

DAFITC 2024 - Panel

Mission and Power Project Tied to a System of Critical Control Systems

Moderator:

Tim Watkins at SEL Inc - Senior Engineer (Systems and Cyber Engineer)

Panelist:

Cedric Carter at MITRE – Principal Engineer (Critical Infrastructure Cyber)

Honorable Mr. Lucian Niemeyer at Building Cyber Security – CEO

Randy Benn at Claroty – Solutions Engineer – US Federal

Control Systems Basics

CONTROL SYSTEMS HAVE **FOUR FUNCTIONS**

- Measuring
- Comparing
- Computing
- Providing corrective calculation

FUNCTIONS ARE PERFORMED BY **FIVE ELEMENTS**

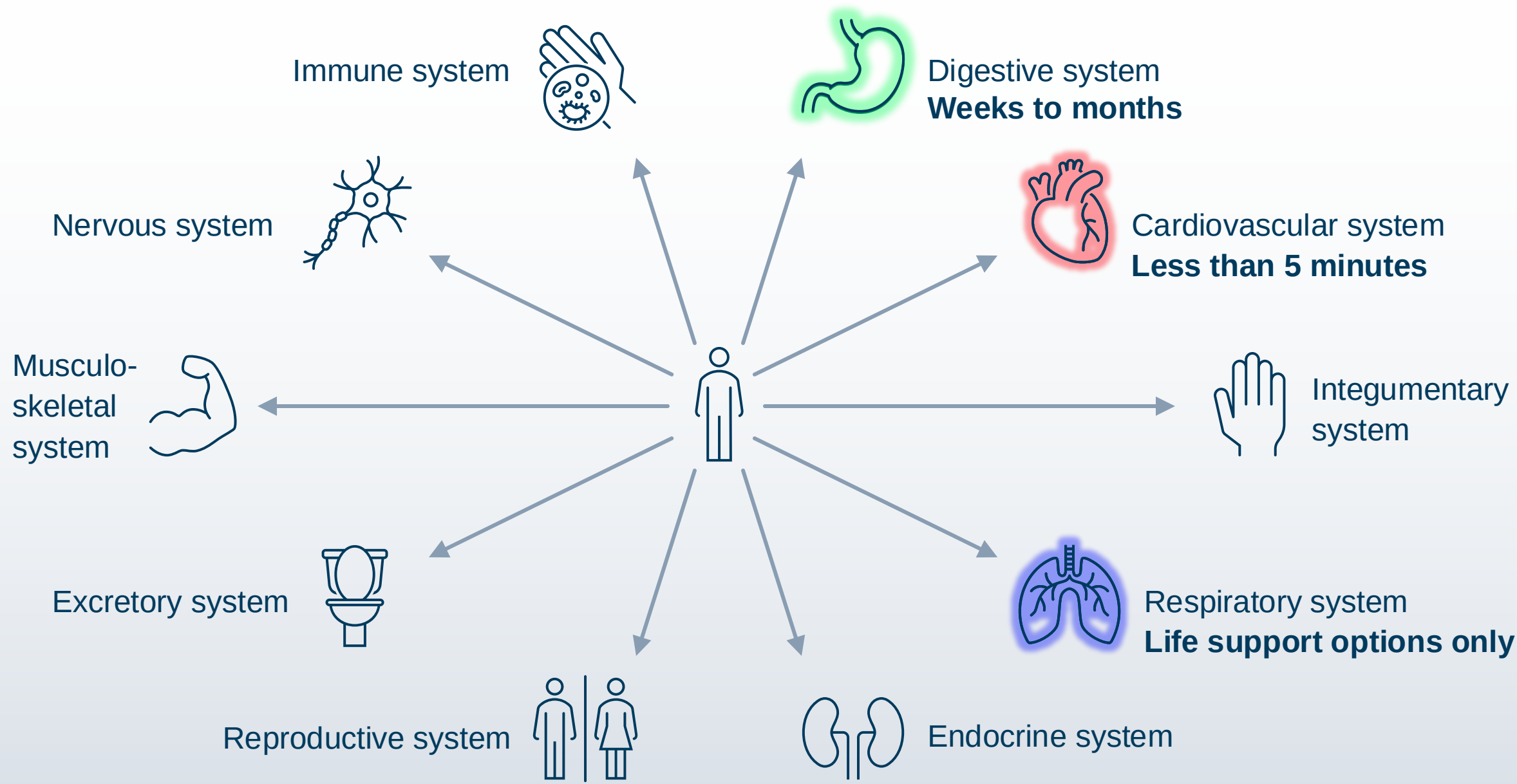
- Sensors
- Transducers
- Transmitters
- Controllers
- Control elements



