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National Guard Response Frameworks for Emergencies & Needs for Microgrids & Energy Storage

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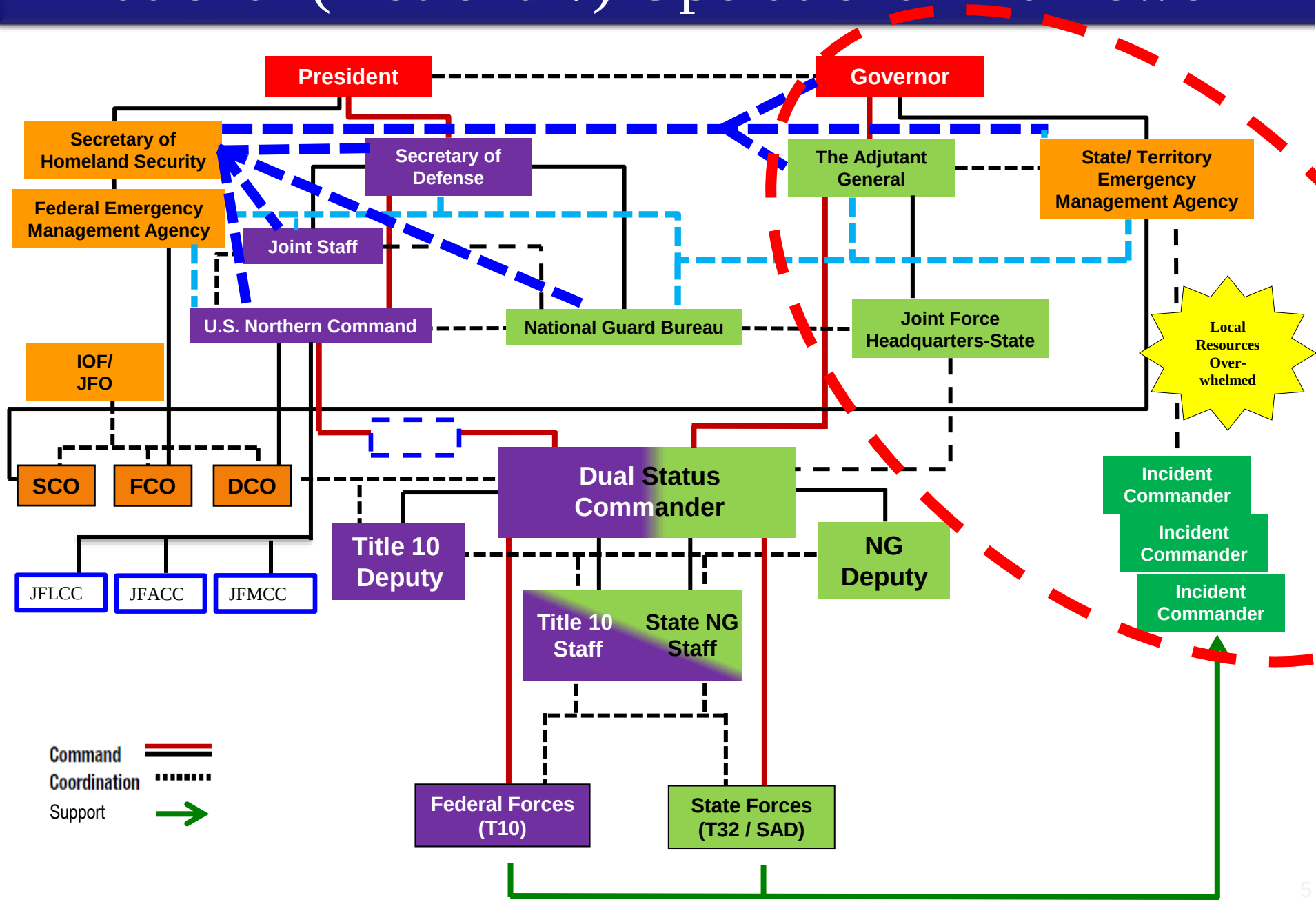
Disclaimer

The opinions expressed in this brief are those of the presenter and do not necessarily reflect those of the Iowa Army National Guard, the State of Iowa, or the Department of Defense.

