

Program Progress Performance Report for University Transportation Centers

Federal Agency and Organization Element to Which Report is Submitted:

U.S. Department of Transportation
Research and Innovative Technology Administration

Federal Grant or Other Identifying Number Assigned by Agency: DTRT12-G-UTC14

Project Title: National Center for Intermodal Transportation for Economic Competitiveness (NCITEC)

Program Director (PD) Name, Title and Contact Information (e-mail address and phone number):

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Submission Date: January 31, 2014

DUNS and EIN Numbers: 64-6000819

Recipient Organization (Name and Address): U.S. Department of Transportation
Research and Innovative Technology Administration
(Denise Dunn, UTC Grant Administrator)
1200 New Jersey Ave, S.E.
Washington, DC 20590

Recipient Identifying Number or Account Number, if any: 363277-061300-021000

Project/Grant Period (Start Date, End Date): 1/1/2012 – 1/31/2016

Reporting Period End Date: December 31, 2013

Report Term or Frequency (annual, semi-annual, quarterly, other): Semi-annual, PPPR4

Signature of Submitting Official:



1. Accomplishments

As indicated in our grant application, NCITEC's major goals are to address the economic competitiveness and safety of the national intermodal transportation system. Economic competitiveness and safety are two of the five strategic goals that U.S. Department of Transportation (USDOT) has identified. The next section provides more specific goals of NCITEC.

1.1. What are the major goals and objectives of the program?

- Develop, implement and maintain a comprehensive research program that addresses the economic competitiveness and safety of the national intermodal transportation center.
- Develop educational programs in intermodal transportation that incorporate the multidisciplinary nature of intermodal transportation by drawing upon the resources of each university.
- Utilize modern educational technologies, and develop effective professionals in intermodal transportation.
- Enhance the public awareness, understanding, and appreciation of intermodalism and its role in the modern world, including career opportunities in the field.
- Offer interdisciplinary programs and experiential training in intermodal transportation operations to provide a steady source of transportation professionals to public and private organizations.
- Ensure the availability of research results to potential users in a form that can be directly implemented, utilized, or otherwise applied.
- Strengthen the collaboration between NCITEC consortium members as well as between federal, state, and local agencies.
- Develop ties with other University Transportation Centers (UTCs) and USDOT's research clusters to create opportunities for collaborative activities.

1.2. What was accomplished under these goals?

- *Develop, implement and maintain a comprehensive research program that addresses the economic competitiveness and safety of the national intermodal transportation center:* Some of the projects funded in 2012 have been completed. Their final reports will be available early in 2014. The projects that were selected in the first half of 2013 have begun in the second half of 2013. Some of those projects will be completed towards the end of 2014.
- *Develop educational programs in intermodal transportation that incorporate the multidisciplinary nature of intermodal transportation by drawing upon the resources of each university:* The Mission Intermodal Excellence (MIE) project hosted its first group of middle school teachers in June. Fifteen teachers attended the program. They spent 3 days at Mississippi State University. Following the three-day workshop they developed lesson plans for their students. The students worked on projects throughout the fall semester and prepared Public Service Announcements (PSA).
- *Utilize modern educational technologies, and develop effective professionals in intermodal transportation:* One of the ongoing NCITEC projects is about educating the next generation of

transportation professionals through well-designed education and Work Force Development (WFD) programs. Two student interns collected transportation course information across campus. They also assisted with the organization of the National Conference on Intermodal Transportation (NCIT) and development of the conference proceedings.

- *Enhance the public awareness, understanding, and appreciation of intermodalism and its role in the modern world, including career opportunities in the field:* The teachers who participated in the MIE program mentioned above worked with their 4th to 8th grade students and developed PSAs which will be available early in 2014.
- *Offer interdisciplinary programs and experiential training in intermodal transportation operations to provide a steady source of transportation professionals to public and private organizations:* We graduated several students who are now either looking for jobs or have recently found jobs. These students will be reported in the performance metrics that will be submitted.
- *Ensure the availability of research results to potential users in a form that can be directly implemented, utilized, or otherwise applied:* The projects that began in 2012 are being completed and their results will be published on our website in early 2014. As listed later in this report, some of these projects have been presented at conferences.
- *Strengthen the collaboration between NCITEC consortium members as well as between federal, state, and local agencies:* We are in close collaborations with state DOTs. The Mississippi (MDOT), Louisiana (LADOTD), Colorado (CDOT), and Virginia (VDOT) Departments of Transportation have all served as reviewers on some of our proposals.
- *Develop ties with other University Transportation Centers (UTCs) and USDOT's research clusters to create opportunities for collaborative activities:* The UTCs that were selected in 2013 and 2013 in Region 4 have been in communication to organize a regional conference. In April 2013, the UTC in Region 4 held their first conference and the second one is planned for March 2014.

1.3. How have the results been disseminated? If so, in what way/s?

A few of the NCITEC projects are complete but most are still ongoing. Here is a list of some of the results reported by the PIs:

- Steven Worley from University of Mississippi presented his work "Field Testing of the Ford Center Bridge" at the Mid-South Annual Engineering and Sciences Conference in Oxford, Mississippi, October 28-29, 2013.
- Preliminary results were previously presented that the University Transportation Center Conference for the Southeastern Region: Southeastern Transportation Research, Innovation, Development, and Education Center, and the 2013 Engineering Sustainability: Innovation and the Triple Bottom Line : Mascaro Center for Sustainable Innovation at the University of Pittsburgh and the Steinbrenner Institute for Environmental Education and Research at Carnegie Mellon University,. During this period, another presentation was given at the NCITEC Annual Conference on November 1st.
- The results have been presented in to 2013 Engineering Sustainability: Innovation and the Triple Bottom Line by the Mascaro Center for Sustainable Innovation at the University of Pittsburgh and the Steinbrenner Institute for Environmental Education and Research at Carnegie Mellon University,

the 2013 Canadian Society of Civil Engineers (CSCE) Annual Conference, and the American Society of Civil Engineers (ASCE) Journal of Management in Engineering; Also, the results will be presented under the ASCE's 2014 Construction Research Congress in Georgia Tech.

