

# ADVANCING SMART LOGISTICS – NATIONAL SCIENCE FOUNDATION

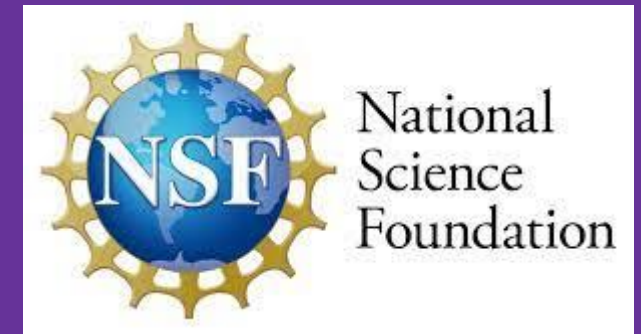
## PROMOTING COOPERATION & COORDINATION FOR RIVER PORT MANAGEMENT

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# Purpose of Presentation

- Describe **National Science Foundation** (NSF) Grant (2023).
  - **Recipients:** Corn Belt Ports, Western Illinois University (WIU), and others.
  - \$1,000,000 NSF Planning Grant – **Advancing Smart Logistics**.
  - NSF project focuses on two converging issues:
    - Rise of Industry 4.0 Technologies.
    - Impact of Industry 4.0 Technologies on Logistics and Supply Chain Management.
- **Our portion of the project focuses on:**
  1. **Business Clusters:** Operation of **regional river ports** as **business clusters**.
  2. **Smart Logistics:** Impact of Industry 4.0 technologies on regional ports, business clusters, and supply chain competitiveness.
- **Ask for your help and input on this initiative**
  - Initial focus on Illinois Waterway (ILWW) Ports.
  - Future funding opportunities to invest in the Corn Belt Ports.
  - **Ultimate Goal:** Spur innovation and increased Corn Belt Port competitiveness.

# Outline

## **I. Overview of NSF Grant: Advancing Smart Logistics (ASL)**

- Purpose of Grant
- Participants
- Waterborne Commerce & Industry 4.0 Technologies (smart logistics)

## **II. Creating Regional Ports**

## **III. Research Project – Regional Ports as Business Clusters**

- Literature Review
- Hypothesis
- Methodology

## **IV. Conclusion and Discussion**

# I. Overview of NSF Grant—ASL

- **Type I Regional Innovation Engines**

- CHIPS and Science Act of 2022
- \$1,000,000 Planning Grant for 2 Years

- **Purpose of NSF Program**

- Boost regional innovation capacity
- Sustainable innovation ecosystems
- Inclusive economic growth
- Workforce Development
- Speed and scale innovation and translation in emerging and critical technologies
- Create new regional cultures of innovation

- **Participants**

- GSU (PI), SIUE, SIUC, UIUC, UIC, & WIU plus multiple private sector partners
- Illinois Innovation Network

- **Smart Logistics**

- Supply chain technologies
- Is Illinois Keeping Up?

- **Industry 4.0 Technologies Include:**

- Automation
- Artificial intelligence
- Data analytics
- Sensors
- Industrial internet of things (IIoT)
- Quantum computing

- **Advancing Smart Logistics:**

- Multi-modal research corridor in Illinois.
- Electric vehicles, green logistics, drones, autonomous vehicles, cargo VTOL, and **smart logistics for marine highways.**

