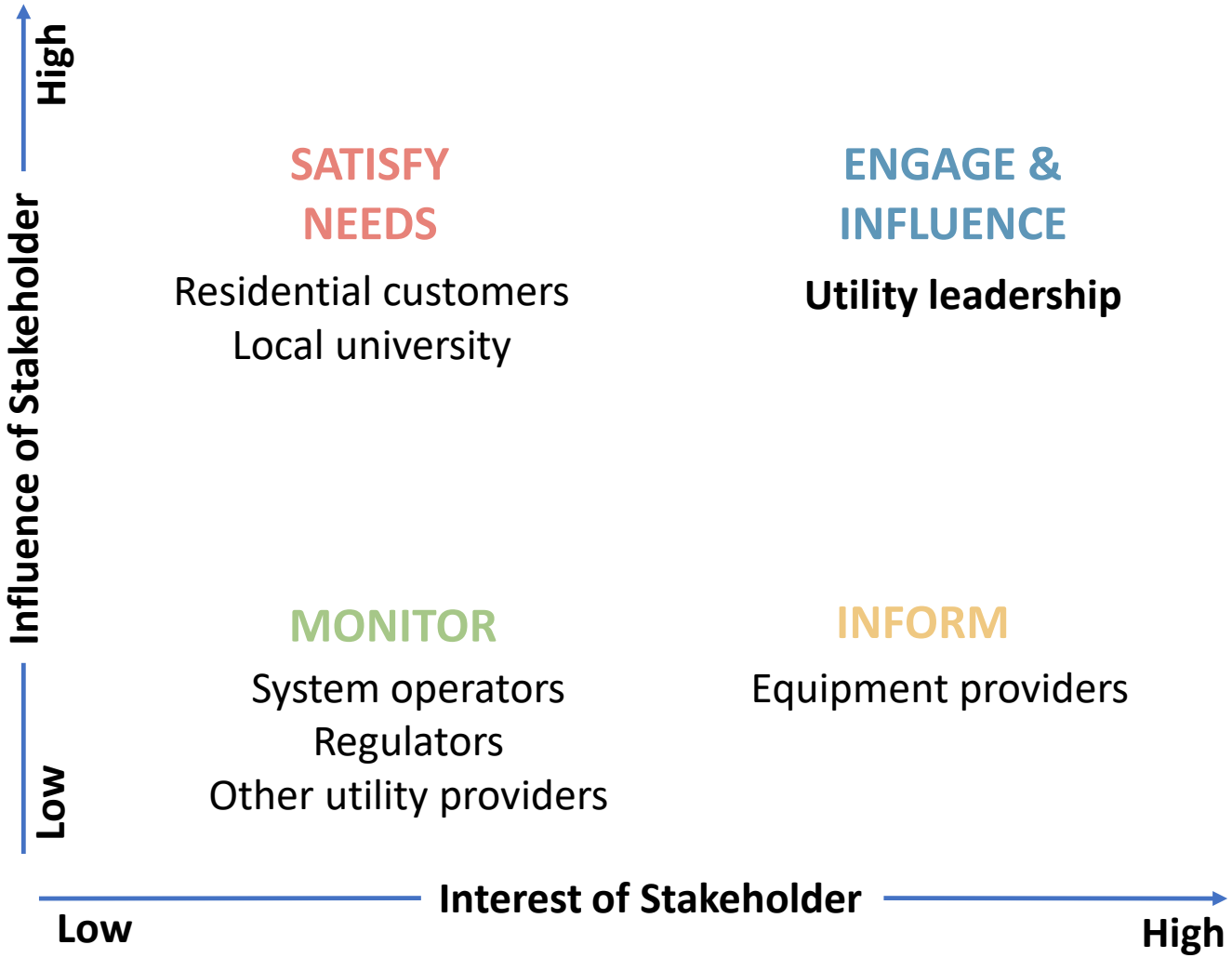


Storage
250 kW



Wind
100 kW

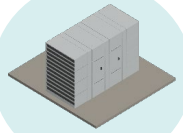
Electric Vehicle
Load Only

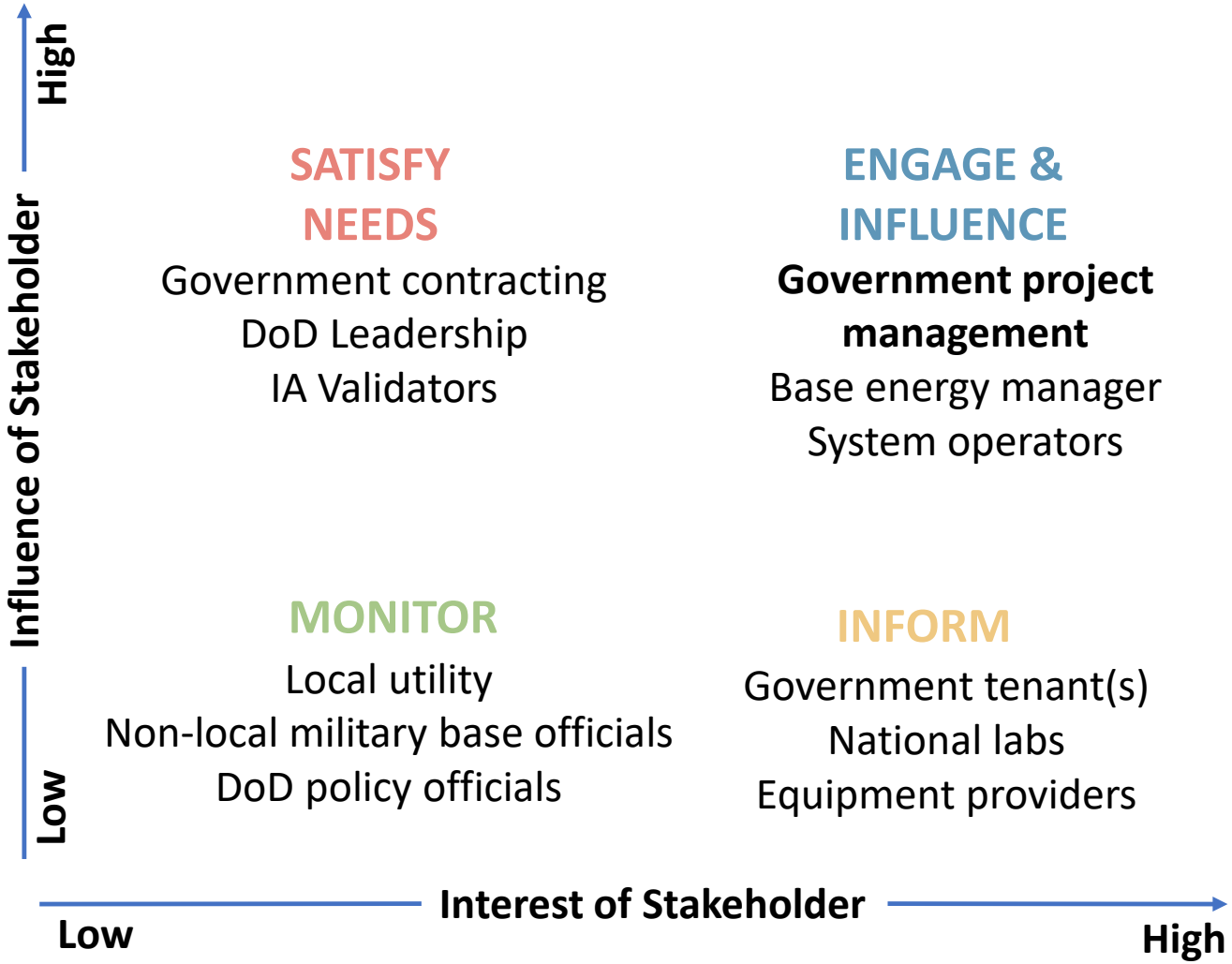


The Complexity of a Military Microgrid

