Program Progress Performance Report

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Project Title: Transportation Informatics University Transportation Center (TransInfo UTC): Harnessing the Power of Big Data in Support of USDOT Strategic Goals

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1. Accomplishments

1.1 Major Goals of the Program

The volume, variety, quality and resolution of transportation-related "Big Data" currently present the transportation community with an unprecedented opportunity for improving system performance. Specifically, the wealth of data can be *studied, analyzed, and mined for insights and applications that can improve the efficiency, safety, sustainability, resiliency and reliability of the transportation system, and can inform and guide transportation policy.* It is to this goal that TransInfo's activities are dedicated. TransInfo's mission will be to undertake research, education, training, and technology transfer activities aimed at realizing the full potential of "*Big Data" and Transportation Informatics* in: (1) improving transportation system performance; and (2) guiding investments and policies. We anticipate that the activities performed under the umbrella of the TransInfo Center will advance the state of knowledge in the emerging field of transportation informatics, and will better prepare and educate both the existing transportation workforce, as well as the next generation of transportation professionals in how to harness the power of "Big Data" to address transportation challenges.

Because improved utilization of transportation data will help improve system performance, and because transportation serves as the very foundation of our nation's economy, the Center's activities are envisioned to directly address the US Department of Transportation (US DOT) Strategic Goal of "Economic competitiveness". However, "Economic competitiveness" is not the only goal that TransInfo UTC will address. The common thread behind all of TransInfo's research and educational activities is to compile, fuse, and mine various data streams to support a wide range of transportation applications in traffic operations, safety, emergency operations, travel behavior modeling, and performance measurement. As such, TransInfo also touches upon the goals of "Safety", "Environmental Sustainability", "Livable Communities", and the "State of Good Repair".

1.2 Progress and Accomplishments

Work during the reporting period covered by this report has focused on: (1) establishing the TransInfo Center; (2) completing the subcontracting paperwork with the members constituting TransInfo; (3) initiating TransInfo's research program at the different universities; (5) involving graduate students in TransInfo's research activities; (4) starting a bi-weekly transportation seminar series at the University at Buffalo (UB); (5) securing funding for a National Summer Transportation Institute at UB; and (6) outreach activities to governmental agencies, members from the transportation industry, as well as the International community. Each of these accomplishments is briefly described below.

1.2.1 TransInfo Center Establishment

- A kick-off meeting for the Center was held at the University at Buffalo campus on November 6, 2013. At the meeting, TransInfo researchers shared with Dr. Kevin Womack and Dawn Tucker-Thomas our plans for the center, and received very useful feedback. The RITA team also toured UB facilities and labs.
- A monthly conference call was scheduled for the next Thursday of each month for the different members of TransInfo
- An External Advisory Board for TransInfo was formed which includes members from New York State Department of Transportation, the Virginia Department of Transportation, Puerto Rico Department of Public Works. We are also in the process of adding more individuals from the industry (e.g., INRIX)
- Taking advantage of the Transportation Research Board (TRB) meeting in Washington, DC, in January 14, George Mason University hosted a meeting among faculty members and researchers from the four universities involved. The meeting focused on discussing the vision and future plan for TransInfo, and on mechanisms needed to maintain continuous communications and collaborations among the different members of TransInfo. Also discussed were ideas to better engage with our stakeholders.
- Two staff members were hired to aid with the operations of TransInfo, Ms. Jennifer Giegel to serve as the Outreach and Operations Coordinator, and Ms. Sussie Skillman, to serve as an Administrative Assistant.
- Office space was secured within the Department of Civil, Structural and Environmental Engineering at the University at Buffalo (UB) to serve as the TransInfo headquarters
- A website for TransInfo was established (http://www.buffalo.edu/transinfo). The website provides background information about TransInfo, its members, research facilities, the research performed, news, and upcoming events.

1.2.2 Subcontracting with TransInfo Member Institutes

- The University at Buffalo's Office of Sponsored Projects completed all the necessary paperwork needed to enter into subcontracting agreements with TransInfo member institutes.