- We have presented our research to the City of Starkville's Transportation Committee.
- The NCCHE's initial flood simulation results for the Sardis pilot site in northwestern Mississippi (Figure 4) were used by Dr. Uddin to develop and post the following YouTube video on infrastructure global channel. http://youtu.be/h_FRfj-i8IA
- Dr. Uddin presented a keynote lecture on December 9 at 2013 IJPC - First Internal Journal of Pavements Conference, São Paulo, Brazil, "Geospatial Technologies for Highway Asset Management and Natural Disaster Risk Reduction Planning". (This trip was at no cost to the project. Dr. Uddin was an invited guest of the conference organizer professors from Mackenzie University, São Paulo, Brazil, who co-chaired the 2013 IJPC conference.)
- Two presentations have been made in Mid-South Annual Engineering and Sciences Conference (MAESC 2013), Oct.28-29, University of Mississippi.
- Three papers have been presented in the 33rd International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering (MAXENT 2013) (Dec.15-20, Canberra, Australia).

1.4. What do you plan to do during the next reporting period to accomplish the goals and objectives?

We will participate in the Regional UTC Conference that will take place in March 2014 in Atlanta, GA.

Here are some of the other activities that will take place:

- The next phase of our drugged driving project includes an extensive analysis of the data we currently have available and to begin reviewing the new sources of data that should be available around the first quarter of 2014. Our team will also be working to establish a survey instrument that will help assess the legal and implementation issues related to drugged driving. Concurrent with this, we will also be performing interviews of selected people we feel will be beneficial to this project. They will be representatives from several sectors of the community whose expertise will give us a better understanding of how the different components relate to one another.
- During the next reporting period, we plan to hold three summits.
- Develop railroads and waterways capacity models. And develop case scenario to test the model in the Hampton Roads region.
- Conduct the text-while-driving experiment on randomly selected adult drivers. Between 150-200 adult drivers will be involved the driving simulator experiment to visualize the impact of texting-while-driving. Data will be collected on the pre and post experiment survey.
- During the next reporting period, we will construct a systematic sample of news stories about the serious incidents reported in our spreadsheet. We then will download all stories for the sample, conduct a pilot test of news stories to develop and refine a code sheet, conduct coder training, code the stories, and enter the story data and inter-coder reliability data. The analysis will examine interview sources, as well as reputation repair strategies and risk framing, in a systematic sample of at least 600 news stories about 40 selected accidents. As soon as we revise and finalize the social media code sheet and conduct coder training to promote inter-coder reliability, we plan to analyze

all social media posts from all companies listed in the spreadsheet. The social media analysis of transportation-related agencies will occur after the news analysis is completed, so that we can develop a comprehensive list of all agencies involved in the public crisis communications.

- Deploy version 1.0 of the web-based VMI software at Mississippi Export Railroad's (MER) intermodal yard located in Moss Point, MS.

2. Products

2.1. Publications, conference papers, and presentations:

- Elizabeth K. Ervin, "Algorithm Comparison for Structural Health Metrics," BP133, 2013 Structures Congress, ASCE Structural Engineering Institute, Pittsburgh, PA, May 2-4, 2013. Presented on May 2.
- Steven B. Worley and Elizabeth K. Ervin, "A Comparison of Structural Health Indicators," RAM Workshop, Society of Reliability Engineers, Huntsville, AL, October 16-17, 2012. Presented by Worley on Oct 17; second place student presentation.
- James Kyle Bethay, Master's thesis, "FE Modeling in Support of Vibration Based Damage Detection in Bridges," August 2013.
- Steven Worley and Elizabeth K. Ervin, "Field Testing of the Ford Center Bridge," Mid-South Annual Engineering and Sciences Conference, Oxford, Mississippi, October 28-29, 2013.
- Li, X. 2013. "An integrated modelling framework for design of logistics networks with expedited shipment services." *Transportation Research Part E*, 56, 46-63.
- Li, X. "Integrated Design of Logistics Networks with Expedited Shipments." 2nd International Transportation PhD Student Symposium, University of Illinois at Urbana-Champaign, September 2013.
- El-adaway, Islam, Eric Vechan, and Marwa Hassan (2013). "Transportation Network Congestion Mitigation Using Dynamic Social Network Analysis", University Transportation Center Conference for the Southeastern Region, Southeastern Transportation Research, Innovation, Development, and Education Center, Gainesville, Florida, United States.
- El-adaway, Islam, Eric Vechan, and Marwa Hassan (2013) "Sustainability of Transportation Systems using Dynamic Social Network Analysis", 2013 Engineering Sustainability: Innovation and the Triple Bottom Line , Mascaro Center for Sustainable Innovation at the University of Pittsburgh and the Steinbrenner Institute for Environmental Education and Research at Carnegie Mellon University, Pennsylvania, United States.
- Boz, Mehmet* and Islam El-adaway (2013), "Nature, Work, and Flow Sustainability Assessment of the Built Environment", 2013 Engineering Sustainability: Innovation and the Triple Bottom Line , Mascaro Center for Sustainable Innovation at the University of Pittsburgh and the Steinbrenner Institute for Environmental Education and Research at Carnegie Mellon University, Pennsylvania, United States.
- Boz, Mehmet and Islam El-adaway (2013), "Dynamic Sustainability Assessment of the Built Environment", 2013 Canadian Society for Civil Engineering Annual Meeting and Conference and 4th Construction Specialty Conference, Ontario, Canada, CON-01, pp. 1-10.

