Supporting Secure and Resilient Inland Waterways

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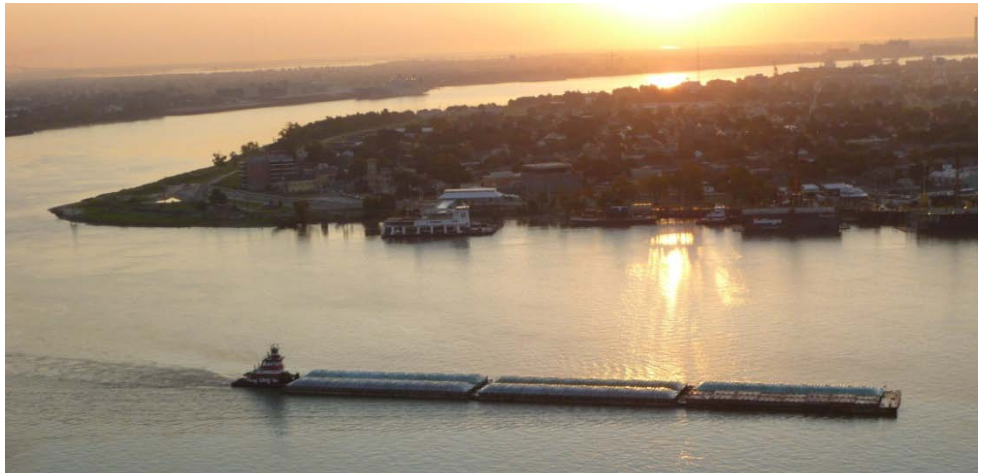
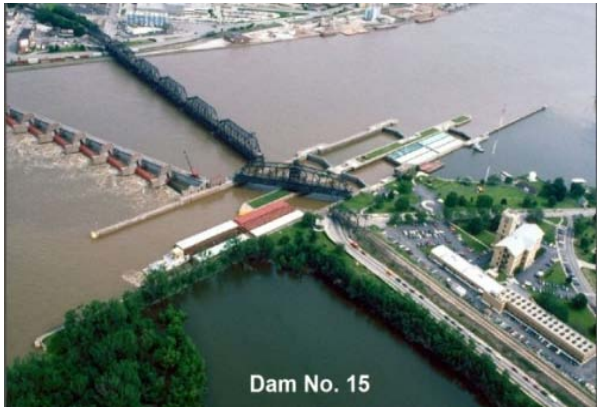
Project Overview

- Funded through DHS National Transportation Security Center of Excellence
  - Collaborative project between University of Arkansas and Rutgers University
- Project dates July 2010 through June 2013