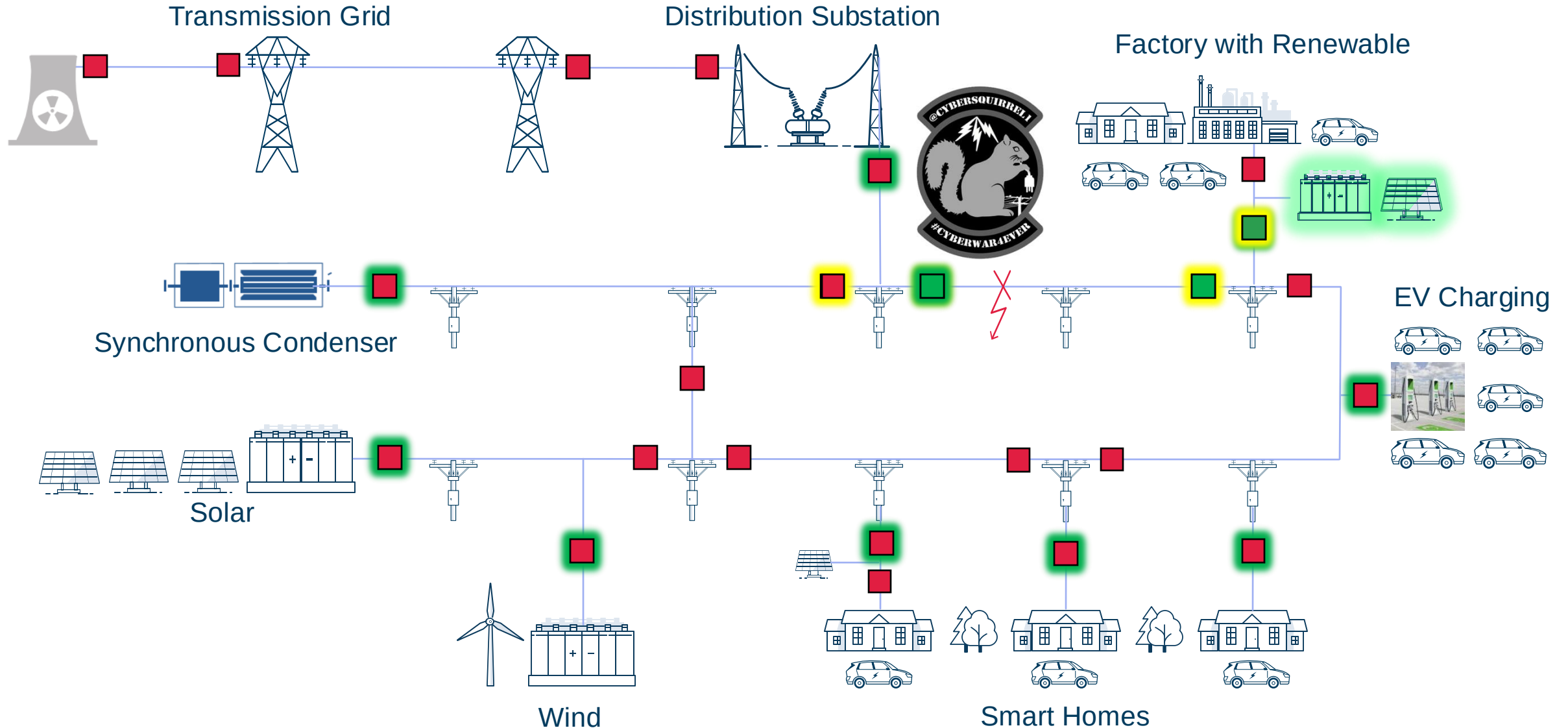


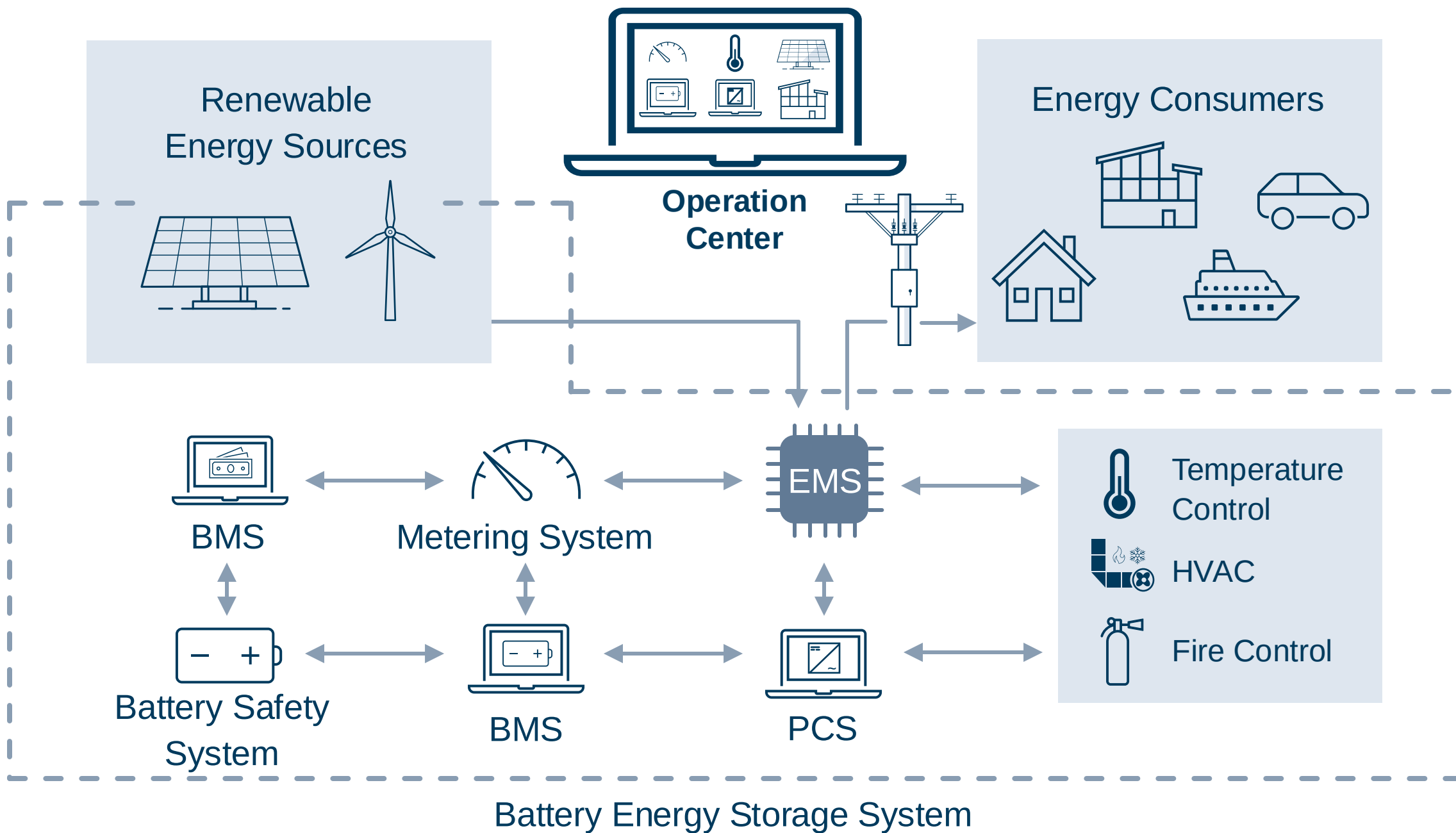
Systems of control systems are now largely automated to provide real-time data and full system visibility.

It is imperative to understand the dependencies between control systems and how they support mission!