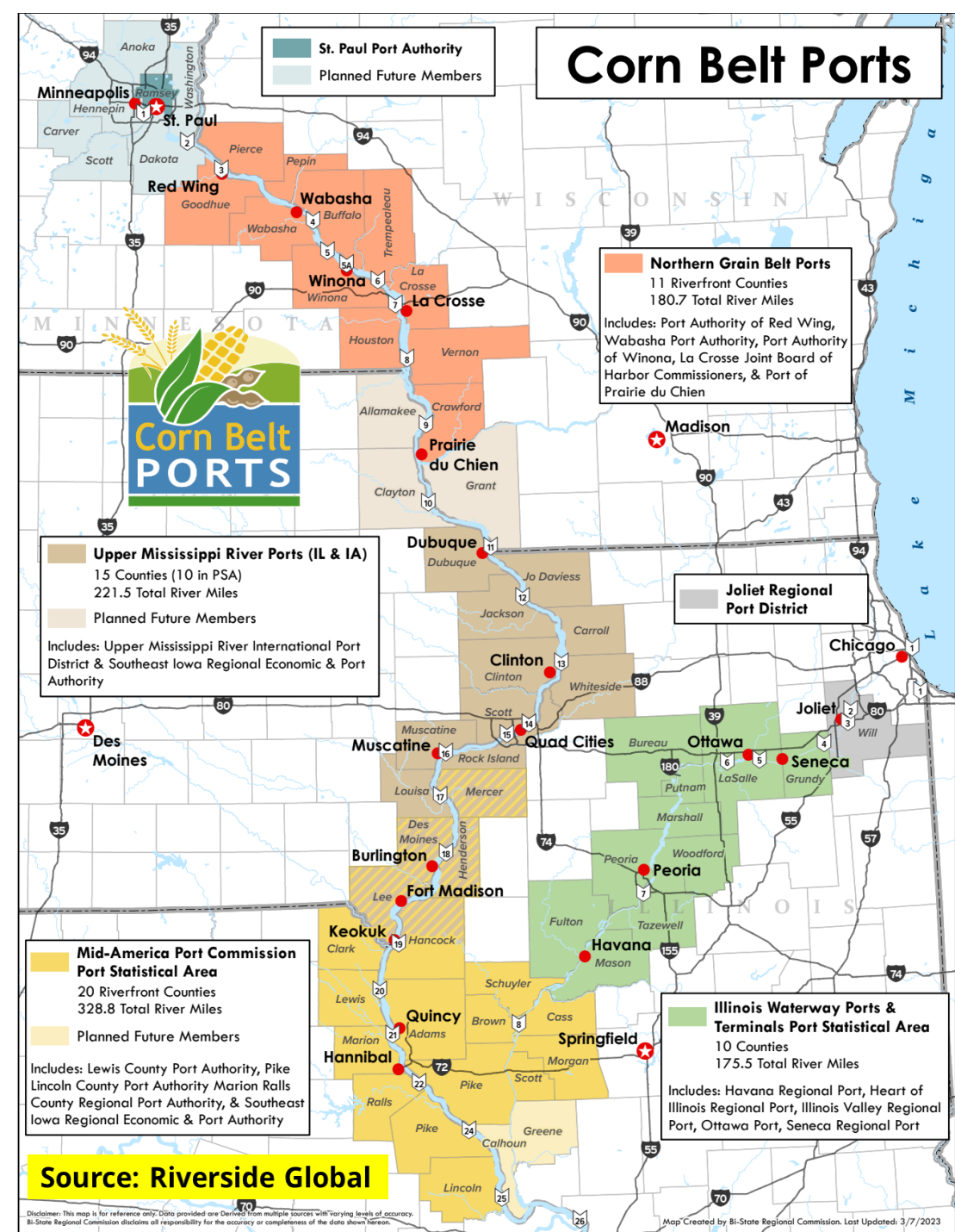
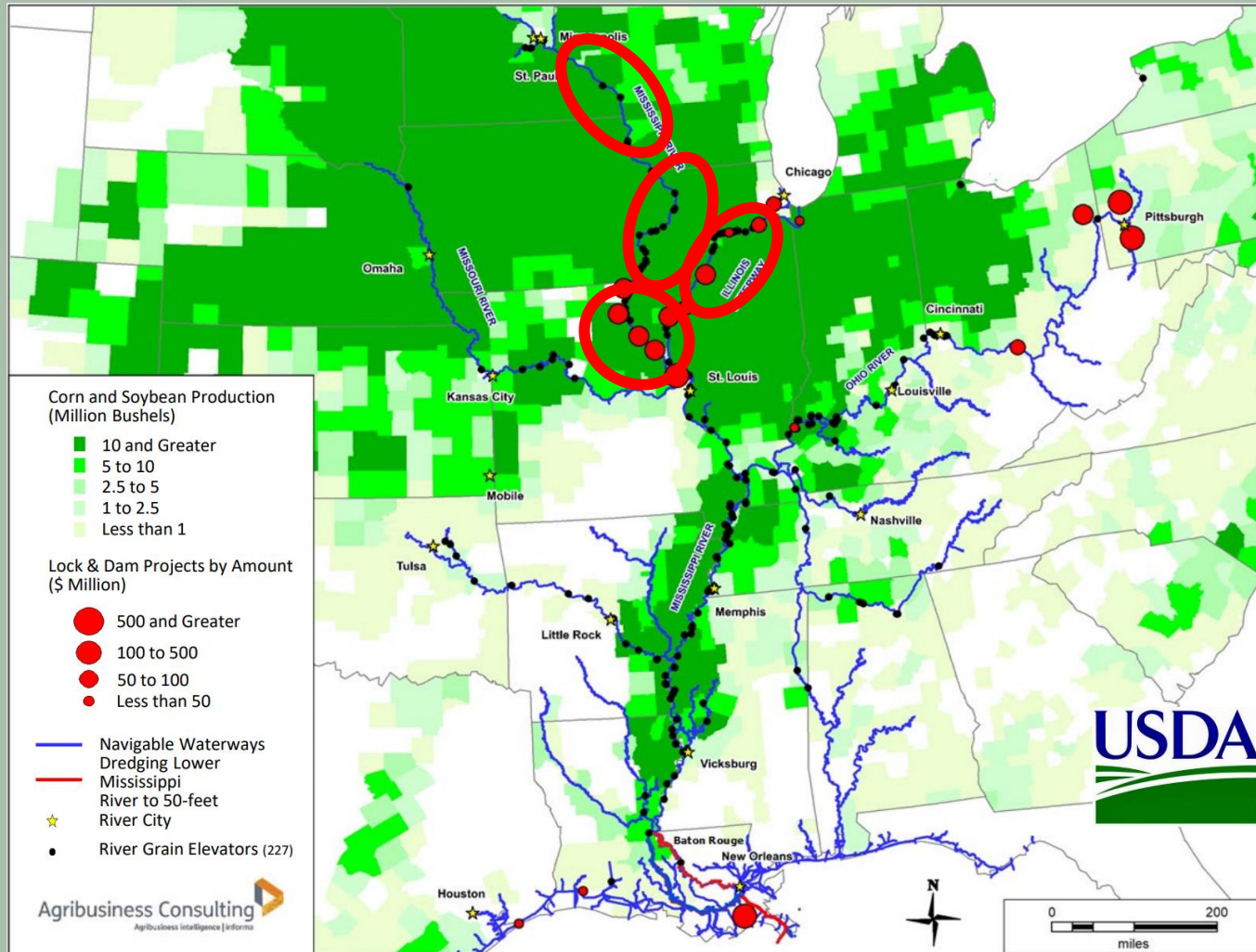
## II. Creating Regional Ports