- Boz, Mehmet and Islam El-adaway, “Managing Sustainability Assessment of Civil Infrastructure Projects using Work, Nature, and Flow”, Journal of Management in Engineering, American Society of Civil Engineers, doi: 10.1061/(ASCE)ME.1943-5479.0000203.
- Li, X., Medal, H. and Wang, J. “Infrastructure Network Design under Additive Service Utilities.” Presented at the INFORMS Annual Meeting, Minneapolis, October 2013.
- Presentation at 1st NCITEC Annual Meeting, October 31 – November 1, 2013: Glascock, S. and Wilmot, C. “Improving Freight Crash Incident Management”.
- Uddin, W. (2013). Geospatial Technologies for Highway Asset Management and Natural Disaster Risk Reduction Planning. 2013 IJPC - First International Journal of Pavements Conference (IJPC), São Paulo, Brazil, December 9 – 10, 2013. (This trip was at no cost to the project. Dr. Uddin was an invited guest of the conference organizer professors from Mackenzie University, São Paulo, Brazil, who co-chaired the 2013 IJPC conference.)
- Uddin, W., W.R. Hudson, and Ralph Haas (2013). Public Infrastructure Asset Management. McGraw-Hill, ISBN 0071820116. (publication available since mid-July 2013) YouTube video: <http://youtu.be/LiHqJInrFy0>
- Uddin, W. A. Ahmed, and M.S. Ali. (2013). Satellite Imagery Applications of Urban Road Inventory, Traffic Flow Attributes, and Road Capacity Assessment. IJRDET - International Journal of Recent Development in Engineering and Technology, Vol. 1, Issue 3, December 2013, pp. 54-60.
- Uddin, W., R. Haas, and W.R. Hudson. (2013). Pavement Design or Pavement Management? Good Design Is Not Enough. Paper 160-2, First International Journal of Pavements Conference (IJPC), São Paulo, Brazil, December 9 – 10, 2013. (presented by Dr. Uddin)
- Uddin, W. and Zul Fahmi M. Jaafar. (2013). Achieving Sustainability without Compromising Long-Term Pavement Performance for Road Infrastructure Assets. Paper 211-3, First International Journal of Pavements Conference (IJPC), São Paulo, Brazil, December 9 – 10, 2013.
- Two presentations have been made in Mid-South Annual Engineering and Sciences Conference (MAESC 2013), Oct.28-29, University of Mississippi.
- One presentation has been made in the Annual Conference of National Center for Intermodal Transportation for Economic Competitiveness (NCITEC), Oct.31-Nov. 1, 2013, Mississippi State University
- Three papers have been presented in the 33rd International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering (MAXENT 2013) (Dec.15-20, Canberra, Australia). The titles of these three papers are:
 - “Design-as-inference: probability-based design of intermodal transportation networks”
 - “Assigning priors for parameters constrained to a simplex volume”
 - “Parallelizing nested sampling”
- Adams-Price, C., Turner, J., Warren, S., & Wilmoth, J. (November, 2012). Activity participation in black and white Mississippians from urban, Micropolitan, and rural contexts. Symposium title: Contexts of aging: Exploring the intersections of geography and well-being among older adults. Symposium to be presented at the Annual Meeting of the Gerontological Society of America, San Diego, CA.

- Jannat, S. and Greenwood, A. G., "Estimating Parameters of the Triangular Distribution Using Non-Standard Information," Winter Simulation Conference, December 2012, Berlin, Germany (extended abstract and poster).
- Hales, H. and Greenwood, A. G., "General Simulation Model to Improve the Design and Operation of Cross-Docking Systems," Winter Simulation Conference, December 2012, Berlin, Germany (extended abstract and poster).
- Ladier, A.-L., Greenwood, A. G., Alpan. G., "Cross-Docking Operations: A Simulation Model for the Validation and Robustness Assessment of IP-based Truck Schedules," Analytics Research Workshop, Deep South INFORMS Regional Chapter, April 2013, Tuscaloosa, AL (abstract and poster).
- Greenwood, A. G., Hales, H., Alpan. G., and Ladier, A.-L., "Performance Evaluation of Worker Timetables in Cross-docking Facilities Using Simulation," EURO-INFORMS Conference, July 2013, Rome, Italy (paper).
- Ladier, A.-L., Greenwood, A. G., Alpan. G., and Hales, H., "Simulation-based Assessment of the Robustness of IP-based Truck Schedules for Cross-docking Operations," EURO-INFORMS Conference, July 2013, Rome, Italy (paper).
- Jannat, S. and Greenwood, A. G., "Simulation Modeling and Analysis of Flexible Supply Chains," National Center for Intermodal Transportation for Economic Competitiveness (NCITEC) Annual Conference, October 2013, Starkville, MS (abstract and poster). Won 3rd place in poster competition.
- Greenwood, A. G. and Hill, T, "Simulation Modeling of Domestic and International Intermodal Supply Paths," National Center for Intermodal Transportation for Economic Competitiveness (NCITEC) Annual Conference, October 2013, Starkville, MS (abstract and presentation).
- Maheshwari, S. K. & K. A. D'Souza. "A Framework for Implementing Interdisciplinary Transportation Education and Workforce Development Modules in Business Curriculum". Presented at the Annual NCITEC Conference, Mississippi State University, Starkville, Mississippi, October 31 – November 01, 2013.
- Sheppard, E.; Jagasivamani, V. & Vitali Khaikine. "Utilizing Acoustic Emission for Monitoring Safety of Highway Bridges." Presented at the Annual NCITEC Conference, Mississippi State University, Starkville, Mississippi, October 31 – November 01, 2013.
- Maheshwari, S. K. & K. A. D'Souza. "A Framework for Implementing Interdisciplinary Transportation Education and Workforce Development Modules in Business Curriculum". Presented at the Workshop on Transportation Workforce Development for Non-Technical Professionals, Hampton University, Hampton, Virginia, November 12, 2013.
- Garriott, P. O., Norris, S. J., Zucker, K., Mazzotta, E., & Prabhakar, B. (2013, October). Do vocational stereotypes and social norms predict transportation career intentions? In B. Eksioglu (Chair). Workforce development in intermodal transportation. Panel conducted at the 2013 National Center for Intermodal Transportation Conference, Mississippi State, MS.
- Presentation by V. Jagasivamani and V. Khaikine entitled "Utilizing Acoustic Emission for Monitoring Safety of Highway Bridges," 2013 National Center for Intermodal Transportation for Economic Competitiveness (NCITEC) Annual Conference, Oct. 31 – Nov. 1, 2013, Colvard Student Union, Mississippi State University.

