

Operational Technology Cyber in 2024: Increase Resilience and Cost Effectiveness

Moderator: Colin Dunn, P.E., CEM, LEED AP,
CEO, Fend Incorporated

Speakers:

- Daryl Haegley, SL, GICSP, OCP
Technical Director, DAF Control Systems Cyber Resiliency
- Michael Chipley, Ph.D., GICSP, PMP
President, PMC Group
- Wanda Lenkewich, P.E., CxA, LEED AP,
President, Chinook Systems

May 14, 2024, 3:00 p.m.

HOUSEKEEPING ITEMS

Take Note of Exits

Silence Your Mobile Devices

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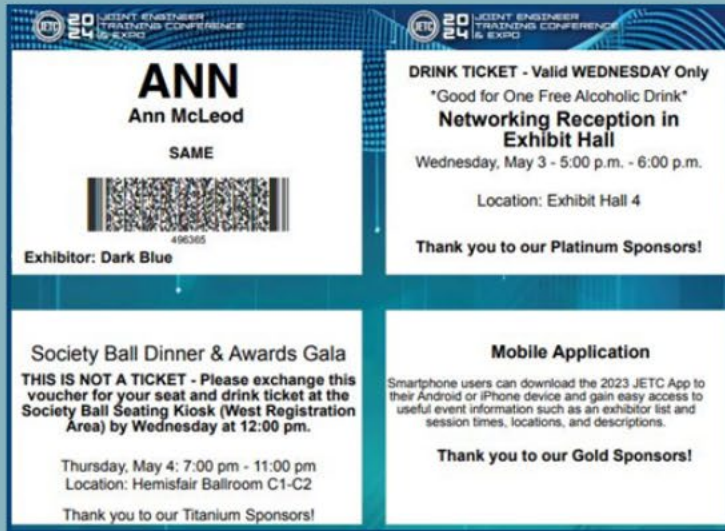


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(Minimum age 18 - No Children)



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or SAME Booth



Buses depart Gaylord
& Caribe Royale,
beginning at 6:00 p.m.



Learning Objectives & Takeaways

Where Should You Spend your Money
OT is Not IT – Smarter Data Acquisition
How to Find the Right Information
Standardizing Processes and Deliverables



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SPEAKER



Daryl Haegley GICSP, OCP
Air Force & Space Force
Technical Director, Control Systems
Cyber Resilience



Fun Facts

- Did you know...
I love BINGO



BINGO TIME!



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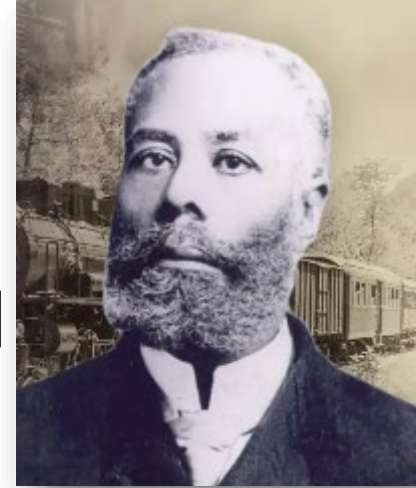
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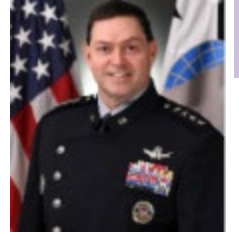
Which is the “Real McCoy?”

- **1872 = invented “oil-drip cup” using steam pressure to pump oil automatically lubricate the steam engine parts, preventing it from overheating. Easy to recreate, similar products were made; however, railroad workers preferred the “real McCoy”**
- **1920 = sold liquor via his British registered ship 3 miles offshore in international waters. There was no law prohibiting from going from legal port to legal port and selling booze in between. Many smugglers watered down while reselling theirs, but he wouldn’t, customers wanted the “real McCoy”**





Gen. B. Chance Saltzman, Chief of Space Operations, United States Space Force



2023

- One of Russia's earliest endeavors was to deny Ukrainian troops access to a satellite comms system (Viasat) stationed in geosynchronous orbit
- “And they did it with a **cyber attack against the ground infrastructure** ... so you **attack the ground network** to achieve the space effect you want”

Takeaway:

- If an adversary believes that it cannot achieve a military objective, it will hesitate to “cross a threshold of violence.” No conflicts. No debris. No crisis.

100% Missions Depend on Control Systems; 1st Target by Adversaries

Buzzword = Zero Trust

Perimeter Cybersecurity Model

- Strong perimeter walls
- Must authenticate for network access
- Open access to all or most resources once inside



Zero Trust Model

- Departmentalized access
- Continuous monitoring and adjustment
- Security measures applied throughout the entire system



ZERO TRUST

Once Upon a Time ...

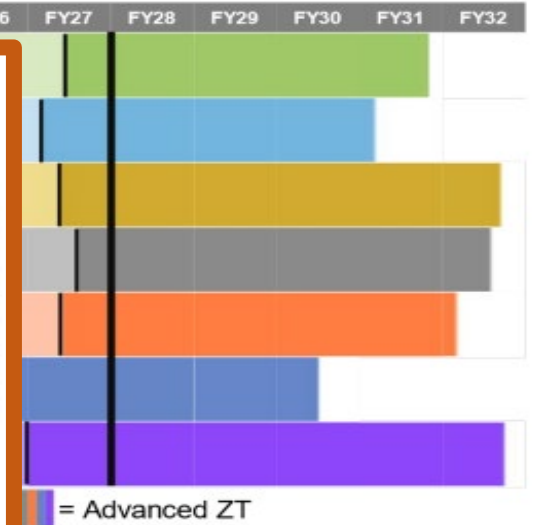
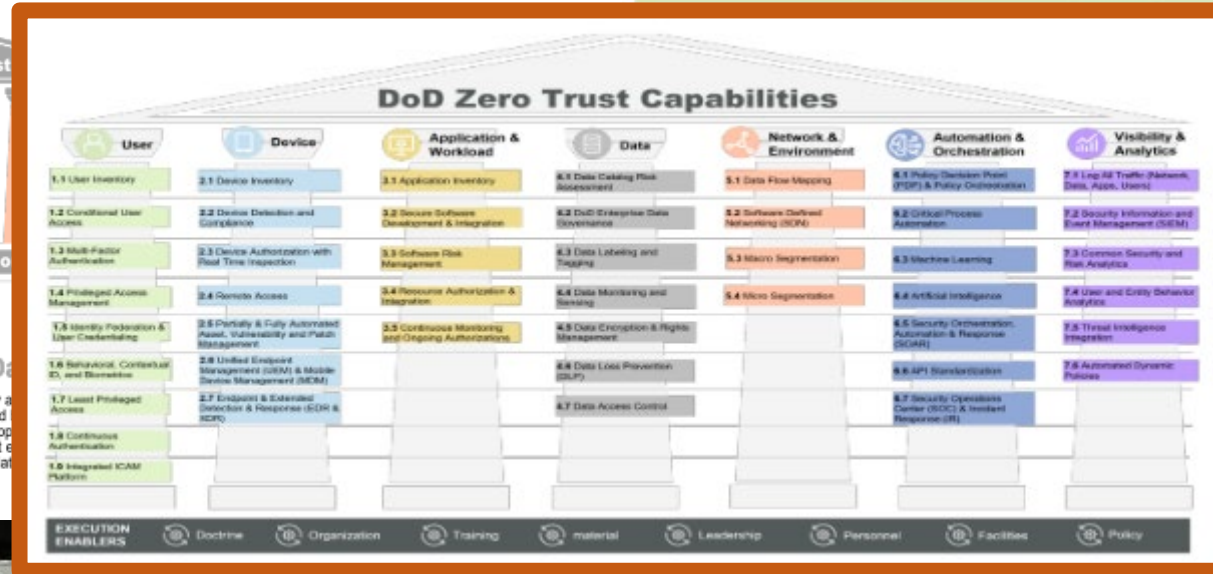
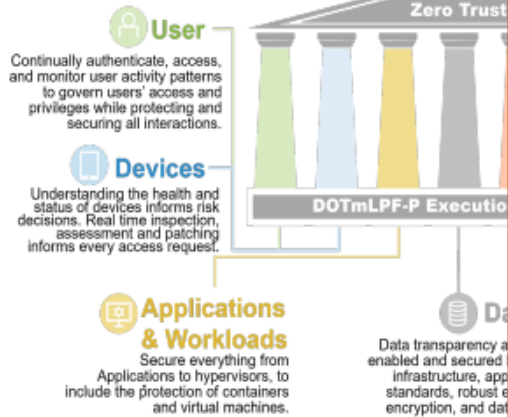


... Vendor Exhibit, System Owner Email and CIO \$

Results: Good, Bad & Ugly



The Good ...



“OT Zero Trust Alliance”



- BlastWave
- DarkTrace
- Nozomi
- CloudBees
- Boston Consulting Grp
- SwimLane
- Fend

Thanks DoD CIO ZT Office!