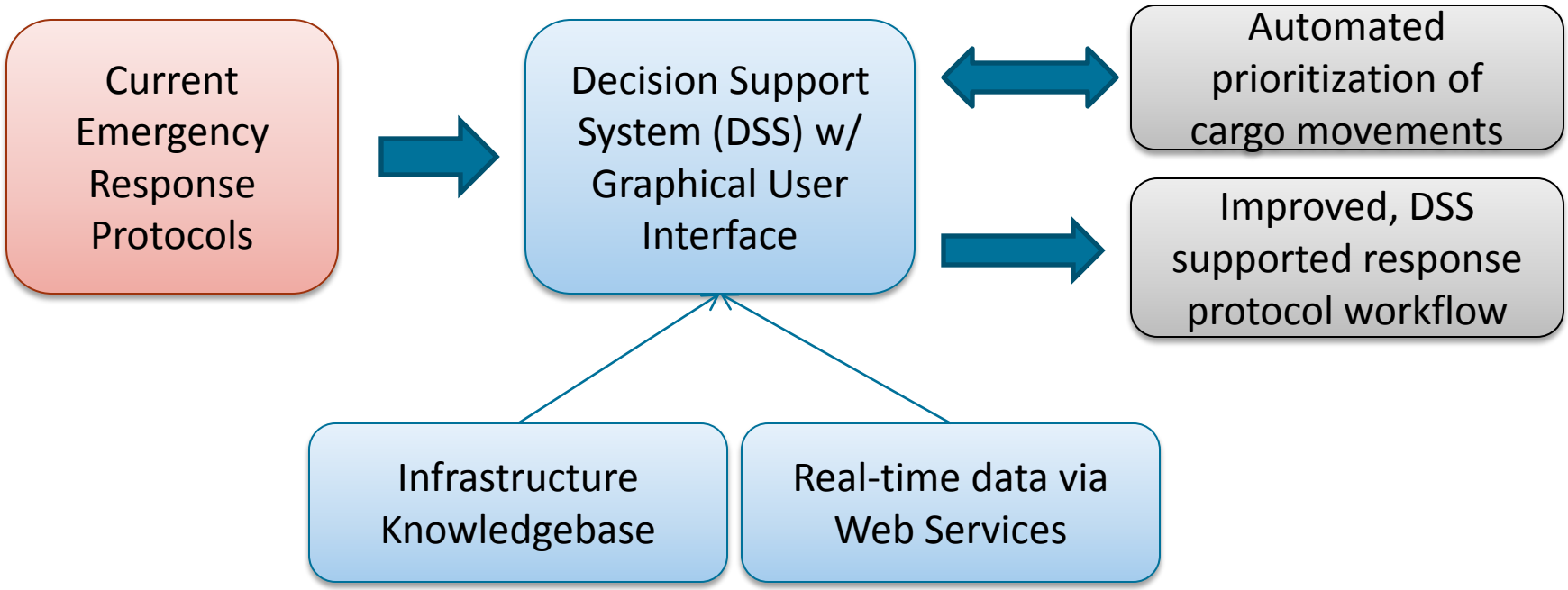


Project Goal

- Develop a prototype decision support system that
  - Integrates cargo prioritization models, freight movement models and geographic information system (GIS) technology
  - Provides decision-making support for prioritization and offloading of waterborne cargo during major disruptions
  - Indicates level of resiliency in terms of multi-modal capacity in the event of attacks or natural disasters against inland waterway transportation systems

