Critical Infrastructure Resilience Institute

A DEPARTMENT OF HOMELAND SECURITY CENTER OF EXCELLENCE

From financial services to transportation systems, our nation's critical infrastructure is deeply woven into the way we live, work, and play. But as these systems become more technologically advanced, they also become more vulnerable to an attack, equipment failure, or natural disaster.

At the Critical Infrastructure Resilience Institute (CIRI), our goal is to strengthen the resilience of our nation's critical infrastructure. When we design manmade systems to be naturally robust, we reduce the impact of disruptions on essential functions that keep the trains running and the lights on.

What is Resilience?

At CIRI, we analyze and assess networks and systems to find solutions that make our assets more secure and resilient. But what exactly does it mean to be 'resilient'?

Resilience is more than protection or safety—it is the ability to fail gracefully and leverage a built-in capacity to self-heal in a manner that is both timely and resource efficient. CIRI is conducting research that will help developers, infrastructure owners, and businesses build systems that are:

- Resistant to attack and failure, like the cascading impact on infrastructure systems when a flood causes the power to go out.
- Operable in a degraded state during a disruption, such as keeping emergency communication systems online during a storm, even when civilian communication systems are down.
- Able to recover more nimbly after an attack or failure, like resuming normal maritime port operations following a hurricane so that the flow of products and people isn't hampered any more than necessary.

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ciri.illinois.edu

About CIRI | CIRI is a national hub established by the Department of Homeland Security, housed at the University of Illinois. Our work harnesses the intellectual power of academia, private industry, and government through public and private partnerships to strengthen the resilience of our nation's critical infrastructure. We do this by conducting cutting-edge, outputs-oriented research, supporting technology transition, and building a more robust workforce through training and education.

CIRI's Unique Strengths

CIRI offers expertise in exploring and improving the connections between the physical and virtual worlds. We have a nuanced understanding of threats and vulnerabilities to both American and global systems and a broad network of industry, military, and academic partners.

CIRI has assembled a renowned line-up of academic and industry partners from some of the leading universities and private sector organizations who provide leadership and resource development for this emerging area of study.

Strategic Mission Areas

CIRI has been tasked with analyzing and improving the resilience of networks and resources. We accomplish this through four strategic mission areas.

- **Building the business case for infrastructure development:** What market forces, such as insurance, economics, and finance, can drive the tidal wave of change needed to make a measurable impact?
- **Informing the regulatory environment:** How can regulation be used to complement market forces to create the imperative for change?
- **Developing new technology and solutions:** How do we translate knowledge gleaned from our research efforts to create tools that help businesses and infrastructure operators implement the change?
- **Educating the workforce:** How do we grow and evolve the workforce to support the needs of the new marketplace?

Each of these four elements is essential in creating lasting change in infrastructure resilience.

CURRENT RESEARCH PROJECTS

Insurance and the Business Case for Resilience

- **Analyzing Cyberinsurance as a Market-Based Solution for Cyber Resiliency** *(University of Illinois)*
- **Community Resilience and Disaster Costs** *(University of Illinois)*
- **Community Resilience through Comprehensive Risk Assessment for Business Continuity** *(University of Illinois)*
- **Identifying and Reducing Barriers to Infrastructure Insurance** *(University of Pennsylvania)*
- **Measuring Business and Economic Resilience in Disasters** *(University of Southern California)*
- **Scenario-based Flood Risk Mapping** *(University of Washington)*

Macro and Micro Industrial Supply Chains

- **Assessment and Measurement of Port Disruptions** *(University of Illinois)*
- **Cybersecurity Assurance for Critical Infrastructure** *(Stanford University and UCLA)*

Infrastructure Dependencies and Interdependencies

- **Dynamic Resiliency Modeling and Planning for Interdependent Critical Infrastructures** *(New York University)*
- **Mapping Infrastructure Interdependencies for Improved Emergency Management and Resilience Investment Decisions** *(Georgia Institute of Technology)*
- **Resilience Governance for Infrastructure Dependencies and Interdependencies** *(Northeastern University)*
- **Strengthening Local and Regional Regulatory Capacities for Cyber-Resilience** *(Stanford University and Cornell University)*

Communication Systems

- **LEFT: An LTE-Oriented Emulation-Instrumented Fuzzing Testbed** *(University of New York at Binghamton)*
- **Quantifying Interdependencies of the Logical/ Physical Internet Topologies** *(University of California and San Diego)*