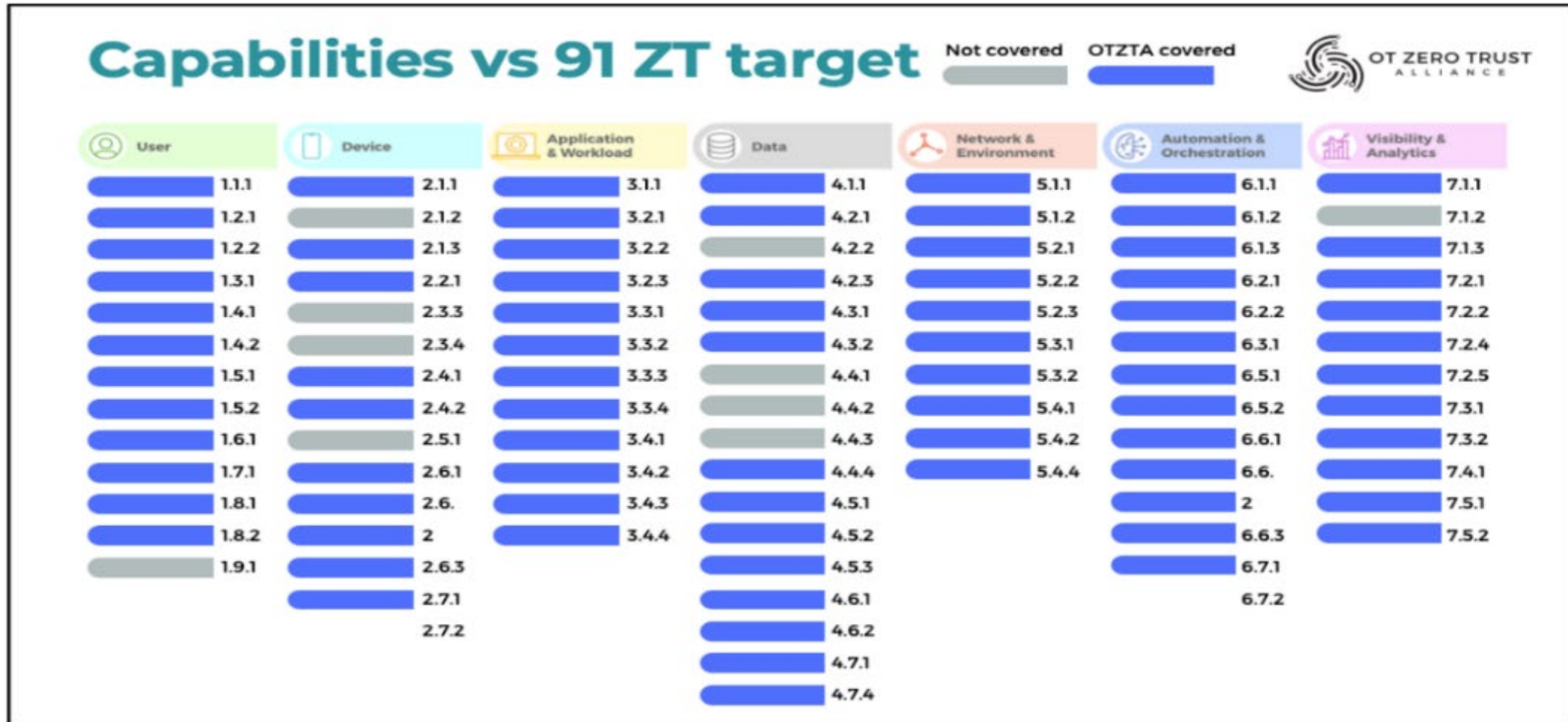
Security = Zero to Hero



The Bad ...



©GIGA | Wikimedia:Drnthoth

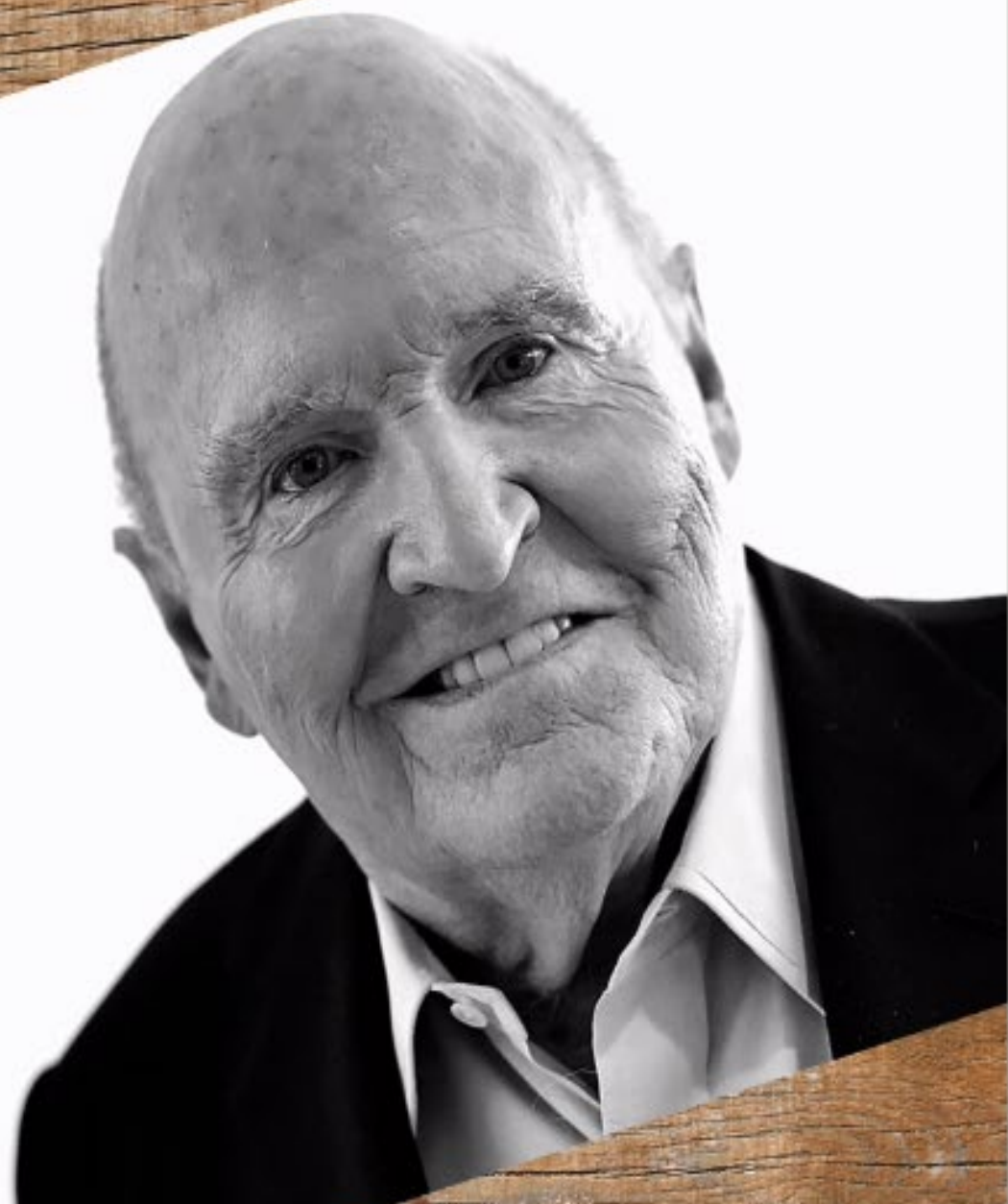




The Ugly ...







“If the rate of change on the outside exceeds the rate of change on the inside, the end is near.”

Jack Welch - GE: CEO



Your rate of change
needs to **EXCEED** the
rate of change externally

“If the rate of change on the
outside exceeds the rate of change
on the inside, the end is near.”

Jack Welch - GE: CEO

Need = OT SMEs Determine Which Apply



Note: ZT Activities are grouped as either Target or Advanced.

Future Zero Trust OT Demonstrations

1 - Integrate with current connected systems; dashboard to cyber experts

Power Utility Systems, Water Utility Systems, HVAC Systems; Fuel Systems; Launch; Security Forces; Depots, etc.

2 - 100% vendor run; via secure cloud; Govt gets actionable dashboard; monthly \$ lease includes 4ever updates





ZERO TRUST IS COMING

3 Ways to Increase Resilience & Cost Efficiency

- **COMMUNICATE** the change you need in & outside your organization
- **THINK** minimize attack surface; enable proper access; where data securely needs to go
- **FOLLOW-THROUGH** to get “the real McCoy”



Outcome: DoD OT Networks, Systems, Devices Are Resilient to Cyber Exploits

Ready or Not, Hear I come!





MODERATOR



Colin Dunn, P.E.
Fend Incorporated
Chief Executive Officer

Fun Facts

- Did you know...
My kids love SPAM®



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Want to save money on cyber?



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Want to save money on cyber?

Do less cyber.

Do more engineering!



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Cybersecurity \approx Plumbing



Objectives

- Maintain flow
- Prevent leaks
- Limit damage



OT Cybersecurity & Plumbing

- Behind the scenes
- Important, but most people never think about it unless something has gone terribly wrong
- Not in the budget
- Need to design with the future in mind







