CIRI | CRITICAL INFRASTRUCTURE RESILIENCE INSTITUTE

A DEPARTMENT OF HOMELAND SECURITY CENTER OF EXCELLENCE

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Assessment and Measurement of Port Disruptions

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RS21 THERE'S A SMARTER WAY

BROWARD COUNTY FLORIDA

U.S. Customs and Border Protection

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Project Summary

Space	Critical Infrastructure at Shipping Ports
Problem	Area Maritime Security Committees (AMSCs) need to evaluate risk of increased dependencies on communications/IT networks.
Solution	Use simulation and visualization to understand cascading effects of disruptions to shipping ports.
Results	A cloud-based platform to simulate disruptions.
TRL	5
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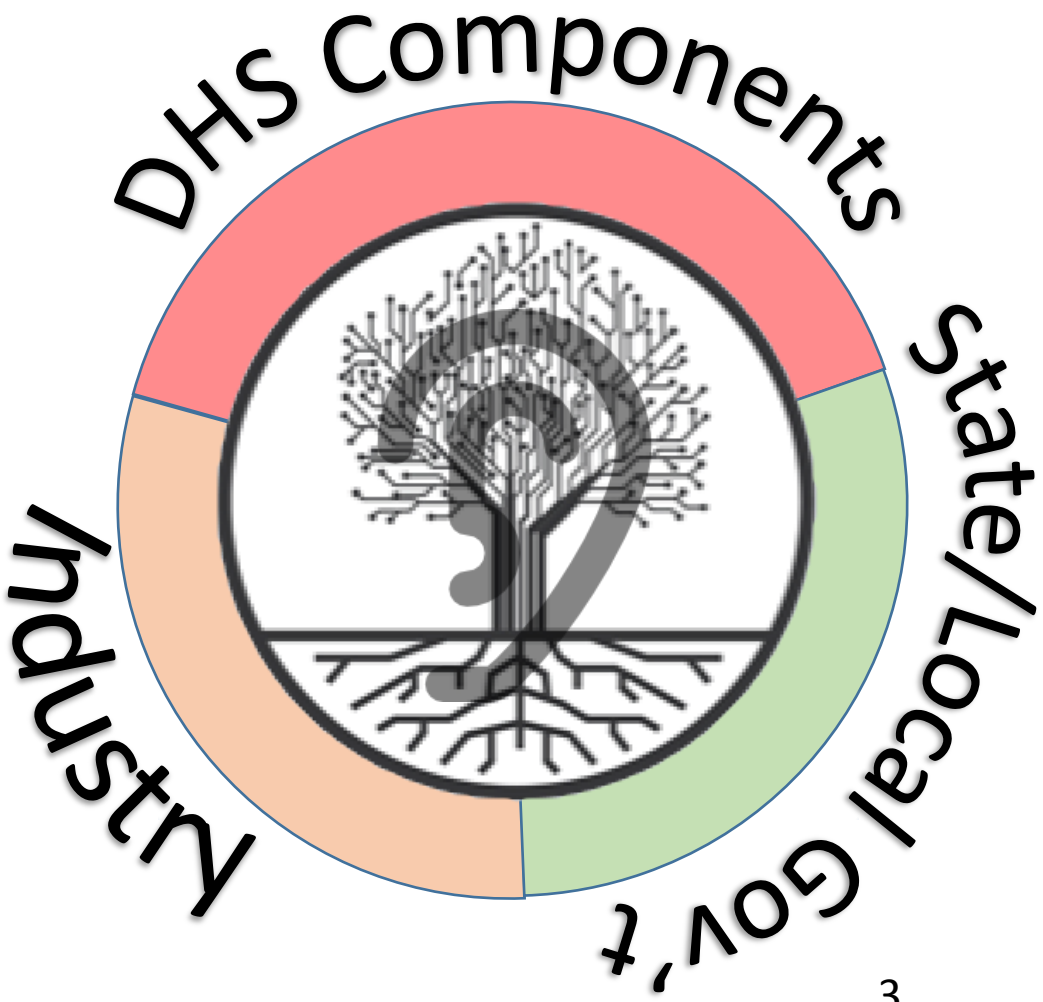
Goals