Agenda Framework

- Disaster Response
- Resiliency
- Micro Grids
- Recovery

National (Notional?) Operational Framework



Response & Recovery Cycle

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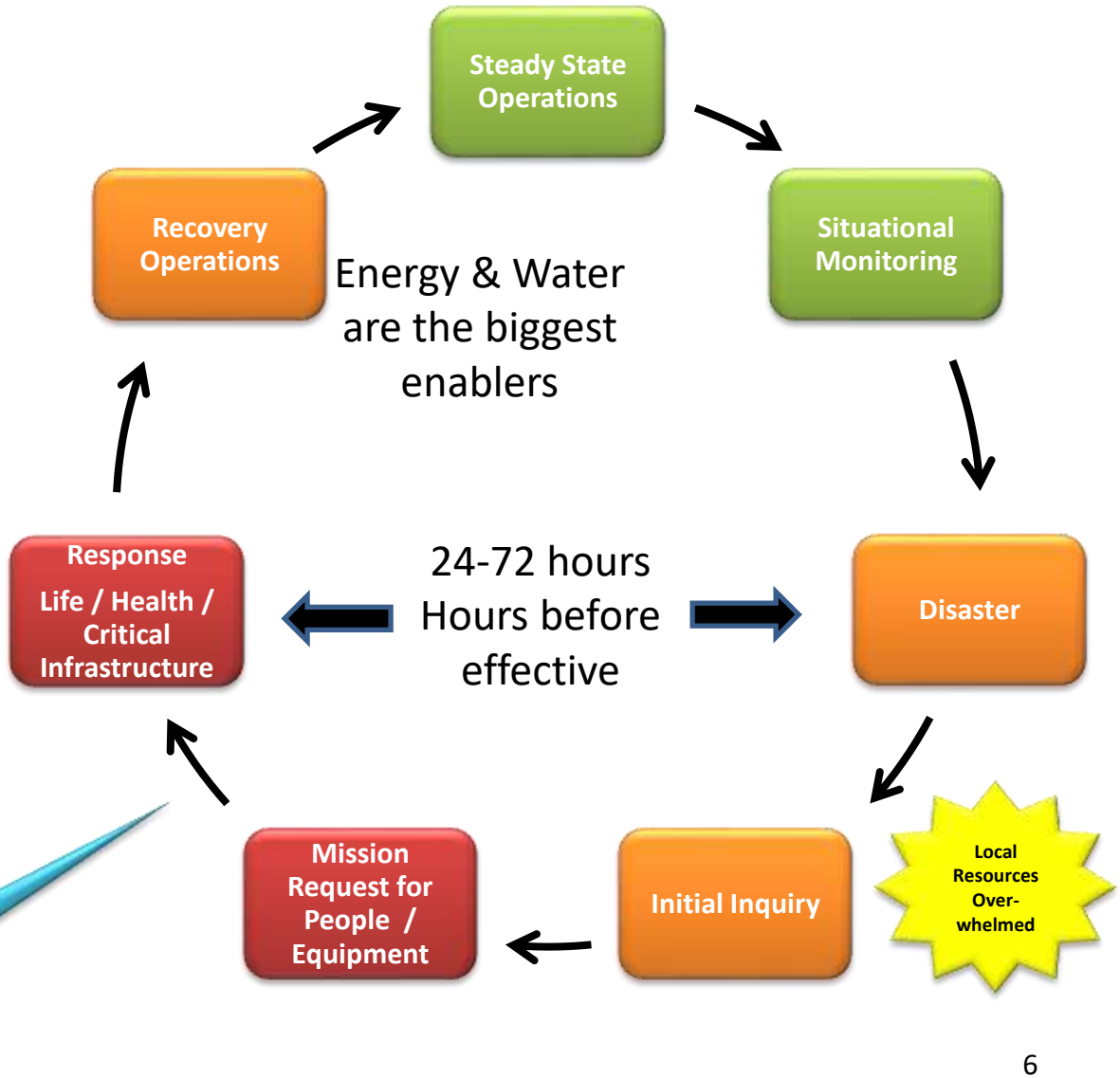
Natural and Manmade Threats will attempt to interrupt <u>Force Generation</u>