Modern and Future Distribution Grid



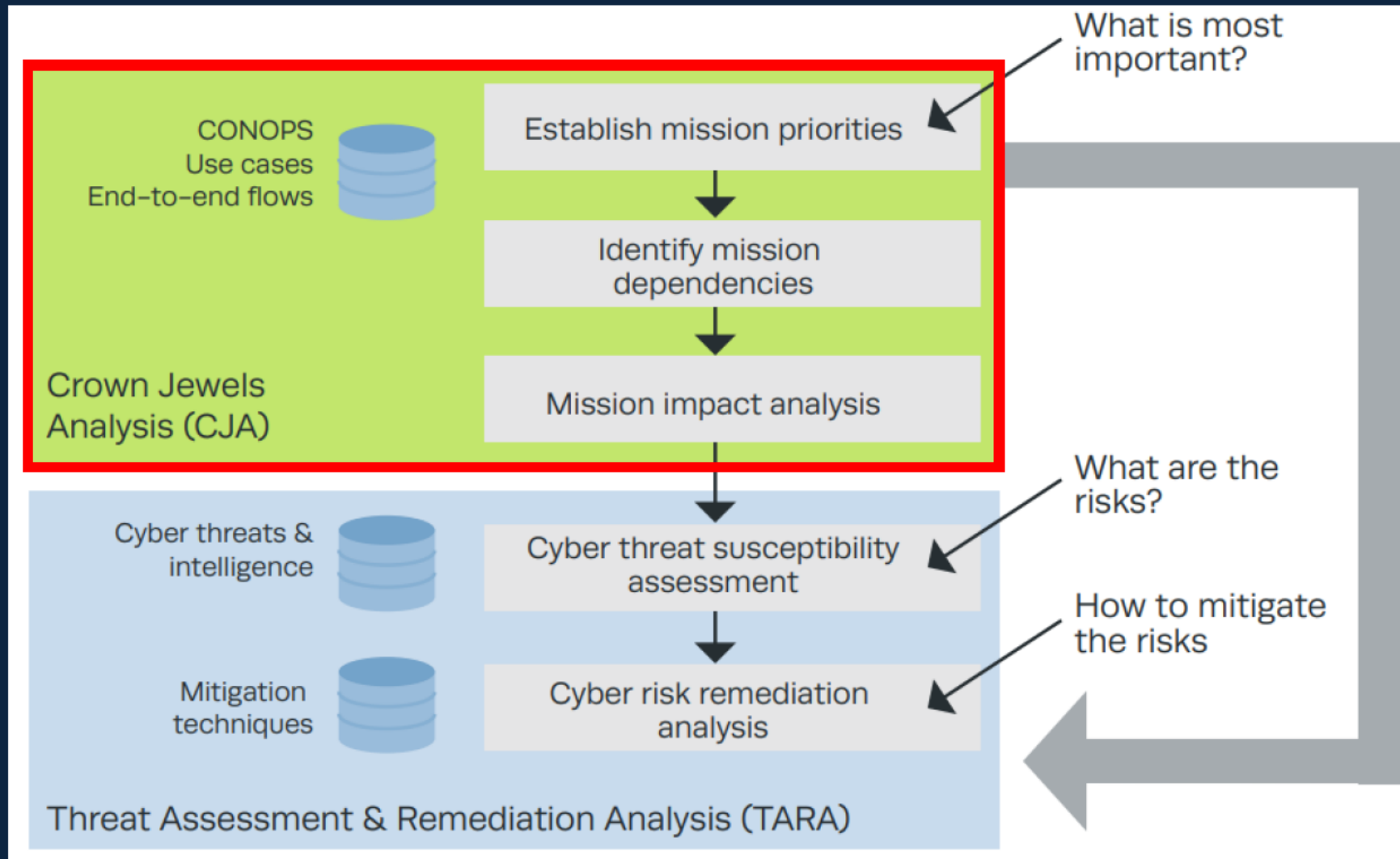


Motivation of Applying CJA for ICS

- Every mission, every business in every country relies on critical infrastructure (e.g., energy, water & wastewater, transportation, etc.) – they are National level assets
- There are functions associated with both operations and safety of critical infrastructure systems that must be resilient for sustainment
- These functions are dependent on underlying Industrial Control Systems (ICS)
- Critical components associated with these functions need to be identified in order to safeguard them from non-kinetic threats, including cyber-attacks, and to develop and apply resiliency measures

It is imperative that large, complex control systems be analyzed to discover their critical components

Mission Assurance Engineering Process



Source: The MITRE Corporations System's Engineering Guidebook

Crown Jewels Analysis Overview

- A crown jewel is logic-bearing or non-logic bearing device, whose failure – or *failure to perform as intended* – can cause one or more mission objectives to fail
- Methodology developed by MITRE and practiced since late 2000s
- A process for identifying assets most critical to mission sustainment/accomplishment
- Determined through Mission Impact Analysis (MIA) after functionally decomposing an organization's mission into objectives → tasks → functions → assets
- Approach combines expert input with established techniques:
 - Analytic Hierarchy Process (AHP)
 - Quality Function Deployment (QFD)
 - Failure Modes and Effects Analysis (FMEA)

Crown Jewels Analysis Definitions

- **Mission Objective (Level 4)**
 - One of a set of typically three to six objectives that comprise an overall mission goal (e.g., maintain hand-off from local electric utility; maintain uninterrupted distribution of electricity to customers)
- **Operational Task or Human Task (Level 3)**
 - Activities carried out by personnel where task performance supports achievement of mission objectives (e.g., monitor electricity distribution status; control end devices)
- **System Function (Level 2)**
 - Enable performance of operational tasks
 - Monitor (e.g., poll and process OT data; store historical data)
 - Control (e.g., open/close breakers remotely/locally; provide precision timing to controllers and end devices)
- **Asset (Level 1)**
 - A logic-bearing or non-logic bearing device essential to task performance and achievement of mission objectives (e.g., SCADA server, RTU, PLC, operator workstation, IT switch, IT/OT gateway, protection system/breaker, power transmission cable, etc.)

CJA Helps Us Answer a Key Question

**Mission
Objectives**



How do failures here . . . translate into impacts here?