Listen to stakeholder needs, be responsive to them, deliver

CIRI Federal Coordinating Council

- NPPD Infr. Protection
- NPPD Cyber-security & Comms.
- Policy
- FEMA
- Coast Guard
- S&T Cyber-Security Division
- S&T Office of National Labs
- NIST
- NSF



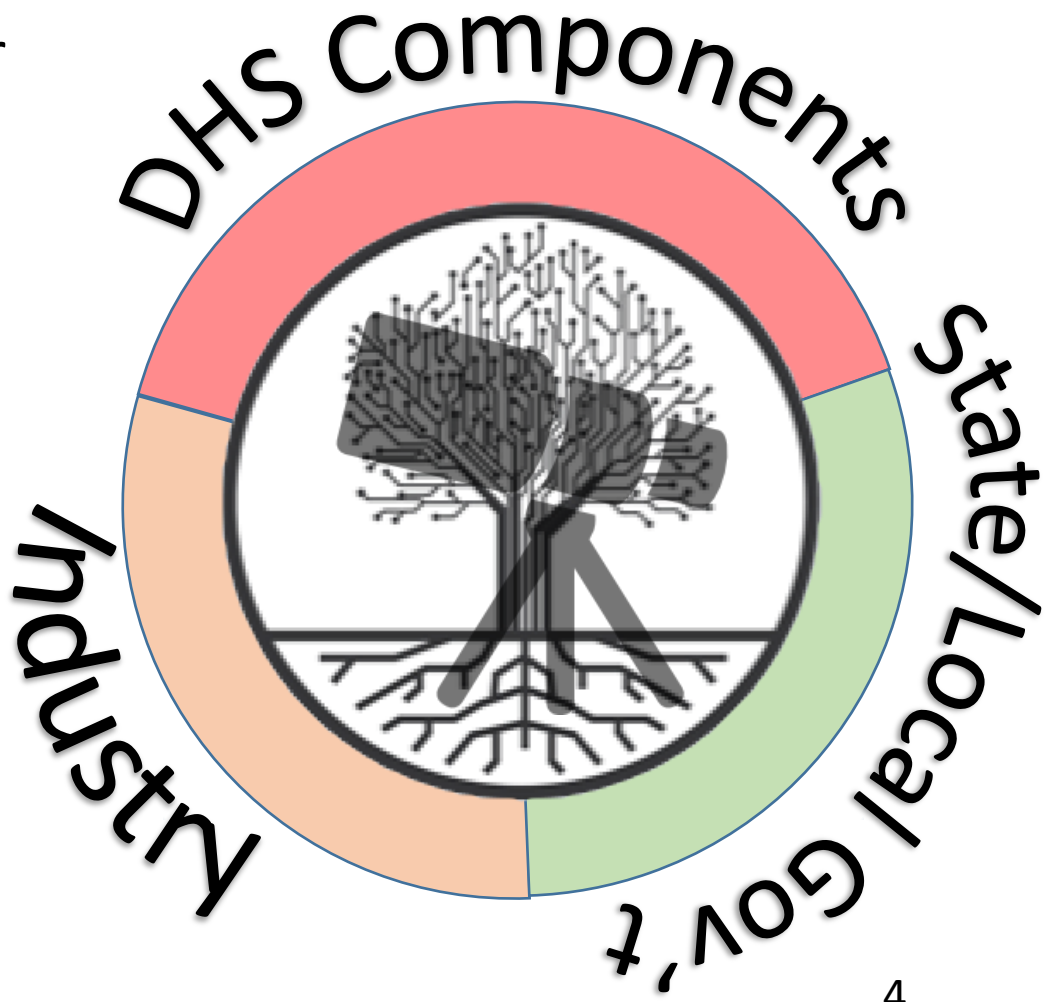
Goals

Anticipate future stakeholder needs

- Educate stakeholders
- Prepare for future needs, deliver

Evolving needs due to

- Technology changes
  - Can be used to increase resiliency
  - Threatens resiliency
  - Disruptive
- Technological convergence
- Changes in law / policy
- Changes in business practices, business climate
- Public perception