- Marufuzzaman M., Eksioglu S.D., Li X., Wang J. (2013) "Analyzing the Impact of Intermodal Hub Disruption in Biofuel Supply Chain Network." NCITEC Annual Conference, 31 Oct. - 1 Nov., Starkville, MS.
- Marufuzzaman M., Eksioglu S.D., Li X., Wang J. (2013) "Models for Designing Reliable Biofuel Supply Chains." INFORMS Annual Meeting, 6-9 Oct., Minneapolis, MN.
- Marufuzzaman M., Li X., Eksioglu S.D., Wang J. (2013) "Analyzing the Impact of Intermodal Hub Disruption in Biofuel Supply Chain Network." TRB Annual Meeting, Jan. 12-16, 2014, Washington DC.
- Eric Heiselt, Christina McDaniel, Sandra Eksioglu, Burak Eksioglu, "Mission Intermodal Excellence," MSTA-Mississippi Science Teachers Association State Convention in Jackson, MS on Oct 27-29.
- Eric Heiselt, Christina McDaniel, Sandra Eksioglu, Burak Eksioglu, "Mission Intermodal Excellence," PBGTA (Pine Belt Gifted Teachers Association) Annual Conference.
- Eric Heiselt, Christina McDaniel, Sandra Eksioglu, Burak Eksioglu, "Mission Intermodal Excellence," Annual NCITEC Conference, Mississippi State University, Oct. 31-Nov.1, 2013.
- Christina McDaniel, Eric Heiselt, Sandra Eksioglu, Burak Eksioglu, "Mission Intermodal Excellence," Mississippi Association for Gifted Children Conference, Sept. 25-27, 2013, Hattiesburg, MS.
- Vahedifard, F. (2013). "Sustainably Enhancing Intermodal Freight Operation of Ports using Geotextile Tubes." MSU and Argonne National Laboratory meeting, CAVS, Mississippi State University, MS, September 9, 2013.

2.2. Website(s) or other Internet site(s):

All products will be published on NCITEC's web site (www.ncitec.msstate.edu).

MIE project websites:

- Overview: <http://www.bagley.msstate.edu/outreach/mission-eggcellence/2013-mission-intermodal-excellence/>
- Video: <http://www.bagley.msstate.edu/outreach/mission-eggcellence/2013-mission-intermodal-excellence/mission-intermodal-overview/>
- Resources: <http://www.bagley.msstate.edu/outreach/mission-eggcellence/2013-mission-intermodal-excellence/mission-intermodal-resources/>

Other project websites:

- <http://biz.hamptonu.edu/esitac/> - the Eastern Seaboard Intermodal Transportation Applications Center (ESITAC) website.
- Twitter: <https://twitter.com/drwaheeduddin> Started in 2012; several lists and "Global Infrastructure" timeline created; over 3,800 tweets.
- Twitter: <https://twitter.com/disasterglobal> Started in 2012 on topics of protection from natural disasters and managing infrastructure assets; over 2,200 tweets.
- Twitter: <https://twitter.com/InfrastructureG> Started in January 2014 to focus on built infrastructure and transportation assets; several lists on specific categories such as sustainable transportation.

2.3. Technologies or techniques:

- Geospatial mapping of a preliminary study of freight intermodal integration of highway truck traffic and barge traffic on Mississippi River (Figure 5) and CO2 footprints at international bridges of NAFTA corridors on U.S.-Mexico border.
- Developed a means to use distribution moments and percentiles in place of, or in conjunction with, location parameters to specify the triangular distribution. This allows modelers to use the best information they have available in order to specify the distribution. The technique also facilitates the experimentation process, e.g. the technique allows desired changes in moments between scenarios to be translated to the distribution specifications used by simulation software.
- A two-layer MCMC-based method has been developed for terminal location program. In addition, the parameter variation has been considered through the Bayesian inference method.
- Developed a means to use distribution moments and percentiles in place of, or in conjunction with, location parameters to specify the triangular distribution. This allows modelers to use the best information they have available in order to specify the distribution. The technique also facilitates the experimentation process, e.g. the technique allows desired changes in moments between scenarios to be translated to the distribution specifications used by simulation software.

