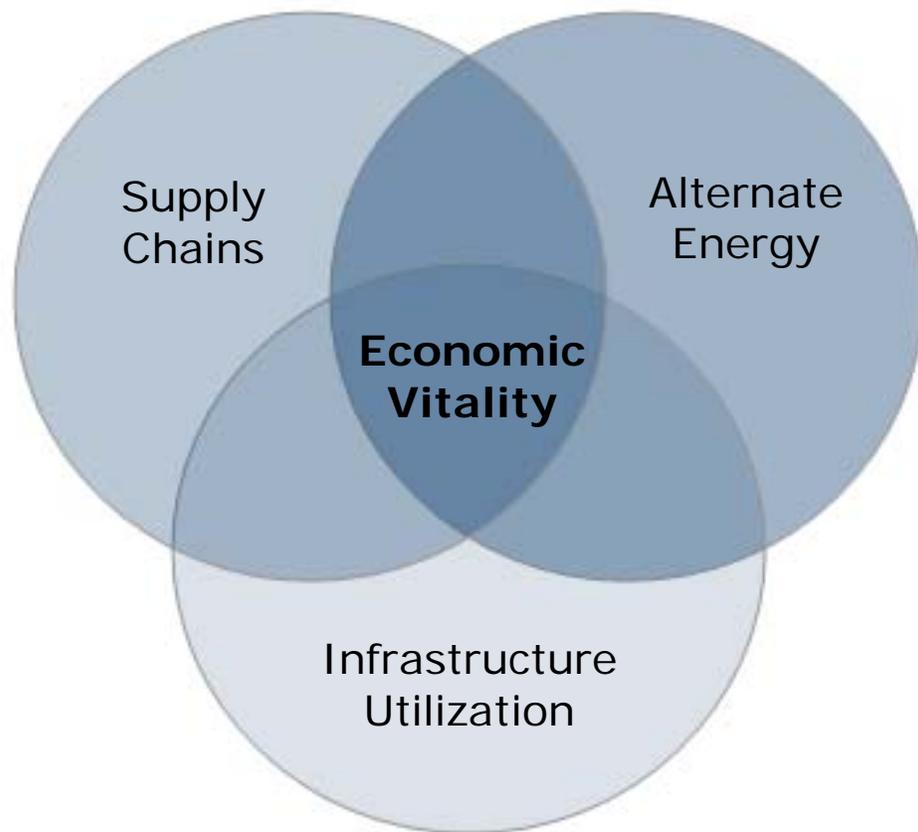




The University of Toledo

University Transportation Center

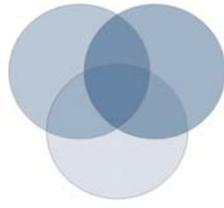


Annual Report 2007-2008

The University of Toledo University Transportation Center (UT-UTC) is funded by the U.S. Department of Transportation, RITA which paid for the development and printing of this document

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Director's Message



It is my pleasure to speak to you at the end of a busy and successful year for the University of Toledo University Transportation Center (UT-UTC). I share my pride in the recent noteworthy accomplishments and compliment all our partners, staff, and collaborators as you read through this latest edition of the UTC Annual Report.

This year's achievements of our Center result in no small part because of ongoing support from the University of Toledo, especially President Lloyd Jacobs who supports and champions our initiatives.

In addition, our successes are attributable to our transportation community's consistent support and collaboration. Community interactions range from the many (and growing) number of individual collaborations, to active community participation in advisory roles and direct engagement in ongoing regional strategic planning for transportation and logistics.....all of these relationships improve and leverage the work we do.

The University of Toledo University Transportation Center presently has 18 active, cutting-edge Transportation and Logistics research projects valued at \$1.16 million dollars. The University of Toledo Transportation Center is dedicated to being a principal influence in the emergence of our region as an international transportation and logistics power.

One of our major efforts that I would like to highlight is our success in elevating the region's Intermodal/Logistics Hub initiative. This initiative is being embraced as possibly the single most powerful regional economic development project. The University of Toledo has been leading the research, public information and education, and facilitation of this regional effort.

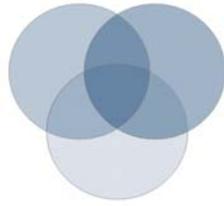
By virtue of its strategic geography, our region literally and figuratively stands at a fork in the road. We at the University of Toledo have made a clear choice and diverted from the traditional path of the past, and are on a new path; one that creates an innovative transportation and logistics vision that will propel us from where we are to where we want to be.

In closing, as you review this report, I encourage you to provide any feedback and know that I look forward to working with you in the future.

A handwritten signature in blue ink that reads "Richard S. Martinko". The signature is fluid and cursive.

Richard S. Martinko, P.E.
Director
University Transportation Center &
Intermodal Transportation Institute



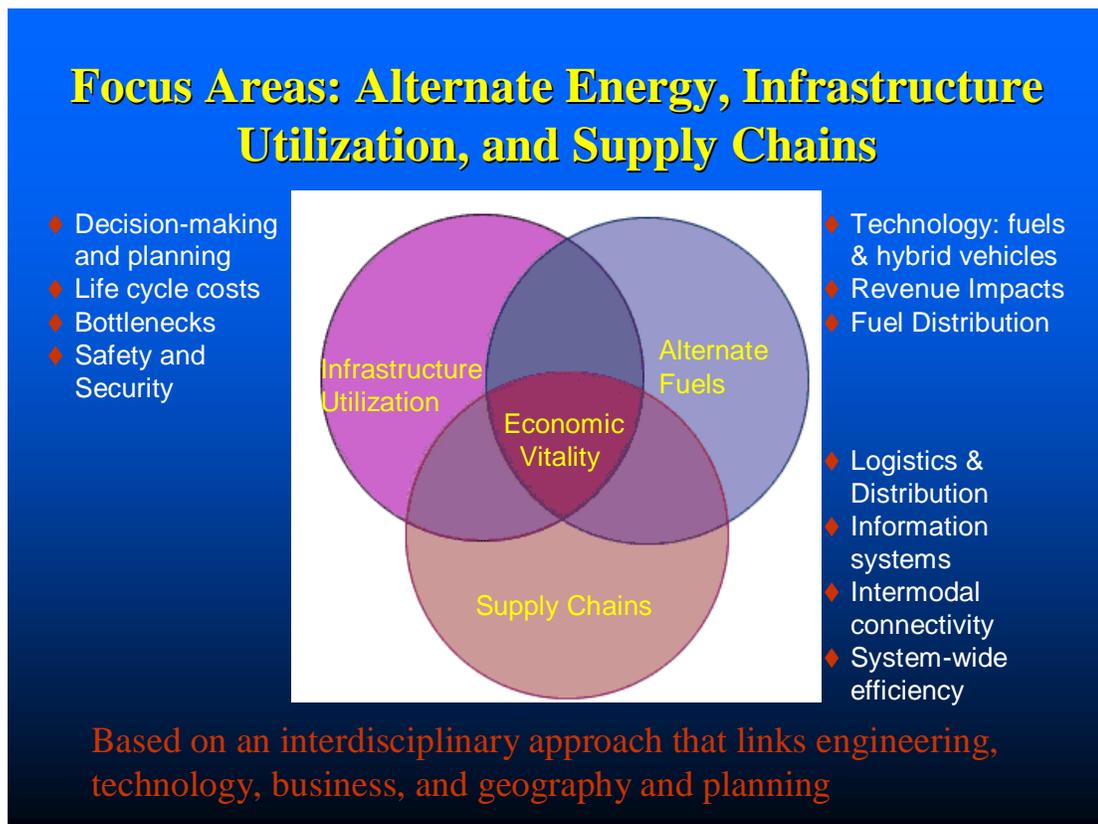


CENTER THEME

The theme of The University of Toledo University Transportation Center is *Transportation for Economic Security and Development: Alternate Energy, Infrastructure Utilization, and Supply Chains*. Safe, secure, and efficient transportation systems are essential to the economic viability, quality of life, and strength of our nation. If the U.S. economy is to reach new heights, the transportation system must be capable of moving people and goods safely, quickly, and efficiently. This Center focuses on three critical elements in the transportation system: alternate energy for transportation, infrastructure utilization, and supply chain management. See Figure 1.

There is synergy between infrastructure utilization and supply chain management. One of the major problems in getting supply chains to work well is to streamline the flow of goods from suppliers to manufacturers and from manufacturers to wholesalers and retailers, and one of the largest obstacles in doing this is bottlenecks. So the application of information systems and transportation technology, as well as the development of intermodal solutions, are ways to improve infrastructure utilization and increase supply chain efficiency. The area of alternate energy is critical to transportation, and the University of Toledo is committed to alternate energy. In addition to our efforts as part of the UTC, there are significant efforts currently underway in the Department of Physics and the College of Engineering. UT currently has substantial support for alternate energy from the State of Ohio.