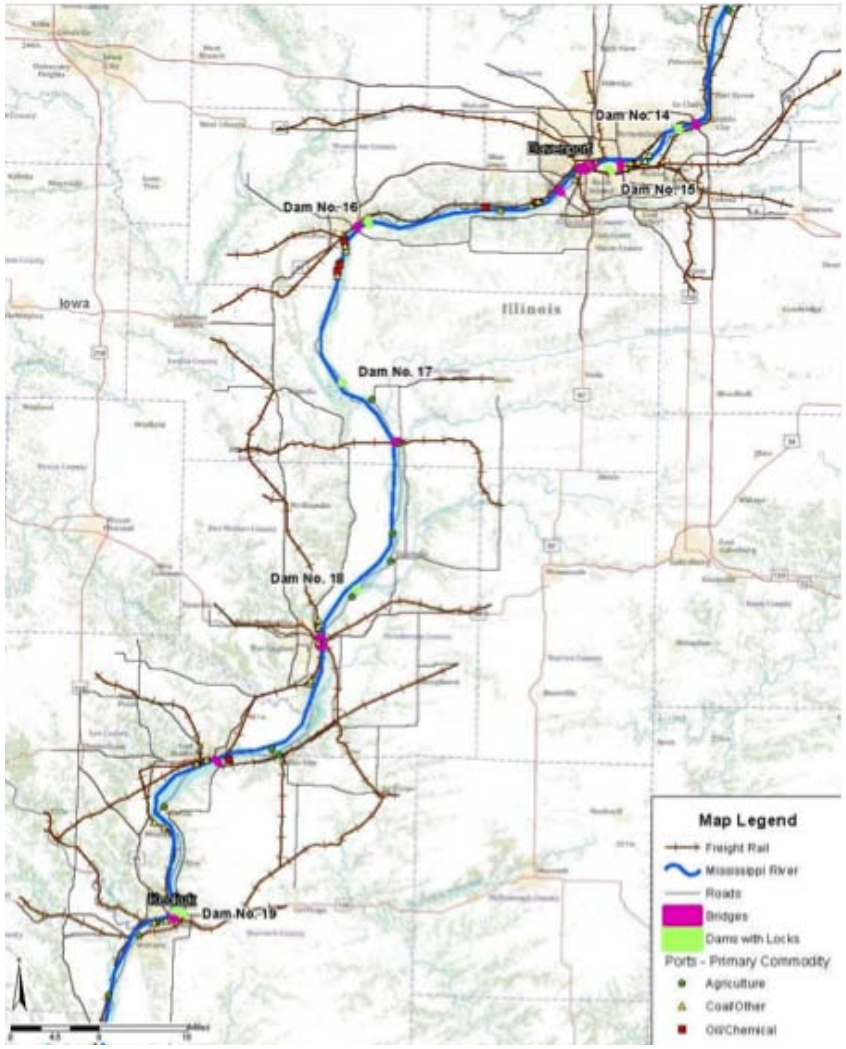


Conceptual Framework for National Model



Study Area

- Upper Mississippi River including Lock & Dam #14 just north of Davenport, Iowa and Lock & Dam #19 at Keokuk, Iowa
- Develop a digital and geospatially accurate map and related database of all
  - Locks, dams and bridges
  - Ports and terminals
  - Freight rail
  - Highways
  - Other infrastructure



What we've seen about data…

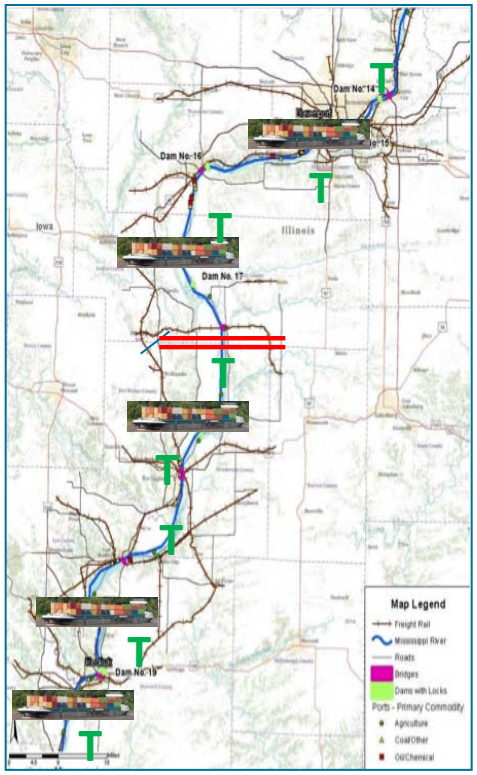
- Data is detailed, but usability depends on mission
  - "useful lists of stuff"
- Different characteristics captured by different agencies for same assets
- Assets not uniformly represented
- Different approaches to prioritization

What we've heard about response..

- Increased focus on system resilience and opportunities to understand the flexibility of the system
- Decision making for prioritization based on industry and federal cooperation
- Responses to previous events
  - Source from alternate suppliers
  - Use rail
  - Consider moving business

Cargo Prioritization

- To prioritize and direct disrupted barges, we need the following data
  - Location of each barge and terminal within impacted region
  - Volume and type of cargo on each barge
  - Capacity of each terminal for each cargo type
  - Handling time of each barge at potential offload terminals
  - Value decreasing rate of each cargo type
  - Water depth of each terminal
  - Draft of each barge tow



Cargo Prioritization (cont.)

