EPRI

INFORMATION, COMMUNICATION AND CYBER SECURITY (ICCS) LABORATORY

Matt Wakefield

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DIRECTOR'S INSIGHT

EPRI's ICCS labs are at the forefront of evaluating emerging technologies, standards, and protocols, with a focus on interoperability, data integration, telecommunications, cybersecurity and related research in the Information & Communication Technology (ICT) (161) and Cyber Security (183) Programs. We have a growing range of unique capabilities enabled by software tools and equipment that has been purpose-built to meet the needs of utilities. In addition, we have constructed systems that replicate utility environments for testing and training, addressing critical cyber security challenges across integrated security operations centers, substations, DER, and grid-edge devices. With specialized labs dedicated to cybersecurity, DER interoperability, enterprise systems, telecommunications, and advanced metering systems, we accelerate utility innovation and industry standards adoption.

Key Uses

Enabling our research

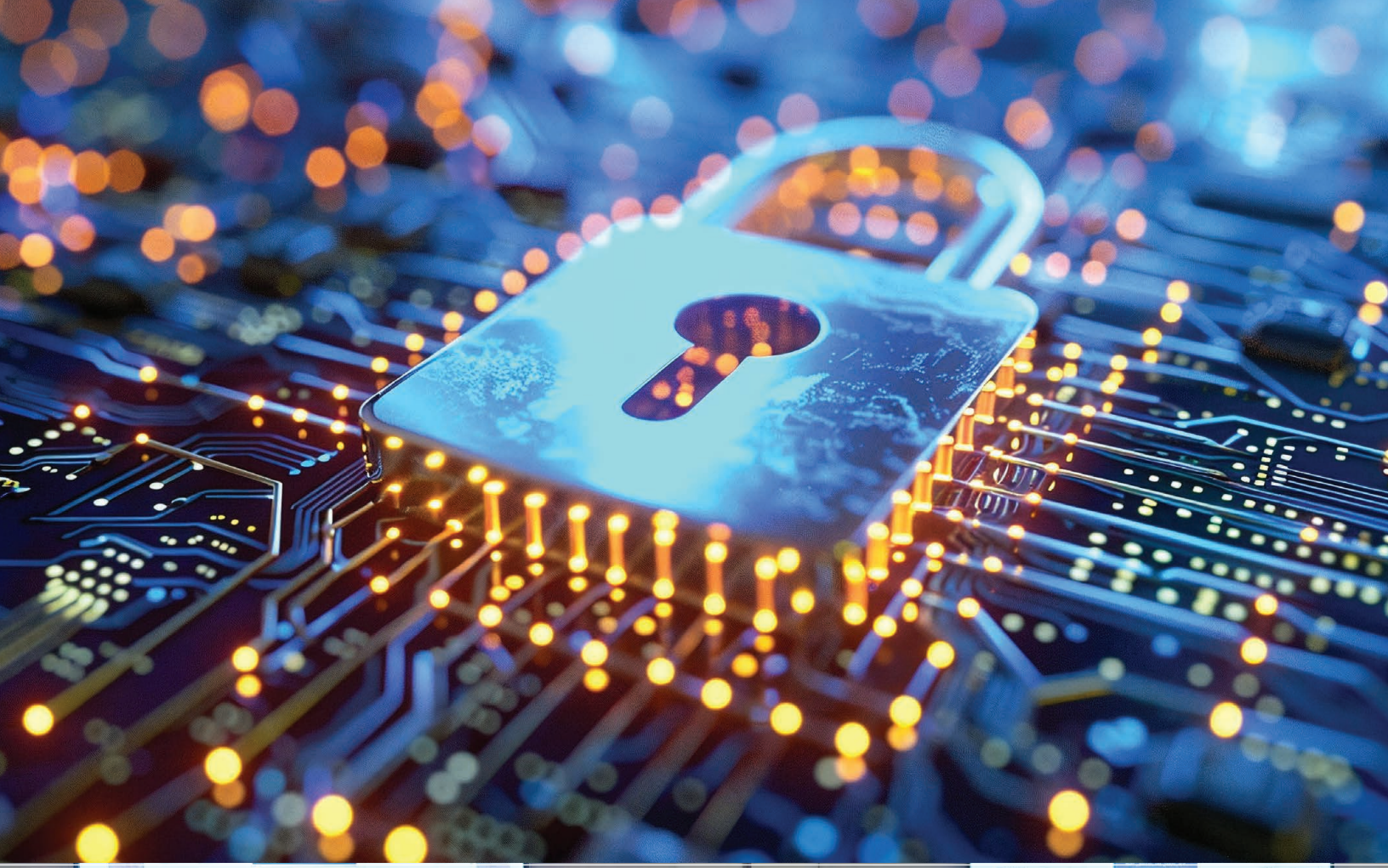
Our ICCS lab is the foundation on which many of our primary research projects and reports are based. Our commitment to conduct objective, vendor-neutral research demands that we have direct access to tools and equipment and are not forced to repeat information gathered from other sources. To the extent possible, we are the original source of the data and insights we share.