1.6 gpf - 6.0 Lpf
Waterline

Filters



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Leak Detectors



Adapters



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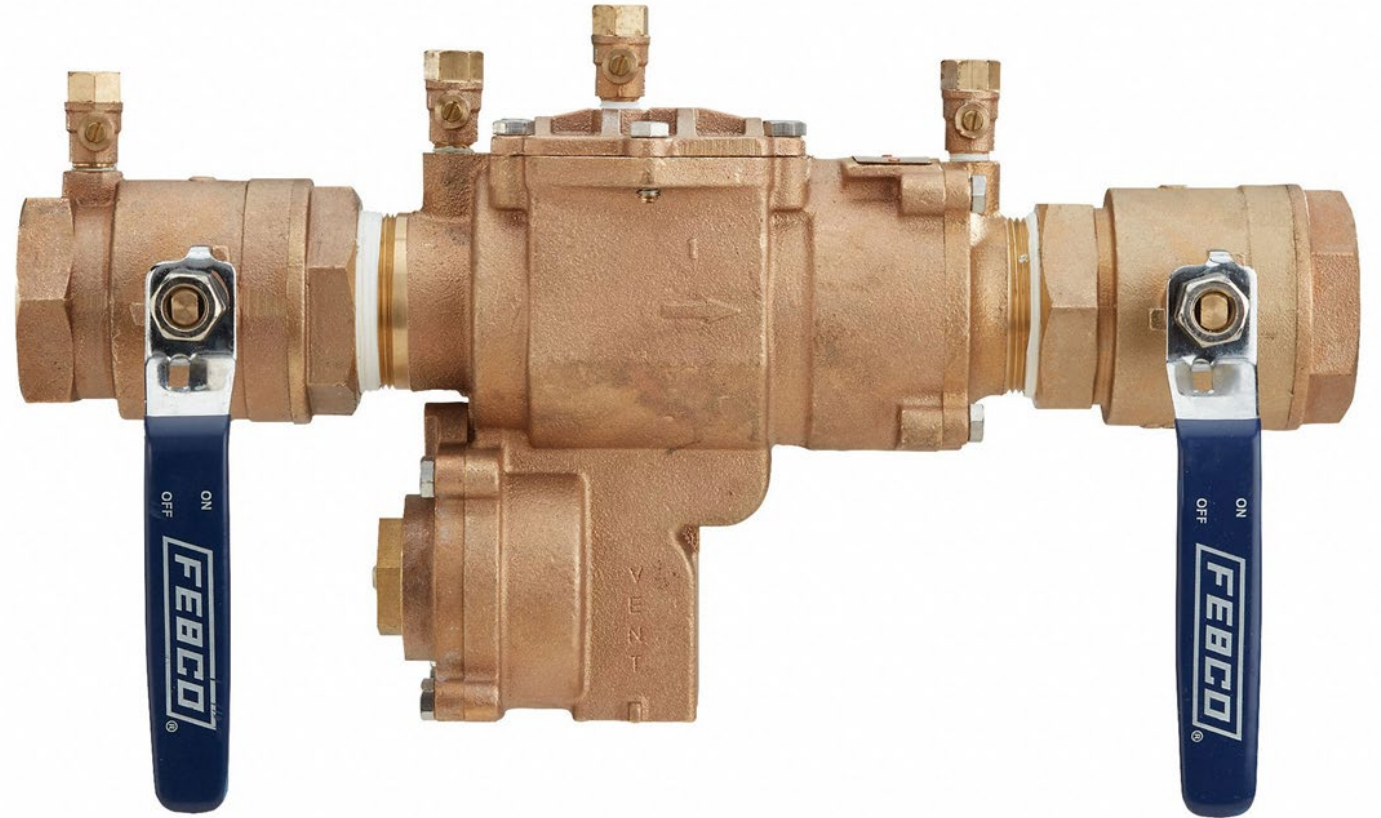


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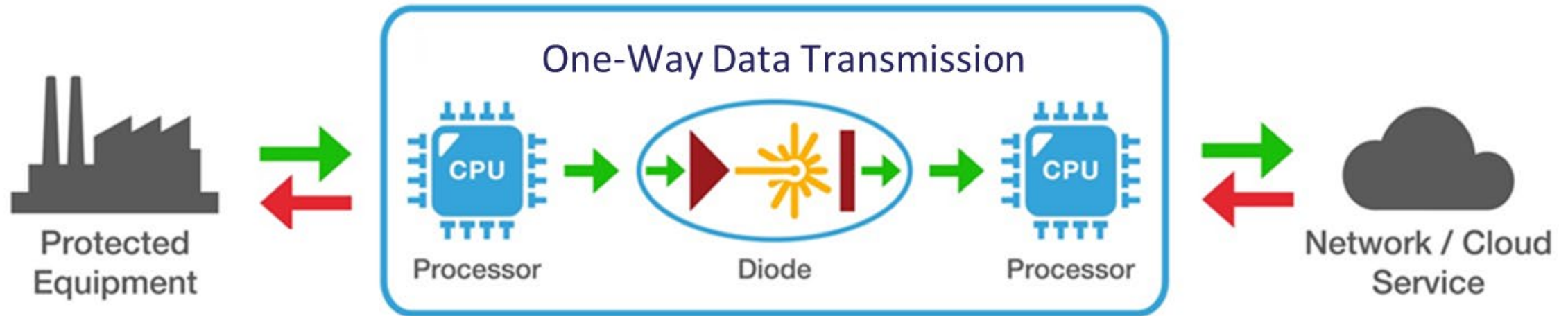
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Backflow Preventers



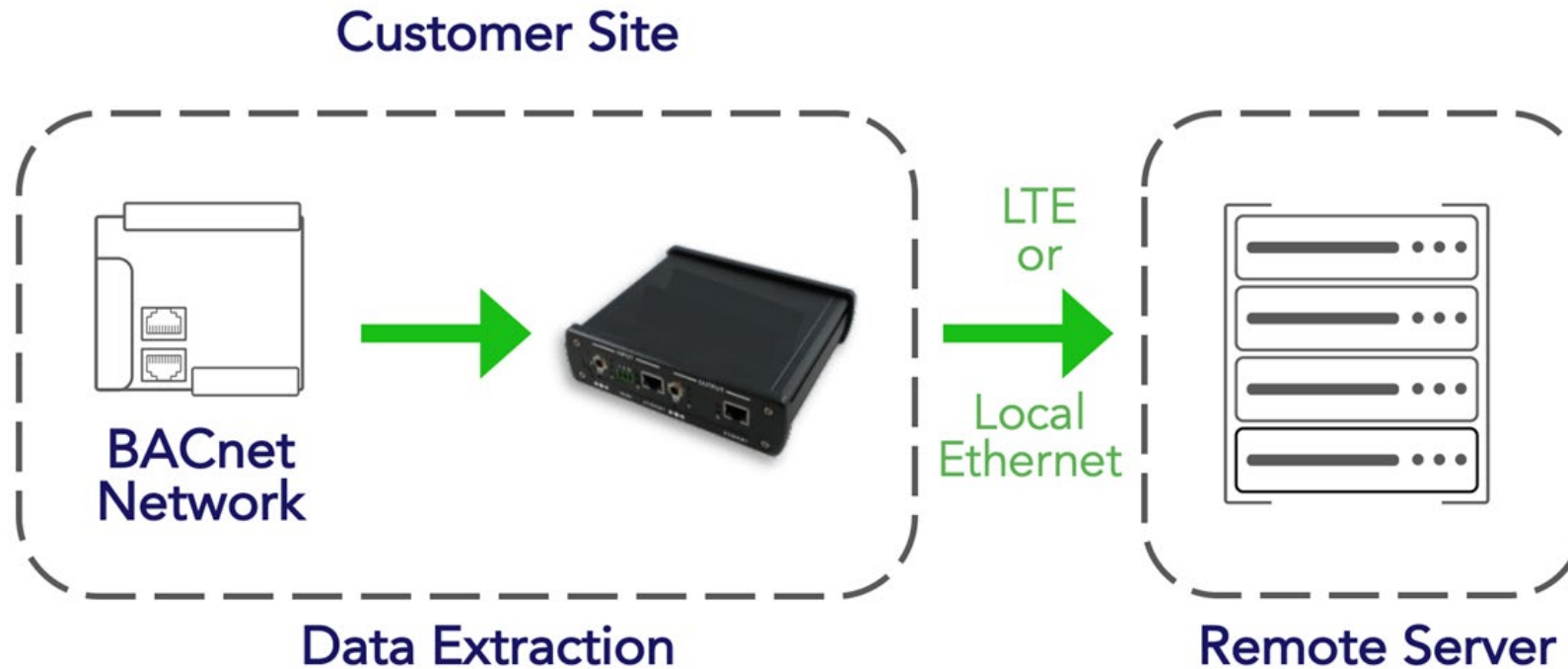
Data Diodes

Data goes out.



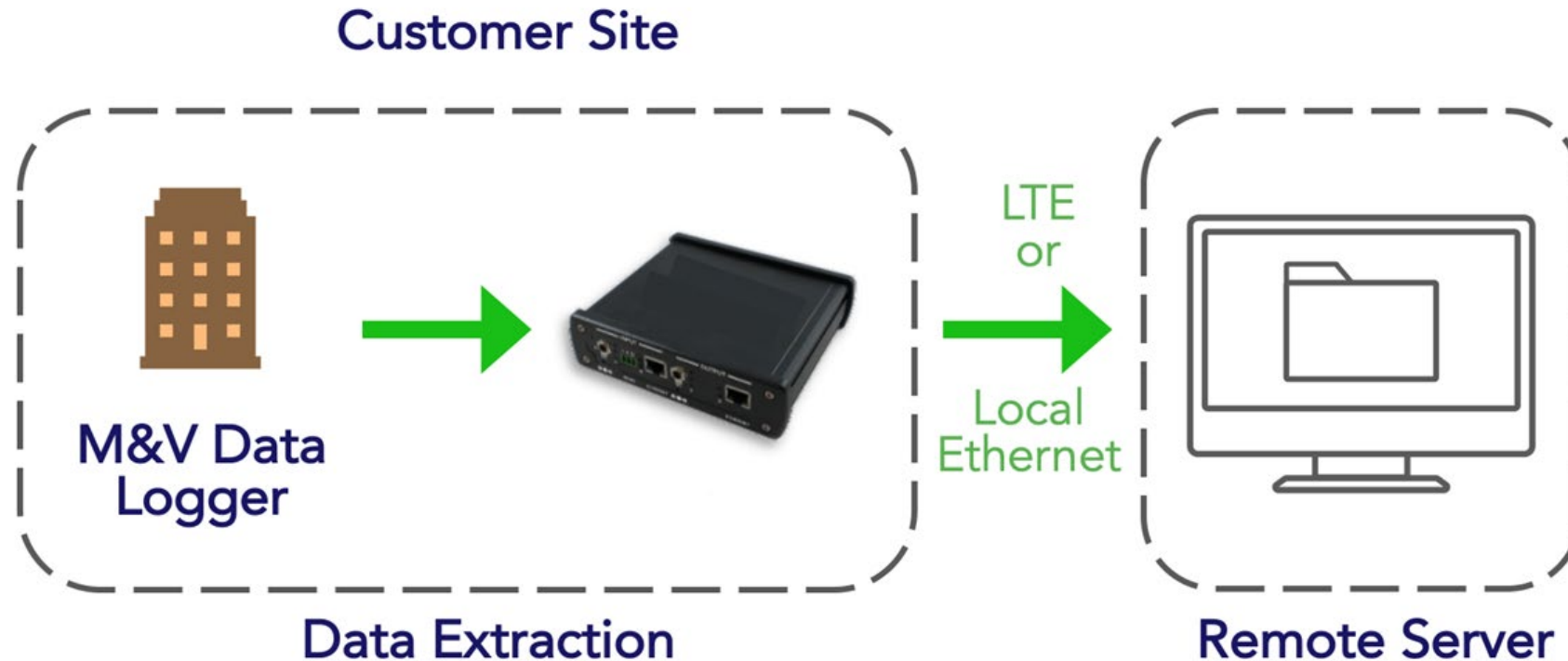
Nothing gets in.

