



Homeland Security

Science and Technology

Critical Infrastructure Resilience Institute (CIRI)

A DHS Science and Technology Center of Excellence



CRITICAL INFRASTRUCTURE RESILIENCE INSTITUTE

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Research Areas

- Understanding Resilient Critical Infrastructure Systems
- Application of Critical Infrastructure in the Real World
- Business Case for Infrastructure Resiliency
- Future of Resilience

"One of the more urgent and challenging issues of our time is resiliency of our critical infrastructure. This is a challenge that requires unprecedented partnering and collaboration across industry, government, universities, and our national laboratories."

– Brent Stacey

Associate Laboratory Director for
National Homeland Security INL

Mission: To conduct research and education to enhance the resiliency of the Nation's critical infrastructures and the businesses and public entities that own and operate those assets and systems

Quick Facts

- Led by the University of Illinois at Urbana-Champaign
- With an emphasis on results-oriented research, education and workforce development, and early and continuous engagement with end users and homeland security practitioners, CIRI will explore the organizational, policy, business, and technical dimensions of critical infrastructure's dependence on cyber assets.
- CIRI will examine how computer hardware and software both contribute to and threaten resiliency and how industry makes decisions about cyber assets which contribute to resilience.
- Consortium of 16 partners that include universities, private industry and national research laboratories. Consists of leading experts in business, computer science, ecosystems, engineering, law, political science, public policy, and urban planning, among other fields.
- CIRI has 25 research partners nationwide.
- The Institute will analyze and assess the resilience of critical infrastructure, networks, and resources.
- CIRI will research and develop solutions to strengthen the resilience of vital infrastructure and deploy them to the marketplace.
- The Institute will develop new curriculum to help educate the current and next-generation workforces in industry and government.

Background

Established in 2015 as a Center of Excellence by the U.S. Department of Homeland Security Science and Technology Directorate, CIRI has been tasked with assessing and analyzing the state of resilience in the Nation's critical infrastructure; conducting results-oriented research and development informed by that assessment; transitioning impactful tools and technologies to owners and operators to strengthen the resilience of critical infrastructure; and to raise awareness, educate and develop an action-oriented, resilience-aware critical infrastructure workplace.

Research Partners

CIRI partners with leading computer scientists, engineers, and social scientists at a growing number of corporations and academic and research institutions throughout the world, including:

Angelo State University
Argonne National Laboratory
Cornell University
Florida International University
Group NIRE
Northeastern University
Ohio State University
Pacific Northwest Laboratory
Sandia National Laboratories
Stanford University
Tennessee State University
Texas Tech University
University of California, Los Angeles
University of Colorado, Boulder
University of Pennsylvania
University of Southern California
University of Washington
University of Washington Bothell

Industry Collaborators

Ameren
American Transmission Company
American Water Works, Inc.
Boeing
CME Group
Digital Manufacturing and Design
Innovation Institute
Exelon
Forcepoint
Georgia Tech Research Institute
Honeywell
IBM
Illinois Emergency Management Agency
Illinois Law Enforcement Alert System
MidAmerica Energy
Midcontinent Independent Systems Operator
PG&E
Sacramento Municipal District
Siemens

CIRI Research Themes

Understanding Resilient Critical Infrastructure Systems

Research in this theme will yield an understanding of the characteristics of resilient infrastructures; the scope and dynamics of the linkages and interdependencies of resilient infrastructures; and effective methods for bringing owners and operators of critical infrastructure together with the government sector to forge effective public/private partnerships to advance and enhance infrastructure security and resilience.

Application of Critical Infrastructure in the Real World

Activities in this theme will focus on gaining a systems-level understanding of how critical infrastructure sectors are actually connected and how those interconnections affect risk management and risk sharing strategies used by industries and infrastructure owners and operators. Researchers will identify and evaluate policy and technology options that could support effective decision-making in collaborative risk management environments in real-world settings. This research could lead to models allowing decision makers to effectively analyze questions such as: how do risk management strategies in one infrastructure community transfer risks to another?



Business Case for Infrastructure Resiliency

Businesses that own and/or operate critical infrastructure systems make decisions and tradeoffs regarding infrastructure security and resilience before, during, and after a catastrophic event. Work conducted in this area will seek to understand how those decisions are made. Further, researchers will also analyze government policies and regulations and the dynamics of risk insurance markets to determine their effects on the motivations and behavior of decision makers throughout the homeland security enterprise. Researchers hope to define future mechanisms that will properly incentivize decision makers to make timely and appropriate investments in infrastructure security and resilience.

Future of Resilience

While considering the disruptive changes taking place in all sectors of the critical infrastructure as well as the constantly evolving threat landscape, researchers will seek breakthrough, game-changing, blue-sky projects that could significantly influence the adoption and evolution of critical infrastructure resilience. Research will involve the entire gamut of factors affecting security and resilience and the full resilience life-cycle. The goal of this research is to gain an understanding of how resiliency can be designed and built into the physical and cyber infrastructures and the commercial and regulatory environments of the future.