### Project Title: Dynamic Decision Modeling for Inland Waterway Disruptions

#### Project Abstract (Brief Description):
The inland waterway system is a major component of the U.S. transportation system. Disruption on the inland waterway system can have widespread economic and societal impacts, and their consequences can be significant. However, the uncertainty associated with the disruptive events, such as extreme weather conditions, have made it difficult to determine whether it is optimal to stay on the water and wait for the locked traffic to clear, or it is more economical to redirect to rail or freight transportation. In order to facilitate decision making in the event of waterway closure under uncertainty, this research proposes a dynamic multi-criteria decision framework that can be used to find a timely and optimal solution for the greatest overall societal benefits. The potential contribution of this research is threefold: (1) this is the first study to incorporate uncertainty in the decision process when facing inland waterway disruption; (2) it proposes the idea of collaborative planning in the event of disruption when all stakeholders’ decision goals are considered simultaneously; and (3) it develops a user-interactive real-time decision support tool that can automate the decision process and propose an optimal solution in a short period of time.

#### Describe Implementation of Research Outcomes (or why not implemented):
A comprehensive literature review on inland waterway disruptions has been conducted. We have also reviewed literature on other kinds of disruptions in a supply chain, and the methods on measuring the severity and recoverability of systems upon a disruptive event. We have been searching for the data sources on sever weather caused disruptions, their duration and impacts on different stakeholders. We have developed a Markov decision process (MDP) model from a barge owner perspective. The model aims to find the optimal decision in the event of a weather-caused disruption to minimize the barge-owner loss. Currently, we are searching for data to calculate the associated transition probabilities and the costs per unit time due to delay on the water.

#### Impacts/Benefits of Implementation (actual, not anticipated)
*To be determined upon conclusion of the project:*

#### Web Links:
martrec.uark.edu

#### Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): $155,218 MarTREC + $80,947 Salary Release = $236,165

#### Project Start and End Dates: 08/01/14-06/30/16

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#### Principal Investigator Institution (University): University of Arkansas