Utility access and utilization

We are happy to share our laboratory capabilities with utility members, supporting their needs in cases when the needed internal capabilities don't exist at the utility. We also share the designs and procedures that we have built so that utilities that are designing their own facilities have the benefits of our learning and developments.

Stakeholder engagement

The ICCS laboratories are used as testbeds to support industry working groups and "plugfests". These events bring together vendors and integrators to help identify performance, communication, and interoperability issues that might otherwise impede or delay utility projects.



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Cyber Security Integrated Security Operations Center (ISOC)

The ISOC lab supports incident and threat management research for mission-critical utility operations. It integrates security events from OT, IT, and physical security systems, enhancing prevention, monitoring, detection, response, and recovery. The lab evaluates firewalls, Industrial Control System (ICS) focused Intrusion Detection System (IDS) and Network Visibility Tools, Security Information and Event Management (SIEM), Secure Remote Access, and Artificial Intelligence (AI) based detection and analysis. With a unique multi-vendor environment, it accelerates utility cyber security testing and utility-specific use cases in a controlled environment, aiding in resolving industry challenges.

Team Lead

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Cyber Security Digital Substation Lab

The Cyber Security Lab simulates digital substation systems to support operational research offering a realistic environment with Distributed Network Protocol (DNPv3), IEC-61850 protocols, synchrophasors, and emerging security technologies. It integrates potential security controls for evaluating operational impacts. Equipment includes protection and control devices from major vendors, support for standard protocols, diverse communication network options, and integration with other lab environments (control center, ISOC, etc.) for comprehensive testing.

Team Lead

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DER Interoperability and Cyber Security

EPRI's Distributed Energy Resources (DER) Interoperability and Cyber Security Lab was established as an industry resource recognizing that successful communication among diverse vendor products and system-wide security are essential for DER technologies such as solar, batteries, and Electric Vehicles (EVs) to continue to scale. The lab includes reference implementations, independently developed by EPRI, of clients and servers for standard DER communication protocols, as well as a wide range of commercial smart inverters, EV chargers, manageable/flexible load devices, gateways and Distributed Energy Resource Management System (DERMS). These resources enable us to evaluate DER management systems end-to-end for both interoperability and cyber security, with ability to identify functional gaps and vulnerabilities to help utilities improve their DER system designs.

Team Leads

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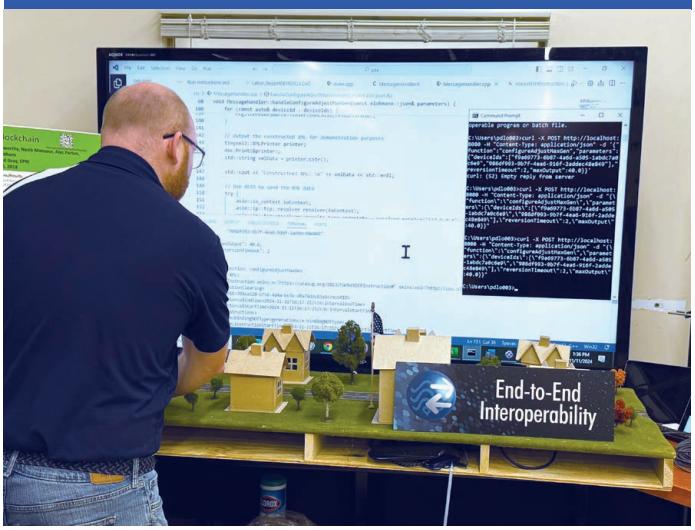
Enterprise Systems Integration and Interoperability Lab



This lab supports IEC Common Information Model (CIM) standards interoperability testing and evaluations between various vendors for grid model management to numerous enterprise platforms like DERMS for DER Group Management. Interoperability tests frequently occur at EPRI hosted "plugfests" to physically connect systems and accelerate addressing issues in real-time in a neutral environment. Our expanding capabilities include an enterprise integration testbed and a wide range of test procedures aimed at improving vendor readiness and simplifying integration of systems such as DER/DERMS, Advanced Metering Infrastructure (AMI), and Advanced Distribution Management System (ADMS). Recent enhancements to the enterprise systems integration lab are advancing the state of DER integration, including the cases of utility-direct control via AMI and Supervisory Control And Data Acquisition (SCADA).

Team Lead

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Telecommunications

Our telecommunications lab provides a wide array of capabilities for research and tools to support field testing at utility sites such as 6 GHz interference testing. The lab includes dedicated equipment and capabilities for Long Term Evolution (LTE) and 5G network performance assessment, 5G Ultra-Reliable Low Latency Communications, (URLLC) evaluation, Automated Frequency Coordination (AFC) testing for Wi-Fi 6E and 5G NR-U, private LTE utility use cases, and emergency communication solutions assessment. Our facilities include a Nokia Multiprotocol Label Switching (MPLS) network and a private LTE network for prototyping and testing teleprotection and failover scenarios.