- For research purposes
  - Historical annual tonnage data by two-digit commodity group (coal, petroleum, chemicals, etc.) for each lock & dam is publically available (US Army Core of Engineers Water Commerce Statistics Center (USACE WCSC)). Four-digit commodity data can be obtained for aggregate waterway sections (e.g. , the Upper Mississippi River).
  - Historical vessel trip data for aggregate sections of the waterways is publically available from USACE WCSC.
  - Federal agencies can obtained more refined historical data including monthly data and vessel trip data associated with commodity type.
- For practical implementation purposes
  - Currently, the US Coast Guard treats each event separately. Data on vessel locations and cargo is collected through individualized data requests during an event response.
  - Improved tools and technologies such as Lock Operations Management Application (LOMA) via AIS (Automated Identification System) are expected to provide real time vessel data. In addition to supporting event response, these tools will facilitate better data for planning purposes.

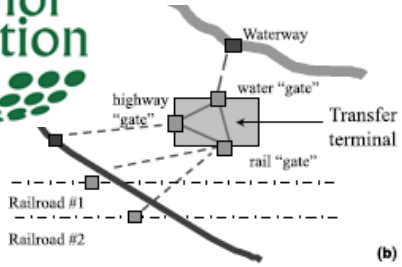
Current Infrastructure Data

Aerial Imagery

Navigation Data Center / Master Docks Data

Marine Transportation System Recovery Unit Data

Center for Transportation Analysis



CTA Intermodal Network and Terminal Database*

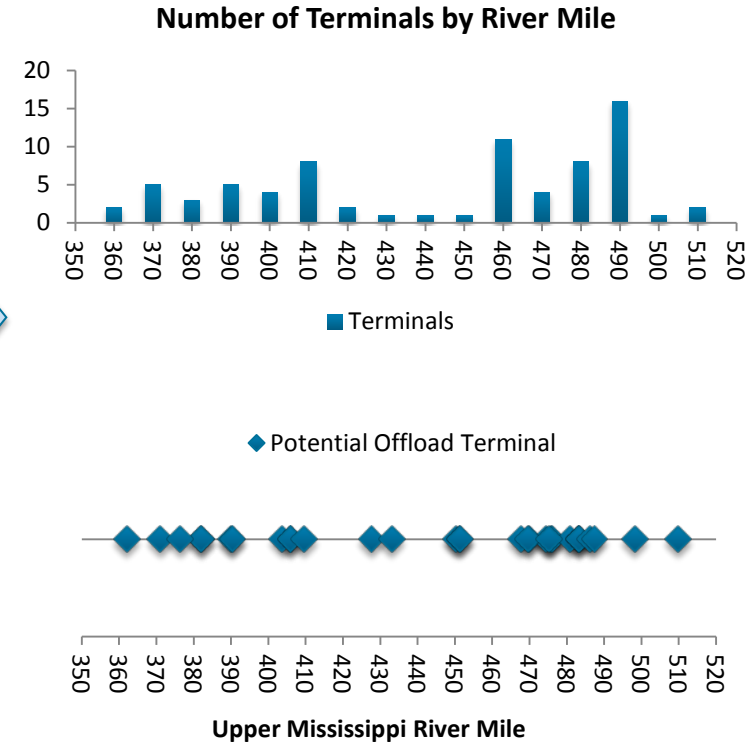


*Image Source: Southworth, F. and Peterson, B.E. (2000) Intermodal and international freight network modeling. Transportation Research Vol C8:147-166.