2.4. Inventions, patent applications, and/or licenses:

Nothing to report.

2.5. Other products, such as data or databases, physical collections, audio or video products, software or NetWare, models, educational aids or curricula, instruments, or equipment

- Draft tech memos on (1) “Infrastructure funding” and (2) “Pavement Friction Measurement and Interpretation”.
- Geospatial database of highway and rail networks in NAFTA countries (Canada, U.S., Mexico).
- Geospatial database and spatial maps of highway and rail networks in Mississippi, as well travel demand and economic data of Mississippi counties.
- We developed class materials which are distributed (as handouts and also soft copies) to teachers during the MIE workshop. The teachers should be able to use these materials to introduce students to intermodal transportation.

3. Participants & Other Collaborating Organizations

- School Districts: Brookhaven, Madison County & Canton Public
- Schools involved: East Flora, Luther Branson, Northeast Madison, Camden & Huey Porter
- LEGO Education

3.1. What other organizations have been involved as partners?

- Organization Name: Mississippi Department of Transportation
Location of Organization: Jackson, MS
Partner’s contribution to the project: Financial support and providing expertise and data
Financial support: MDOT has provided \$99,642.

Collaborative research: Dr. Imad Aleithawe is our contact person with MDOT. We have had discussions with him and his team the project. We will be visiting with Imad and his team this January again to get feedback on the progress of our project.

- Parsons Brinckerhoff (PB) representative works closely with the ITEWDM team in planning and organizing meetings and conferences on HU campus.
- IAVO Research & Scientific, Durham, North Carolina: IAVO has offered a new version of the GeoGenesis® geospatial software for CAIT Transportation and Remote Sensing Labs. The value of the software for each computer seat will be used as in-kind cost share for this project. Their help will be sought to identify imagery specifications and training data for CAIT students.
- Mississippi Department of Transportation (MDOT): MDOT Roadway Design Division has been contacted for access to aerial imagery for candidate sites(s) in Mississippi. Follow up of initial contacts was made through an EIT who is Dr. Uddin's former student and CAIT staff.
- MDOT Planning Division through contact with Dr. Uddin's former student and EIT for accessing overlapping aerial imagery scenes of the study sites.
- MDOT Transportation Information Director (Mike Cresap) has been especially helpful to provide data and photos for the I-55 bridge on the Sardis site and updated geospatial database of all state maintained highways and bridges of Mississippi. This has been a very important contribution to this project.
- Mississippi Automated Resource Information System: MARIS is a statewide resource agency in Mississippi for no-cost Landsat imagery and DEM data sources of selected counties in Mississippi. <http://www.maris.state.ms.us/> Project researchers have downloaded bare ground 5-ft DEM/contour data and 2-ft aerial imagery scenes of Sardis site.
- Additionally, Dr. Uddin contacted MARIS and requested 2-ft aerial imagery and DEM of other candidate sites. We will be getting it soon on a USB hard disk.
- US Army ERDC Hydraulics Lab, Vicksburg, Mississippi.
- The simulator developer DriveSquare, Inc. is indirectly involved in providing technical support and resolving other instrumentation related issues.
- Organization Name: Mississippi State University CAVS Extension
Location of Organization: Canton, MS
Partner's contribution to the project: Financial support, Facilities (office space, conference rooms), Collaborative research, and Personnel exchanges.
- Organization Name: Miller Intermodal Logistics
Location of Organization: Ridgeland, MS
Partner's contribution to the project: In-kind support, Collaborative research, and Personnel exchanges
- Provide the following information for each partnership: Lead Teacher
Organization Name: Brookhaven High School
Location of Organization: Brookhaven, MS
Partner's contribution to the project: Facilities, Collaborative research and Personnel exchanges
- Provide the following information for each partnership: 2 Teachers & 5 student participants
Organization Name: East Flora
Location of Organization: East Flora, MS
Partner's contribution to the project: Facilities, Collaborative research and Personnel exchanges
- Provide the following information for each partnership: 2 Teachers & 5 student participants
Organization Name: Northeast Madison
Location of Organization: Camden, MS
Partner's contribution to the project: Facilities, Collaborative research and Personnel exchanges

- Provide the following information for each partnership: 2 Teachers & 5 student participants
Organization Name: Luther Branson
Location of Organization: Canton, MS
Partner's contribution to the project: Facilities, Collaborative research and Personnel exchanges
- Provide the following information for each partnership: 2 Teachers & 5 student participants
Organization Name: Camden Elementary
Location of Organization: Camden, MS
Partner's contribution to the project: Facilities, Collaborative research and Personnel exchanges
- Provide the following information for each partnership: 2 Teachers & 5 student participants
Organization Name: Huey Porter
Location of Organization: Canton, MS
Partner's contribution to the project: Facilities, Collaborative research and Personnel exchanges
- Intergraph for continuing academic license of GeoMedia Pro at no cost to the University of Mississippi for use on CAIT projects (worth \$118,000 per year).
- As Intergraph Registered Research Lab, CAIT Remote Sensing and Geospatial Analysis Laboratory and CAIT Transportation Modeling and Visualization Laboratory is receiving geospatial industry support for education and training of students in geographical information system (GIS) applications through the project research tasks. This Intergraph software grant is a cooperative feature of this project. The software is being used to create planimetrics of roads, bridges, and buildings from high resolution aerial imagery.
- Organization Name: GSCOP (Laboratory of Grenoble for sciences of conception, optimisation and production)
Location of Organization: Grenoble, France
Partner's contribution to the project: in-kind support (labor, computers); facilities; collaborative research.
- Organization Name: Franklin Furniture Institute, Mississippi State University
Location of Organization: Starkville, MS
Partner's contribution to the project: Financial support (labor); in-kind support (labor, software, computers, equipment); facilities; collaborative research.
- Organization Name: Flexsteel
Location of Organization: Starkville, MS
Partner's contribution to the project: In-kind support (labor); collaborative research.
- Organization Name: Nissan North America
Location of Organization: Canton, MS
Partner's contribution to the project: In-kind support (labor); collaborative research.
- Organization Name: FlexSim
Location of Organization: Orem, UT
Partner's contribution to the project: In-kind support (software).
- Organization Name: University of Arizona
Location of Organization: Tucson, AZ
Partner's contribution to the project: Proving expertise and data
- Organization Name: St. Louis Metro Transit
Location of Organization: St. Louis, Missouri
Partner's contribution to the project: In-kind support and collaborative research
- Organization Name: VDOT
Location of Organization: Hampton Roads District