Example: Remote Monitoring of Sensors and Control Systems



Stream industrial data

Example: Log Files and Records



One-way file transfer

Safely Open the Door to the Cloud



- Make use of AI-based tools for critical / legacy OT systems
- Extract authorized data without inviting attack
- Provide asset visibility
- Integrate with other analytics providers
- Combine isolation + intrusion detection

Standards and Guidance Documents

Use of Data Diodes:

- US Department of Defense: Cybersecurity of Facility-Related Control Systems (FRCS) (UFC 4-010-06, 10/2023)
- NIST Guide to Operational Technology (OT) Security (SP 800-82, Revision 3, 9/2023)
- Cybersecurity and Infrastructure Security Agency (CISA) Cybersecurity Advisory AA22-083A (3/2022)
- Water Information Sharing and Analysis Center (ISAC) “15 Cybersecurity Fundamentals for Water and Wastewater Utilities”

Related:

- US Department of Homeland Security (DHS) Binding Operational Directive (BOD) BOD 23-01
- Federal Energy Regulatory Commission (FERC) is strengthening its Critical Infrastructure Protection (CIP) Reliability Standards

Tested: DoD Environmental Security Technology Certification Program (ESTCP) Project EW19-5156

Objective	Test Method	Result
Demonstrate that low cost data diodes provide physical isolation	Penetration tests by Army TSMO and NAVFAC CSTB teams	Blocked all outside attempts to send data across data diodes
Show broad applicability across a variety of common DoD system types	Compatibility tests at USACE ERDC-CERL to transport data using common protocols (BACnet, Lon, Modbus, FTP)	Data transmitted accurately from a variety of data sources to end destination.
Evaluate long-term device performance	Installation at operational buildings at CERL	Continuous, reliable operation

Full report available at <https://serdp-estcp.mil/>, search “data diodes”

Thank You

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571-970-1382





SPEAKER



Michael Chipley Ph.D.
GICSP PMP
The PMC Group LLC
President

Fun Fact

- Did you know ...
I love fishing



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Energy Resilience Research and Development Contributions



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Energy Cybersecurity Resilience

This section will highlight Legislation/Policy, Cybersecurity Organizations and several DoD and DOE Energy and Water Research and Development projects

Drivers

- Innovation Agenda 2022
- Infrastructure Investment and Jobs Act 2023
- Investing in America Agenda 2024

Cyber Organizations focused on Control Systems

- Building Cybersecurity Organization
- International Society Automation
- National Institute Standards and Technology
- SANS

R&D Program Offices

- DoD Environmental Security Technology Certification Program Office
- DOE Federal Energy Management Program and Advanced Research Projects Agency
- GSA Green Proving Grounds

Electrification and Decarbonization

- Grid Modernization
- Grid Efficient Buildings
- Electric Vehicles
- Decarbonization Roadmap

Legislation and Policy

Public Law No: 117-58 (11/15/2021)

Infrastructure Investment and Jobs Act

Among other provisions, this bill provides new funding for infrastructure projects, including for

- roads, bridges, and major projects;
- passenger and freight rail;
- highway and pedestrian safety;
- public transit;
- broadband;
- ports and waterways;
- airports;
- **water infrastructure;**
- **power and grid reliability and resiliency;**
- resiliency, including funding for coastal resiliency, ecosystem restoration, and weatherization;
- clean school buses and ferries;
- **electric vehicle charging;**
- addressing legacy pollution by cleaning up Brownfield and Superfund sites and reclaiming abandoned mines; and
- **Western Water Infrastructure.**

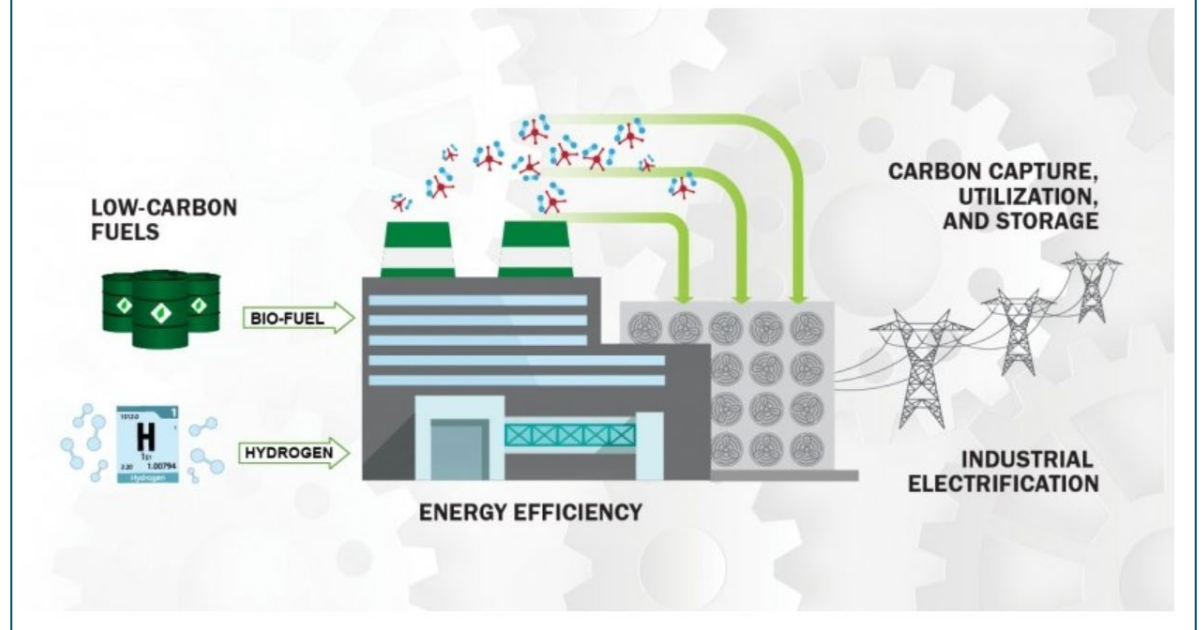
New Innovation Agenda Will Electrify Homes, Businesses, and Transportation to Lower Energy Bills and Achieve Climate Goals

Today, the Biden-Harris Administration is announcing the development of a rapid innovation agenda to make equitable and efficient electric options available for everyone. Under President Biden's leadership, the United States is leading a clean energy transition that's made in America and leaves no one behind. President Biden's bold actions to tackle the climate crisis are lowering household energy costs, bolstering energy security, improving health, and creating good-paying jobs. The President set **goals to reduce our greenhouse gas (GHG) emissions by 50-52% by 2030, to achieve a carbon pollution-free electricity grid by 2035, and to reach net-zero GHG emissions by no later than 2050.** To achieve these goals and secure a better future for all Americans, we need a clean, smart, and equitable electricity system built for the 21st century.

Legislation and Policy

WASHINGTON, D.C. — As part of President Biden’s Investing in America [agenda](#), the U.S. Department of Energy (DOE) today announced up to **\$6 billion for 33 projects across more than 20 states to decarbonize energy-intensive industries, reduce industrial greenhouse gas emissions**, support good-paying union jobs, revitalize industrial communities, and strengthen the nation’s manufacturing competitiveness. Funded by the President’s Bipartisan Infrastructure Law and Inflation Reduction Act, the projects will create and maintain tens of thousands of high-quality jobs and help accelerate the commercial-scale demonstration of emerging industrial decarbonization technologies crucial to meeting the Biden-Harris Administration's climate and domestic manufacturing goals.