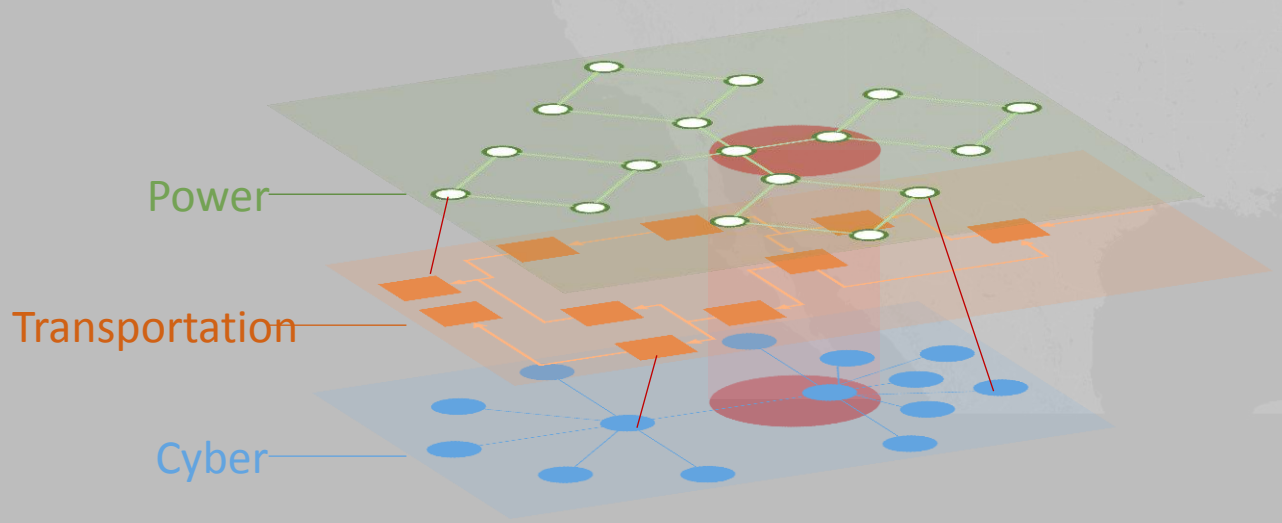


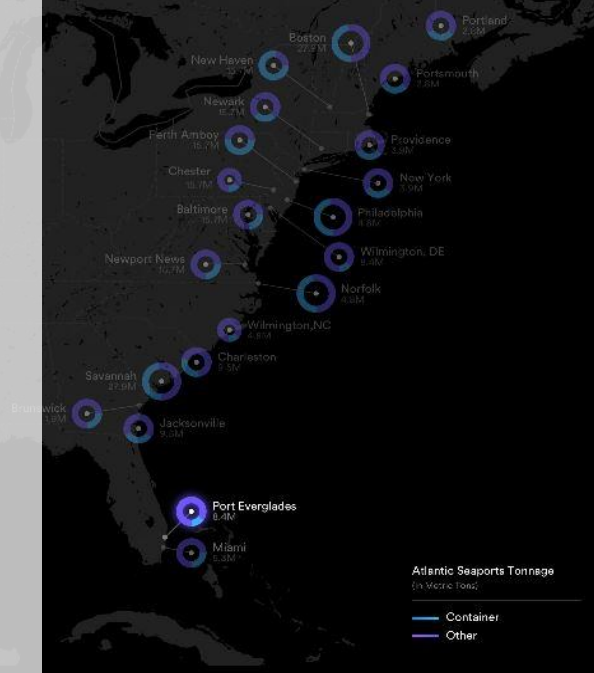
Strategic Thrusts

- Help create the **business case** for greater investment in the security and resilience of the Nation's critical infrastructure
- Help policy makers and regulators craft sound policies that **improve response** to disruptions and **speed recovery** and which support the business case
- **Develop** and **transition to market** tools, technologies, and knowledge needed to construct and maintain secure and resilient critical infrastructure
- **Educate** and **develop** a **workforce** able to meet the evolving challenges of critical infrastructure resilience