- Lengthen response & effectiveness timelines
- Possibly additional loses to life / health / critical infrastructure
- Longer recovery & greater overall costs

Most effective way to generate forces is from a <u>Base of Operations</u>



Mitigation

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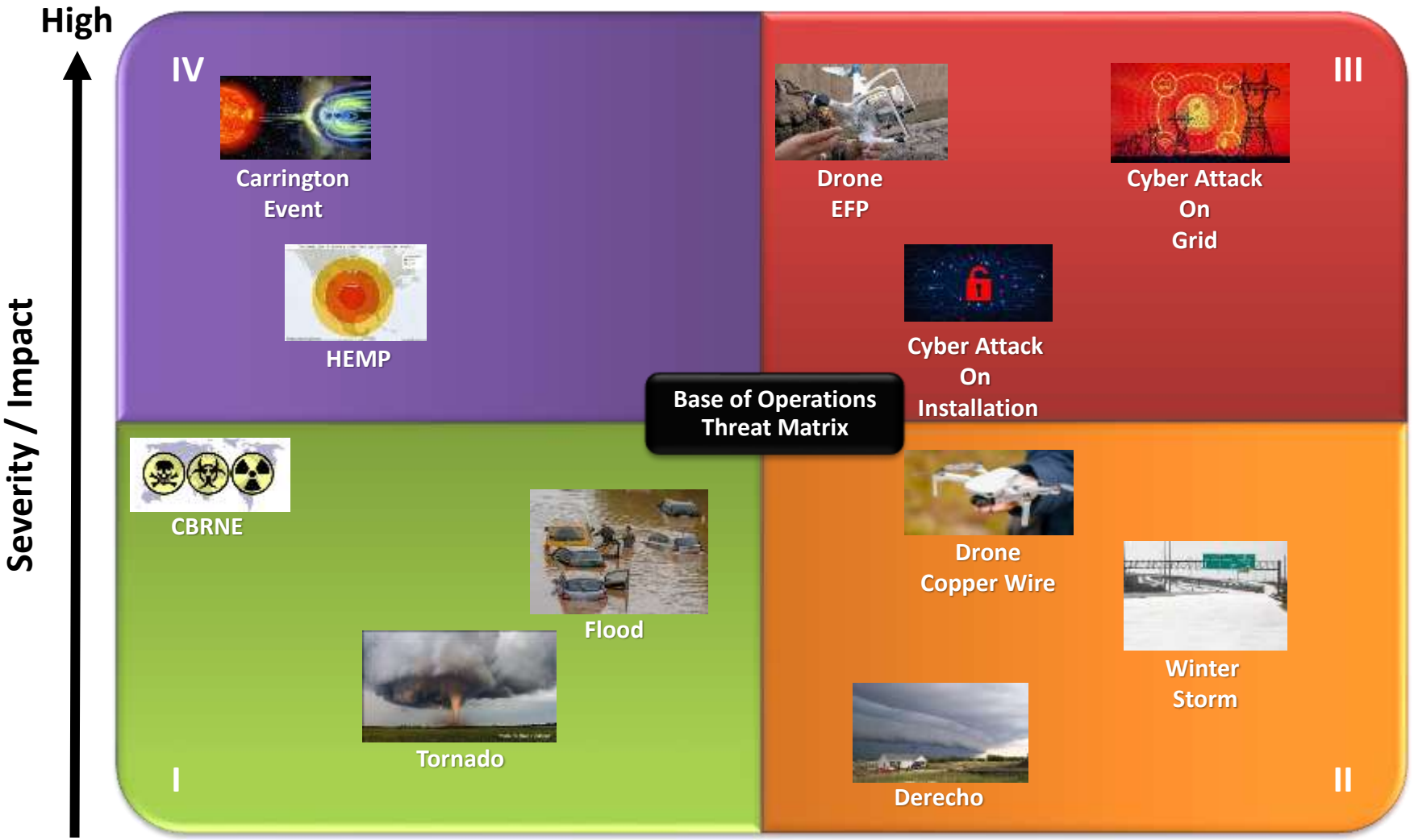
Risk? What Risk?