1.2.3 Initiating the Research Program at the Different Universities

Work on a number of research projects started during the reporting period covered by this grant. Some of those projects have already resulted in very useful products, including papers published in some of the field's best journals, a smartphone app which can be used to provide *predicted* border crossing wait time, a submission to the US Department of Transportation Data Challenge contest, along with several presentations at a number of venues as briefly described below.

1.2.3.1 Research at the University at Buffalo

Research on three different research projects was initiated at the University at Buffalo during the reporting period covered by this report. These are

a) Border Crossing Delay Prediction: This research developed an Android smartphone application called the Toronto Buffalo Border Waiting (TBBW), designed to collect, share and predict waiting time at the three Niagara Frontier border crossings (i.e., the Lewiston-Queenston Bridge, the Rainbow Bridge, and the Peace Bridge). The innovative app offers the user three types of waiting time estimates: (1) current waiting times; (2) historical waiting times; and (3) future waiting time predicted by an underlying traffic delay prediction model which provides predictions for the next 15 minutes (and updates them every 5 minutes). For the current waiting time, the app can provide estimates based on data collected by border crossing authorities as well as user-reported or "crowd-sourcing" data shared by the community of the app's users; reporting of the data could be done either manually or automatically through a GPS tracking function. For the historical waiting time, the app provides statistical charts and tables to help users choose the crossing with the likely shortest wait time. The ability to integrate officially reported delay estimates with crowd-sourcing data, and the ability to provide future border wait times clearly distinguish our app from others on the market.

The benefits of the app to individual drivers and to society in general can be tremendous. For individual drivers, the app can help them choose the right crossing and the arrival time which would minimize their wait time, thereby saving them time, gas, and money. For society, the app can help reduce the cost of border crossing delay on a region's economy as well as on the environment in the area, which is estimated to be in the order of billions of dollars annually in lost business productivity, wasted fuel, traffic-related pollutants and associated health hazards. To increase the market share of the app, we plan to promote it with the help of several of our partners including the Android PhoneLab at the University at Buffalo and the Niagara International Transportation Technology Coalition (NITTEC). A Ph.D. student is being supported on this project, and is gaining first-hands experience applying his skills to a real-world problem.

b) Novel Machine Learning Methods for Accident Data Analysis: With the recent advances in data collection, storage and archival methods, the size of accident datasets has grown significantly. This in turn has motivated research on applying data mining and complex network analysis algorithms, which are specifically designed to handle datasets with large dimensions, to traffic accident analysis. This project is exploring the potential for using a number of machine learning and data mining methods to accident data analysis, including methods such as the modularity-optimizing community detection algorithms, association rules learning algorithms, Bayesian Networks, and frequent pattern trees. The project has resulted so far in a Transportation Research Board (TRB) paper which was recently accepted for publication, and two other papers in refereed conference proceedings.

c) Mining Transportation Information from Social Media for Planned and Unplanned Events:
The focus of this project is on mining social media data to deduce useful information about present or future travelers' behavior, with a special emphasis under events, including both planned events (sporting games, concert, parade, holidays and etc.), and unplanned events (such as inclement weather, earthquakes, hurricanes, floods and etc.). Specifically, the project proposes to develop effective and efficient techniques to collect, extract and mine social media data to support advanced traveler information systems and traffic operators. By mining social media based semantics, especially text semantics, this project aims to achieve the following goals: 1) Assess the impact of unplanned events. 2) Extract useful travel information to indicate congestion for planned events. 3) Identify causality between abnormal traffic pattern and social media data. A graduate student is currently being supported on this grant.