Partner's contribution to the project: In-kind support, Facilities – VDOT works with HU to select suitable bridge structures for testing and grants and provides access to them, Collaborative research – VDOT works with HU to provide general oversight of the research and will help to disseminate research findings

- Organization Name: Mistras Group, Inc.
Location of Organization: Princeton Junction, NJ
Partner's contribution to the project: In-kind support, Facilities – Mistras Group, Inc. provides consulting and training
- Organization Name: Louisiana State Police Crime Lab
Location of Organization: Baton Rouge, Louisiana
Partner's contribution to the project: Provide data base of blood test results for our project team to analyze.

3.2. Have other collaborators or contacts been involved?

- We have made contacts with several member of the City of Starkville Transportation Committee. We have also made contacts with the Starkville City Engineer (in charge of transportation) and the director of Parking and Transit at Mississippi State University. Finally, we have received data from the Golden Triangle Planning and Development District
- We are in contact with the other UTCs in Region 4.
- Organization Name: Quality Transportation Services
Location of Organization: Mechanicsville, VA
Partner's contribution to the project: Collaborative research and Personnel exchanges.
- The following organization have been or are being contacted for mass transit information and employer stakeholder feedback:
 - Gulf Coast Transit Authority (CTA) providing bus transit services to the City of Biloxi, the City of Gulfport and Harrison County on Mississippi Gulf Coast
 - Oxford-University Transit (OUT) service, Oxford, Mississippi
 - Cities of Gulfport Port and Biloxi; Port Authority of each of these cities
 - American Public Transportation Association (APTA)
 - National Association of Railroad Passengers (NARP)

4. Impact

4.1. What is the impact on the development of the principal discipline(s) of the program?

- This project is likely to make an impact on the base of knowledge on how state agencies, especially DOTs, can encourage local growth management policy development through incentives, technical assistance, and provision of a toolkit for municipalities, parishes, and regions in Louisiana. This project will also advance the state of research on growth management and transportation planning in rural communities and in a southern context, with applicability to other states. The project will demonstrate effective, politically palatable tools for developing and achieving livability, sustainability, and economic goals in a context where traditional growth management strategies have failed to take hold.

- The largest potential impact of this project is to assist ports in transitioning their operations to the larger ships and freight quantities from the Panama Canal expansion. This project builds off previous research related to geotextile tubes use for disaster recovery. It is also a step further with regard to a project recently constructed in Peoria, IL by the U.S. Army Corps of Engineers where geotextile tubes were filled with fine grained soil that was not cementitiously stabilized. Geotextile tubes have been used at ports in the past, though the manners being described in this project are somewhat unique in that they plan to simultaneously incorporate several potentially beneficially items together. For example, dredging a port's harbor deeper to accommodate larger freight ships, and instead of building a containment facility for the dredge spoils, they are cementitiously stabilized with more sustainable binders and used as part of a wall construction project that was needed at the port.
- We developed a number of lesson plans that teachers can use in the classroom. These lesson plans are on-line with the curricula. The lesson plans delivered, and the class materials handed to teachers are great tools to introduce students to intermodal transportation.
- The impact on the development of the principal discipline includes advancement of the NDT technology application expertise by utilizing the AE technology for data acquisition and real-time analysis and for prediction of factors that lead to deterioration and wear in the highway structural components under the stresses of traffic environment. This research also provides student education and training and builds the foundation for transportation related courses within the department which serves to attract and educate more students and, in turn, impacts the development of the principal discipline.
- Current findings may advance understanding of recruitment and marketing efforts for transportation officials. For example, the finding that social norms and perceived dissimilarity to transportation employees predicted transportation career intentions may encourage officials to account for the image of transportation careers or targeting individuals' families in marketing efforts. Similarly, recruitment efforts may need to be adapted to expand the attractiveness of transportation careers to high school students with more varied career-related learning experiences and self-efficacy (e.g., Investigative theme).
- The ITEWDM's modular approach consisting of varied transportation education and training options has received recognition from national and international organizations. It has attracted and educated our top students in transportation. Lexis Phillips, a Presidential Scholar has joined the project team as a student research assistant. In addition, 12 scholars were selected as Transportation Fellows to work on research projects in the Student Transportation Fellowship Program (STFP).
- Independence Scale developed for the survey is being tested on an independent sample, may provide an explanation for why it is difficult for older adults to give up driving.
- Allow intermodal infrastructure network planning for a community to be planned in an integrated and holistic manner.

4.2. What is the impact on other disciplines?

- Journalism department's students often contact Dr. Uddin for their Planet Forward video projects every year on sustainability related topics for posting on George Washington University's Planet Forward web site every year. Dr. Uddin discusses with potential Journalism students the findings and significance of this project so that impacts of extreme flood events on infrastructure can become one of their projects.