**Cyber
Assets**



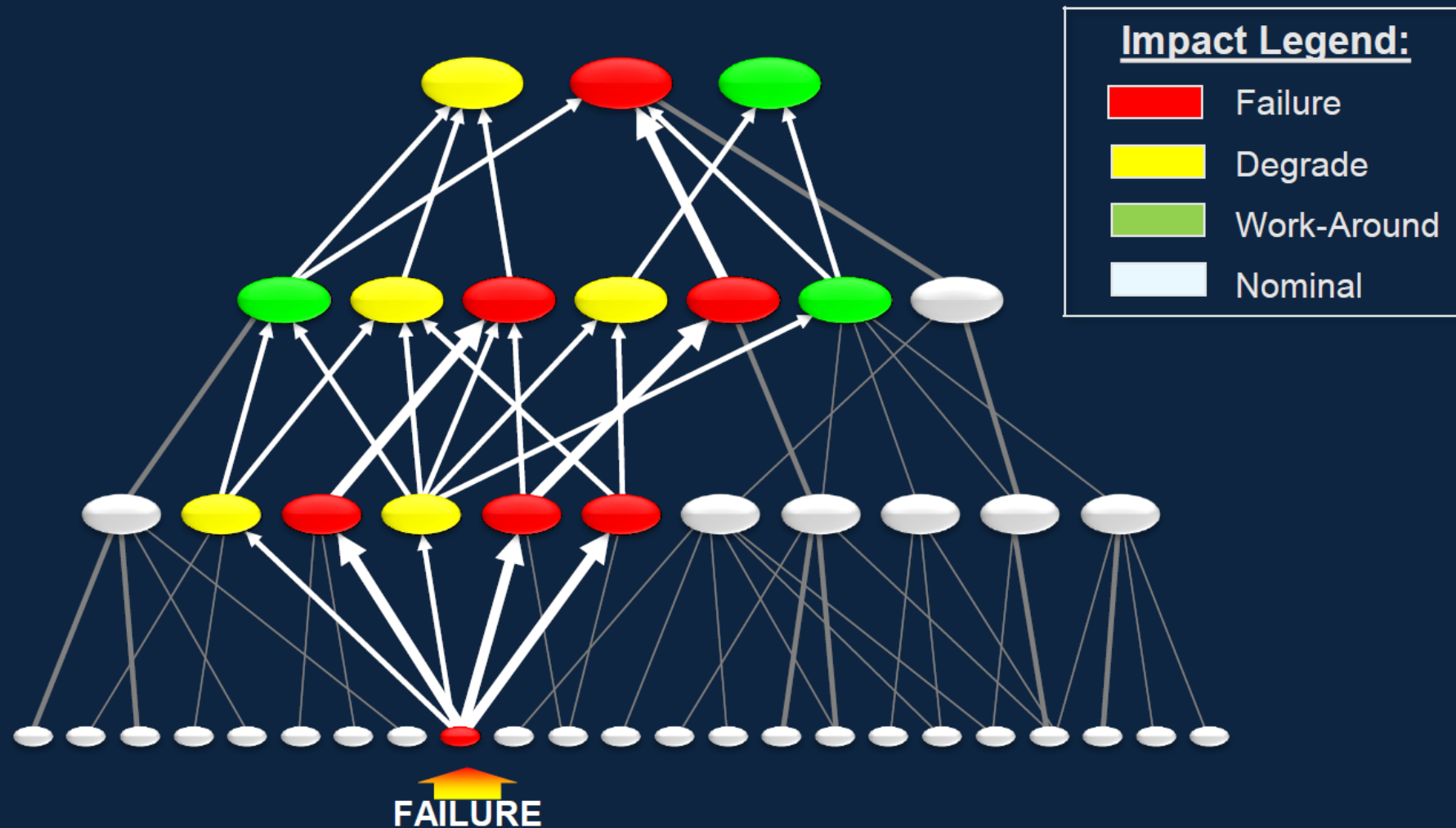
We Use Dependency Maps to Predict the Impact of Cyber Asset Failures