Team Lead

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AMI Systems Lab

The Advanced Metering Infrastructure (AMI) lab enables EPRI to evaluate AMI systems and protocols to assess capabilities, performance, and interoperability. A centerpiece of the lab is a one-of-a-kind AMI system simulator, designed and developed by EPRI, that enables us to assess a given AMI system's ability to support use cases such as DER and EV integration, advanced cyber security techniques, and more frequent meter data collection. The AMI lab includes commercial systems and reference equipment from meters to access points to headends, allowing end to end assessments and data integration. It offers reference implementations of standard protocols like Device Language Message Specification/Companion Specification for Energy Metering (DLMS/COLEM), the American National Standards Institute (ANSI) C12 suite and Wi-SUN.

Team Lead

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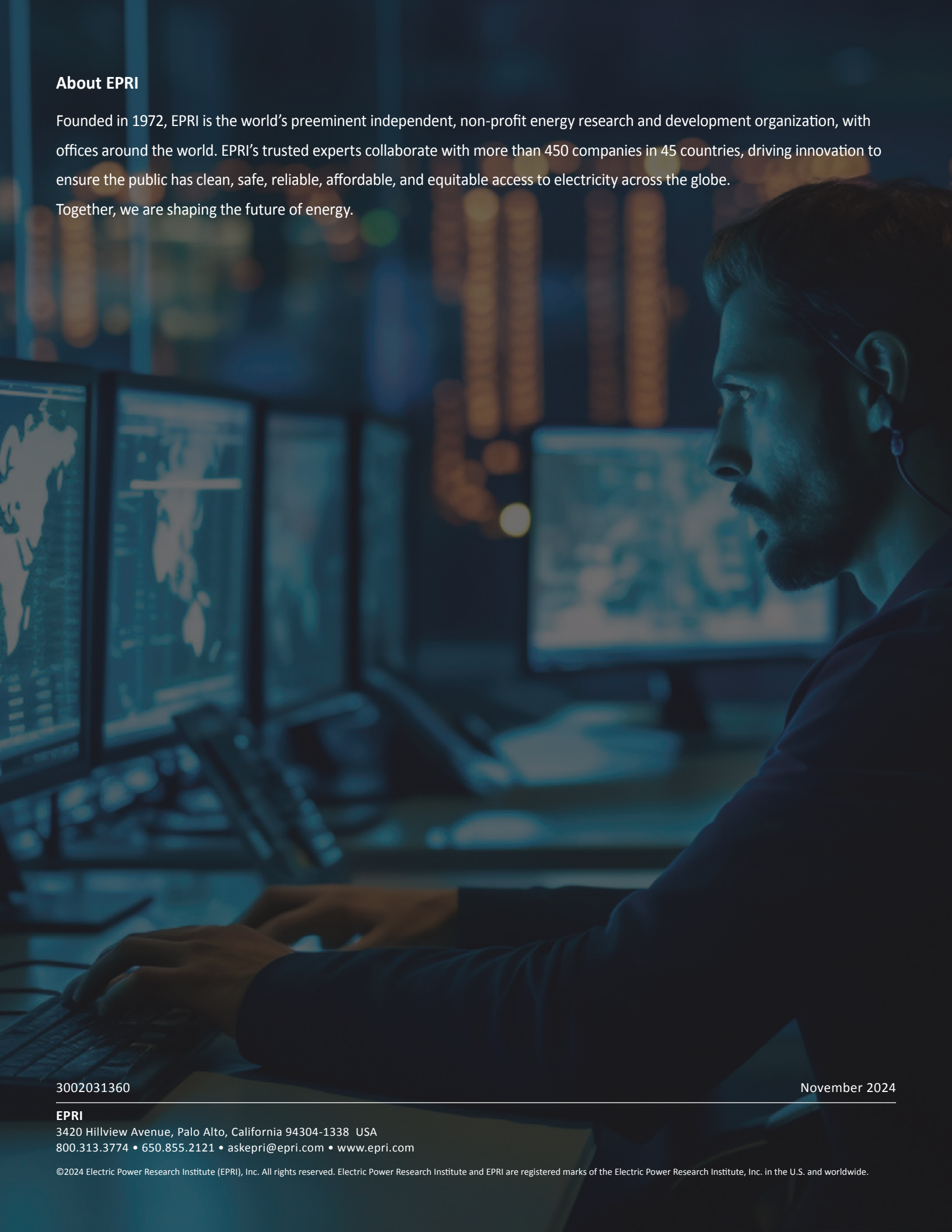

About EPRI

Founded in 1972, EPRI is the world's preeminent independent, non-profit energy research and development organization, with offices around the world. EPRI's trusted experts collaborate with more than 450 companies in 45 countries, driving innovation to ensure the public has clean, safe, reliable, affordable, and equitable access to electricity across the globe.

Together, we are shaping the future of energy.

3002031360 November 2024

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