Resilient Installations

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- Installation Energy and Water Plan (IEWP) Goals:
  - Provide necessary energy and water services for a minimum of 14 days by identifying requirements for sustaining all critical missions
  - Mitigate risks to all missions, including planning for restoration of degraded energy and water systems and reducing risks of future disruptions by addressing the following attributes:
    - Assured Access to Resource Supply – Redundant and diverse sources of supply, including renewable energy and alternative water, that meet evolving mission requirements during normal and emergency response operations.
    - Reliable Infrastructure Conditions – Infrastructure capable of onsite energy and water storage along with flexible and redundant distribution networks that reliably meet mission requirements.
    - Effective System Operations – Trained personnel who conduct required energy and water security system planning, operations, and sustainment activities.
    - Reduce energy and water use of all missions through conservation and efficiency efforts.
    - Lower total operating costs, while fully maintaining services.

Avoid Fighting Your Way Out of Your Fort!

Camp Dodge Energy Security Concept

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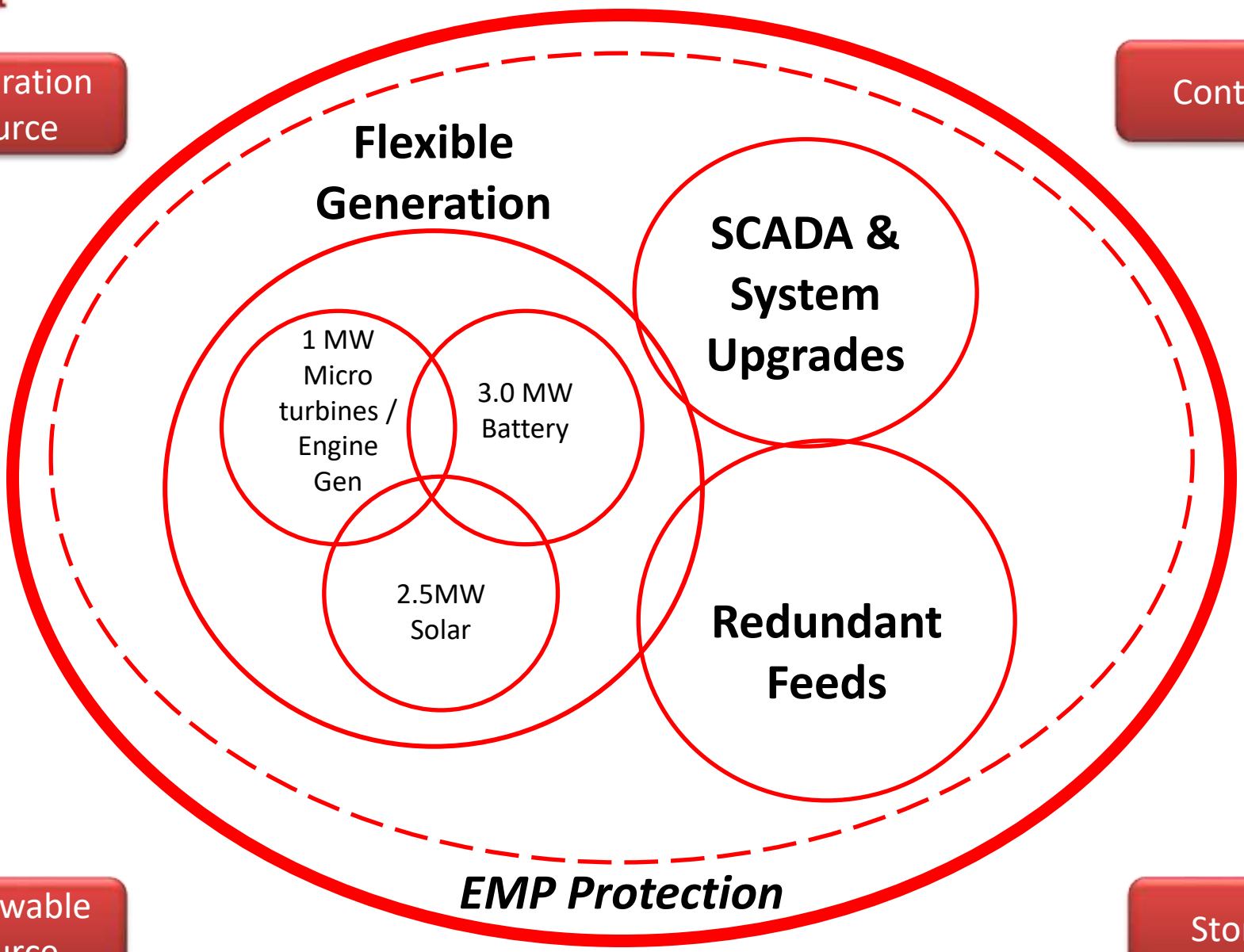
Generation Source