Figure 1: Overview of University of Toledo UT-UTC

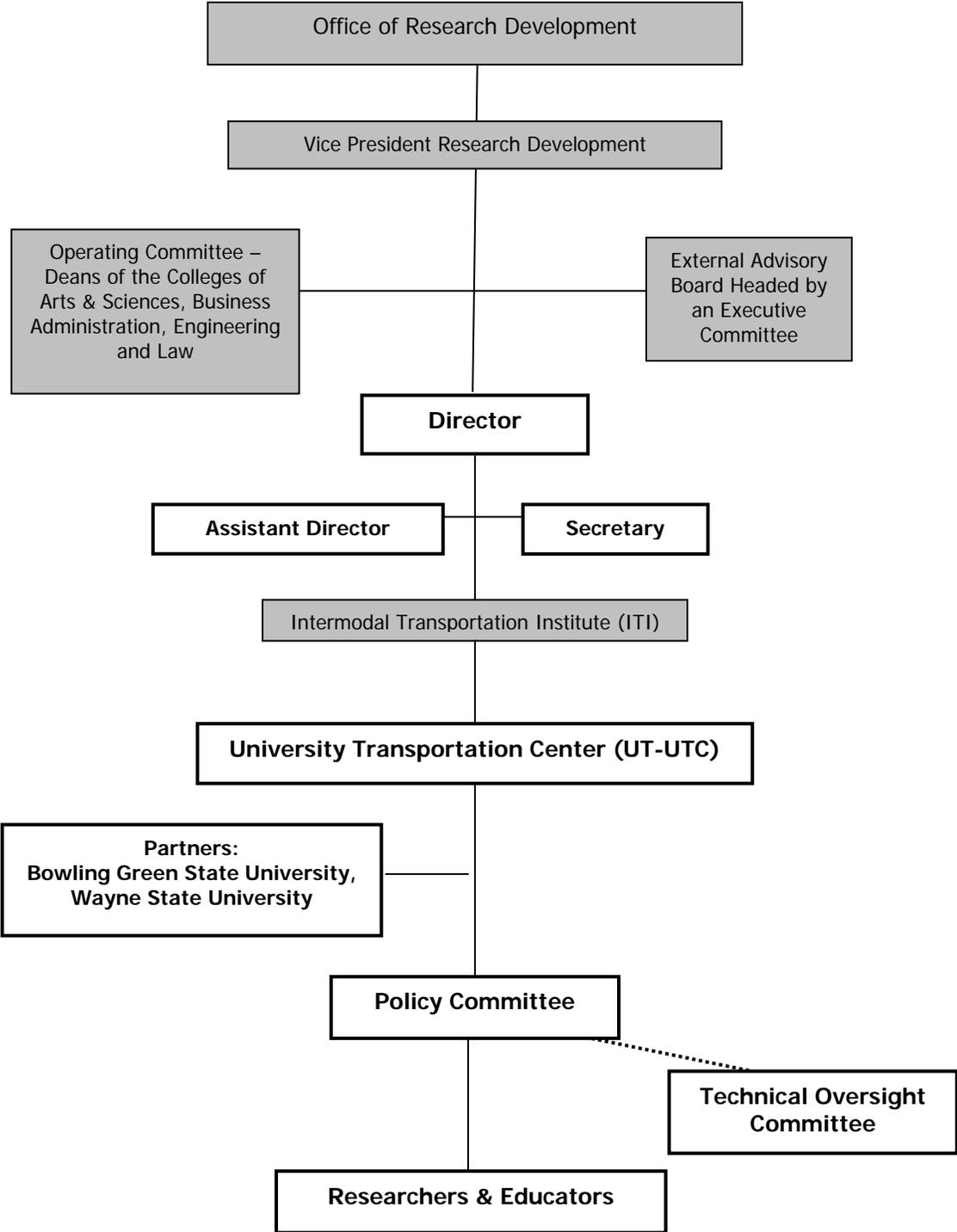


The amount of freight moving across the various modes of transportation is expected to increase dramatically. A comparable increase in transportation infrastructure is not a viable option because it is capital-intensive and requires the commitment of valuable land that could be used for agriculture, recreation, and economic development. To respond effectively, ideas and methods are needed that (1) increase the utilization of existing assets through the application of information technology and innovative management practices and (2) identify innovative solutions to bottlenecks in the transportation system. Through information gathering, data mining, analysis, and assessment, it is possible to improve the management and planning that lead to increased infrastructure utilization and availability.

The efforts of the UTC focus on the transportation, logistics, and distribution aspects of the supply chain as well as intermodal connectivity and system-wide efficiency. This multidisciplinary approach, integrating information technology and management practice with transportation, will provide new opportunities for educational programs in transportation and supply chain management.

MANAGEMENT STRUCTURE AND PRINCIPAL CENTER STAFF

Organization Chart



Institutional Resources

The UT-UTC is a consortium that is led by the University of Toledo with its partners, Bowling Green State University in Bowling Green, Ohio and Wayne State University in Detroit, Michigan. The consortium allows for a pooling of institutional resources that allow for a concentrated effort in addressing the critical problems facing our transportation system in the areas of alternate energy, infrastructure utilization, and supply chains. In this way, more can be accomplished in the areas of research, education, and technology transfer than working independently. These universities possess strong faculty and research facilities, have diverse, interdisciplinary educational programs, and ample numbers of graduate students to make a positive difference in the transportation area.

Center Director

The Director of the Center is responsible for administering the Center's programs, coordinating activities among the consortium of universities, managing and controlling the Center's budget, and ensuring the effective use of Center resources. The Center Director is responsible for implementing the Center's strategic plan and ensuring compliance with all other UTC program requirements. The Director is ultimately responsible for assuring that:

- Research, education, and technology transfer activities at the Center are being performed well.
- Activities are completed on time.
- Deliverables and reporting requirements are completed to a high standard.
- Problems and conflicts are resolved.
- Planning for Center growth is conducted.

The Director works with other centers and national transportation institutes and organizations as well as with public and private agencies to develop activities that increase student and faculty diversity. Finally, the Director actively pursues new opportunities to expand the education, research and technology transfer initiatives. The Director works closely with the Policy Committee and the Technical Oversight Committee to ensure that the views of stakeholders are well represented.

The Assistant Director helps the Director administer the Center in fulfilling reporting requirements, developing communications via web links and newsletters, playing a major role in economic development, assisting with relationships with the regional MPOs and with the state DOTs, and other duties as identified by the Director. The secretary provides support for the Director and Assistant Director as needed.

Multiparty Arrangements

UT has established a consortium or partnership arrangement with BGSU and WSU as well as public and private sector organizations and government agencies. With the combined expertise, the consortium allows the Center to address a variety of projects that are beneficial to many stakeholders. By organizing this consortium, significant collaborative efforts can be undertaken which will enhance the research, education, and technology transfer activities across all of the universities.

The consortium acts as an integrated whole. The Policy Committee defines the scope of the projects so they satisfy the goals of the Center and are within its theme. Once these project areas are defined, the Policy Committee works with the Center Director and staff as well as the Technical Committee to recruit faculty from the affiliated universities who will develop detailed proposals

including the budget request. The Technical Oversight Committee, which has representatives from all three universities, evaluates the proposals and makes recommendations to the Policy Committee regarding feasibility, technical rigor, and budget adequacy. The Technical Oversight Committee may engage outside reviewers to evaluate proposals when the proposals are outside of the expertise of the members. The Policy Committee selects the projects to be completed and allocates funds to those projects.

Policy Committee

Chairman – **Jim Hartung**

Representing UTC staff and faculty from partner universities

Richard Martinko - Director, Intermodal Transportation Institute and University Transportation Center, The University of Toledo

Christine Lonsway – Assistant Director, Intermodal Transportation Institute and University Transportation Center, The University of Toledo

Heinz Bulmahn – Vice Provost for Research, Dean of the Graduate College, Bowling Green State University

Snehamay Khasnabis – Professor of Civil Engineering, Wayne State University

Representing Carriers and Shippers

Christopher Kaiser – Truckload Operations, Thyssen Krupp/TKX Logistics

Tom Kovacic – Executive Director, Transportation Advocacy Group of Northwest Ohio

Edwin Nagle – President/CEO, Nagle Companies, Inc.

Representing public agencies that engage in transportation-related activities

Jim Hartung – President/CEO, Toledo-Lucas County Port Authority; Chairman, Intermodal Transportation Institute Executive Committee

Anthony Reams – President, Toledo Metropolitan Area Council of Governments

Lee Springer – Director, International Business Development, Regional Growth Partnership

Representing academic research officers

Frank Calzonetti – Vice President Research Development and Professor of Geography, The University of Toledo

Representing a state agency

Dave Dysard – District Deputy Director, Ohio Department of Transportation, District 2

Representing the US Department of Transportation

Vacant

Representing the Michigan-Ohio UTC

Leo Hanifin – Director, Michigan-Ohio University Transportation Center and Dean, College of Engineering and Science, University of Detroit - Mercy

Technical Oversight Committee

Alternate Energy:

Subba Rao, Ph.D. – Professor, Information Operations Technology Management,
College of Business Administration, The University of Toledo

Simon Ng, Ph.D. – Professor, Chemical Engineering,
College of Engineering, Wayne State University

Infrastructure Utilization:

Hiroyuki Iseki, Ph.D. – Assistant Professor, Department of Geography and Planning,
College of Arts and Sciences, The University of Toledo

Mumtaz Usmen, Ph.D. – Chair, Civil and Environmental Engineering,
College of Engineering, Wayne State University

Supply Chains:

Paul Hong, Ph.D. – Associate Professor, Information Operations Technology Management,
College of Business Administration, The University of Toledo

Hokey Min, Ph.D. – James R. Good Chair in Global Supply Chain Strategy, Department of
Management, College of Business Administration, Bowling Green State University

Ken Chelst, Ph.D. – Chair, Industrial and Manufacturing Engineering,
College of Engineering, Wayne State University

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Assistant Director – Christine Lonsway

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Secretary – Gloria Cook

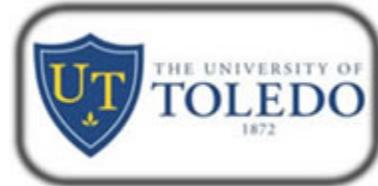
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MEMBER UNIVERSITIES

The University of Toledo – Lead University

The University of Toledo (UT) is a Carnegie Doctoral/Research-Extensive, state-supported university with an enrollment of approximately 20,700 undergraduate, graduate and professional students and more than 1,300 full-time and part-time faculty members. The University of Toledo, a student-centered public metropolitan research university, integrates learning, discovery and engagement, enabling students to achieve their highest potential in an environment that embraces and celebrates human diversity, respect for individuals and freedom of expression. The University strives for excellence in its service to all constituents, and commits itself to the intellectual, cultural and economic development of our community, state, nation and the world.