Mission
Objectives

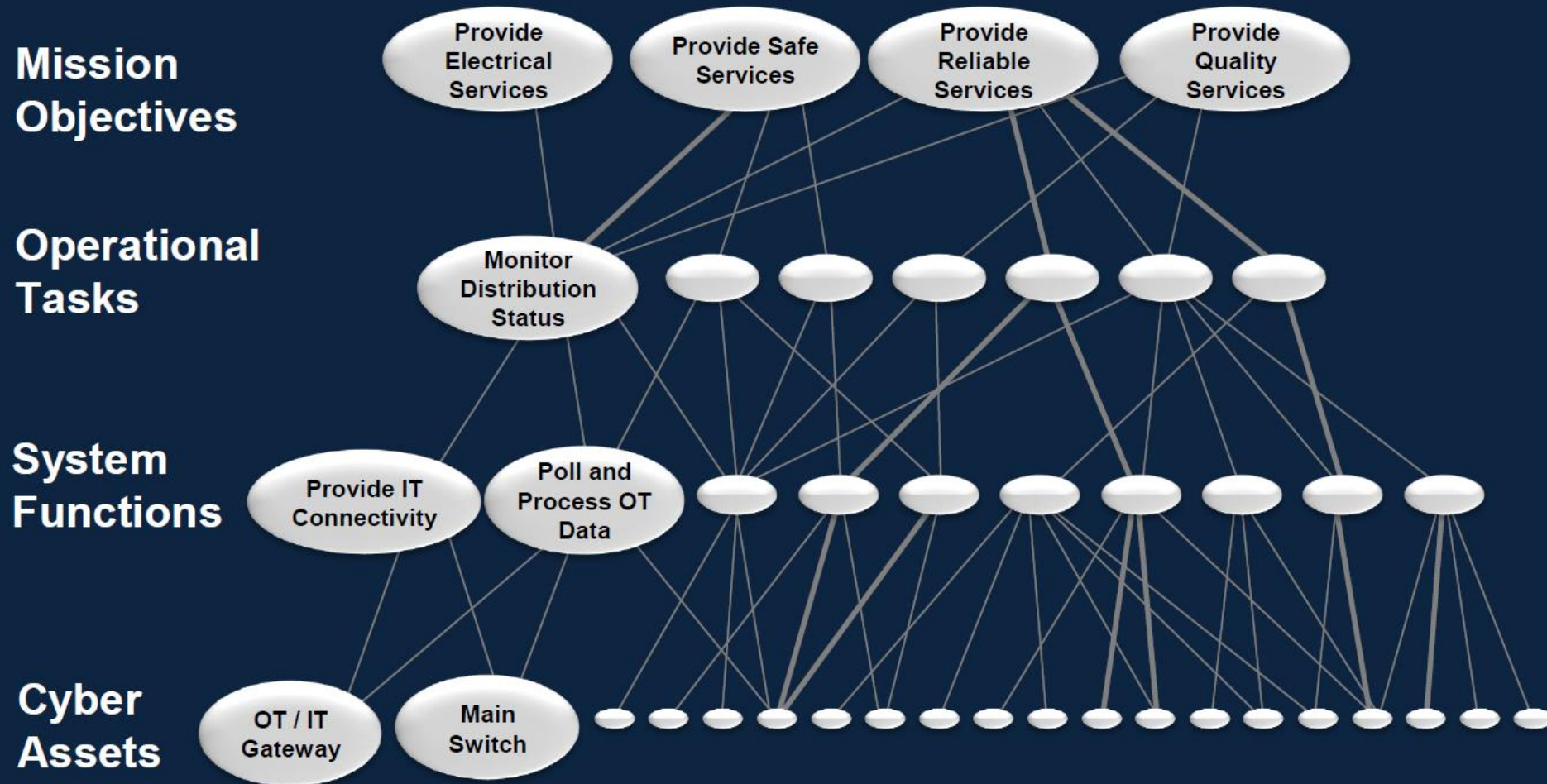
Operational
Tasks

System
Functions

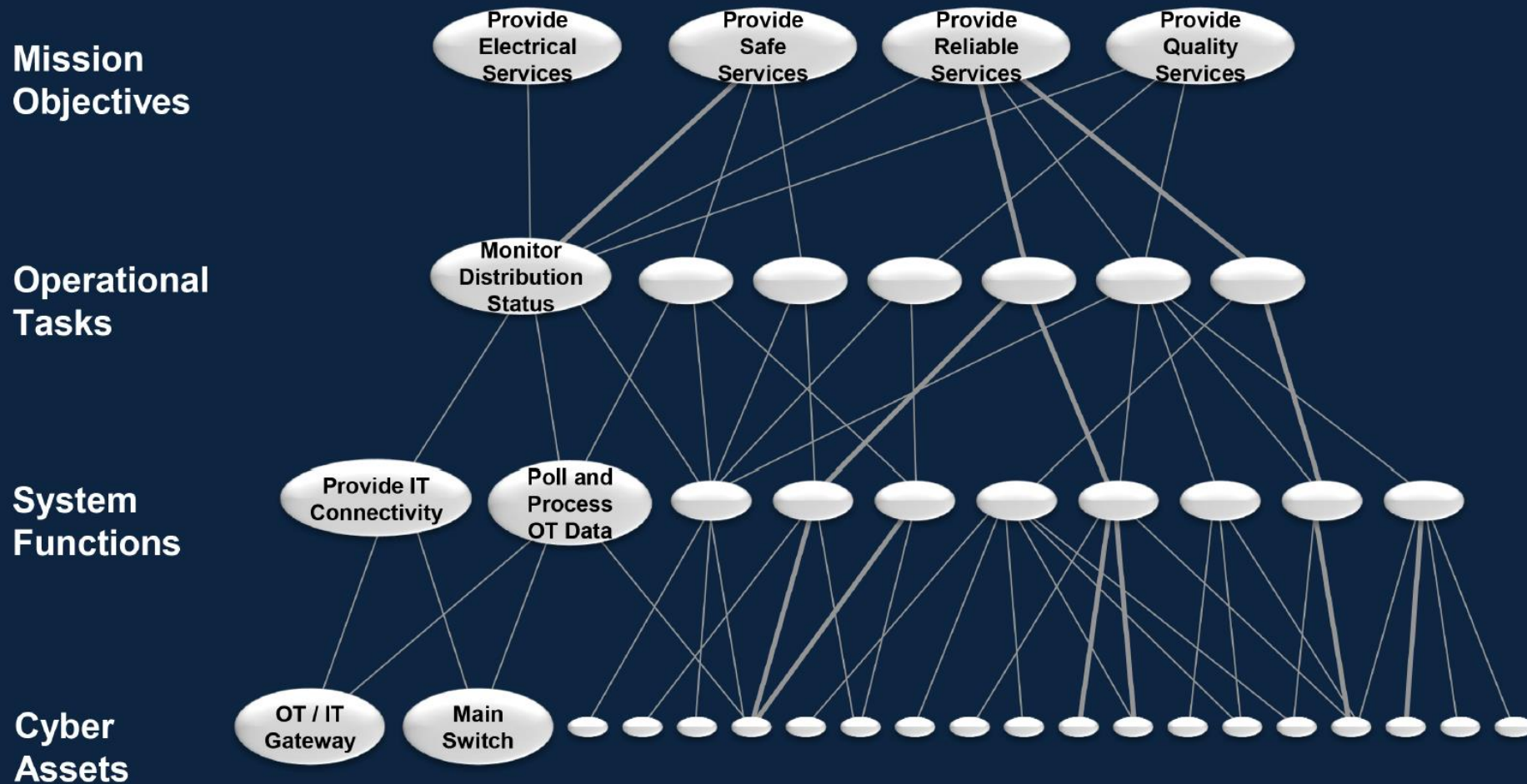
