U.S. DEPARTMENT OF ENERGY | Office of NUCLEAR ENERGY

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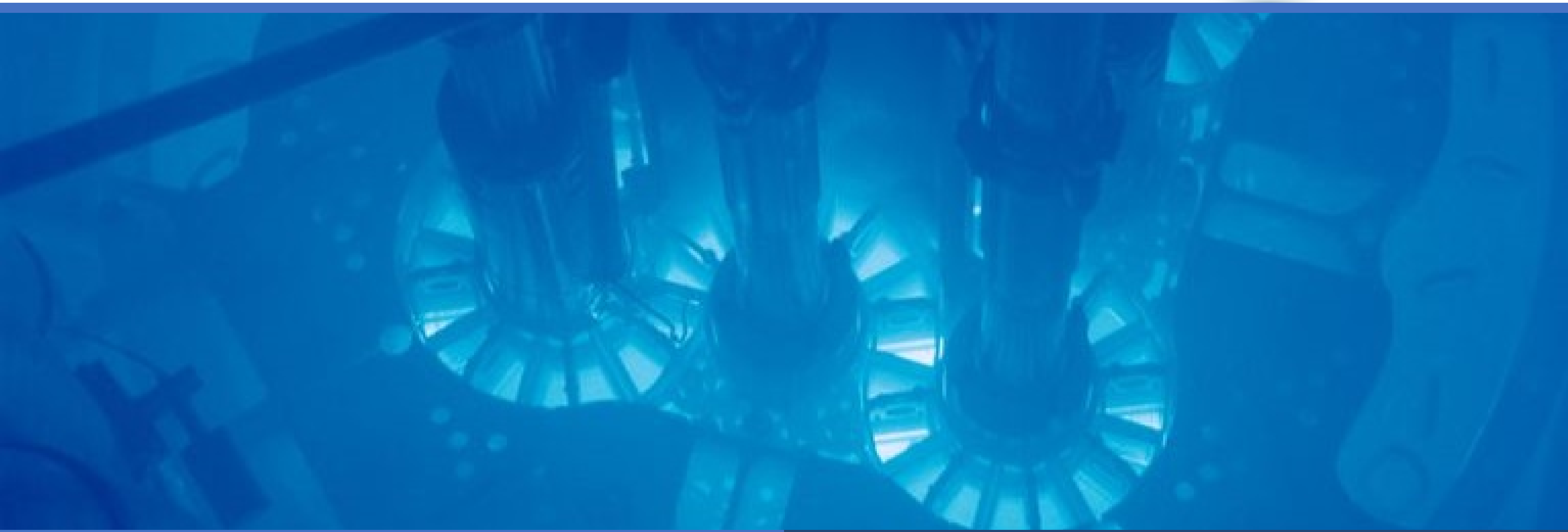

NEET/CTD Cybersecurity R&D

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Cybersecurity R&D Program Overview

Mission: Enable science-based methods and technologies for cost-effective, cyber-secure digital instrumentation, control and communication for current and future nuclear power plants.

Goals by Strategic R&D Area:

Sensors and Instrumentation
Intelligence
ed Control Systems

CYBER RISK MANAGEMENT

Provide threat-informed, science-based and experimentally validated risk methods

SECURE ARCHITECTURE

Establish a foundation for architectural features, design requirements, and operational standards.