UT offers more than 250 undergraduate, graduate and professional programs in the colleges of Arts & Science, Business Administration, Education, Engineering, Health and Human Services, Law, Medicine, Nursing, Pharmacy, and University College. July 1, 2006, UT merged with the Medical University of Ohio, to form the third-largest public university operating budget in the state.

In January 2002, UT started the Intermodal Transportation Institute (ITI). The ITI is an interdisciplinary research, education, and outreach center. The vision for the ITI is to develop technology-enabled intermodal transportation systems and supply chains that promote economic development and quality of life. Its purpose is to work cooperatively with public and private sector partners in the fields of transportation, logistics, and supply chains to develop and implement ideas that increase safety, mobility, and access. The ITI actively seeks ways to work with its partners by providing research capabilities, educational programs, and planning and technical assistance. The ITI fosters collaborative efforts among faculty, staff, and students that contribute to learning and success, and it provides a convenient way for those outside UT to access University resources. The link between the University and the external community is an integral part of the ITI.

The ITI's purpose is strongly linked to the mission, goals, and objectives of UT, which embrace learning, discovery, and engagement and which focus heavily on building relationships with external constituents. The ITI engages the community through outreach and partnership, and it supports the local, regional, national, and international communities through research, education, and economic development. The ITI is currently working with organizations to investigate new transportation-related concepts and technologies and to assess current infrastructure capacity across the Midwest. It provides a vehicle to use resources from across the university in collaboration with government and private sector partners.

The ITI reports directly to the Office of Research Development and is academically supported by the Colleges of Arts and Science, Business Administration, Engineering, and Law. This structure facilitates interdisciplinary programs and projects, and simplifies outreach and engagement with the community. The University of Toledo has undergraduate programs in Transportation Planning in Civil Engineering, in GIS and Transportation in Geography and Planning, and in Supply Chain Management in the College of Business Administration. The Civil Engineering Department has Masters and Ph.D. degrees in Transportation Planning. The Geography and Planning Department offers a Masters degree in GIS and Transportation. The College of Business currently has a Masters degree and a Doctoral degree in Manufacturing Management that include offerings in Supply Chain Management. There is active and on-going research in transportation planning and infrastructure utilization, supply

chain management, and alternate energy; there are related programs in fuel cell design and development as well as hydrogen generation.

Bowling Green State University - Partner

Bowling Green State University (BGSU) has a total enrollment of 20,300 students which includes 17,300 undergraduates. In 2005, BGSU achieved record overall enrollment as well as a record number of students with ACT scores of at least 30. With more than 200 undergraduate majors and programs, BGSU has been recognized by *U.S. News & World Report* for its first year programs and residential living/learning communities. Integral to campus life are the core values: respect, cooperation, intellectual and spiritual growth, creative imaginings, and pride in a job well done.



BGSU offers an outstanding educational experience. At BGSU, academic learning is paired with a campus wide commitment to values exploration which prepares graduates to be critical thinkers, skilled communicators, and ethical leaders in all areas of study. This vision uniquely distinguishes BGSU as a public university with a unified purpose.

The Supply Chain Management specialization, in the AACSB accredited College of Business Administration, is currently ranked 16th among U.S. schools according to the *U.S. News and World Report (2008)*. Seven full-time faculty members teach and do research in supply chain management. Beginning in Fall 2006, Dr. Hokey Min joined the faculty as the James R. Good Chair in Global Supply Chain Strategy. Dr. Min has developed an international reputation for his research in transportation and logistics.

In 2000, the College of Business Administration established the Supply Chain Management Institute (SCMI); Dr. Amelia Carr is the Director. The mission of the SCMI is to support excellence in supply chain education and practice by forging collaborative partnerships with supply chain professionals. Currently there are 15 member companies in the SCMI: BP, Bechtel Power Corporation, Bendix, Deere & Company, Eli Lilly, Emerson Climate Control, HP, GlaxoSmithKline, Honda of America Manufacturing, Lowes, Marathon, Nordson Corporation, Owens Corning, Parker Hannifin, and SAIC.

In 1993, the College of Technology established the Electric Vehicle Institute with the mission to develop and promote advanced electric propulsion technology and transfer the technologies to appropriate corporations and public agencies for production and implementation.

Wayne State University - Partner

Wayne State University (WSU) is an urban university located in the heart of the City of Detroit, Michigan. The mission of the University, supported by the taxpayers of Michigan, is to "discover, examine, transmit and apply knowledge that contributes to the positive development and well-being of individuals, organizations and society." Through its research, teaching, and services, it endeavors to engage in a wide range of activities with the local communities. WSU's current enrollment of approximately 30,000 students includes more than 12,000 graduate students.



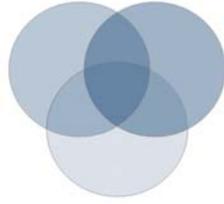
The College of Engineering offers programs leading to the Bachelor's, Master's, and Doctoral degrees in various branches of engineering. The College has been offering graduate programs (both at the Master's and Ph.D. level) in Transportation, housed in the Department of Civil Engineering, for more than 30 years. A full breadth of transportation courses including traffic operation, highway safety, highway design, highway bridges, pavements, planning, and economics is offered through the Department. Students have the option of selecting their minor cognate from other programs including Urban Planning, Business, Industrial Engineering, Mathematics and Education. Transportation graduates of WSU are employed in various sectors including universities, state DOT's, USDOT, TRB, local and county governments and private corporations.

Transportation research in the Department of Civil Engineering has been supported by various agencies including the USDOT, Michigan Department of Transportation (MDOT), National Research Council, Michigan Office of Highway Safety Planning and others. The amount of research funding in transportation during the last five years exceeds \$4 million. Faculty members regularly publish their work along with their graduate students in refereed journals including those of the American Society of Civil Engineering, Transportation Research Board and the Institute of Transportation Engineers. They also actively participate in professional societies/committee activities, and present their research findings at national and international conferences. Research projects conducted under the transportation program encompass such diverse areas as traffic engineering and control, transit asset management, highway safety, transit planning and operations, transportation economics, transit privatization, Intelligent Transportation Systems, highway materials, and bridges. The Department currently (Fall 2008) has six full-time faculty members including those in bridges and materials.

There are a number of other programs in the College of Engineering that are involved in Transportation. These are Bio-Engineering focusing on automotive safety, the Center for Automotive Research (CAR) focusing on automotive engines, and Supply Chain Management involving transportation logistics. Of the above three, the Bio-Engineering program is a department by itself, the CAR program is a part of Mechanical Engineering, and the Supply Chain Management is a part of the Industrial and Manufacturing Engineering Department. The College also has a new graduate (Masters' and Certificate) program in the area of Alternative Energy Technology (AET). The program is not housed in any particular department; rather it is offered under the larger umbrella of the College and faculty members from all departments participate in the program.

The College of Engineering at Wayne State University has been a participant of the UTC program in the past. It was a part of the consortium of The Great Lakes Center for Truck and Transit Research (GLCTTR) at the University of Michigan – Ann Arbor, the UTC in Region V during 1988-1999. As part of this program, WSU conducted research on the structural and safety implications of seat belts in transit vehicles, ways to improve the operation of wheelchair lifts on transit buses, procedures to assess benefits and disbenefits of traffic signal preemption, performance assessment of transit agencies, and incorporation of IVHS (later named ITS) in transit research. Many of these research projects were jointly supported by MDOT. A total of four faculty members and a number of graduate students participated in the research program. The above program resulted in a total of 15 journal publications (Transportation Research Record, American Society of Civil Engineers Transportation Engineering Journal). Additionally, a large number of papers were presented in national and international conferences and published in conference proceedings.

WSU also received research funding from the Midwest Regional University Transportation Center (MRUTC), University of Wisconsin - Madison, established under the UTC program in Region V during 1999-2005. Research conducted under this program has resulted in two journal papers, two in Conference Proceedings, and four national presentations. Besides being a participant in the current University of Toledo/UTC program, WSU also is a member of the five university consortium of the MIOH/UTC program at the University of Detroit - Mercy (UDM).



OVERVIEW OF EDUCATION, RESEARCH, AND TECHNOLOGY TRANSFER PROGRAMS

Year 2 of the University of Toledo University Transportation Center (UT-UTC) brought a year of both significant development and significant change. With a new director starting in August and a move out of the College of Business Administration into the newly formed Research and Technology Complex, many things were different but the track that was set in the strategic plan, the guideline for UTC activities, remained the same.

As the projects funded in Year 1 progressed and new projects were awarded, the emphasis of research and education continued as intended. However, the UTC and its umbrella organization, the Intermodal Transportation Institute (ITI), were thrown into the public spotlight by the rush of local events. Intermodal, a word that had produced quizzical expressions on the faces of all but transportation professionals, suddenly became the hot topic as the media and the public became aware that intermodal could be integral to economic development – the mantra of the Midwest. Director Martinko became a local luminary as he was interviewed on radio and TV, quoted in newspapers and appeared in front of numerous area forums speaking about transportation and the prospects it could bring to the region. Transportation Opportunity Districts (TODs) became the catchphrase of a new hope for Northwest Ohio and Southeast Michigan. As the year ended, a variety of initiatives were taking shape.