Strategies for Decarbonizing U.S. Industries





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Building Cybersecurity Organization



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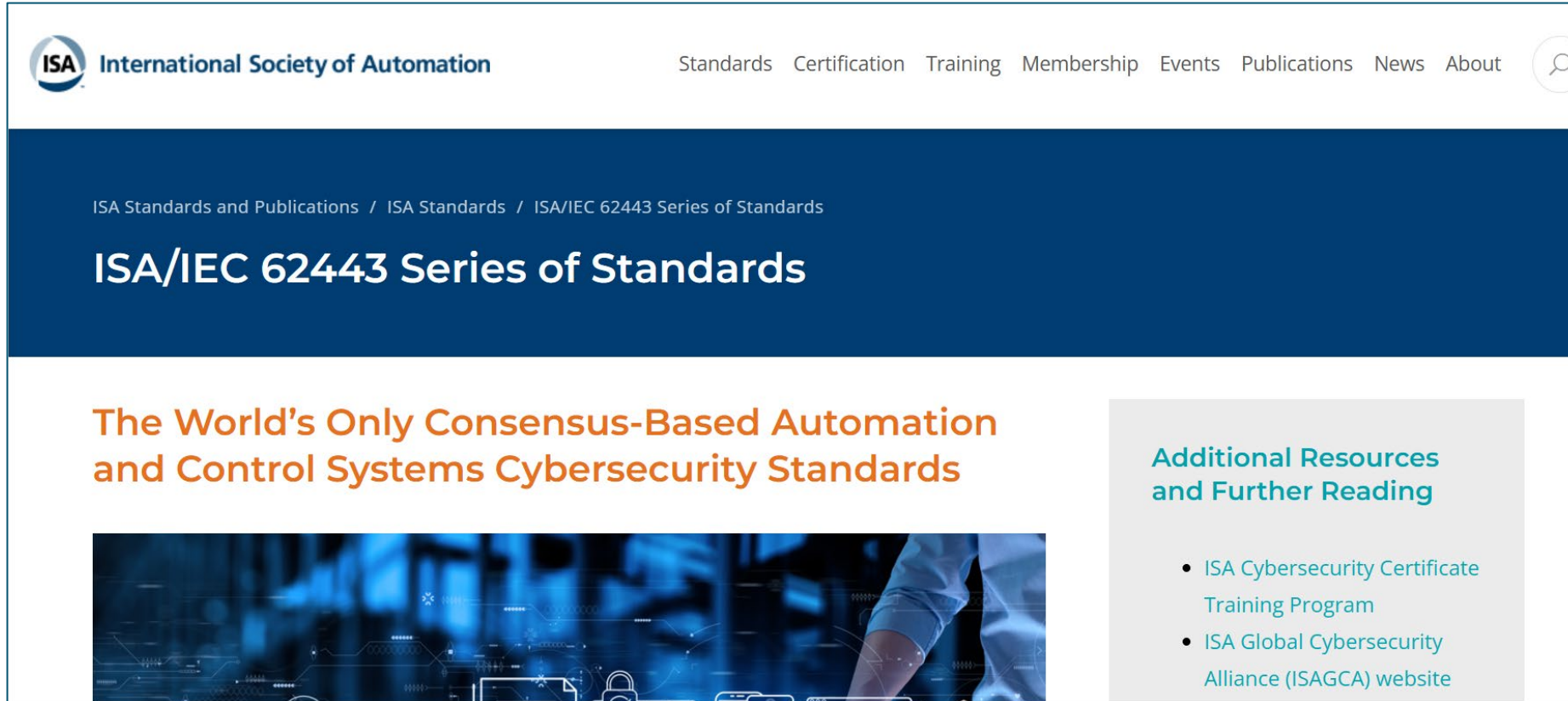
Advancing
Cyber-Physical Security
and Safety



LET'S DIG DEEPER

Who we are

ISA/IEC 62443 Series of Standards



The screenshot shows the ISA website header with the logo and navigation menu. Below the header is a breadcrumb trail: "ISA Standards and Publications / ISA Standards / ISA/IEC 62443 Series of Standards". The main heading is "ISA/IEC 62443 Series of Standards". Below this is a sub-heading: "The World's Only Consensus-Based Automation and Control Systems Cybersecurity Standards". To the right of this sub-heading is a box titled "Additional Resources and Further Reading" containing two bullet points: "ISA Cybersecurity Certificate Training Program" and "ISA Global Cybersecurity Alliance (ISAGCA) website". At the bottom of the screenshot is a blue-tinted image of a person's hand interacting with a digital interface.

ISA International Society of Automation

Standards Certification Training Membership Events Publications News About

ISA Standards and Publications / ISA Standards / ISA/IEC 62443 Series of Standards

ISA/IEC 62443 Series of Standards

The World's Only Consensus-Based Automation and Control Systems Cybersecurity Standards

Additional Resources and Further Reading

- ISA Cybersecurity Certificate Training Program
- ISA Global Cybersecurity Alliance (ISAGCA) website

NIST SP 800-82 R3



NIST Special Publication
NIST SP 800-82r3

Guide to Operational Technology (OT) Security

Keith Stouffer
 Michael Pease
 CheeYee Tang
 Timothy Zimmerman
 Victoria Pillitteri
 Suzanne Lightman
 Adam Hahn
 Stephanie Saravia
 Aslam Sherule
 Michael Thompson

This publication is available free of charge from:
<https://doi.org/10.6028/NIST.SP.800-82r3>

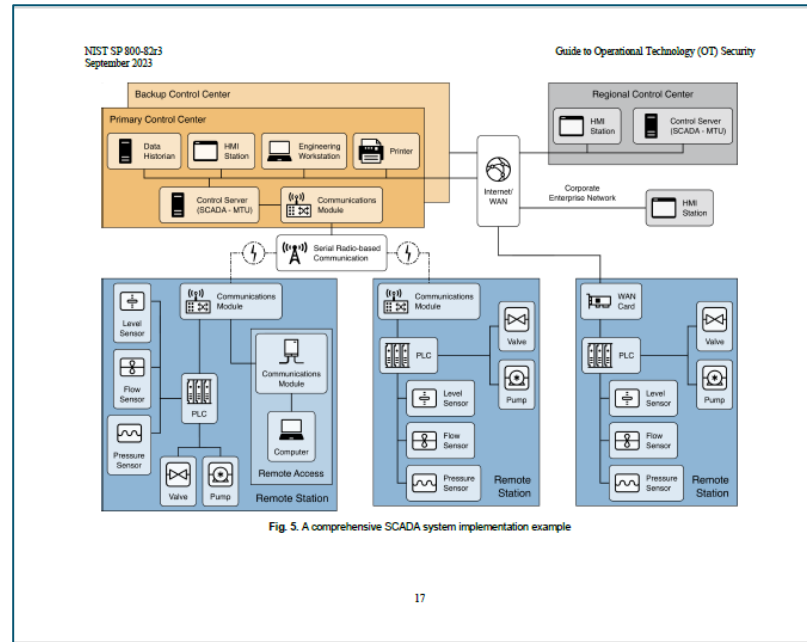


Fig. 5. A comprehensive SCADA system implementation example

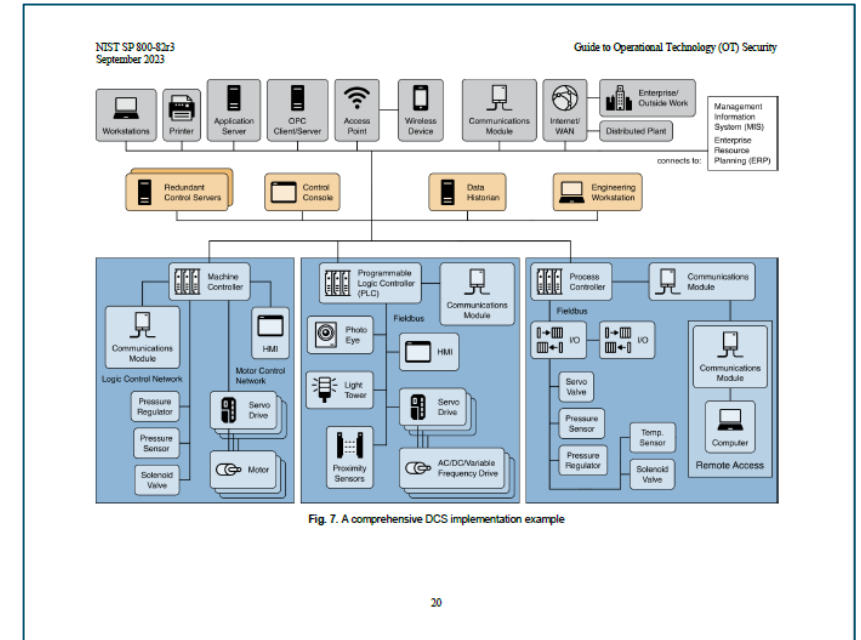


Fig. 7. A comprehensive DCS implementation example



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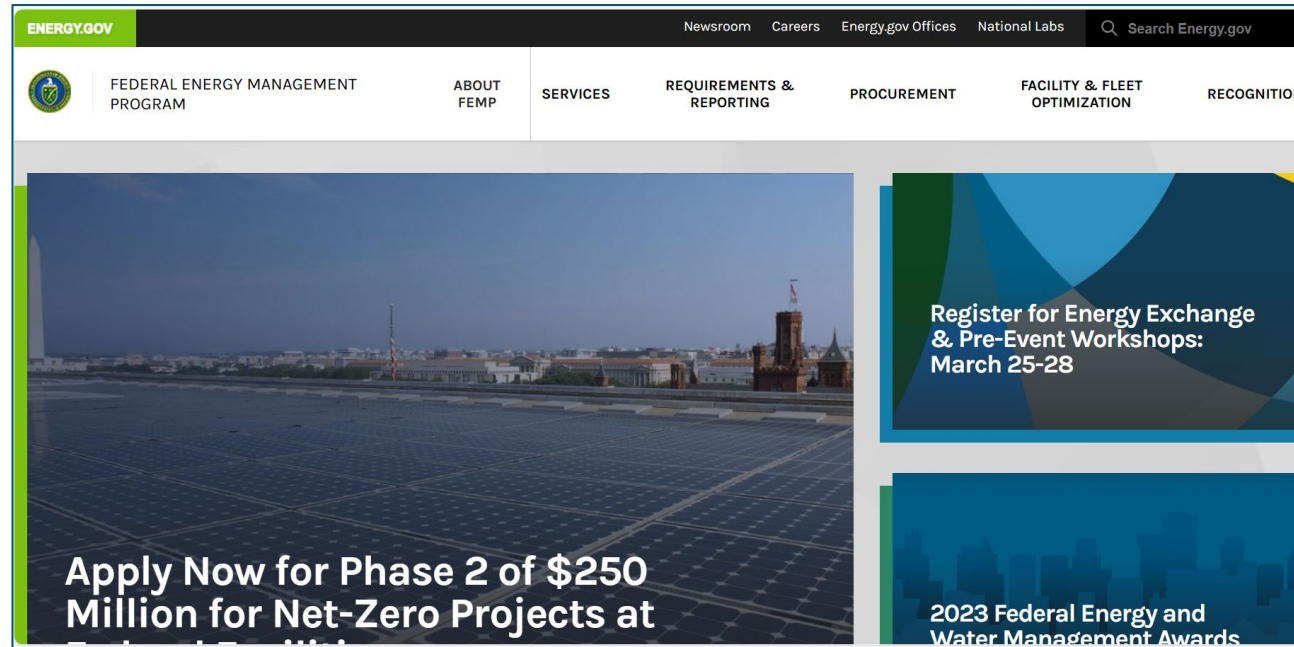
Secure Your Infrastructure with ICS Security Awareness Training

Move beyond compliance to cultivate habits that prevent compromise.