- **Importance of Upper Mississippi and Illinois River Ports**
  - Essential to Upper Midwest commodity flows.
  - Strategic disadvantage due to low tonnage at each port.
  - Hard to compete for federal infrastructure funding and business.
- **Creation of Regional Ports.**
  - Improve Upper Midwest port competitiveness.
  - Aggregate individual ports into **Port Commission** or **regional ports**.
  - Consolidated 16 ports and 253 barge terminals into four **regional ports**:
    - Mid-America Port Commission
    - Upper Mississippi River Ports
    - Northern Grain Belt Ports
    - Illinois Waterway Ports
  - Collectively – Four regional ports form the **Corn Belt Ports region**.
  - Each regional port now ranks in the top 50 of US ports in tonnage handled.



# America's Heartland Requires a Reliable Transportation Corridor

[The Importance of Inland Waterways to U.S. Agriculture Report | Agricultural Marketing Service \(usda.gov\)](#)



## II. Significance of Regional Ports

- **Achieve Near-term Goal of Elevating Port Visibility**

- Aggregating port tonnage metrics improves port visibility / ranking.
- Tonnage is primary measure used by inland river system.

- **Raises Longer-term Questions**

- Regional ports transform existing relationships and create new ones.
- Can this be a basis to forge a new regional identity?
- Can new regional ports spark logistics innovation and development?