Looking to the future, the ITI and the UTC will be a focal point for regional transportation development efforts as plans evolve and work progresses with the Center's many stakeholders. The funded research projects will be producing their final reports and new efforts to educate transportation professionals of the future will be put in place. The workshops of Years 1 and 2 focusing on short sea shipping have increasing relevance as more possibilities develop in the St. Lawrence Seaway and the Great Lakes. And, the International Network of Scholars has scheduled future symposia and workshops in India, Madrid and Taiwan, following gatherings in Toledo and Busan this year. Halfway through the grant period, much has been accomplished but many exciting challenges loom in the near future.

Education

In the first year of the UT-UTC, emphasis was placed on developing curricula for transportation education at the Ph.D., Masters and undergraduate levels. The Ph.D. project in the College of Arts and Sciences integrating intermodal transportation into the spatially integrated social sciences was extended after the Ohio Board of Regents approved the Ph.D. program and the new degree was given a start date in the 2010 academic year. The development of a Masters program in the College of Business Administration resulted in three course outlines in the core competitive strategy of supply chain management. Further development issues are under consideration. The final work on an undergraduate cooperative education program in supply chain management is underway and the final report is anticipated in the fall.

The development of a certificate program in transportation was funded this year to offer key information to working professionals who are not registered in degree programs. An exciting element of the proposal is the involvement of the Toledo Trucking Association. UT faculty working with TTA members will put together the curriculum incorporating the most needed elements for those already on the job. The Association has also instituted a scholarship program for some of the students. Key to the design is the ability of those who earn their certificate to continue in a degree program should they choose.

And, to introduce transportation to those still considering their career path, a project was funded to develop a program at the secondary level in transportation, logistics and supply chain management. Working with career technical high schools, private sector shippers and carriers and the companies who support them, the program focuses on basic concepts. Because the courses are offered with the possibility of college credit, they could become part of a plan to achieve an associate degree and eventually a bachelor's degree in the field.

The Student-of-the-Year awards are always among the most enjoyable activities of a UTC year. This time the University of Toledo not only had one recipient, but two. Samir Dhar, a graduate student in Geography and Planning, was the awardee from the UT-UTC. Chris Schroeder, a Ph.D. student in the College of Engineering, received the award from the MIOH UTC at the University of Detroit – Mercy.

Another very special occasion for UT graduate students in the Department of Information Operations Technology Management in the College of Business Administration came when the International Symposium and Workshop on Global Supply Chain, Intermodal Transportation, and Logistics Management was held in Toledo. This was part of a UTC funded project to build an international network of scholars and educators. The students were deeply involved in putting the symposium together, attended all sessions and the dinner, with some presenting papers in the symposium sessions. This was a valuable intellectual experience and offered the students a chance to meet noted scholars from around the world. The UT-UTC also sponsored one Ph.D. student, James Roh, to participate in the second symposium and workshop in Busan, Korea in May.

Research

Year 2 saw much activity from the research projects which were funded in the first year as well as the selection of new projects.

Continued development of the project to create the Great Lakes Maritime Information Delivery System showed exciting results. With a focus on waterborne commerce connected to landside transportation networks, it will be an integral part of the development of short sea shipping on the Great Lakes and St. Lawrence Seaway. With initial support provided by the Midwest Regional UTC at the University of Wisconsin-Madison and the UTC at the University of Illinois-Chicago, continued funding is provided by the UT-UTC and the Great Lakes Maritime Research Institute, a consortium of the University of Wisconsin-Superior and the University of Minnesota-Duluth.

New projects were funded including assessing the value of ITS information on congestion avoidance, a novel image database analysis system for the maintenance of transportation facilities, a study of the impacts of infrastructure utilization focused specifically on the airline industry, an analysis of public-private partnerships as it relates to the Indiana toll road with special attention to the implications on freight and, looking into the future, a project which conceptualizes a dedicated high speed transportation corridor.

As part of the focus area of alternate energy, work continues on a project addressing the noise & vibration of hydraulic hybrid and plug-in hybrid electric vehicles. In the area of infrastructure utilization, the project developing a testing framework for alternative ownership of the proposed Detroit-Windsor river crossing headed toward the end of Phase I. The supply chain project to develop software to schedule drivers under the new hours-of-service regulations has moved to the stage of interacting with companies.

Education/Research/Technology Transfer

The project to build an international network of scholars and educators was especially productive. In October the first in a series of symposia and workshops on global supply chain, intermodal transportation and logistics management was held in Toledo at the University. The second was held in May in Busan, Korea.

At the Toledo event, over 80 academics, transportation practitioners and students were in attendance from eight countries. A significant element of this event was the opportunity for graduate students at UT to not only attend all the sessions, but to present papers. As part of the agenda, a session was held for future planning to build the Network and hold future events. Symposia and workshops are scheduled for India and Madrid in 2009, and Taiwan in 2010.

The second symposium in Busan brought together 64 participants from more than 20 universities in seven different countries. The proceedings, including the 30 papers presented in eight sessions, can be found on the UT-UTC web site at www.utoledo.edu/research/ututc/network. The welcome address was given by Dr. Hokey Min of partner Bowling Green State University. The event concluded with a tour of the Hyundai Motor Company and Hyundai Heavy Industries. Special issues of the *International Journal of Logistics Systems and Management* and the *International Journal of Services and Operations Management* are to include papers presented at the symposium.

UT faculty held meetings with Hanyang University, Yonsei University, and Korea University in Seoul which provided the opportunity to meet with faculty and graduate students at the universities and to facilitate future cooperation. Project Co-PI, Dr. Paul Hong, and former UT-UTC Director, Dr. Mark Vonderembse, also met with the top management of Korea Express during which an agreement was reached to work with the company on global supply chain research.

The Network maintains its connection to the International Cargo Handling Coordination Association, ICHCA LLC, headquartered in London, from which the impetus for the development of a Research and Education Panel emanated.

Technology Transfer

The third in a series of data workshops "Great Lakes: From Data to Markets to Shipping Opportunities" was held at the University of Toledo concurrent with the International Symposium. After a review of Great Lakes related projects and the Great Lakes database, the group focused on discussing a program plan for developing markets and moving into the commercialization phase.

Further discussion of short sea shipping was the subject of "Modern Ship Services and Ship Building on the Great Lakes Think Tank #1" conducted by the Toledo-Lucas County Port Authority in which UT faculty and UT-UTC staff participated. Focusing on the development of and introduction of new types of vessels to expand short sea shipping, this forum brought together public agencies, researchers, and private sector ship builders.

Both Director Martinko and Former Director Vonderembse were presenters at the 2007 Ohio Conference on Freight held in Toledo in September presented by the Toledo Metropolitan Area Council of Governments. Members of the ITI Executive Committee and UT-UTC Policy Committee were integrally involved in this event: Tony Reams, President of TMACOG, was the organizer and host; Dave Dysard, District Deputy Director of ODOT District 2, gave the luncheon address, and Jim Hartung, President/CEO of the Toledo-Lucas County Port Authority, introduced the keynote speaker, Terry Johnson, Jr., Administrator of the St. Lawrence Seaway Development Corporation.

A major development in the role of UT-UTC Director Martinko came as the possibilities for the location of intermodal facilities in the region became a focus of local media. As new shipping routes and deep water ports are brought on-line to handle the ever growing cargo from Asia, the hope of building facilities to move the increased flow of freight has become a prized economic development prospect. As various public and private entities fed the discussion, Director Martinko was called upon to explain what came to be known as a Transportation Opportunity District (TOD), what it was and what it could mean to the community. In addition to interviews on radio, TV, and for the print media, plus making presentations to numerous interested public and private forums, he also gathered a stellar group of public and private leaders in a think tank session to brand the concept and move it forward. The ITI/UT-UTC will continue to be heavily involved in the initiatives to build the region through newly identified transportation related projects.

Cooperative Activities

The University of Toledo is a partner in the Michigan-Ohio (MIOH) UTC at the University of Detroit-Mercy where it has four funded projects. It is also a partner in the National Center for Freight Infrastructure Research and Education (CFIRE) at the University of Wisconsin-Madison from which \$500,000 in project funding will be received over five years. As an affiliate university of the Great Lakes Maritime Research Institute (GLMRI), a consortium of the University of Wisconsin-Superior and the University of Minnesota-Duluth, continued funding has been provided for the Great Lakes Maritime Information Delivery System data collection project.

EDUCATION

UT-UTC Student-of-the-Year Samir Dhar

Samir Dhar, a graduate student in the Department of Geography and Planning, was selected as the UT-UTC Student-of-the-Year. In addition to the \$1,000 award, Samir received a trip to Washington, D.C., to attend the Council of University Transportation Centers (CUTC) Award Banquet plus registration and expenses for the Transportation Research Board conference which started the



Right to left: Former US DOT Secretary Norman Mineta, Samir with award, RITA Administrator Paul Brubaker, CUTC President Ron Diridon

following day. Joining Samir at dinner was his wife, Madhavi, and UT-UTC assistant director, Christine Lonsway. Samir was one of the 46 students from across the country being recognized for their exceptional work in transportation. Keynote speaker at the dinner was the Honorable James Oberstar, Chairman of the U.S. House Transportation and Infrastructure Committee, who received the CUTC Lifetime Achievement Award.

for the Great Lakes Maritime Research Institute, and developing the GIS of all Ports/Docks in the Great Lakes region for the US Army Corps of Engineers. He has also worked on Location-Analysis for site selection for retail outlets and fire stations; developed the EMS routing between emergency centers and trauma centers; developed a detailed regional database of international air freight volumes from the US to Europe, Asia and South America; and also worked on developing the GIS for the sewer system in the City of Toledo.

Samir was selected as Student-of-the-Year because of the integral role he played in the successful completion of the Corridor Study and the combination of IT and academic rigor he brings to his research.