1.2.3.2 Research at RPI

Developing Big Data Analytics Methods for Urban Transportation Modeling
As technologies advance, emerging urban data are increasingly available for wide urban areas. Such data are inherently heterogeneous, including both fixed-location data (e.g.., those from loops) and mobile data (e.g., those from GPS), which we refer to herein as *Urban Hybrid Traffic Data* (*U-HTD*). U-HTD provides great opportunities for urban transportation/traffic system performance evaluation, modeling, and management, while posimg great challenges in data collection, processing, storage, and use. This research aims to tackle some of these challenges by developing methods on how to best mine the different data elements in U-HTD, how to protect privacy when processing and using U-HTD, and how to develop novel methods that can best utilize U-HTD for critical urban transportation applications.

1.2.3.3 Research at George Mason University

Improving Incident Response System for Northern Virginia using Historical Incident and Traffic Data
This project aims at improving incident response strategies by exploring historical incident and traffic data. Traffic incidents have become a major cause of congestion and significant threat to urban mobility. Many road networks in major cities are currently operating near, if not beyond, capacity during peak hours. Capacity reduction and road closure due to incidents can cause significant delays over an extended period. An effective incident management system not only helps to mitigate congestion through swift incident detection, response, and site clearance, but also generates significant environmental benefits by reducing fuel consumption, emissions, and potential secondary incidents. By exploring both historical incident and traffic data, the system can be improved by proactively deploying response units. The system should adapt itself to evolving incident patterns over different time of day and under different traffic/weather conditions, and change the strategy accordingly. Moreover, an effective system must also consider the network effect and travel behavior in response to changed traffic conditions in the aftermath of major incidents. These factors are extremely important in an urban setting where

traveler information system is usually readily available and multiple alternative routes co-exist. This study would address these challenges.

1.2.3.4 Research at the University of Puerto-Rico at Mayaguez

a) Development of New Performance Metrics and Operational Strategies Based on Bus Location and Passenger Count Data: The transit industry in several cities, including the San Juan Metropolitan Area (SJMA), has relied on limited, general, and aggregate measures for reporting performance to external funding and regulatory agencies. This implies the use of relatively small samples, with findings that had to be extrapolated to the whole system. However, with the implementation of new technologies in the transit industry, it is now possible to measure the performance of a transit system not with sample data but with a more complete set of data for the entire system. Several new real-time performance metrics need to be developed using big databases instead of a small sample of data. These metrics will assist AMA to improve their levels of service. Furthermore, there is an opportunity to develop preventive maintenance to improve the mechanical condition of the vehicles and avoid costly repairs. Passenger counts and load diagrams will also be used, not only to develop performance metrics, but to establish new strategies such as new express routes or the addition of new units in heavily used corridors. Thus, the main objectives of this research study are: (1) Develop the computational tools needed to process the immense amount of data produce by the GPS and passenger counter system; (2) Proposed better methods of saving these data to simplify their analysis; (3) Develop new performance metrics based on the data collected; and (4) Propose methods to enhance the performance of the system.

b) Development of a Mobile Computer Application for the Process of Data Collection and Data Sharing for Vehicle Accidents. The main goal of the research study is to develop a mobile computer application for documenting and sharing data regarding vehicular accidents. The developed application will benefit the police workforce, the Puerto Rico DTOP, and higher education institutions by providing the means to collect accident data accurately and making it available for further research . The detailed objectives are: (1) Determine relevant data needed from accident reports and the key features of this data. This first step will help in the creation of reports, the development of the database and the proper transfer of the data to other interested agencies; (2) conduct an extensive literature survey on off-the-shelf equipment, and available software platforms for the development and deployment of the mobile application; (3) Select the proper architecture for the mobile application software and reporting system. The initial system will be deployed at a small-scale; however the design must be scalable; (4) Develop a mobile application that will substitute the police report that is filed in the field when a vehicle accident is reported; (5) Develop an accident data sharing system among the interested parties (i.e. local police station, central police station, Puerto Rico DTOP, and higher-education institutions). The collected data and reports could be available to the general public; and (6) Use data mining algorithms on the collected accident report data to develop transportation informatics.