Fort Belvoir, VA

Critical base for military applications – Completed 2019

3				
Megawatts	**Generators** 1.6 MW	**Solar** 1.0 MW	**Mobiles** 400 kW	**ATO** RMF



Practical Tips to Consider

Project Management

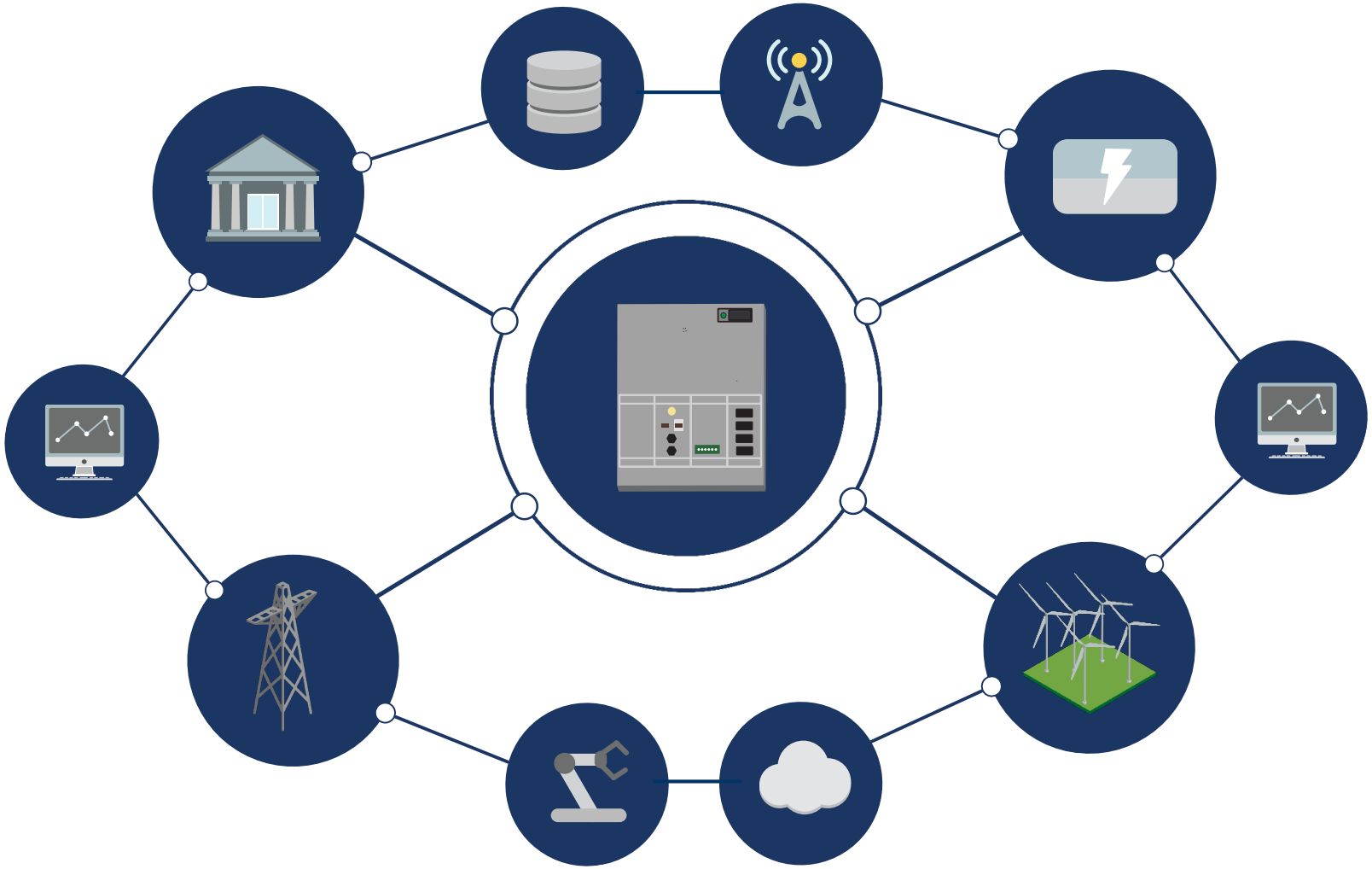
Make Time

Smarten Up

Who's Who

Hidden Helper

2: Cybersecurity - System of Systems



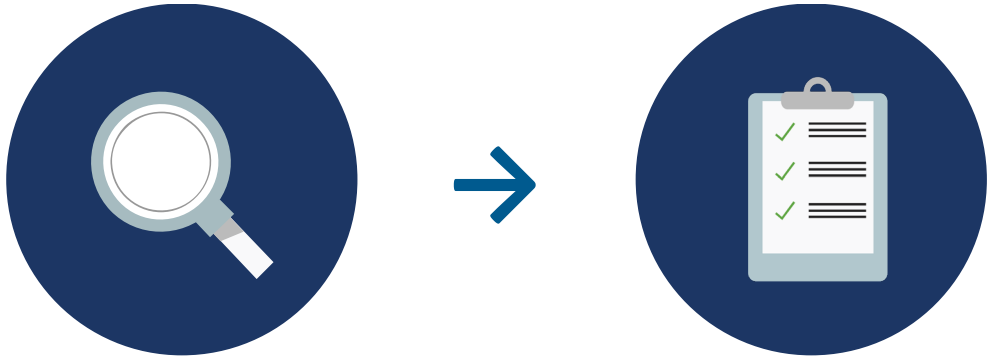
Overly Complex Security Protocols Result in Fragile Systems