- The developed sample generating method can enrich the research in Bayesian inference with MCMC, and has impact in data analysis in general where model selection and parameter estimation are major tasks. The techniques in routing and location selection can also be used in many network-based operational problems in other disciplines.
- Independence Scale can be quite useful for other studies of aging, particularly studies of well-being and studies of willingness to use assistive devices.
- The risk of toxic transportation spills increases the challenges and potential costs of operating the intermodal network of highways, rails, waterways, airports, and shipping terminals. Examining how these accidents are presented to the public could help corporate leaders and governmental policymakers more effectively determine the levels of transportation-related risk that are acceptable and affordable. Examining public risk messages about these incidents also may mitigate potential public outrage after accidents and help transportation leaders identify priorities for response and preparedness.
- These findings may advance vocational psychology research through the use of non-traditional vocational theories, such as the TRA, to predict career intentions.
- The project is investigating use of geotextile tubes to enhance intermodal freight operation of ports. Geotextile tubes enable beneficial re-use of degraded materials and in addition to positive technical impacts to the principle discipline, the project can lead to several environmental and economic impacts. The outcome of this project can also lead to a more sustainable solution where the structure built with geotextile tubes is in harmony with natural landscape.

4.3. What is the impact on the development of transportation workforce development?

- Providing exposure and an educational resource on growth management for local and state transportation planners and policy makers
- Improving technical skills in effective transportation planning and design for transportation practitioners throughout the state
- Improving public access to and awareness of new transportation policy tools, especially in rural communities
- The lesson plans we have developed are on-line with the existing curriculum, so it will be easy for teachers to use. These lessons will introduce K-12 students to the following items related to intermodal transportation: costs involved, environmental benefits, safety issues. These students will hopefully find these topics of interest, get excited, and continue their undergraduate/graduate studies in fields related to transportation.
- The ongoing research project in the field of transportation at the HU Department of Engineering offers stipend and tuition scholarships to undergraduate students. It offers students an opportunity to gain specific knowledge and hands-on experience with AE technology both in the laboratory setting and in the field therefore making an impact on the development of transportation workforce.
- The project has exposed high school students to information regarding transportation careers (e.g., fortune 500 companies in the transportation industry). A majority of these students are from underrepresented groups (e.g., > 50% Latina/o). Opportunities have also been provided for graduate students to complete transportation related research.

- Offering graduate and undergraduate students updated courses in intermodal transportation and experiential learning that reflect real-world applications.
- Improving transportation skills of minority and women students through research and in-company internships that will increase access to transportation related professions.
- Offering internships and scholarships that will encourage students to pursue transportation education modules offered by ITEWDM.
- Interaction with transportation organizations for bridging the gap between academic education and professional skills required for management of transportation systems.
- This project is providing an opportunity to study how to better utilize the Tenn-Tom Waterway for transportation of bulky and oversized/ overweight/over dimensional goods that do not move well by road, air or rail. Additionally, with the better utilization of barge traffic comes increased employment opportunities for those that cater to transportation, port access, support services, and business development along the Tenn-Tom Waterway.
- Provided opportunities to UG students, MS and doctoral graduate students, other participating specialists for research in passenger travel, traffic flow, transportation of commodities and supply chain logistics, intermodal network optimization, geospatial visualization, and related disciplines.
- Enhance intermodal transportation education by supporting graduate and UG students. Led 3 PhD graduate students, one MS graduate student, and 7 UG students to work on project related assignments. Some of them completed their course term projects on topics related to this project at UM.
- Improved the performance and modern computer modeling and visualization skills of main stream professionals and members of underrepresented groups (minority students) that will improve their access to or retention in transportation research, teaching, travel demand management, or other related professions.
- Developed and disseminated new educational/training materials and provide exposure to transportation, science and technology for practitioners, public works professionals, teachers, young people, media, transport and transit infrastructure stakeholders, and general public.

4.4. What is the impact on physical, institutional, and information resources at the university or other partner institutions?

The project impacts on enhancing current capabilities and research infrastructure at both CAIT and NCCHE units of the University of Mississippi include:

- *Physical infrastructure resources:* Computing facilities, geospatial laboratory, geospatial and flood simulation software.
- *Institutional resources:* Involving Student Chapter of Institute of transportation Engineers (ITE) in project activities and developing a workshop model. A major goal to support undergraduate students is to motivate them to pursue graduate studies in geospatial and disaster impact topics.
- *Information resources and electronic means:* CAIT web pages, news interviews by journalism students, You Tube video production, blog posts, and scientific papers. (Over 1,330 SlideShare views of 7 presentations on transportation and infrastructure and over 800 views of project related 7 YouTube videos were reported by the first week of January 2014.)

The ITEWDM project has made the following impact on HU and its partner institution:

- The Buckman Hall 208 classroom is made available for conducting ITEWDM modules through state-of-the-art Smart Board technology.
- The newly installed Driver Simulator at the HUARC is being utilized by students and faculty to conduct advanced research on texting-while-driving and driving distraction whose results could be possibly used in education and workforce development programs.
- The driver distraction research conducted at HRT and PRTC has resulted in several papers and presentations and provides a framework for conducting driver distraction studies at any transit agency in the Commonwealth of Virginia.
- Provides partnering transportation organizations with a pool of bright young potential employees.
- Strengthened the partnerships with transportation organizations through a workshop hosted by the ESITAC at HU.
- The impact on the university resources includes enhancement of the HU Department of Engineering research, education, and training facilities with respect to the AE technology. In addition to the previously available Sensor Highway II AE remote monitoring system, a new portable 1284 Wireless Acoustic Emission system has been acquired. Also, this study impacts the university resources by providing students with research-based engineering courses.
- As growth occurs along the Tenn-Tom Waterway, and among the intermodal partners, there will be a need for skills training, facilities layouts, logistics coordination, and construction. The community colleges specialize in skills training, the universities specialize in facilities layouts and logistics development, and economic development districts specialize in community development planning, and implementation needed. This shift in needs for technology brings utility services to areas that were previously lacking. Additionally, internet and other high speed communication will develop around the increased needs of the business sector.