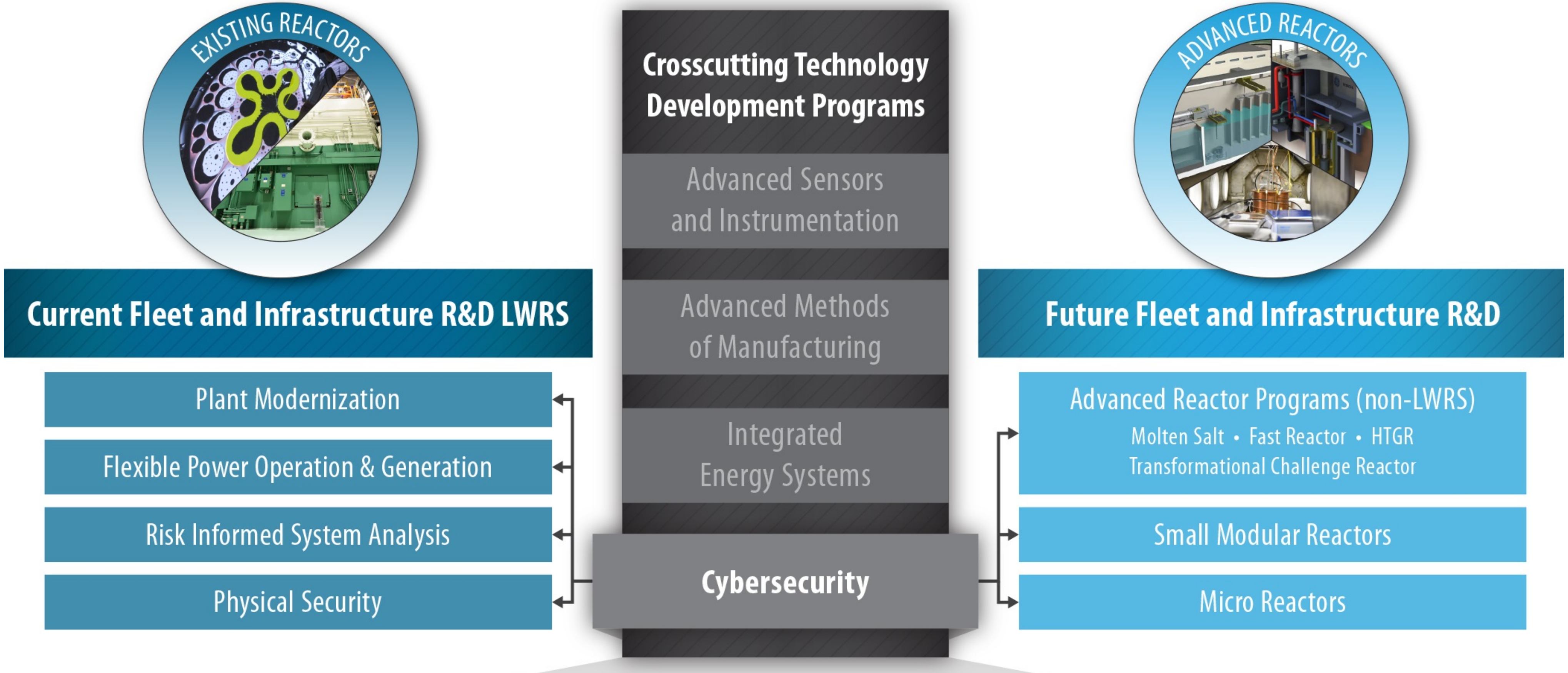
SUPPLY CHAIN

Deliver tools, methods, and guidelines for cyber threat-resistant supply chains

MODELING & SIMULATION

Develop at-scale emulation systems for experimentation and demonstration

Connections to other R&D programs, NRC, Industry



Current Fleet and Infrastructure R&D LWRS

- Plant Modernization
- Flexible Power Operation & Generation
- Risk Informed System Analysis
- Physical Security

Crosscutting Technology Development Programs

- Advanced Sensors and Instrumentation
- Advanced Methods of Manufacturing
- Integrated Energy Systems
- **Cybersecurity**

Future Fleet and Infrastructure R&D

- Advanced Reactor Programs (non-LWRS)
  Molten Salt • Fast Reactor • HTGR
  Transformational Challenge Reactor
- Small Modular Reactors
- Micro Reactors

Stakeholders, Peers, Partners

(Industry, Industry Associations, Universities, Regulators)

EPRI ELECTRIC POWER RESEARCH INSTITUTE · NUSCALE · NEI NUCLEAR ENERGY INSTITUTE · Exelon. · DUKE ENERGY. · aps · GAIN Gateway for Accelerated Innovation in Nuclear · NEUP Nuclear Energy University Program U.S. Department of Energy · Federal Energy Regulatory Commission · U.S.NRC

2021 NEUP Call Interests

- The DOE-NE Cyber Security program seeks to perform R&D in technologies that support and enable digital solutions for the U.S. nuclear sector.
- Proposals are sought for research and development to enable secure communication for future reactor technologies, specific to safety- and security-related sensors and/or controls. Areas of interest include cybersecurity research that enables advanced reactor control concepts including the potential for remote reactor operations.
- Compelling proposals should include aspects of:
  - Secure communications for control and monitoring systems to enable remote operations;
  - Secure communications to support expanded use of data for operational decision making.
- Topics not of interest include:
  - General-purpose attack scenario models or intrusion detection tools for plant operations.
  - Development of technologies, tools or methods generally applicable to industrial control systems, except to adapt these for use in the regulatory and operational context of nuclear power plants. .

Previously Awarded Cybersecurity NEUP Areas

CT-1: Nuclear Cyber NEUP – R&D Focus Areas

Cyber Risk Management:

- *Methodology Development for Cybersecurity Robustness and Vulnerability Assessment of University Research Reactors: A Case Study Using the PULSTAR Reactor*
- *Cyber Security Analysis for Nuclear Reactor Control Systems*
- *Support for Reactor Operators in Case of Cyber-Security Threats*

Modeling and Simulation:

- *NICSim: Nuclear Instrumentation and Control Simulation for Evaluating Response to Cyber-attacks*
- *Model-Based Diagnostics and Mitigation of Cyber Threats*
- *Development of Information Trustworthiness and Integrity Algorithms for Cybersecurity Defenses of Nuclear Power Reactors*

Secure Architecture:

- *CyberSim: A Flexible Simulation Environment for the Evaluation of Cyber Risk in Nuclear Power Plants in Support of the Design of Cyber Protection Architectures*
- *A Cyber-Attack Detection Platform for Cyber Security of Digital Instrumentation and Control Systems*

Questions

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