Assessment and Measurement of Port Disruptions
Communities depend on the Maritime Transportation System (MTS).

- **Globally**: The MTS accounts for more than 80% of global merchandise trade in volume and 67% of its value in 2017.

- **Nationally**: The MTS accounted for more than $4.6 trillion of economic activity (1/4 of the US GDP) in 2014.

- **Regionally**: Consider Port Everglades and Miami’s tourism industry
Shipping ports increasingly depend upon and are a nexus of critical infrastructure systems.

Intermodal Transportation System
Shipping ports increasingly depend upon efficiencies introduced by cyber systems.

Communications/IT System

<table>
<thead>
<tr>
<th>ID</th>
<th>Component</th>
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<tbody>
<tr>
<td>1</td>
<td>Gate Operating System (GOS)</td>
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<tr>
<td>2</td>
<td>Communications Network</td>
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<tr>
<td>3</td>
<td>Terminal Operating System (TOS)</td>
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<tr>
<td>4</td>
<td>Electronic Data Interchange (EDI)</td>
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<tr>
<td>5</td>
<td>Automatic Identification System (AIS)</td>
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</table>
Stakeholders need approaches to risk assessment relative to cross-infrastructure dependencies.

- Be **conducted continually** by individual ports for their **specific and changing** operational, technological, and threat **environments**.
  - Intelligent adversaries evolve
  - Environments evolve
- Provide results **rapidly**
  - Current, DHS-funded prototype for Port Everglades (PEV) delivers results in minutes
Stakeholders need approaches to evaluate functional and economic impact of disruptions relative to cross-infrastructure dependencies.
Intended Outcome

• Illuminate cross-organizational, functional dependencies on infrastructure.

• Rapidly identify impacts from possible coordinated disruptions to stakeholder missions

• Prioritize investments to plan and respond to all-hazards that may affect mission
  • Prevention
  • Mitigation

<table>
<thead>
<tr>
<th>Location</th>
<th>Time</th>
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<tbody>
<tr>
<td>Power</td>
<td>Left of Boom</td>
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<tr>
<td>Transportation</td>
<td>Boom</td>
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<tr>
<td>Cyber</td>
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<tr>
<td>• Training Exercises</td>
<td>• Determine the effects of mitigation strategies</td>
<td>• Evaluate response and recovery strategies</td>
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<tr>
<td>• Area Maritime Security Plans</td>
<td>• Compute optimal mitigation actions</td>
<td>• Evaluate strategies to improve port operations</td>
</tr>
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<td>• FEMA Port Security Grants</td>
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</table>
Benefits for Academia: Intellectual, Social, and Financial

Industry

- Ports
  - Port Everglades
  - Ports of Auckland
- Operators
- USCG
- USTRANSCOM

Academia

- CIRI Port Disruptions Project
  - Transportation
  - Cyber
- CIRI Tech Transfer Team

Real-World, Important Problems

Expertise/Interviews/Site Visits

Real Data, Better Assumptions

Feedback for Validation

Social Impact

Potential for Additional Funding

Benefits for Academia:

- Intellectual
- Social
- Financial
Benefits for Industry: **Intellectual, Social, and Financial**

**Industry**
- Ports
  - Port Everglades
  - Ports of Auckland
- Operators
- USCG
- USTRANSCOM

**Theoretical Frameworks for Problems**
- Expertise/Interviews/Site Visits
- Results from Data Analysis
- Insights from Research Outputs
- Building Community
- Improved Mission via Funded Research

**Academia**
- CIRI Port Disruptions Project
  - Transportation
  - Cyber
- CIRI Tech Transfer Team
Thank You!

- Department of Homeland Security
- US Coast Guard
  - USCG Sector Miami
  - USCG Research & Development Center
- Ports of Auckland
- Port Everglades
  - Broward Country Sheriff’s Office
  - Customs and Border Protection
  - Crowley
  - Florida East Coast Railway
- USTRANSCOM