4.5. What is the impact on technology transfer?

The results of this project will be transferred to local and regional government agencies across the state, and is likely to result in the adoption of new policies or practices in response to the recommendations detailed in the final policy blueprint. All final deliverables will be made available to all organizations who participated in the stakeholder meeting series, as well as the general public.

The ITEWDM's education, research, and workforce development activities have been communicated to the larger transportation community through conference/workshop presentations at MSU and HU to increase the support from industry and other UTCs.

The ITEWDM team hosted a regional workshop on *Transportation Workforce Development for Non-Technical Professionals*, Hampton University, Hampton, VA 23668, November 12, 2013. Around 50 industry, faculty, and students participated in the workshop. The focus of the workshop was the rapid changes around the nations that are transforming transportation systems and services and transportation education. With large number of retirements of transportation professionals anticipated in the next five years or so, the US will experience shortages of transportation professionals including qualified educators. Workforce shortages combined with skill-mix imbalances will leave many transportation sectors without access to quality services. The inadequate linkages between service demands and educational outputs were discussed. One of the recommendations made at this workshop was that transportation educational programs must be brought in line with future transportation needs through the following approaches:

- Curricula need to be updated in universities to focus on changing transportation priorities;
- Traditional teaching and learning methods often based on rote learning – should refocus on student development of critical thinking, clinical reasoning and problem-solving skills.

The project is making positive impacts on technology transfer to students and workforce, as well as public use, including:

- Preparation for future presentation of our transportation modeling and economic analysis results at conferences and to the cooperating state transportation agencies, Mississippi DOT, as well as to local and state emergency management officials in an effort to introduce the developed methodology and models.
- Demonstration of spatial maps for passenger travel corridors, related decision support system methodologies, and simulation results of intermodal integration to local and state government transportation and public works agencies. The implementation of these research products will result in more efficient, safer, less polluting, and economically competitive passenger travel corridors.
- Outreach to government agencies, city and metropolitan transit authorities, ports and airport authorities, rail operators, area manufacturers, gaming industry, and other employers, educational institutions, commercial businesses, and other stakeholders. We will be sharing the results from our research project including economic impact evaluation of different infrastructure integration strategies and solicit feedbacks.
- Collaboration with geospatial industry and other stakeholders will enhance modeling of integrated transport corridors and built infrastructure, as well as offer added benefits of geospatial visualization products.
- Preparation of refereed papers, making presentations, and participating in regional and international conferences, NCITEC conference, and annual Transportation Research Board (TRB) meeting.
- Using these research dissemination and outreach efforts to establish contacts with government and employer/industry stakeholders, academia, interested rail, transit, and highway agencies.

4.6. What is the impact on society beyond science and technology?

- The broader impacts include 1) involvement of various stakeholders of the potential New Orleans-Orlando Corridor (NOOC), 2) outreach of restoring the NOOC in relation to community livability and environmental sustainability, and 3) recommendation of strategies for optimizing intermodal transportation systems to better facilitate passenger travel and proposed resilience enhancement strategies, especially for evacuation purposes and providing relief services after disasters.
- Through a multidisciplinary program of course work and experiential learning the ITEWDM project has attracted and educated students through well-designed transportation education and workforce development programs to produce a trained, effective, and efficient future workforce. This fulfills the USDOT's goal of advancing U.S. technology and expertise in transportation that will provide safe, secure, efficient, and interconnected transportation systems.
- Knowledge regarding transportation careers in the vocational psychology literature is limited. This research will expand knowledge and awareness among career counselors and vocational psychology researchers.
- During the Fall 2013 semester teachers delivered the lesson plans and activities in their classroom. In the end of the semester, students of participating teachers developed Public Service

Announcements (PSA) related to intermodal transportation. A PSA is a “commercial” that is not selling anything but want to teach the audience something important. The PSAs prepared by the students delivered some important messages. Garnett McDaniel teaches 6th graders at the Central School in West Point School District. His students delivered these messages: “When driving: Safety is first”, “The right way to cross the road: look both ways and then run,” “Never walk on train trucks.” Richard Humphries teaches 9th graders at the St. Martin High School in Jackson County School District. His students delivered these messages: “Be aware of the blank spot when driving,” “Always check for the warning signs in the road,” “Do not race a train in the cross-road,” “Do not let a choo choo train cause a bad boo-boo pain.” Carol Davidson’s 4th grade students say “Use intermodal because is economic and is good for the environment.” The statements by the students indicate an increased awareness about transportation and related issues, such as, safety and economic impact.

5. Changes/Problems

5.1. Changes in approach and reasons for change:

Nothing to report.

5.2. Actual or anticipated problems or delays and actions or plans to resolve them:

Nothing to report.

5.3. Changes that have a significant impact on expenditures:

Nothing to report.

5.4. Significant changes in use or care of animals, human subjects, and/or biohazards:

Nothing to report.

6. Special Reporting Requirements

No additional award-specific reporting requirements.