Cyber
Assets



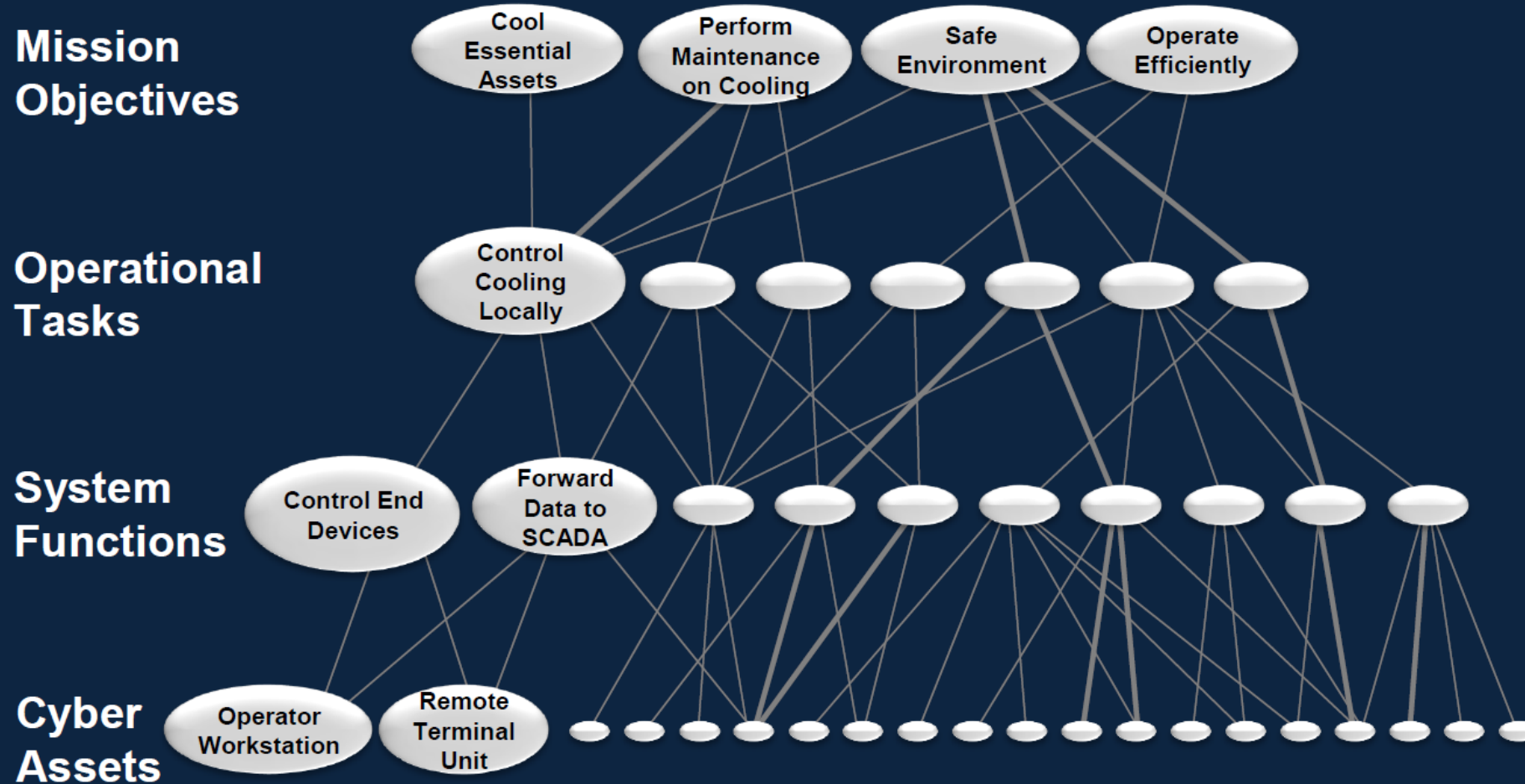
Dependency Mapping Example: Power Distribution