Current Infrastructure Data

Name
Location
Owner
Operator
Business Purpose
Contacts

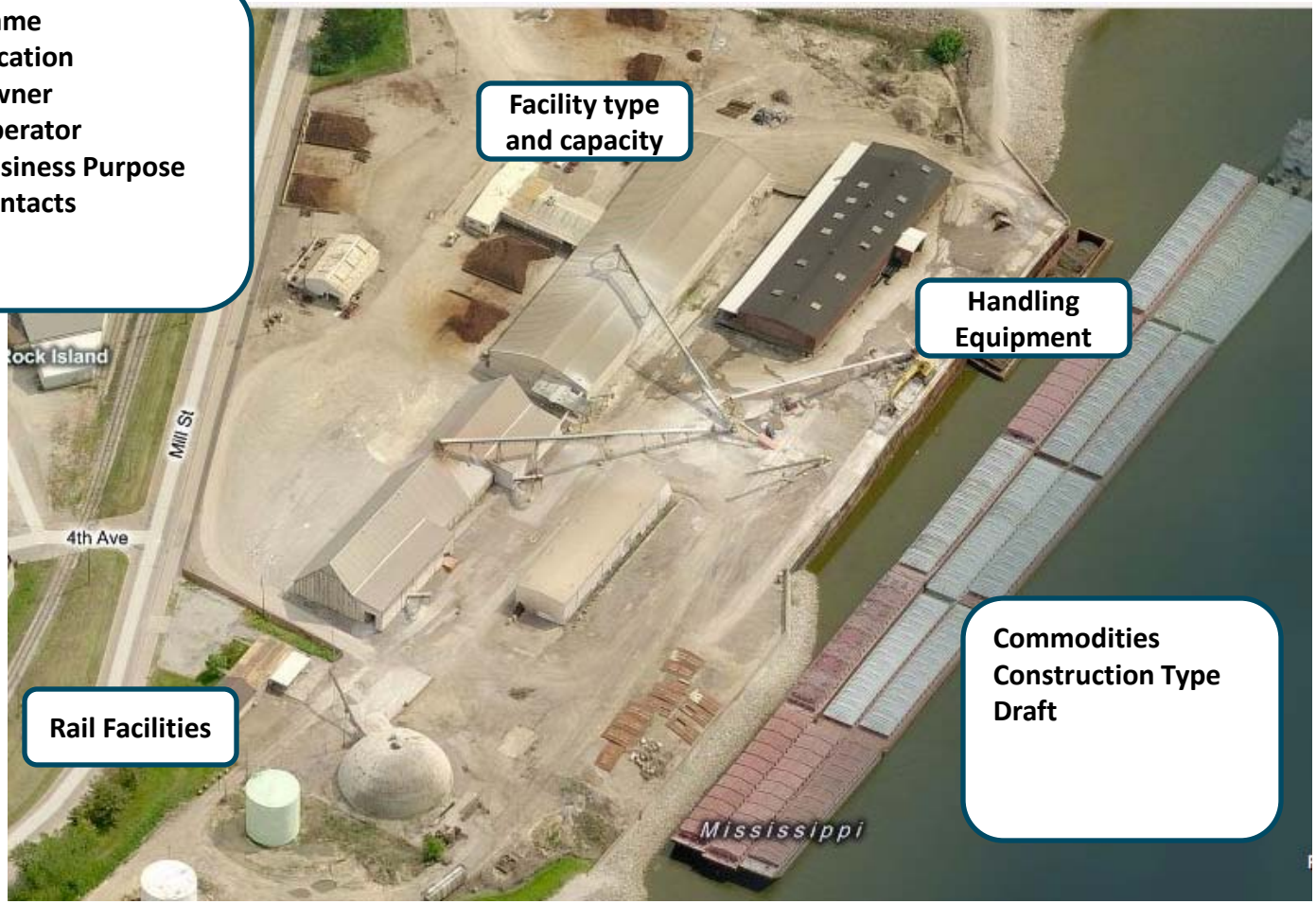


Image Source: *Bing Maps*. Microsoft Corporation. 2010. http://www.bing.com/maps/.

Potential for Emergency Use

Image Source: *Bing Maps*. Microsoft Corporation. 2010. http://www.bing.com/maps/.

Can current data help us to answer these questions?