Access Free Trial



DOE Federal Energy Management Office



The announcement revealed the selection of 31 net-zero projects under the Assisting Federal Facilities with Energy Conservation Technologies (AFFECT) program—a key initiative ignited by President Biden's Bipartisan Infrastructure Law, boasting an overall \$250 million in funding. **The AFFECT program aims to propel federal facilities toward clean energy, efficiency, and resilience.**

DOE Grid-Interactive Efficient Buildings (GEBS)

ENERGY.GOV

Newsroom Careers Energy.gov Offices National Labs



Office of
ENERGY EFFICIENCY & RENEWABLE ENERGY

ABOUT EERE

RESOURCES

BUILDINGS & INDUSTRY

RENEWABLE ENERGY

SUSTAINABLE TRANSPORTATION


BUILDINGS

Grid-Interactive Efficient Buildings

Buildings



GSA Green Proving Ground

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[Home](#) > [Climate Action and Sustainability](#) > [Center for Emerging Building Technologies](#) > [About Green Proving Ground](#)

Center for Emerging Building Technologies

- Overview
- About Green Proving Ground**
- Completed Assessments
- Ongoing assessments
- Pilot Your Emerging Tech at GSA: FY24 RFI

About Green Proving Ground (GPG)

The Green Proving Ground program leverages GSA's real estate portfolio to evaluate innovative building technologies. The program aims to drive down operational costs in federal buildings and help lead market transformation through the deployment of new technologies. [View full-size infographic](#) [PDF - 233 KB].



GREEN PROVING GROUND
GPG helps drive building performance beyond business-as-usual

GPG PUBLISHED RESULTS

The GPG program has 32 ongoing technology evaluations in buildings across the country. 53 results have been published to date:

Building Envelope

- [Automated Envelope Sealing*](#)
- [Chromogenic Windows](#)
- [Dual-Zone Indoor Shades](#)
- [EC Windows for Office](#)

ESCTP EW Program

Established in **1995** to:



- Improve DoD's environmental performance
- Reduce costs
- Enhance and Sustain Mission Capabilities

Demonstration and Validation Focus

Promote **Implementation**
DoD Collaboration, Tech Transfer



Installation Energy & Water (EW) is **1** of **5** ESTCP Program Areas

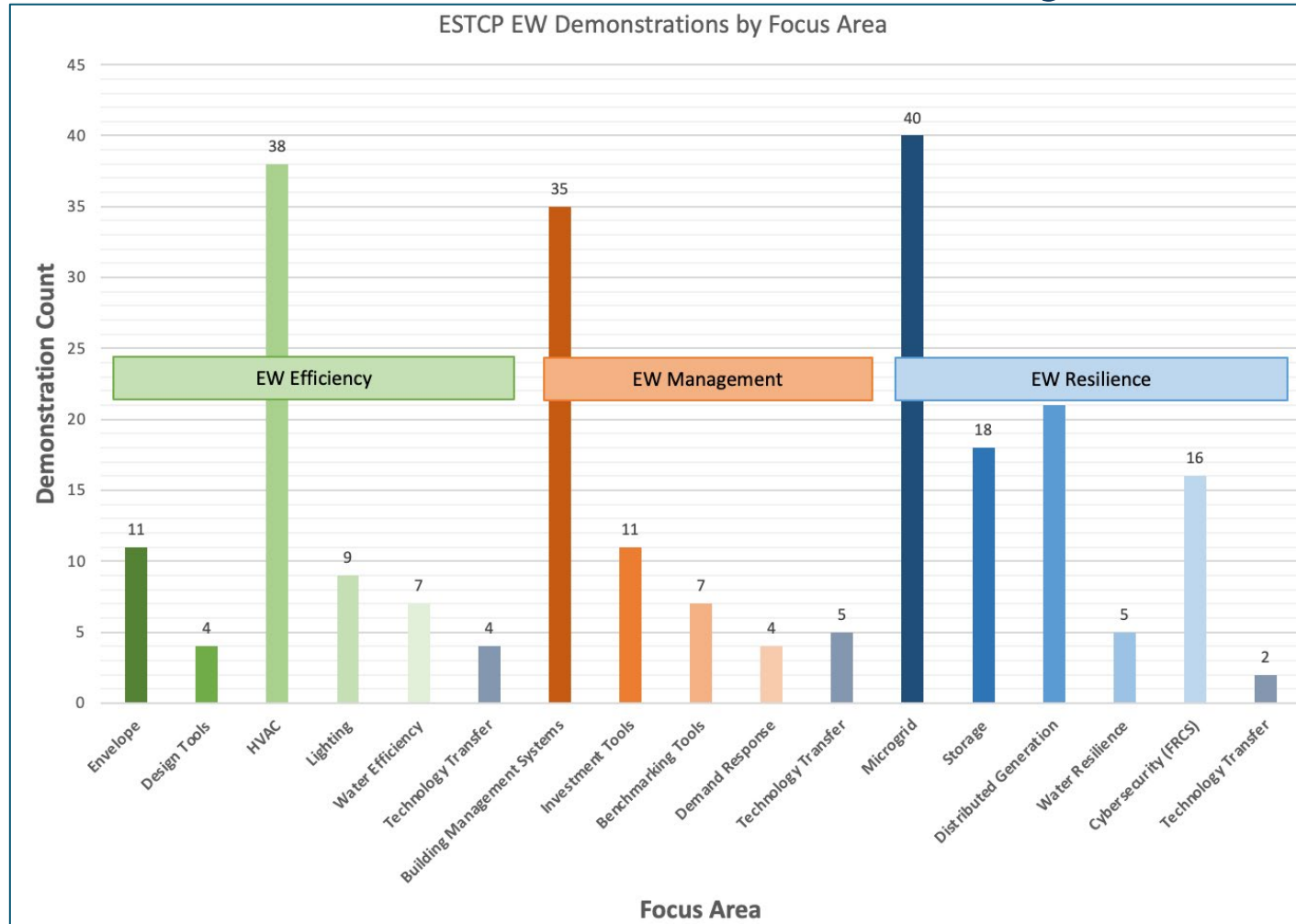


Annual Solicitations
(DoD, Fed, Private Sector)