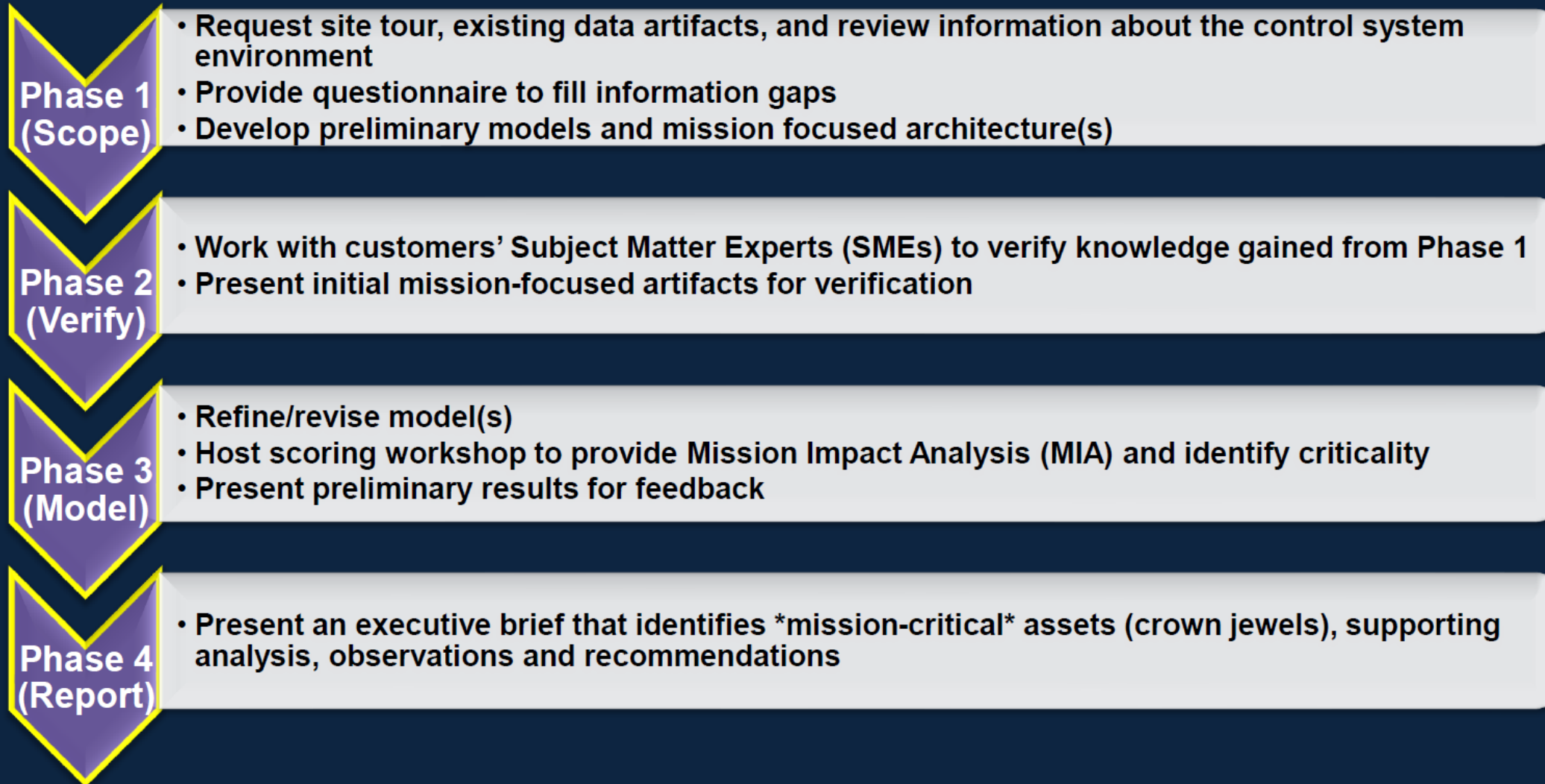
Dependency Mapping Example: Power Distribution



Dependency Mapping Example: Building Automation System



Crown Jewels Analysis for ICS Process



Mission and Power Project Tied to a System of Critical Control Systems

Moderator:

Tim Watkins at SEL Inc - Senior Engineer (Systems and Cyber Engineer)

Panelist:

Cedric Carter at MITRE – Principal Engineer (Critical Infrastructure Cyber)

Honorable Mr. Lucian Niemeyer at Building Cyber Security – CEO

Heather Young at Claroty – Regional Public Sector VP

Discussion and Questions?