COMPLEXITY ≠ RESILIENCY

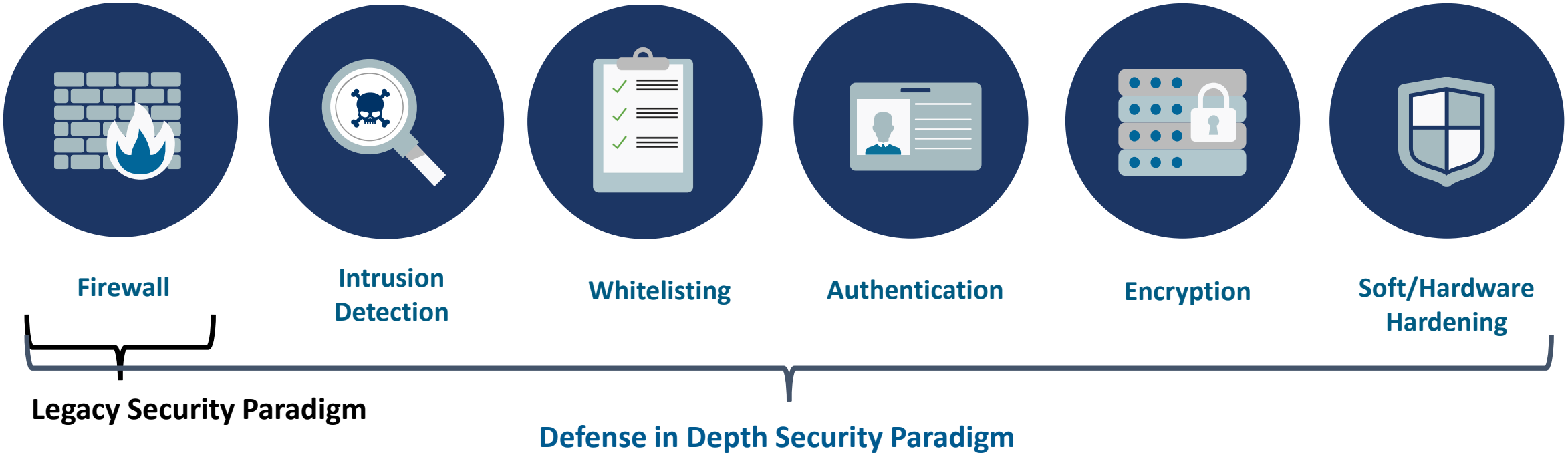
Augmentation of cybersecurity solutions adds devices and applications that can malfunction and cause system degradation or cascading failures.

KNOW YOUR SYSTEM'S NEEDS

Understand the components and interfaces of your system and assess the risks at hand before selecting security measures.