Controls



Renewable Source

Storage

SMMTR Controls Buildings Concept

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- **S**ustainable, **M**odular, **M**ulti-**T**hreat **R**esilient Controls Building for mission critical systems

  - **S**ustainable – Manufactured in the US utilizing the majority of materials that are found in the US and designed to last 50-75 years with minimal structural maintenance.

  - **M**odular – Standardized concrete panel construction allowing for custom footprint configurability with low design and engineering cost.

  - **M**ulti-**T**hreat **R**esilient – Integrated ballistic protection (Tornado, Blast Overpressure, Small Arms), EMP protection, top EFP protection, Physical Security, and supportive Cyber Protection enhancing features built in.

Remaining Gaps

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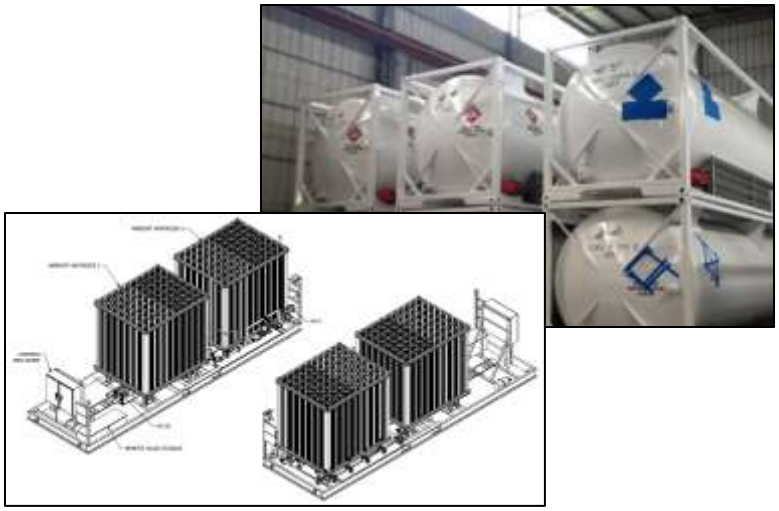
- Installation Energy and Water Plans for Outlaying Faculties
  - Armories
  - Aviation Facilities
  - Maintenance Facilities
- Loss of Natural Gas Distribution
- Building Management System Integration

Mitigation Potentials

- Back up Liquid Natural Gas storage
- Building Operations Control Center
- Small Microgrid Packages for key facilities
- ***Mobile Micro Grids***



Mobile Micro Grids

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- Generation Source
- Controls
- Renewable Source
- Storage
- Mobility

A Mobile Microgrid for Disaster Recovery
IEDA September 21, 2020

Anne Kimber, EPRC Director

Funding: IEDA DOE American Recovery and Reinvestment Act
Team: IEDA, Iowa Army National Guard, PowerFilm Inc., SunCrate and ISU

Really Mobile Micro Grids

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Scalability as a Design Criteria

Crate-O-Energy

Pallet-O-Energy

Bucket-O-Energy

Capacity vs Load Profile

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Hello
my job is

kW h
Individual Needs

- Phone Charging
- Medical Devices
- Home Refrigeration

mW h
Small Facility Needs

- Shelters
- Gas Stations
- Armories

mW h
Community Needs

- Hospitals
- Nursing Homes
- Water Systems
- Sewage Systems

Critical Loads vs Peek Loads?

Recovery as a Form of Mitigation

- Consumers vs Providers of Resiliency
  - Individual Resiliency lowers recovery costs
  - But, most homes cannot afford:
    - Electric Vehicles - $$$
    - 3kW h Battery Pack - $3000
    - Roof mounted solar/battery systems - $$$$$
- Mobile Energy as Community Storage


Comments?
Questions?