Motivation

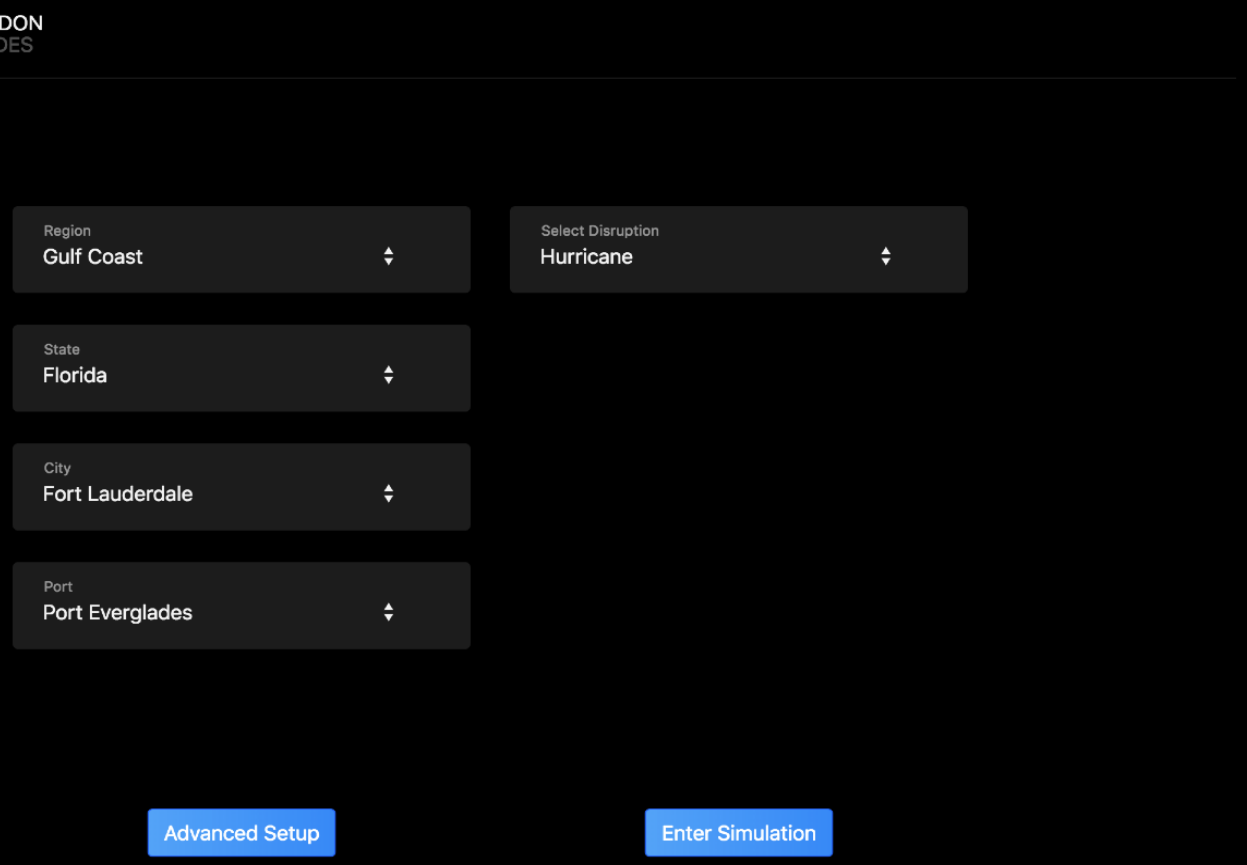
- More than 360 sea and river ports in the United States
- More than 90% of US Goods go through these ports
- Modern shipping ports are a nexus of critical infrastructure systems