Not all security postures are created equal

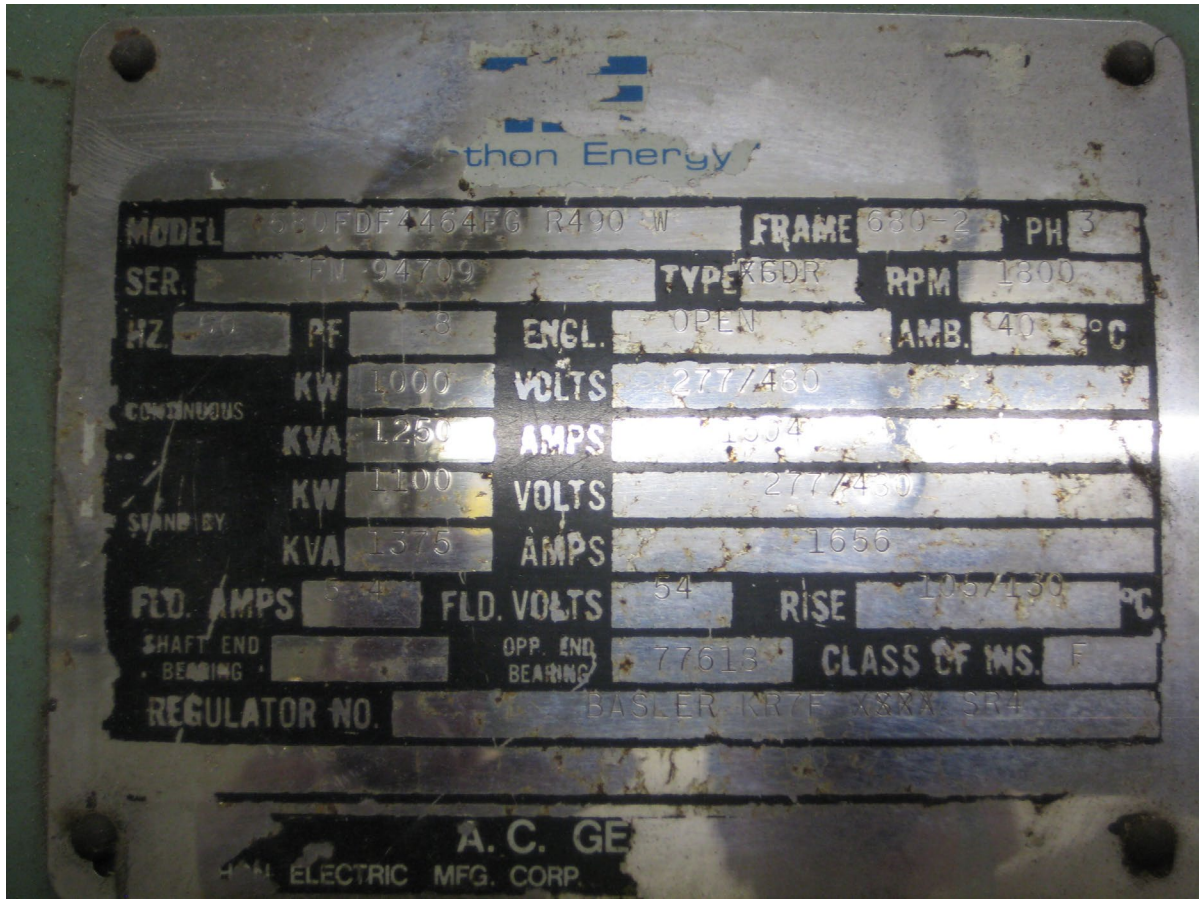


3: Existing Infrastructure Integration

- Sizing of transformers
- Imbalance on the system
- Existing PV & feeder
- Adaptive relay settings

Generation Assets

- Examining generator operational state
- Upgrading generator controls
- Considering associated equipment



Physical Location

- Considering sub-grids
- Identifying open space for installation
- Installing new equipment

Network

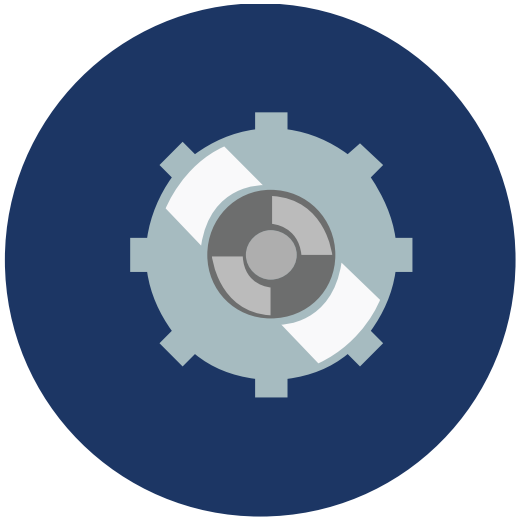
- Varying speeds of communications
- Coordinating network design
- Integrating network hardware
- Participating in existing network

4: Ensuring Operational Requirements are Met

- Standard Use Cases
  - Grid-Tied
  - Island
  - Transitions
    - Black start
    - Intentional Island
    - Island to Grid-Tied
  - DER Optimization
  - DER Monitoring and Control

- Complex Use Cases
  - Storm Preparedness
  - Islanding with renewables (Green Mode)
  - Peak shaving
  - Curtailment
  - Renewable smoothing
  - Frequency Regulation
  - Power Factor Correction

5: Multi-Layered Contingency Handling



Resilient Equipment

Distributed Design

Intelligent Controls

A microgrid must be able to withstand the loss of equipment or communications when supporting critical facilities.

What can we do?

- Coordination of All Stakeholders
- Deploying the latest Cybersecurity
- Review and develop Plan for Existing Infrastructure
- Ensure Operational Requirements are Met
- Deploying Multi-level contingency handling

Check List

- Engage Stakeholders
- Evaluate what is existing
  - Generators
  - Transformers
  - Distribution Circuit
  - Some areas maybe a better fit for a microgrid than others
- Develop of Resiliency Plan
  - If you have one, develop a feasibility study for your critical assets

Thank You!

S&C Electric Company

Chris.Evanich@SandC.com