- **How to answer these questions?**

- Recognize that PSAs or regional ports represent **business clusters**.
- Business cluster theory is a key way to explore regional innovation.
- **Next section—Connect Industry 4.0 Technology to Regional Ports.**

# III. Research: Regional Ports as Business Clusters

- **Literature Review:**

- Business Clusters & Regional Innovation → Cluster Theory to Study Inland Waterway Regional Ports.
- Waterborne commerce lags behind other supply chain modes in adopting Industry 4.0 Technologies.
- Regional ports and associated intermodal supply chains can act as **business clusters** or **“collective action regimes.”**
- Collective Action Regimes can drive regional innovation along marine highways, ports, & supply chains.

- **Hypothesis – A Strategic Visioning Planning Process Can:**

- Help a regional port operate as a collective action regime to spur development.
- Promote collaboration among stakeholders in newly-formed regional ports.
- Spur discussions about Industry 4.0 Technologies and regional port competitiveness.

- **Methodology:**

- Riverside Global (experts in regional ports) and IIRA / WIU (experts in strategic visioning) will undertake applied research on Corn Belt regional ports.
- Use strategic visioning planning process for the Illinois Waterway (ILWW) regional port.
- 10 variables to measure how the ILWW regional port operates as an effective collective action regime.



# III. Research: Regional Ports as Business Clusters

## • Literature Review –What are Business Clusters?

- “Geographic concentrations of interconnected companies, specialized suppliers and service providers, firms in related industries and associated institutions” (Porter 2000).
- Business clusters also include supply chain actors in the region.
- Cluster firms are part of a **regional ecosystem** – They compete and cooperate.

## • The Ecosystem Helps Firms Succeed in Direct and Indirect Ways.

- Firms benefit from “productivity-enhancing spillovers, concentrations of allied and supporting firms, efficient labor markets, and business culture connectivity” that can spark innovation **under the right circumstances** (Miller and Stich 2009).
  - Note that a business cluster does not automatically lead to innovation.
  - Innovation requires governance and leadership provided by key cluster stakeholders.
- Apply cluster theory to explore how regional ports and associated intermodal supply chains can generate governance and leadership to drive regional innovation.

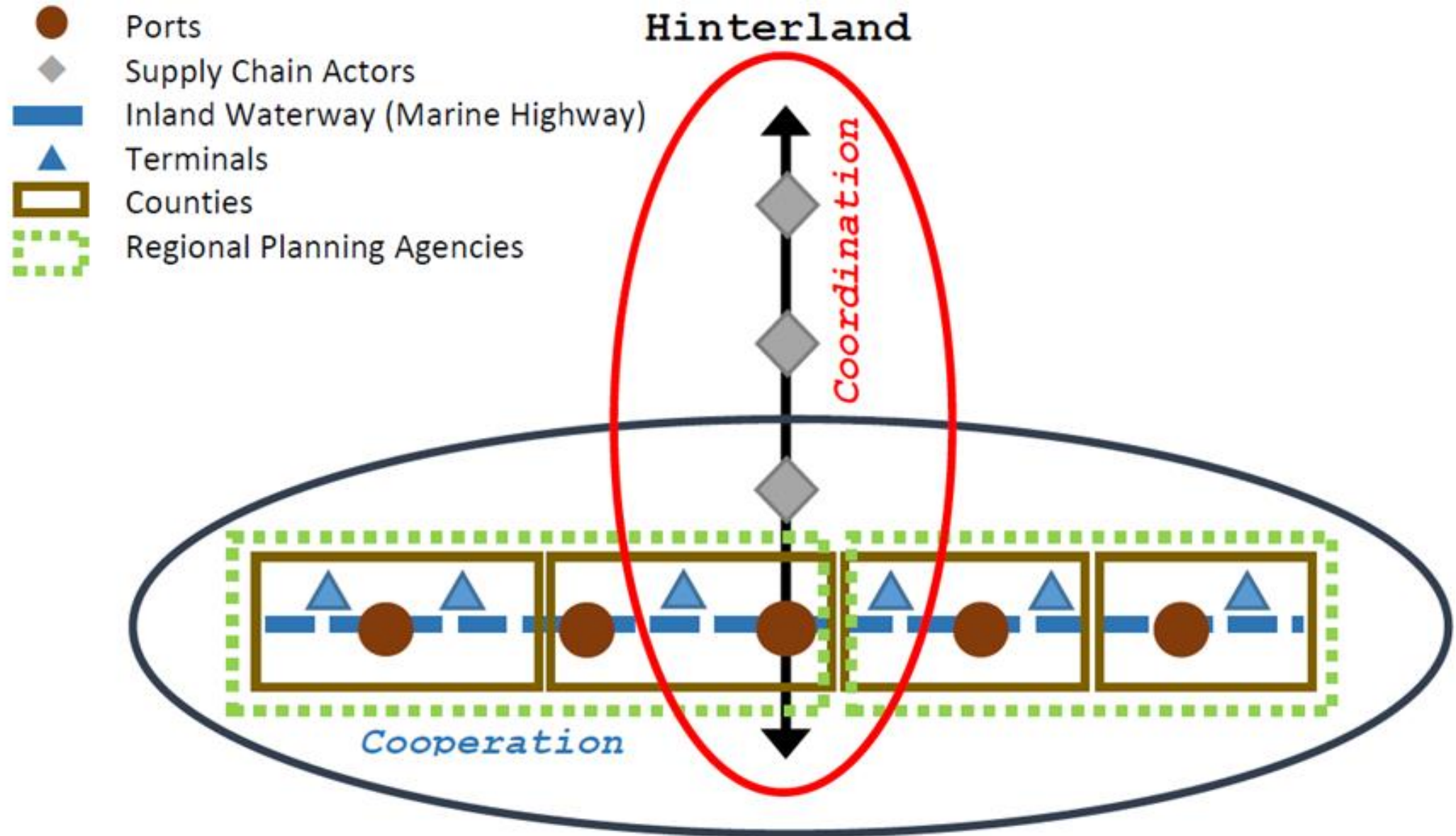
# III. Research: Regional Ports as Business Clusters