Objective

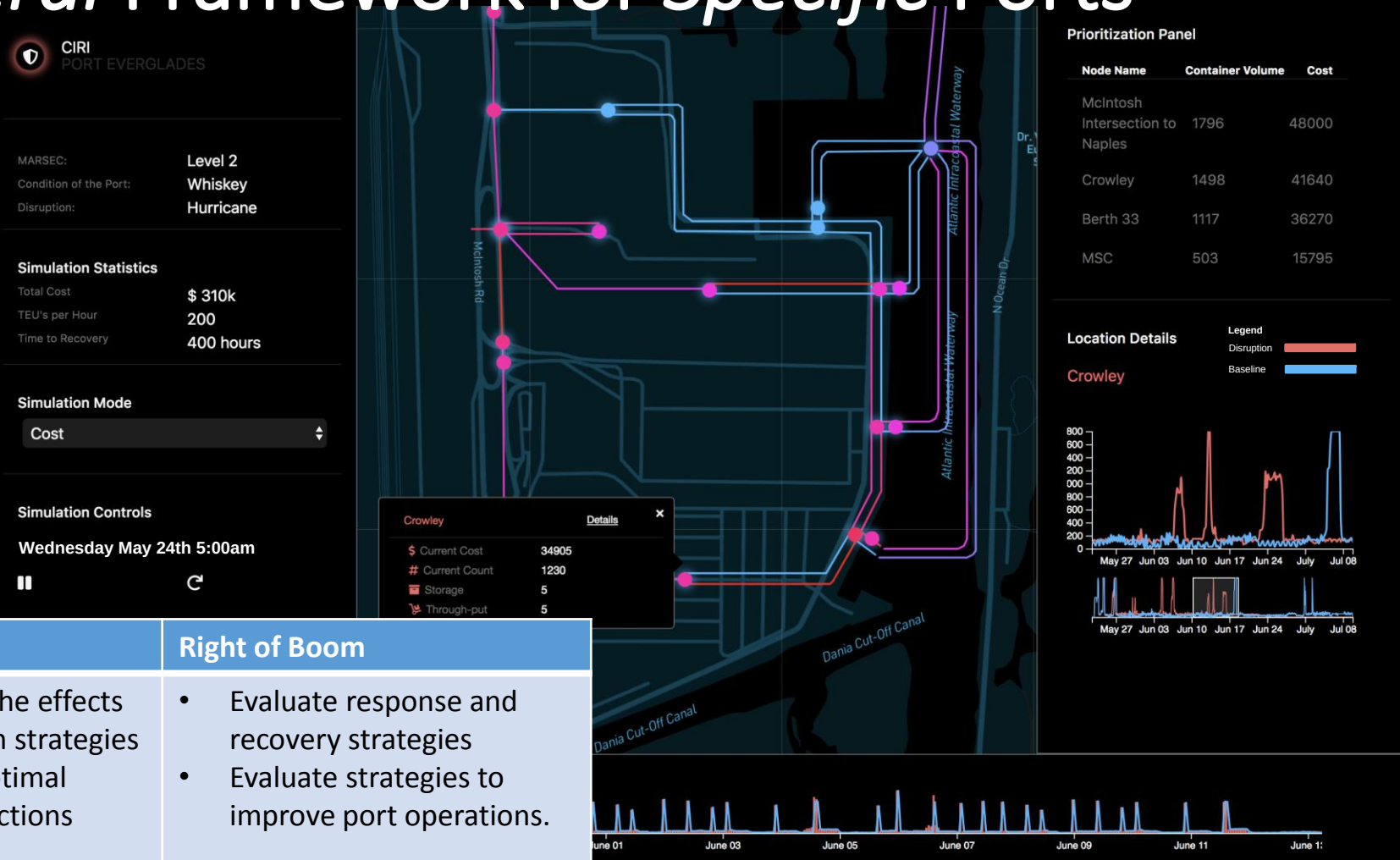
"Following a disruption of port operations, what are the secondary and tertiary effects of the port disruption on other modes of transport (trucking, rail, pipeline, etc.) and what are the economic impacts of such an incident?"