Samir and Madhavi at the awards dinner

UT Student Chris Schroeder Honored as MIOH-UTC Student-of-the-Year



Chris Schroeder, a graduate student in the College of Engineering at UT, was selected as the Student-of-the-Year by the Michigan-Ohio UTC and was honored at the Council of University Transportation Centers Award Banquet in Washington, D.C. Joining him at this special occasion was his proud father, Thomas Schroeder, and MIOH-UTC assistant director, Patricia Martinico.

Chris is working on the MIOH funded project "Multipurpose Educational Modules to Teach Hydraulic Hybrid Vehicle Technologies." He is working with Dr. Mohammad Elahinia in the Department of Mechanical, Industrial and Manufacturing Engineering on the project. (See story below.) Nominees were rated on the significance of their contribution to a MIOH funded project plus their academic performance, professionalism and leadership, and university and community service activities.

Chris received a \$1,000 award plus registration and expenses for the Transportation Research Board conference in Washington, D.C.

MIOH-UTC Visit to UT Researchers & Students

On February 27th, the Michigan-Ohio UTC at the University of Detroit-Mercy visited partner institution, the University of Toledo, to review the projects they have funded. Joining in the visit was partner institution, Bowling Green State University.



Graduate Student Chris Schroeder (right) and project member, Dr. Mohammad Elahinia (center) discuss with Roland Kibler of NextEnergy the module to teach hydraulic hybrid vehicle technologies during the MIOH visit to UT.

The Director of the MIOH-UTC, Leo Hannifin, Assistant Director, Patricia Martinico, plus faculty and students from UDM came for the presentations by UT Engineering faculty members Dr. Mohammad Elahinia and Dr. Eddie Chou, and BGSU researcher, Dr. Hokey Min. Richard Martinko, UT-UTC Director, welcomed the group along with Vice President Frank Calzonetti. Graduate students from the UT College of Engineering also participated in the lively discussions.

Following the presentations, Chris Schroeder led the group to view the test stand that is being developed as part of the MIOH funded project that will enable students to evaluate the performance of dual-function hydraulic pump/motors as the main components of hydraulic hybrid vehicles. Alternate energy is a focus area for both MIOH and the UT-UTC.

Funded Projects – New: Education

Developing a Certificate Program in Transportation, Logistics, and Supply Chain Management

Focus Area: Supply Chain Management

Abstract: It is essential to train and educate professionals, who are responsible for managing and organizing transportation and logistics services. These services are vital to the success and continuing improvement of the supply chains that connect various industries to consumers both nationally and internationally. The program that is being developed is a nine credit hour certificate program to be offered initially by the University of Toledo and will carry with it college credit. As this program succeeds, it may be offered by other universities. The program will focus on basic concepts in managing and operating transportation and logistic systems such as dispatching, inventory, and scheduling. The efforts to develop the curriculum will be guided by private sector shippers and carriers as well as companies who support these carriers such as firms who provide insurance or equipment. This program is targeted at people who are currently working in transportation and logistics who are interested in furthering their education but are not prepared to begin a two-year or four-year degree program. The program will be offered in a distance learning format, so employees from around the region can continue working while making progress towards a management career in transportation and logistics. Because these courses are offered for college credit, they could become part of a plan to achieve an associate degree and eventually a bachelor's degree in the field.

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Project Dates: 05.05.2008 – 12.31.2008

Project Awarded: FY 2008

UT-UTC Designation: UTUTC-SC-5

Funding:

UT-UTC Grant Amount	\$10,000
Match Amount	\$18,289
Total Project Budget	\$28,289

Development of a Secondary Level Education Program in Transportation, Logistics, and Supply Chain Management

Focus Area: Supply Chain Management

Abstract: It is essential to train and educate students at the secondary level who are interested in becoming responsible for managing and organizing transportation and logistics services. These services are vital to the success and continuing improvement of the supply chains that connect various industries to consumers both nationally and internationally. The program that is being developed is a for credit program to be offered in Career-Technical High Schools and Career Centers, and will ultimately lead students to receive college credit through articulation agreements with The University of Toledo. The program will focus on basic concepts of transportation and logistic systems such as dispatching, inventory, and scheduling. The efforts to develop the curriculum will be guided by private sector shippers and carriers as well as companies who support these carriers such as firms who provide insurance or equipment. This program is targeted at students in grades 11/12 who indicated an interest in working in transportation and logistics and who are interested in furthering their education in these fields. The program will be offered in a distance learning format, so that the students may enroll as a regular part of their high school curriculum or as an additional elective. Because these courses are offered with the possibility of college credit, they could become part of a plan to achieve an associate degree and eventually a bachelor's degree in the field.

Principle Investigator:

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Project Dates: 05.05.2008 – 04.30.2009

Project Awarded: FY 2008

UT-UTC Designation: UTUTC-SC-6

Funding:

UT-UTC Grant Amount	\$10,000
Match Amount	\$18,126
Total Project Budget	\$28,126

Funded Projects – Ongoing: Education

Incorporating Intermodal Transportation into the Spatially Integrated Social Sciences

Focus Area: Infrastructure Utilization

Abstract: The purpose of this proposal is to request development funds to expand the role of intermodal transportation in the newly proposed Spatially Integrated Social Science Ph.D. Program to be administered jointly between the Departments of Geography and Planning, Economics, Political Science and Public Administration, and Sociology and Anthropology at The University of Toledo. The particular transportation-related areas of interest that the SISS program that complement the UT UTC will be in the areas of Transportation for National Security, Transportation and Regional Economic Development, Infrastructure Utilization, and the spatial dimensions of Supply Chains. Each of these topics readily lend themselves to the faculty expertise, the available geospatial technology, and the regional economic needs of northwest Ohio. Furthermore, the SISS faculty will focus on the movement of people among all modes of the transportation system and in the conflicts that arise between the movement of freight and the movement of passengers. Specific areas of transportation research and teaching will include: 1) Transportation and urban form; 2) Transportation, Public Administration and Policy; 3) Transportation Analysis and Quantitative Methods; 4) Intermodal Transportation—Passenger and Freight; 5) Infrastructure Utilization and Planning; and 6) Transportation and the Environment. It is anticipated that transportation and all of its spatial dimensions will play a pivotal role in this program and will attract students with an interest in combining an analytical approach to studying transportation, but from a perspective that appreciates the contribution of diverse social science disciplines to understanding this important spatial process.

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Project Dates: 05.03.2007 – 06.30.2009

Project Awarded: Year 1

UT-UTC Designation: UTUTC-IU-3

Funding:

UT-UTC Grant Amount	\$8,706
Match Amount	\$8,706
Total Project Budget	\$17,412

Develop a Plan for Cooperative Education in Supply Chain Management at the Undergraduate Level

Focus Area: Supply Chains

Abstract: Cooperative education enables undergraduate students to work in the environment that they will face when they graduate. It integrates hands-on business experience with academic training. It provides students with an understanding of how concepts and ideas that are discussed in the classroom are used in the business world. It also provides motivation and a willingness to learn that is difficult to establish without this experience.

This project will lay the foundation for developing a cooperative education program for the Supply Chain Management Area of Specialization within the Bachelors of Business Administration at the University of Toledo. The purposes of this effort are to enhance the students' experiences thereby making them more marketable and to increase enrollment.

It will develop goals and objectives for the program, outline a curriculum, develop an organizational structure that enables students to graduate in a timely manner, and make a recommendation for successful implementation. During this process, the PI will meet with appropriate managers and staff in the College of Engineering at the University of Toledo, where a mandatory cooperative education program exists, as well as other universities that currently have cooperative education programs in Business Administration including the University of Cincinnati and with business organizations to determine their willingness to participate in the program.

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Project Dates: 09.01.2007 – 08.31.2008

Project Awarded: Year 1

UT-UTC Designation: UTUTC-SC-4

Funding:

UT-UTC Grant Amount	\$5,000
Match Amount	\$18,144
Total Project Budget	\$23,144

Funded Projects – Finished: Education

Global Supply Chain Management/Transportation Efficiency Systems Graduate Degree Program

Focus Area: Supply Chains

Abstract: Global Supply Chain Management/Transportation Efficiency Systems graduate degree program covers areas in global supply chain management and transportation efficiency. Global Supply chain management integrates global information, material and cash flow processes across all functions including sourcing, operations, return or recycling and logistics and planning – for both all partners. Supply chain system professional are the agents of change for e-business, manufacturing, high tech, service and consulting companies. Transportation system analysis and planning stress the conceptual and quantitative approaches to the analysis of transportation and related systems. The objective is to prepare students to identify, analyze, solve complex transportation, supply chain problems, and communicate those solutions towards their successful implementation.

The program could be very flexible which students with engineering/science/business backgrounds could take. There will be a core and a set of electives leading to two distinct specialties in two focused areas. Students must meet certain requirements such as having engineering/science background to take specialized courses in transportation. We could also identify some of the courses for undergraduates who want to get a concentration or double major.

This proposal is being submitted to leverage the collaborative work on developing a master's program with the University of Detroit Mercy – MIOH UTC and to further develop an international collaborative master's program in global supply chain management with help from ICHCA International Ltd.

Principle Investigator:

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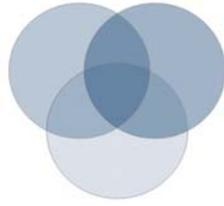
Project Dates: 05.08.2007 – 12.31.2007

Project Awarded: Year 1

UT-UTC Designation: UTUTC-SC-3

Funding:

UT-UTC Grant Amount	\$15,811
Match Amount	\$17,005
Total Project Budget	\$32,816



Research

Building an International Network of Scholars and Educators: Symposium and Workshop in Toledo, Ohio



As part of the UT-UTC funded project "Global Supply Chain Management/Transportation: Building a Global Network of Scholars and Educators," the *International Symposium and Workshop on Global Supply Chain, Intermodal Transportation, and Logistics Management* (<http://www.business.utoledo.edu/scm>) was held October 25-26, 2007 on the campus of the University of Toledo. The symposium was part of the original effort to develop a Research and Education Panel within the International Cargo Handling Coordination Association (ICHCA) which has international headquarters in London.