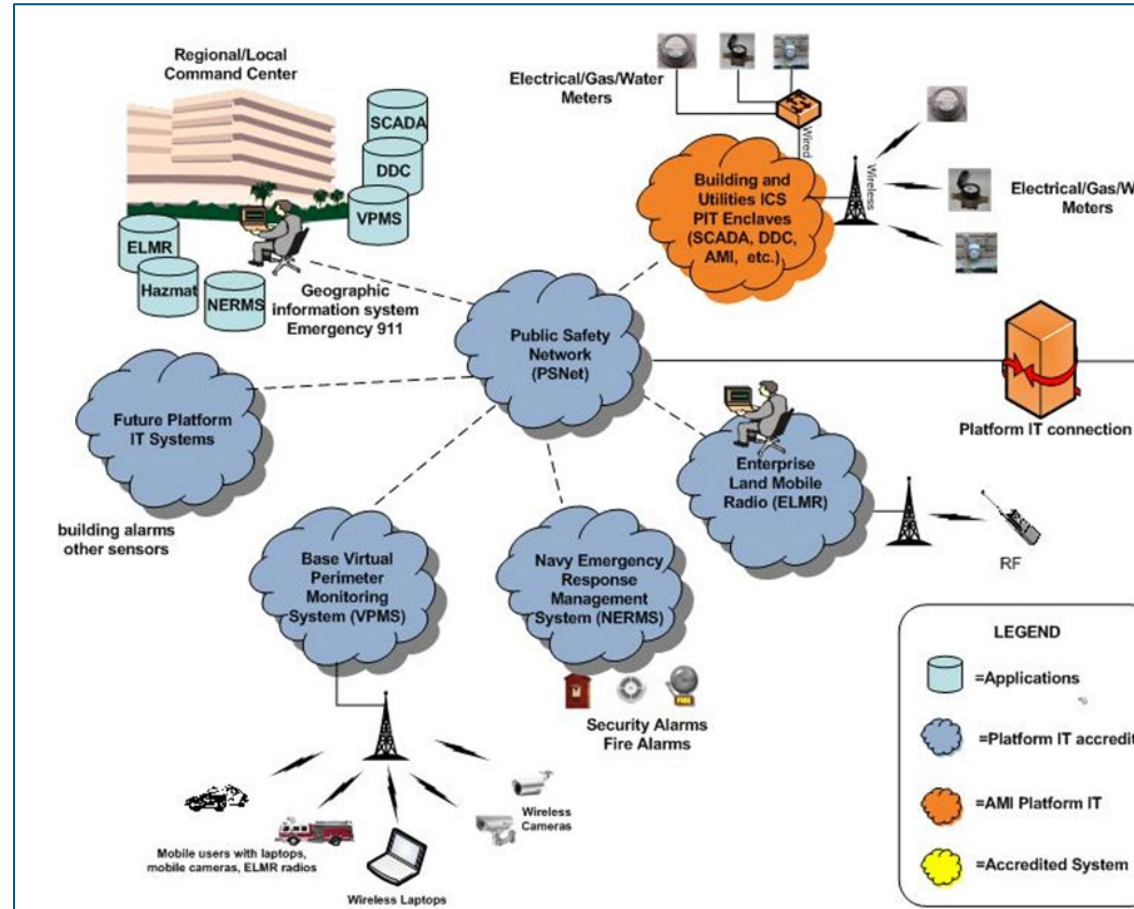
~\$30M
Annual Budget

~70
Active Projects
Wide array of tech

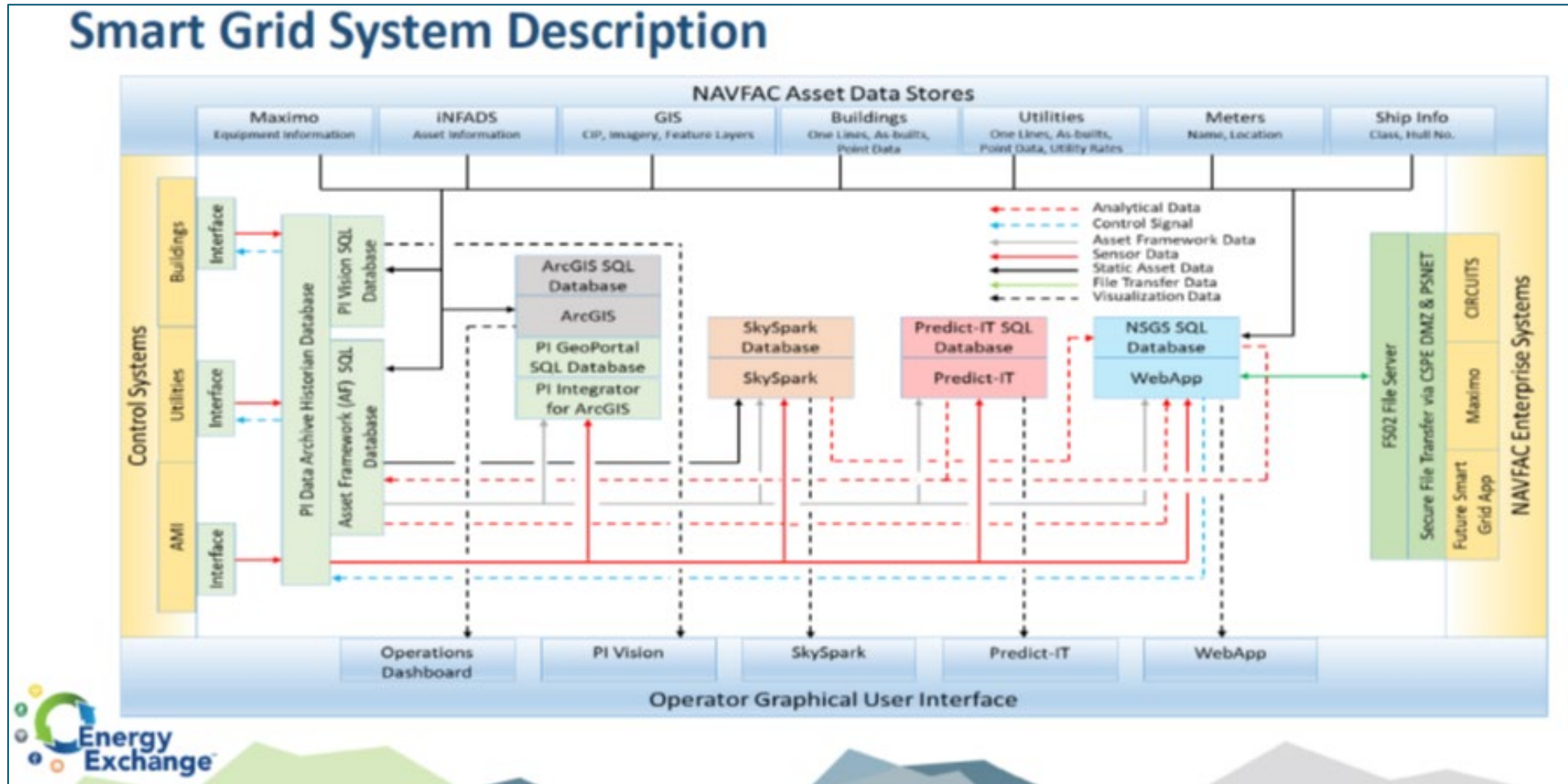
ESCTP EW Demonstration by Focus Area



NAVFAC Facility and Energy Operations Centers (FEOC)



NAVFAC Smart Grid Architecture



ESCTP EW20-5055 MicrogridUP

EW20-5055: MicrogridUP Progress Summary

Y1

Y2

Y3

Technical & Economic Results to date

- Achieved (since last annual review):
 - Public release of app
 - 4 microgrid cluster at Fort Bliss financing approved, entering implementation.
- Final phase (next 12 months):
 - Revise installation plans as new data becomes available to drive additional microgrids towards deployment
 - Polish the beta software for strong final release
 - Execute on tech-to-market plan with additional installations

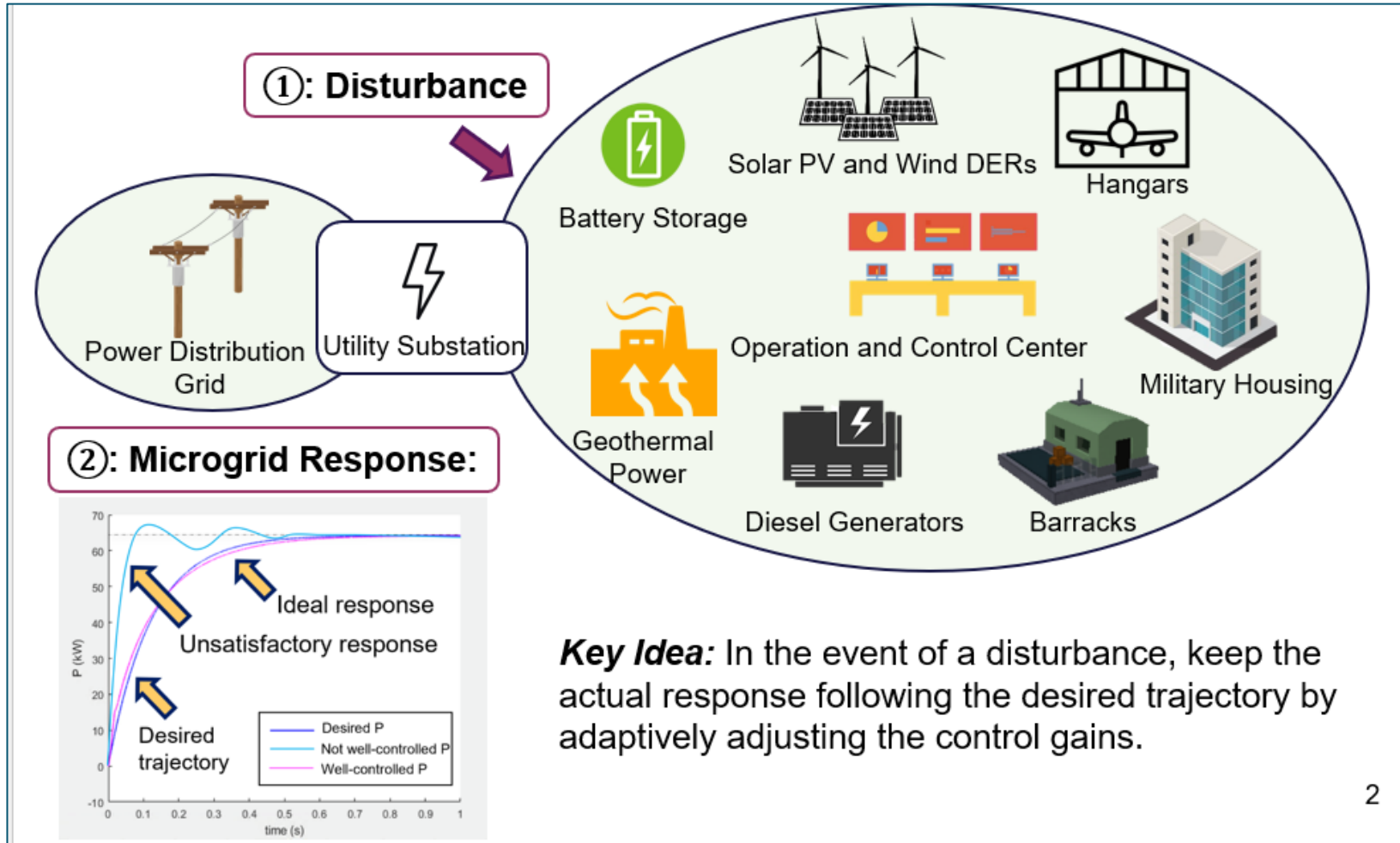
Hurdles to Date

- Microgrid planning involves an enormous number of variables with many often with poor accuracy (mitigation: sensitivity analysis to help users identify worst/best case options).