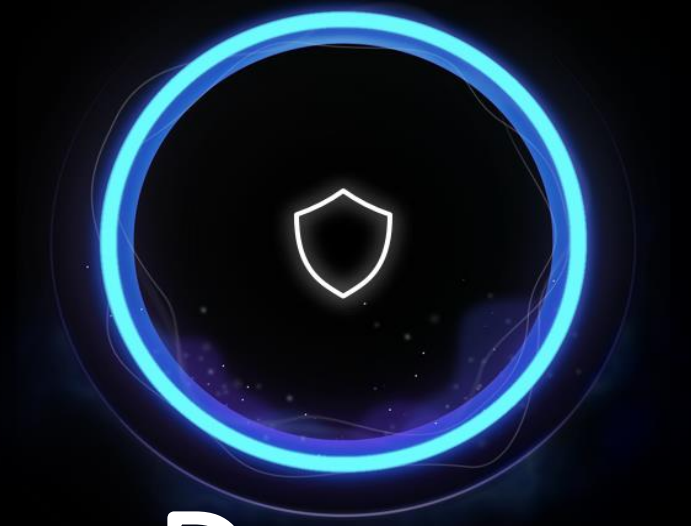
Approach: A *General* Framework for *Specific* Ports

Different port stakeholders need to conduct *what if* analyses

- Simulate various disruptions of the MTS
- Understand increased cost of delivery and delays
- Model the effect of a theoretically possible cyber-physical disruption.



Left of Boom	Boom	Right of Boom
• Training Exercises • Area Maritime Security Plans • FEMA Port Security Grants	• Determine the effects of mitigation strategies • Compute optimal mitigation actions	• Evaluate response and recovery strategies • Evaluate strategies to improve port operations.



Demo

EVERGLADES

Ut enim ad minima veniam, quis nostrum exercitationem ullam corporis suscipi

START

	Core Competency/Priorities	Relevance to Research
	Contingency operations and national taskings (e.g. disaster relief, terror threats)	• Use the cyber-physical disruptions catalog to describe Operational Context. • Simulate effect of threats w.r.t. assets and infrastructure within a specific region or port to establish a Capability Baseline.

	Four Directorates:
	• Law Enforcement Operations
	• Strategic Planning and Analysis
	• Mission Readiness Operations
	• Program Management Office
		• Friendly Force Predictability
		  • "Explore opportunities to increase randomness, vary schedules"
		• "What are the optimal configurations and deployment of resources?"
		  • Optimal Multicommodity Network Flow

	Domestic operations at 328 Ports of Entry (POE).
	• Cargo Security
	• Anti-Terrorism Efforts
	• Agriculture Inspection and Quarantine
		• Simulate the effect of deploying different inspection technologies within a shipping port.
		  • Non-intrusive inspections
		  • Biometric vehicle at speed
		• Understand the effect of disruptions (e.g. driverless cargo)

	• Trade enforcement
	• Information integration
	  • Provide a single, common operating picture to enable risk-driven decisions.
		• Simulate effect of different enforcement/security schemes.
		• Simulate effect of disruptions to technologies
		  • Radiological scanning
		  • CPB targeting systems

[Based on Presentations at CBP Researcher Day. June 1, 2018]

Thank You!

- Department of Homeland Security
- Information Trust Institute
- US Coast Guard
  - USCG Sector Miami
  - USCG Research & Development Center
- Port Everglades
  - Broward Country Sheriff's Office
  - Customs and Border Protection
  - Crowley
  - Florida East Coast Railway
  - TransMontaigne
- USTRANSCOM