PI and Co-PI of the UTC project, Dr. Subba Rao and Dr. Paul Hong, headed the steering and organizational committees for the event.

Over 80 academics, transportation practitioners and students attended the event. Scholars came from India, Japan, Korea, China, Taiwan, Malaysia and Spain. Papers were presented on global supply chains, supply chain security, supply chain issues of small and medium enterprises, IT and supply chains, logistics management, instructional issues in relation to supply chain graduate and certificate programs, effective supply chain instruction methods, and developing global supply chain programs. Research seminar speakers included Dr. Mark Vonderembse (University of Toledo, College of Business), Dr. Hokey Min (Bowling Green State University, Current Research in Logistics Management and UT-UTC researcher) and Dr. Xenophon Koufteros (Security of Global Supply Chains, Texas A & M University).



Drs. Rao and Hong, Symposium leaders, third and fourth from the left, join UT and international participants at dinner.

Representatives from the business world also gave presentations on topics such as the supply chain practices of European firms, strategies for purchasing ocean container freight, global transportation and IT. The participants included Ford Motor Company, St. Luke's Hospital in Maumee, Ohio, Instituto de Empresa and the Toledo-Lucas County Port Authority.

Thursday evening a dinner was held in the historic Libbey Hall at the University. Over 70 symposium attendees and guests listened as Dr. Tom Gutteridge, Dean of the College of Business Administration, gave the welcoming remarks and

spoke about the vision of the University of Toledo as a research university and the College of Business as a leading institution with solid business research and instructional capabilities in the areas of global supply chains, intermodal transportation and logistics. Mr. James Hartung, CEO/President of the Toledo-Lucas Country Port Authority and International Chairman of ICHCA as well as Chairman of the Executive Committee of the ITI, spoke with passion on the mission of the Port and the role of transportation and commerce in promoting world peace.

A core group to form an international research network of universities, industries and businesses was established at a meeting during the symposium. This core group includes practitioners and researchers from organizations including Ford Motor Company, St. Luke's Hospital, the US Army Corps of Engineers and the Toledo-Lucas County Port Authority; twelve universities from the U.S. (The University of Toledo, Eastern Michigan University, the University of Detroit - Mercy, Texas A&M, Bowling Green State University & Wayne State University which are UT-UTC partners, Ball State University, Bryant College, College of Charleston, the University of Indiana at Purdue, the University of Wisconsin at Eau Claire, New Mexico State University) and eight universities from major U.S. trading partners including Korea (Kyungppok University and Youngdoing University), Japan (University of Tokyo), Taiwan (National Cheng King University), China (Yanshan University), Malaysia (Universiti Utara Malaysia), India (PSG Institute of Management) and Europe (Instituto de Empresa).

This core group decided to continue to expand the global research network and agreed to hold future meetings in Busan, Korea (May 2008), India (January 2009), Madrid (2009) and Spain (2010). Steering committees have been selected to develop the specific details for each event.

Sponsors of the symposium included the Great Lakes Maritime Institute, the University of Detroit-Mercy, the Toledo-Lucas County Port Authority, the University of Toledo College of Business, the UT International Business Institute, and the UT Intermodal Transportation Institute.



International Symposium Proves Valuable Experience for Graduate Students

Graduate students in the Information Operations Technology Management Department of the College of Business not only were able to attend the International Symposium and Workshop, but were integrally involved in putting the event together and participating in the conference. From developing the web site, finalizing the program, putting the materials together, serving as session chairs, presenting papers, enjoying the camaraderie of other participants at dinner, and even joining faculty as event photographers, they were part of it all. Without the cost of travel or registration, this was a great opportunity to participate in the exchange of information, and to meet and visit with noted academicians and transportation professionals from the region and around the world. Drs. Rao and Hong, symposium leaders, from the beginning planned the inclusion of the students. This proved not only to be a valuable educational experience for them but greatly added to the success of the event with their hours of effort and the contribution of their many talents.

Second International Symposium and Workshop in Busan, Korea

As a follow-up to the International Symposium and Workshop held at the University of Toledo last October, the second International Symposium and Workshop on Global Supply Chain, Intermodal Transportation and Logistics was held in Busan, South Korea on May 29-30, 2008. The full proceedings of the event can be found on the UT-UTC web site at www.utoledo.edu/research/ututc/network.

The meeting was sponsored by Busan National University, Korean Society for Supply Chain Management, Korea Research Foundation, Korea Science and Engineering Foundation, the University of Toledo, and Bowling Green State University. Former UT-UTC director, Dr. Mark Vonderembse, and Network of Scholars project Co-PI, Dr. Paul Hong, gave the keynote presentation. Thirty papers were presented in eight sessions on the topics: the use of genetic algorithm in supply chain management, reverse supply chain management, supply chain network design, case studies in value chain management, demand planning, new product development, the use of information technology in supply chain management, and global sourcing.

The meeting brought together 64 faculty members and students from more than twenty universities in seven different countries to discuss research ideas, to build research partnerships, and to identify specific actions that will foster future collaborations. The countries represented were China, Japan, Korea, Saudi Arabia, Taiwan, the United States, and Vietnam.

The objectives of the meeting were to identify best practices in supply chain management, to continue to build a global network of universities to study supply chain management, and to develop education and training programs. This is to be accomplished by faculty and student exchanges, cooperative research projects, and joint program development. The following specific actions were identified.

1. Define and conduct cross-national research and publications using cross-national research teams beginning in the summer of 2008. The University of Toledo will take the lead in developing the framework for the research and will hold video and teleconferences to work with the other universities to refine the document. A survey plan will be developed and implemented. Data will be collected every two to three years.
2. Faculty from two or more universities will work together on research to exchange research ideas and skills and to help faculty publish in top journals.
3. The universities involved will have faculty exchanges to facilitate this process. In August and September 2008, one faculty member from Korea and one faculty member from Japan will spend one to two months on the campus of the University of Toledo to work on research. Opportunities for faculty from the U.S. to teach and do research in Korea is not only allowable, it is strongly encouraged.
4. There are also opportunities for student exchange. This was discussed specifically with several Korean universities. UT currently has such an arrangement with PSG Institute of Management in Coimbatore, India.
5. Discussions of creating an international clearing house for research and an international publication series were discussed. This was put on hold until the research projects are up and running.

Special issues of the *International Journal of Logistics Systems and Management* (IJLSM) and the *International Journal of Services and Operations Management* (IJSOM) are to include papers presented at the symposium. At the time of this report, the papers are under review.

Future symposia and workshops are scheduled for India and Madrid in 2009, and Taiwan in 2010. The event concluded with a tour of the Hyundai Motor Company and Hyundai Heavy Industries.

The Network maintains its connection to the International Cargo Handling Coordination Association, ICHCA LLC, headquartered in London, from which the impetus for the development of a Research and Education Panel emanated.

In addition to attending the conference, UT faculty met with fellow faculty members and graduate students at Hanyang University, Yonsei University, and Korea University in Seoul. These meetings provided the opportunity to discuss future cooperation.

Dr. Paul Hong and Dr. Mark Vonderembse also met for more than three hours with the top management of Korea Express, including the president, Kook-Dong Lee. During this meeting an agreement was reached to work with the company on global supply chain research.



From the left:

*Dr. Mark Vonderembse (Professor of Information Operations Technology Management, College of Business, University of Toledo),
Dr. Paul Hong (Professor of Information Operations Technology Management, College of Business, University of Toledo),
Mr. Kook-Dong Lee (President and CEO, The Korea Express Co., Ltd.),
Mr. Young-Ju Lee (Executive Vice President and Head of Strategic Planning & Finance, Office of Chairman, Kumho Asiana Group),
Mr. Ha-Chang Lee (Vice President, The Korea Express).*

The Great Lakes Maritime Information Delivery System Project: Beyond Data into a New Phase



The project team is pictured in the January-March 2008 issue of *Great Lakes Seaway Review*: (from left) Dr. Peter Lindquist, Chair of the Department of Geography and Planning at the University of Toledo; student web developer, Tony Jayne; Research Technician, Samir Dhar; Project Manager, Sarah Schafer. Not pictured are students Tim Nord, Darian Chappel and Dan Nied.

Beginning in Year 1, the UT-UTC joined the Great Lakes Maritime Research Institute in funding the development of the Great Lakes Maritime Information Delivery System. Originally funded as part of the Upper Midwest Freight Corridor Study housed at the Midwest Regional UTC at the University of Wisconsin-Madison, it has expanded into its third phase of funding from GLMRI and the second at the UT-UTC. Moving beyond its beginning focus on an intermodal approach to freight movements through a seven state region surrounding the Great Lakes, it now focuses primarily on waterborne commerce connected to landside transportation networks. Funding from the U.S. Army Corps of Engineers. Began in 2008. Other project participants include the American Great Lakes Ports Association, the Canadian Chamber of Maritime Commerce, the Detroit Port Authority, the Great Lakes Commission, the Lake Carriers' Association, NOAA, the Port of Duluth, the St. Lawrence Seaway Development Corporation, Transport Canada, the U.S. Coast Guard, and the U.S. Maritime Administration

After gathering an extensive amount of information, the project team is moving into a new phase shifting from data collection to improving the delivery system by making it more user friendly. The system can be

previewed at www.maritime.utoledo.edu and the data viewer can be seen through the CITRIX link. To register for a temporary user ID and password, email Samir.dhar@utoledo.edu.