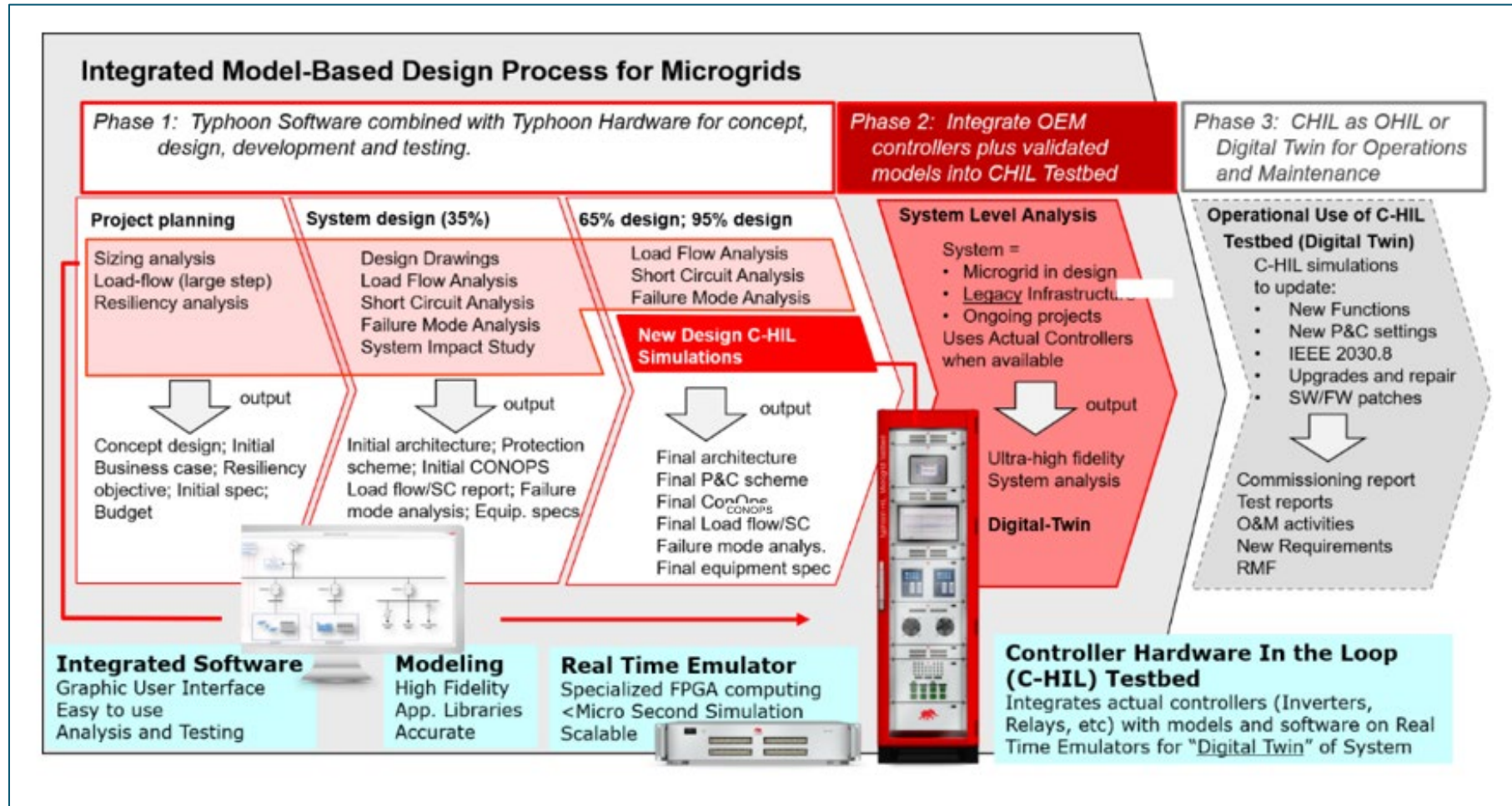


Microgrid evaluation one-line for open test system Lehigh

EW20-EO-5331: MFAC for Autonomous and Resilient Microgrids

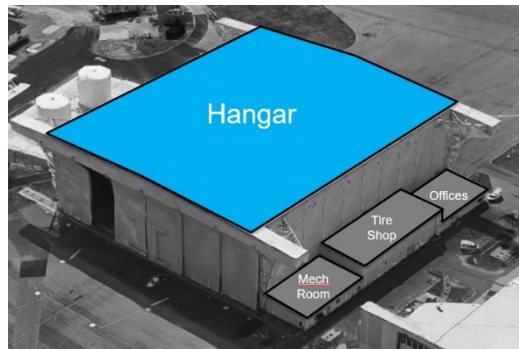


EW20-B8-5049 Integrated Model-Based Design Process (IMBDP) for Affordable, Scalable and Resilient DoD Installation Microgrids

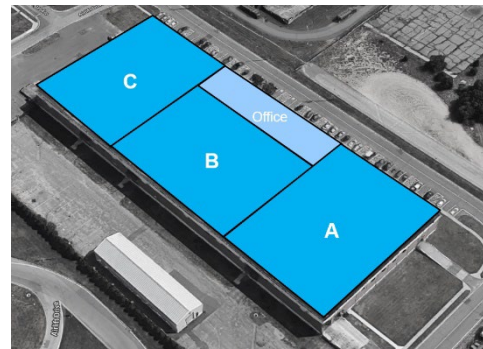


EW-20171EW 201718 Validating the Digital Lumens LED Lighting Control Retrofit

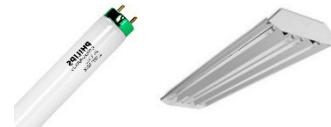
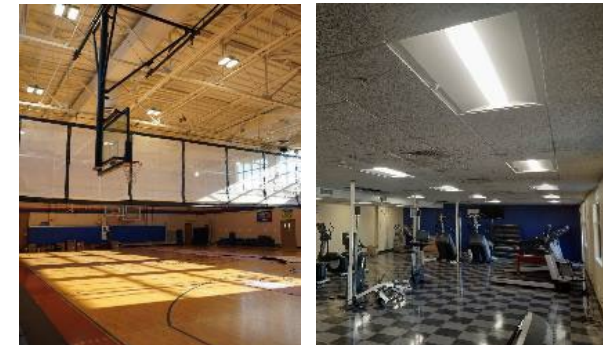
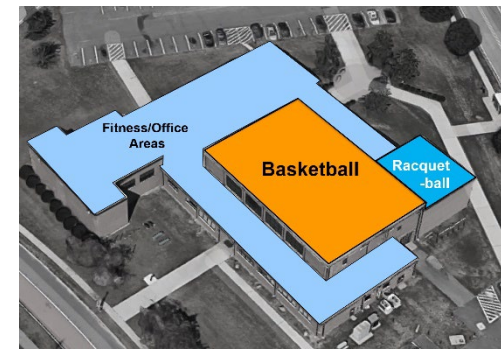
Aircraft Hangar (80,000 ft²)



Supply Warehouse (90,000 ft²)



Fitness Center (25,000 ft²)





SPEAKER



Wanda Lenkewich,
P.E., CxA, LEED^{AP}
Chinook Systems, Inc.
Founder and CEO

Fun Facts

- Did you Know ...
I'm a Farm Girl!



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Live Content Slide

**Poll: Are you involved with continuous monitoring of
Operational Technology?**

Proposed New UFGS Div 01 Specification

Set the Strategy

Project Specific Requirements

- Assess Only
- Authority to Connect
- Authority to Operate
- Full RMF Process



Proposed New UFGS Div 01 Specification

Roles and Responsibilities

Integration of the Team

- Government Stakeholders
- Commissioning
- QA/QC

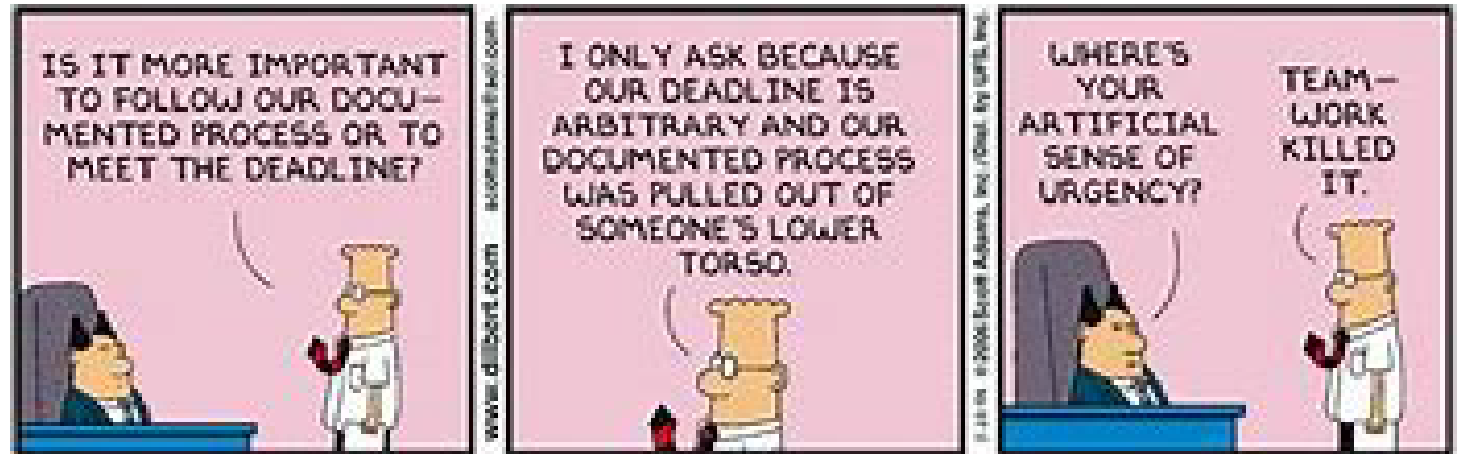


Proposed New UFGS Div 01 Specification

Process

How to Measure Where We Are

- Design
- Construction
- Transition



Proposed New UFGS Div 01 Specification

Deliverables

Consistent and Repeatable

- Formal Planning
- Approved Product List
- Submittal Process
- Reporting



Recap

**Don't Spend Money on Shiny Things
Right Size it for OT**

**No Need to Recreate the Wheel
Create Efficiencies through Standardization**



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**Operational Technology Cyber in 2024:
Increase Resilience and Cost Effectiveness**

THANK YOU

Please take a few minutes to complete a short survey about this session. Your feedback will help us improve future programming for JETC.

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Q&A

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