1.3 Opportunities for Training and Professional Development Provided

As mentioned above, each of the research projects outlined above has at least one graduate student heavily involved in the research conducted. This provides a unique opportunity for the training of graduate students who are likely to constitute the leaders of the transportation profession in the future. Besides this, TransInfo, in collaboration with our sister institute, the UB's Institute for Sustainable Transportation and Logistics (ISTL), has last year initiated a bi-weekly seminar series at UB where we invited several distinguished speakers to come present to our faculty, students *as well as the local transportation profession community*. All seminars are recorded and will be posted to our website to allow other TransInfo member institutes to benefit from such seminars. Below is a brief listing of the seminars hosted, date, the speaker, and the title of the talk.

Date	Speaker	Presentation Title
02/13/2014	Debarshi Indra, Ph.D. Candidate - UB	Choice of residence location and mode of commuting: A cross-sectional analysis of 275 US metropolitan areas
02/28/2014	Venky Shankar, Professor - Penn State	Statistical modeling of discrete transportation outcomes including Big Data
03/13/2014	Wenlong Jin, Assistant Professor – UC Irvine	A control theoretic formulation of green driving strategies based on inter-vehicle communications
03/28/2014	Srinivas Peeta – Professor – Purdue University	Graph-based Modeling of Information Flow Propagation under Vehicle-to-Vehicle Communications
05/02/2014	Oliver Gao – Associate Professor – Cornell University	From Transportation Planning/Management to Air Pollution and Public Health – Are We Doing the Right Thing, and Doing it Right?

In addition to the bi-weekly seminar, TransInfo, in collaboration with ISTL, sponsored the Transportation Summit event, which took place on May 2 here in Buffalo and had distinguished speakers including Congressman Brian Higgins, FHWA Deputy Administrator, and NYS Secretary of Transportation. The focus of the summit was on how to finance transportation investments, and how a region, like the Buffalo-Niagara region, may make the "best" and "optimal" investments in transportation infrastructure to improve economic vitality while preserving sustainability. Members of TransInfo and ISTL moderated several sessions at that summit.

Another notable event pertaining to training and professional development took place at the University of Puerto-Rico at Mayaguez (UPR-M), where the ITE UPRM student chapter of the Department of Civil Engineering and Surveying celebrated *Transportation Week*, a four-day event designed to bring to the academic community a vast and representative set of events, showcasing and

celebrating the profession, challenges and achievements of transportation that have been organized and executed in Puerto Rico.

The first day of the event (Monday, March 31) focused on Air Transportation, and brought notable guests including P. E. Jorge Suárez (Assistant Executive Director, Engineering Bureau), Mr. Rolando Padua (Interim Manager, Aviation Bureau), P. E. Víctor A. Suárez (Director of the Puerto Rico Ports Authority), P. E. Agustín Arellano (President and C. E. O., Aerostar Airport Holdings LLC, Luis Muñoz Marín Airport) and P. E. Carlos Arboleda (President, Atkins Caribe, LLP).

The second day focused on Road Safety, and included the Traffic Bowl competition as well as the Elections of the 2014-2015 Board of Directors. Notable guests included Mr. José A

(Director, Traffic Division, Puerto Rico Police Department), Eng. Juan Carlos Rivera (Supervisor, Roadway Safety Project Division, ACT), Dr. Benjamín Colucci (Director of Puerto Rico), Arch. Ricky Miranda (Professor, Catholic University at Ponce) Eng. Francisco Klein (President, Klein Engineering), UPRM students Tamara Rodríguez and Christian Hernández (traffic safety project, ITE-UPRM), Campus Theater group TeatRUM, the UPRM Marching Band, and Fiesta Colegial.

Day 3 focused on Mass Transit and non-motorized transportation means. Notable guests included Atty. José M. Díaz (Director, SITRAC), Atty. Jessica Sinigaglia (Director, Integrated Transportation System of the South at Ponce), P. E. José Izquierdo (Director, Novotrén/Transcriollo), Plan. Martha I. Bravo (Planning Supervisor), Atty. Luis Villares (Tren Urbano), Urbanist Isabel Parés (Coopiloto Project).