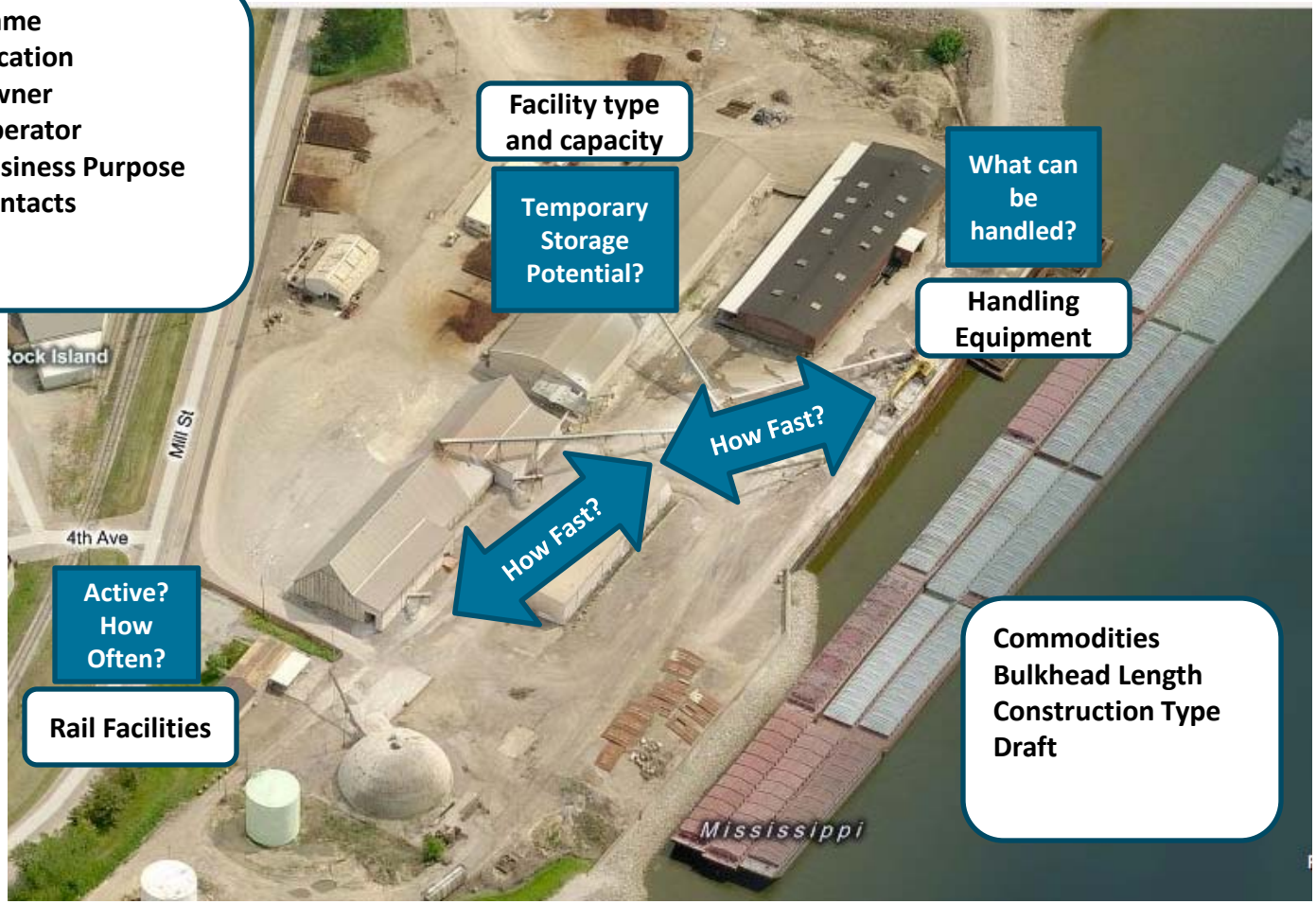


Image Source: *Bing Maps*. Microsoft Corporation. 2010. http://www.bing.com/maps/.

Emergency Response Decisions and Metrics

- Funds are limited: How can we leverage the data we have already?
  - Users familiar with data
  - Processes in place for collection
- Current economics of shippers and carriers suggest offloading may not be an effective strategy given current traffic
  - Would this change based on future waterway transportation development?
- Leveraging data and metrics: other uses for information?
  - Economic development resources
  - Asset management
- Effectiveness of metrics determined by capability to utilize in decision making, not just capability to measure accurately
- Common standards and capability to audit are critical for data sharing and understanding

Research Team

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