An article describing the evolution of the work and the system objectives appeared in the January-March 2008 issue of the *Great Lakes Seaway Review*. The full text of the article is available from the UT-UTC web site at www.utoledo.edu/research/ututc/publications.



Funded Projects – New: Research

Value of ITS Information for Congestion Avoidance in Inter-Modal Transportation Systems

Focus Area: Infrastructure Utilization

Abstract: This research project addresses a major issue contributing to the transportation network efficiency that directly affects supply chain efficiency. The issue is the effect of *congestion at inter-modal terminal facilities* and *road network incidents* on the delivery reliability within inter-modal freight transportation networks. Non-recurring events on road network, such as incidents, as well as inter-modal terminal incidents (accidents, repair, construction, equipment breakdown, labor strikes, etc.) and peak period congestions (e.g., due to seasonal loads) at the inter-modal terminals are the major sources of delay in inter-modal transportation systems. Traditional methods such as capacity expansion with infrastructure investments (network and inter-modal terminals) or buffering methods (e.g., inventory, headways, surplus fleet capacity) prove to be expensive coping mechanisms. Alternative to these expensive and temporary coping mechanisms, Intelligent Transportation Systems (ITS) can provide real-time inter-modal network status information to the users who can then respond to avoid and/or reduce the impact of transportation delays. Specifically, we plan to evaluate the benefits to supply chain logistics from real-time information available through current and future ITS Systems to reduce congestion at both inter-modal freight terminals as well as road networks. More specifically, we will first measure the inter-modal delivery reliability and quantify the impact of delays in inter-modal freight transportation systems on the operations of selected carriers (UPS and C.H.Robinson) and JIT supply chains (Ford inbound and outbound logistics). Next, we will develop simulation and optimization models and algorithms to reduce the impact of and/or avoid congestion in inter-modal freight transportation for supply chain logistics efficiency. In order to generalize our results, we will design and perform survey studies and implement models and algorithms among other representative shippers and carriers in the Michigan and Ohio region. Finally, we will perform a selective cost/benefit analysis of utilizing real-time information from ITS systems for our collaborators.

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Project Dates: 08.15.2007 – 08.14.2008

Project Awarded: FY 2008

UT-UTC Designation: UTUTC-UI-4

Funding:

UT-UTC Grant Amount	\$ 55,000
Match Amount	\$ 77,203
Total Project Budget	\$132,203

A Novel Image Database Analysis System for Maintenance of Transportation Facility

Focus Area: Infrastructure Utilization

Abstract: Transportation is critical to the global economy and plays a particularly vital role in this region's economic growth. Transportation informatics is an emerging interdisciplinary area with focus on innovative use of information technologies for transportation purposes. The goal is to ensure safe and efficient movements of passengers and freights through speedy processing of complex information for on-time decision making.

A group of UT faculty members with diverse expertise related to transportation informatics have worked together to collaborate on research. Image analysis, pattern recognition and decision making for transportation applications have been identified as an area of common interest. Several members have been engaging in research using imaging technologies, including applications for transportation facility inspection purpose. The demands for automated inspection, monitoring, and pattern recognition for transportation applications are ever increasing, partly driven by homeland security concerns, while the costs of imaging technologies have becoming more affordable. Some technologies developed for military or medical applications could be suitable for civilian transportation used. The research group's vision is to develop a self-sustained, externally funded research area in transportation informatics at UT to develop a functioning prototype system to automatically process, store, analyze, and extract information from images for the purpose of inspection, monitoring, and detection of transportation facility.

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Project Dates: 05.01.2008 – 04.30.2009

Project Awarded: FY 2008

UT-UTC Designation: UTUTC-IU-5

Funding:

UT-UTC Grant Amount	\$12,000
Match Amount	\$16,124
Total Project Budget	\$28,124

Regional Freight Information Resources in the Great Lakes Maritime Transportation System – Phase II

Focus Area: Infrastructure Utilization

Abstract: The purpose of this proposed project is to expand the Great Lakes Maritime Information Delivery System's information gathering efforts to include AIS vessel tracking and to incorporate these data into the comprehensive maritime database. The Great Lakes Maritime Information Delivery System is a comprehensive data repository and information clearinghouse for the maritime industry in the Great Lakes and Seaway. The main objective for the system is to promote sustainable maritime transportation in the region by serving as an information resource for public policy decision making and for drawing the link between maritime freight movements, economic viability, and environmental quality throughout the region. The system is designed to be a diversified web-based information delivery site that houses a detailed data repository consisting of 1) vessel movements and commodity flows, 2) port and dock functions, 3) regional economic activity, and 4) regional population/socioeconomic patterns. One important element in this phase of the project will be to develop methods and techniques needed to acquire data through the Automatic Identification System (AIS), currently being developed in the GL MTS. The project team will work with third party data providers to obtain vessel movements and port calls down to the specific dock location. These data will then be aggregated into the system's data repository as a means to measure the volume of traffic and cargo flows through the system. In time, the project team can use these data to track trends in ship traffic, identify locations for intermodal connections to landside transportation networks, and to provide an important foundation for developing a Great Lakes Maritime Exchange for the system. This project will also enable the expansion of the information delivery system to provide data pertaining to the economic impact of great lakes shipping on the regional economy, linking the GL MTS to the wider regional intermodal freight system. Users can thus retrieve data concerning such factors as tonnages, value of cargo, scheduled service, ship technologies, dock and port facilities and intermodal connections.

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Project Dates: 05.01.2008 – 04.30.2009

Project Awarded: FY 2008

UT-UTC Designation: UTUTC-IU-6

Funding:

UT-UTC Grant Amount	\$ 50,000
Match Amount	\$ 50,409
Total Project Budget	\$100,409

Travel Behavior of U.S. Domestic Airline Passengers and Its Impacts on Infrastructure Utilization

Focus Area: Infrastructure utilization

Abstract: The airline carriers have failed to raise their level of service to meet on- and off- board service quality demands by the passengers in recent years. In fact, the level of service has been lowered by the airline carriers in the past decade. Unexpected and unannounced delays and cancellations of flights have emerged as a quasi-normal phenomenon in recent months and years. The airline unreliability is becoming unbearable day by day; however, the volume of airline passengers on domestic routes in the United States has risen in recent years despite the lowering of level of service and the devastating terrorist acts of September 11, 2001. Some speculate that this increased ridership has caused extra pressure on available infrastructure such as airports. However, the causes of increases in air passenger volume despite the presence of frictional factors such as low level of service have not been thoroughly investigated by academicians recently. The nature of current air passenger travel behavior is also largely unexplored. I propose to study the travel behavior of airline passengers and investigate the contributing factors leading to increases in the volume of airline passengers on U.S. domestic routes. I intend to investigate whether the travel demand by the airline passengers has crossed the threshold infrastructure utilization level. I also propose to investigate whether low level of service has caused air passengers to divert to ground transportation. If so, I intend to analyze its impacts on ground transport infrastructure utilization and costs. Initially, I plan to investigate these factors analyzing the in- and out-bound domestic flights in the airports of this region: Chicago's O'Hare International Airport (ORD), Detroit Metropolitan Wayne County International Airport (DTW), Cincinnati-Covington International Airport (CVG), Cleveland Hopkins International Airport (CLE), and Toledo Express Airport (TOL). If I encounter any unforeseen trouble with data on any of the said airports while working on the project, I'll select other appropriate airports and work on those. In this regard, I'll greatly appreciate the advice from UT-UTC on selecting most appropriate airports for this study. If funding continues for the second stage, I'll increase the scope of my study and investigate the travel behavior of airline passengers and infrastructure utilization at the national level. I'll conduct a longitudinal study of the last decade using the dataset provided by the Bureau of Transportation Statistics.

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Project Awarded: FY 2008

UT-UTC Designation: UTUTC-IU-7

Funding:

UT-UTC Grant Amount	\$20,000
Match Amount	\$20,102
Total Project Budget	\$40,103

An Analysis of the Status and Impacts of Public Private Partnerships of the Indiana Toll Road

Focus Area: Infrastructure Utilization

Abstract: In light of funding shortfalls and continuous demand for the construction and maintenance of highways nationwide, public private partnerships (PPPs) in conjunction with road pricing have recently been garnering tremendous attention from federal, state, and local governments in the U.S. One of such examples is the Indiana Toll Road, which runs through northern Indiana and connects to the Chicago Skyway in the west and the Ohio turnpike in the east. It is one of the most critical transcontinental routes that moves freight to and from major US distribution hubs. Tolls are collected either by cash or the electronic toll system.

While this PPP arrangement with tolls has brought substantial amount of funding to Indiana to support other transportation improvement projects in the state, it is still uncertain whether or not this arrangement will bring the net benefit to the society in the long term. In particular, most debates do not address the impact of a private management of this corridor on freight movement as well as passenger travel, taking into account coordination among states of Illinois, Indiana, and Ohio, where the interstate highway 80/90 runs through.

This study will investigate the impacts that the PPP arrangement of the Indiana Toll Road has brought after its introduction. We will examine the status of the PPP management of the toll road, its impacts on the road users, and its effects on the connected highway facilities, using the document and data collected from public agencies and private firms involved in this PPP concession deal. Combining the findings and the forecasted toll rates for the Indiana Toll Road, this study will infer the implication of the PPP management of the Indiana Toll Road on the eastern side of the interstate highway 80/90—the Ohio Turnpike in the future, addressing the connectivity issue of the highway network in the presence of the private sector management.

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Project Awarded: FY 2008

UT-UTC Designation: UTUTC-IU-8

Funding:

UT-UTC Grant Amount	\$19,267
Match Amount	\$19,652
Total Project Budget	\$38,919

High Speed Transportation Corridor: A Conceptual Framework

Focus Area: Supply Chains

Abstract: Here we describe a high speed road corridor and propose to develop a conceptual framework for such a corridor. This proposed corridor will allow for environmentally friendly and convenient transportation for people and materials. This conceptual framework will explore the application of current and emerging technologies for developing high-speed road corridors to link major destinations for materials and people. The concept is to have trucks and cars travel through these corridors at speeds of over 120 mph safely and cleanly. These vehicles will have the ability to use the proposed corridor as well as existing roads, thus providing flexibility.