Finally, day four witnessed the celebration of the 100th Anniversary of the UPRM Civil Engineering and included poster sessions on Intelligent Transportation Systems. Notable guests include Dr. Alberto Figueroa (Representing Hon. Alejandro García Padilla, Governor of Puerto Rico and President and General Manager, AMA), Eng. Javier Ramos (Representing the Secretary of Transportation and Director, ACT), Eng. Edgar Rodríguez (President of CIAPR, Director of the Integrated Transportation Alternative), Eng. Miguel Torres (Secretary of Transportation), Eng. José Pagán (Director of the Smart Traffic Lights Dept.), Eng. Xavier Serra (Operations Director, Metropistas) and the UPRM Centenary Band.

A memorable highlight of the Transportation Week was a recognition statement from the Governor of the Commonwealth of Puerto Rico, Hon. Alejandro García-Padilla, dedicating a

message emphasizing the importance and significance at all levels of this event. On the other hand, the Transportation Week was a platform to execute an alliance of collaborative initiative in education and research related to collective transportation issues, signed by Prof. Lucas Avilés, Interim Rector of the University of Puerto Rico at Mayagüez, and Dr. Alberto Figueroa, President and General Manager of the Metropolitan Bus Authority. It was stated that students and professors are key to identify effective solutions to transportation problems and therefore is needed to access information from the Metropolitan Bus Authority database. The agreement will serve as a workshop for students outside classroom which will provide experiences that will help them forge as professionals.

The University at Buffalo was successful in securing funding for yet another year for its Summer National Transportation Institute (NTSI). Specifically, UB will host NTSI from July 7-11 2014 on UB north campus. The goal of this summer camp is to attract more high school students to pursue their career in transportation area. This is our second time to host this event. Our 2013 NSTI has successfully recruited 20 students and the students received well about our transportation related programs. In this year, we plan to recruit 30 students, and the deadline of application is set to be June 6.

TransInfo, in collaboration with the Region 2 University Transportation Research Center (UTRC2) headed at the City College in New York, have been in communication with New York State Department of Transportation (NYSDOT) to host a roundtable discussion about the topic of Connected and Automated Vehicles CV/AVs, and its broader context of Smart Cities. The idea behind the roundtable is to bring together representatives from governmental agencies (including NYSDOT, the governor office and the Department of Motor Vehicles), the industry (e.g., Google, GM, Ford), and academia to discuss how states can take advantage of CV/AV technologies, and how to best prepare and adapt for their arrival.

TransInfo also participated in the UK-US Future Cities Knowledge Exchange Workshop which was held in New York City on February 6, 2014. Representing TransInfo at the event was Dr. Qing He, Stephen Still Assistant Professor in Civil, Structural, and Environmental Engineering and Industrial and Systems Engineering. This workshop brought a group of approximately 15 UK delegates to the US, to establish and strengthen linkages with their US counterparts on a range of topics related to the future of cities, mainly in the areas of intelligent transportation systems. Funded by the UK's Technology Strategy Board (TSB) and Science and Innovation Network (SIN), the workshop focused on international knowledge exchange between academic, public and private sector organizations. In addition to Dr. He, US participants include Matthew Burt from Volpe Center, David Giles from the Center for an Urban Future's Research, Dr. Nicholas Lownes from the University of Connecticut, Dr. Martin Pietrucha, from the Thomas D.

Larson Pennsylvania Transportation Institute at Penn State University. and Dr. Camille Kamga, from the Region II University Transportation Research Center (UTRC2), and The City College of New York. During the discussions, UK delegates showed a strong interest in big data related areas in future transportation, an area perfectly aligned with the theme of UB's TransInfo University Transportation Center. Dr. He briefly introduced some of research projects taking place at TransInfo including projects on border crossing delay prediction, highway safety performance metrics, social media mining for travel information, and the assessment of sustainability and live ability with GIS and remote sensing data.