- **“Collective Action Regimes” are Business Clusters.**
  - Adapt Cluster Theory to study inland waterways.
  - Regional port = Business Cluster = Collective Action Regime (CAR).
- **Critique of Research on Port Competitiveness.** CAR researchers critique previous studies of port competitiveness which treat ports as singular transportation nodes and measure competitiveness using direct throughput measures such as tonnage handled.
  - Overlooks port competitiveness as a **cluster of economic activities**.
  - Direct measures of competitiveness such as tonnage deflect attention from indirect measures of port cluster competitiveness such as labor force quality, supply chain coordination, hinterland access, regional political support, regional planning efficacy, and access to new technologies.
  - Port cluster competitiveness affected by terminal operators, transportation companies, warehousing, and many other supporting entities.

# III. Research: Regional Ports as Collective Action Regimes

- Each company in a business cluster could benefit from improved regional competitiveness but no single entity can make large improvements on their own.
  - The cluster, composed of private and public stakeholders, can only improve its competitiveness through **“joint action”** and governance provided by a collective action regime.
- This project will study the ILWW regional port as a CAR.
  - Explore how stakeholders along the Illinois River regional port can **cooperate** to improve **coordination** along the regional supply chain.
  - By acting in this collective manner, the ILWW can serve as model of innovation that other regional ports can adopt.
  - Aligns with NSF grant – Planning grant / proof of concept / pilot project.

# III. Research: Cooperation and Coordination in Regional Ports



Adapted from Brooks et. al. (2010).

# III. Research: Regional Ports as Collective Action Regimes

**Methodology:** Conduct a strategic visioning process that focuses on 10 variables identified by previous researchers. The first five variables are **“inward-looking”** and examine the extent to which **coordinated** action is likely to take place:

- 1. Presence of leader firms.** Financial and relational resources to effect change.
- 2. Presence and participation of public organizations.** Local and state governments and planning agencies can provide financial support, but also influence decisions beyond the region.
- 3. Presence of an overarching organizational structure.** This organization welcomes stakeholders from multiple sectors with a shared interest in port success and economic development. This public entity “reduces the transaction costs of cooperation” (de Langen and Visser 2005, 174).
- 4. Community Engagement.** Is there a local interest expressed by the host community in supporting regional improvements in the port and supply chain?
- 5. Voice of Firms.** This is the capacity of local businesses beyond leader firms to influence economic development discussions.