1.4 How have the results been disseminated?

Our most recent research findings were documented in both refereed journal manuscripts, as well as conference proceedings. TransInfo researchers also met with several of our stakeholders during the reporting period covered by this report to keep them up to date on TransInfo research, educational and technology transfer activities. These included meetings with New York State Department of Transportation (both the headquarters in Albany as well as the District 5 Regional Office in Buffalo), the Niagara International Transportation Technology Coalition (NITTEC), the Greater Buffalo Niagara Regional Transportation Council (GBNRTC), the Niagara Frontier Transportation Authority, the Virginia Department of Transportation, the Virginia Center for Transportation Innovation and Research (VCTIR), Puerto Rico Department of Public Works. It also included meeting with the industry including IBM and Xerox.

Finally, the smartphone app which was developed as a result of the border crossing delay prediction research at UB was submitted to the USDOT Data Challenge contest.   We are also in communication with NITTEC to first test the app, and when satisfied with its performance, to market it on their website and to allow travelers in the region to download it and use it.

1.5 Plans for the Next Reporting Period

For the next reporting period, we plan to ramp up our research efforts especially at our partner institutions, where research progress was slightly delayed because of the time needed to complete the subcontracting process. We also plan to work on our educational and training initiatives. At UB, we have already identified three outstanding graduate students who would be candidates to receive financial support (either in the form of a fellowship or research assistantship) for next year.

2. Products

2.1 Publications, conference papers, and presentations

Ni, M., Q. He, and J. Gao, "Using Social Media to Predict Traffic Flow under Special Event Conditions", Proceedings of 93rd Transportation Research Board Annual Meeting Washington DC, January 2014.

L. Lin, Q. Wang, and A.W. Sadek. (2014). Border Crossing Delay Prediction using Transient Multi-server Queneing Models with Erlang Service Times. *Transportation Research – Part A (in press).*

L. Lin, Q. Wang, and A.W. Sadek. (2014). On-line Prediction of Border Crossing Traffic using the Spinning Network Method. *Transportation Research – Part C* (*in press*).

L. Lin, Q. Wang, and A.W. Sadek. (2014). Data Mining and Complex Network Algorithms for Traffic Accident Analysis. *Journal of the Transportation Research Board Meeting (in press).*

L. Lin, Q. Wang, and A.W. Sadek. (2014). Duration Prediction of Urban Freeway Traffic Accidents Based on The M5P Tree and Hazard-Based Duration Models. *Proceedings of the International Conference on Engineering and Applied Sciences Optimization (OPT-i),* Kos Island, Greece.

L. Lin, Q. Wang, and A.W. Sadek. (2014). A Novel Variable Selection Method Based on Frequent Pattern Tree for Real-Time Traffic Accident Risk Prediction. *Proceedings of the International Conference on Engineering and Applied Sciences Optimization (OPT-i),* Kos Island, Greece.

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

A website for TransInfo has been established. Its address is as follows:

http://www.buffalo.edu/transinfo

The website provides background information about TransInfo, its members, research facilities, the research performed, news, and upcoming events.

2.3 Technologies or techniques

A smart-phone app for collecting, sharing and predicting waiting time at the three Niagara Frontier border crossings (i.e., the Lewiston-Queenston Bridge, the Rainbow Bridge, and the Peace Bridge) was developed. The innovative app offers the user three types of waiting time estimates: (1) current waiting times; (2) historical waiting times; and (3) future waiting time predicted by an underlying traffic delay prediction model which provides predictions for the next 15 minutes (and updates them every 5 minutes). The plan is to disseminate the app through our partnership with the Niagara International Transportation Technology Coalition and its website (http://www.nittec.org)

2.4 Inventions, patent applications, and/or licenses

Nothing to report.

2.5 Other products

- Models for short-term traffic volume prediction based on the Spinning Network Algorithm

- Multi-server Queueing Models for predicting border crossing delay time
- Bayesian Network Models for predicting accident risk in real-time based on on-line traffic volume conditions and weather information
- Models for predicting incident duration based on the The M5P Tree and Hazard-Based Duration Models
- Databases including information about incidents along the freeway network in the Buffalo-Niagara Region, weather conditions, and real-time traffic volumes and speeds.

3. Participants and Collaborating Organizations

3.1 Organizations which have been involved as partners with TransInfo

Organization Name: Niagara International Transportation Technology Coalition (NITTEC)
Location of the Organization: Buffalo, NY
Partner's Contribution to the Project: In-kind support and Personnel exchanges

Organization Name: Peace Bridge Authority, Niagara Falls Bridge Commission
Location of the Organization: Buffalo, NY
Partner's Contribution to the Project: In-kind support (data)

Organization Name: Niagara Falls Bridge Commission
Location of the Organization: Niagara Falls, NY
Partner's Contribution to the Project: In-kind support (data)

Organization Name: New York State Thruway Authority
Location of the Organization: Albany, NY
Partner's Contribution to the Project: In-kind support (data)

Organization Name: New York City DOT
Location of the Organization: New York, NY
Partner's Contribution to the Project: In-kind support (data)

Organization Name: Virginia Department of Transportation
Location of the Organization: Richmond, VA
Partner's Contribution to the Project: In-kind support

Organization Name: Puerto Rico Department of Transportation and Public Works (DTOP, by its acronym in Spanish)
Location of the Organization: Puerto Rico
Partner's Contribution to the Project: In-kind support (data)

Organization Name: Metropolitan Bus Authority (AMA, by its acronym in Spanish).
Location of the Organization: Puerto Rico
Partner's Contribution to the Project: In-kind support (data)

Organization Name: Police Workforce
Location of the Organization: Puerto Rico
Partner's Contribution to the Project: In-kind support (data)

3.2 Have other collaborators or contacts been involved?

Work on TransInfo project has involved close collaborations across traditional disciplinary lines. For several of our research projects and initiatives, transportation researchers (from the department of Civil Engineering) are working very closely with their counterparts in the department of Computer Science and Engineering.

4. Impact

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

TransInfo activities are envisioned to help advance the state-of-the-art in the application of advanced data mining, Artificial Intelligence (AI), Social Network analysis and Advanced Statistical and Econometric models to transportation Big Data. Applying such methods is envisioned to result into invaluable insight into how to improve transportation system efficiency, safety, sustainability, resiliency and reliability. It is also envisioned to help support sound transportation decision making through the development and application of appropriate performance metrics.

4.2 What is the impact on other disciplines?

TransInfo activities are likely to have an impact on the field of Big Data Analytics, as it pertains specifically to transportation data. The transportation Big Data context has several unique features which distinguish it from other application domains of Big Data. TransInfo research and educational initiatives are thus likely to have an impact on the emerging field of Transportation Informatics and Analytics.

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

Several graduate students are (or will be) supported by TransInfo either through fellowships or graduate research assistantships. TransInfo also has a number of outreach initiatives aimed at encouraging high school students to consider careers in transportation, which we hope to report upon in future progress reports. We also hope to contribute toward improving the diversity of the workforce.

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

TransInfo Center plans to build several important data repositories during the course of its work which can help support future research in the area of Big Data Analytics. These repositories

would be made available to other researchers via our website to promote research and technology transfer in this field of inquiry.

4.5 What is the impact on technology transfer?

The vision is for many of the transportation research projects undertaken by TransInfo to result in either products which can be implemented to address transportation challenges or improve the traveler experience (e.g., the smart phone app which was already developed for predicting border crossing delay), or in strategies and/or policies to improve transportation system performance and to support sound decisions regarding transportation investments. We hope to work with our stakeholders and partners in the future to make sure that TransInfo research and educational initiatives are having a positive impact on technology transfer.

5. Changes/Problems

Nothing to report.