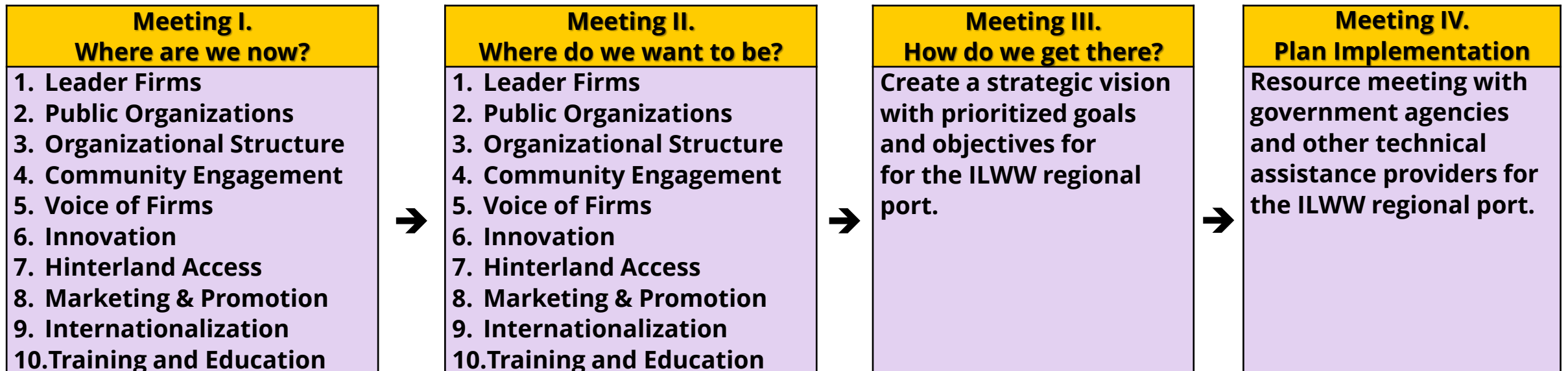
# III. Regional Ports as Collective Action Regimes

The second group of five variables are “**outward looking**” and identify five strategy areas that a regional port, acting **cooperatively** as a collective action regime, could pursue:

- 6. Innovation.** Are there systematic strategies or cooperative agreements to conduct research or make investments in new technologies? This is important given the age of the inland waterway infrastructure, coupled with the explosion of data-driven technologies that could improve port and supply-chain efficiencies.
- 7. Hinterland Access.** Are there collective agreements in place to improve supply chain infrastructure including roads, rail, air, or broadband.
- 8. Marketing and Promotion.** Does the collective action regime have a marketing strategy beyond what individual ports might do?
- 9. Internationalization.** To what extent does the regional port organize its constituent members to expand its perceived market area beyond the United States?
- 10. Training and Education.** **Industry 4.0 Technologies** are transforming our economy. These technologies include automation, artificial intelligence, big data and analytics, sensors, and the industrial internet of things (IIoT), which already influence waterborne commerce. This variable explores how a collective action regime is working to ensure its **workforce** can implement these technologies to drive innovation.

# III. Regional Ports as Collective Action Regimes

- Four meetings in Peoria, Illinois – Winter 2024.
- Build ILWW regional identity as a regional port / business cluster / CAR.
- Identify specific ways to strengthen the ILWW – Build on assets.
- Review the planning process as a pilot study:
  - Can we build regional port Collective Action Regimes elsewhere?
  - Identify how CARs fit into a regional Smart Logistics Engine.



## IV. Conclusions and Discussion

- Regional ports reorganized and elevated their visibility.
  - Now—How can we take regional ports to the next level of competitiveness?
  - Project explores how regional port stakeholders see themselves and how they might better operate as business clusters or Collective Action Regimes.
- This project serves as a pilot project.
  - We absolutely need your input and collaboration – Early 2024!
  - Can this planning process can be replicated elsewhere?
- Regional ports as integral part of an Illinois smart logistics engine.
  - Create a waterway research center – Promote and improve marine highway logistics.
- Use outcomes as input into a NSF Type 2 Innovation Engine Grant Proposal.
  - \$160 million – 10 Year Grant.
- Drive economic development in our region.

**Questions and Comments Welcomed!**



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