The project will address the following:

1. First we will describe the forces that have come together to manifest the need for such a corridor.
2. Next we will describe the concept in some detail.
3. This is followed by some of the technological, management and safety challenges that must be addressed.
4. Finally, we will identify available technologies that can be applied to develop such a corridor.

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Project Dates: 05.01.2008 – 05.01.2009

Project Awarded: FY 2008

UT-UTC Designation: UTUTC-SC-7

Funding:

UT-UTC Grant Amount	\$10,000
Match Amount	\$17,924
Total Project Budget	\$27,924

Funded Projects – Ongoing: Research

Reducing Noise and Vibration of Hydraulic Hybrid and Plug-In Hybrid Electric Vehicles

Focus Area: Alternate Energy

Abstract: The University of Toledo University Transportation Center (UT-UTC) has identified hybrid vehicles as one of the three areas of the research. The activities proposed in this research proposal are directed towards the noise, vibration, and harshness (NVH) solutions for hybrid vehicles. The soaring fuel prices require imperious steps in developing alternate propulsion technologies. The design and development of hybrid vehicles is a critical issue for an economy dependent on an efficient, fast, and secure transportation system. To date, better fuel economy has been mainly achieved by combining two propulsion sources (hybridization) and/or by developing better managing algorithms for the internal combustion engines. Examples for the hybridization are the plug-in hybrid electric and the hydraulic-hybrid vehicles. An example of managing internal combustion engines is the cylinder on demand as a solution that Honda has recently introduced. One common problem with these solutions is excessive noise and vibration that is caused by switching between the propulsion sources and propulsion modes. To mitigate this problem there is a need to develop vibration isolation devices that can provide isolation over a wide range of frequencies. This proposal seeks to study the NVH problem of the hybrid vehicles and to introduce isolation mounts to overcome these issues.

Hydraulic and elastomeric mounts are generally used to dynamically isolate engines and power trains from the chassis, while statically holding these elements together. Hydraulic mounts overcome some of the drawback of the elastomeric mounts. The stiffness and damping of the hydraulic mounts vary with frequency and amplitude of vibration. It is possible to design a hydraulic mount that has a significantly larger static stiffness, compared to an elastomeric mount, and has a much smaller dynamic stiffness at a specific frequency. To achieve low vibration transmissibility, the mount can be tuned to the primary frequency of the vibration source. On the other hand, to isolate the high frequency vibration of the engine the mount should have low stiffness and low damping, which is not possible to achieve.

This proposal proposes to develop a semi-active mount, which will be realized by improving the existing hydraulic mounts through adding a magnetorheological (MR) fluid element. In response to magnetic fields, MR fluids change their viscosity, which can be harnessed in a variable stiffness and damping mount. The resulting mount will provide shock and vibration isolation over a wide range of frequencies. This extended isolation frequency range will be achieved through the variable dynamic stiffness of the MR portion of the mount. This solution will make it possible to improve the noise and vibration characteristic of hybrid vehicles with alternative propulsion systems.

Principle Investigator:

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Project Dates: 08.01.2007 – 12.31.2008

Project Awarded: FY 2007

UT-UTC Designation: UTUTC-AE-1

Funding:

UT-UTC Grant Amount	\$50,000
Match Amount	\$52,948
Total Project Budget	\$102,947

Developing and Testing a Framework for Alternative Ownership, Tenure and Governance Strategies for the Proposed Detroit-Windsor River Crossing

Focus Area: Infrastructure Utilization

Abstract: The United States and Canada share the largest trading relationship in the world, and currently account for approximately \$200 billion of annual surface trade between Southwestern Ontario and Southeastern Michigan. This figure is expected to reach \$300 billion by the year 2030. The Central Business Districts of the cities of Detroit and Windsor are currently connected by a bridge and a tunnel, both built during the late 1920s, that constitute the vital trade corridor between the two countries. The Ambassador Bridge (a four lane facility) is privately owned and operated, while the Detroit-Windsor Tunnel is a two-lane facility jointly owned by the two cities and operated by a private corporation.

During the last few years, a number of studies have been undertaken by the Michigan Department of Transportation and the Ontario Ministry of Transportation to investigate the need, location and type of a proposed third river crossing connecting the cities of Detroit and Windsor. These studies appear to indicate a strong need for such a river crossing, even though its exact location, access and type (tunnel, bridge, etc) are yet to be determined. Nor has any decision been made on the Ownership, Tenure and Governance (OTG) of the proposed crossing.

The purpose of this study is to develop an analytic framework that can be used to test alternative OTG scenarios for the proposed river crossing, including public, private and various joint ownership scenarios. The proposed framework will, among other things, incorporate the concept of "investment decision under uncertainty." The estimates of the project costs and benefits (particularly those beyond the immediate future) are likely to be characterized by significant variances. The risks and uncertainties associated with these estimates will be incorporated in the proposed framework. The framework developed will be tested with data that may be available from different published reports and from the Michigan Department of Transportation.

Principle Investigator:

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Project Dates: 06.15.2007 – 09.30.2008

Project Awarded: FY 2007

UT-UTC Designation: UTUTC-IU-1

Funding:

UT-UTC Grant Amount	\$41,010
Match Amount	\$41,090
Total Project Budget	\$82,100

Regional Freight Information Resources for Market Opportunities in the Great Lakes Maritime Transportation System

Focus Area: Infrastructure Utilization

Abstract: The purpose of this proposed project is to extend the Great Lakes Maritime Information Delivery System to include data for market opportunities for shippers and carriers for diverting freight to the Great Lakes Maritime Transportation System (GL MTS). The Great Lakes Maritime Information Delivery System is a comprehensive data repository and information clearinghouse for the maritime industry in the Great Lakes and Seaway. The main objective for the system is to promote sustainable maritime transportation in the region by serving as an information resource for public policy decision making and for drawing the link between maritime freight movements, economic viability, and environmental quality throughout the region. The system is designed to be a diversified web-based information delivery site that houses a detailed data repository consisting of 1) vessel movements and commodity flows, 2) port and dock functions, 3) regional economic activity, 4) regional population/socioeconomic patterns, and 5) environmental impacts. To date, the development of the system has concentrated on developing an information base that emphasizes regional economic impact of the GL MTS, linking the GL MTS to the wider regional intermodal freight system, safety, environmental impacts/benefits, shipper savings, rate comparisons, and congestion effects of other modes compared to GL MTS. The project proposed here will enable users to retrieve data concerning such factors as Tonnages, Value of Cargo, Scheduled Service, Ship Technologies, Dock and Port Facilities, Intermodal Connections and Transshipment Costs. As a result, data will be made available for developing market plans that can identify key decision makers and market segments that can be served by the GL MTS, tonnages and cargo values associated with those markets, scheduled service and frequency of service that can be established, and ship technologies that can be used to optimize flows through the system.

Principle Investigator:

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Project Dates: 05.03.2007 – 08.31.2008

Project Awarded: FY 2007

UT-UTC Designation: UTUTC-IU-2

Funding:

UT-UTC Grant Amount	\$26,283
Match Amount	\$27,322
Total Project Budget	\$53,605

Combined Truck Routing and Driver Scheduling Problems Under Hours-of-Service Regulations

Focus Area: Supply Chains

Abstract: Since driver fatigue has known to be the primary cause of serious truck crashes, the Federal Motor Carrier Safety Administration (FMCSA) has attempted to implement new hours-of-service (HOS) regulations that aimed to promote safer driving environments. The new HOS regulations effective in January 4th of 2004, however, may lead to substantial cost increases for the trucking industry which will in turn hurt shippers and ultimate customers. For instance, motor carriers may need to hire additional 84,000 drivers to comply with new HOS rules requiring that drivers be placed out-of-service until they accumulated enough off-duty time. In particular, off-duty break required to refresh driving hours was increased to 10 consecutive hours from the old rule of eight cumulative hours. A chronic shortage of truck drivers would further aggravate the additional driver recruitment problem. In addition, due to potential loading/unloading delays and stiffer fines/penalties resultant from new HOS rules, motor carriers such as Schneider National estimated that trucking productivity would decline by 4-19% (WERC Sheet, 2004). To better cope with the challenges of declining trucking productivity, this project develops an intelligent decision support system that will aid logistics executives and transportation planners in creating optimal truck routes and schedules under HOS rules.

Principle Investigator:

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Project Dates: 07.01.2007 – 02.28.2009

Project Awarded: FY 2007

UT-UTC Designation: UTUTC-SC-1

Funding:

UT-UTC Grant Amount	\$41,000
Match Amount	\$41,029
Total Project Budget	\$82,029

Global Supply Chain Management/Transportation: Building a Global Network of Scholars and Educators

Focus Area: Supply Chains

Abstract: Research on Global Supply Chain Management/Transportation Efficiency Systems is critical to US competitiveness. Global Supply chain management integrates global information, material and, cash flow processes across all functions including sourcing, operations, return and recycling, and logistics and planning – for all partners. Supply chain system professional are the agents of change for e-business, manufacturing, high-tech, service and consulting companies. Transportation system analysis and planning stress the conceptual and quantitative approaches to the analysis of transportation and related systems. The objectives are (1) to engage in international network of research collaboration to identify, analyze, and solve complex transportation and supply chain problems and to communicate those solutions to achieve successful implementation and (2) to develop education and training programs that meet the needs of transportation, logistics, and supply chain professionals around the world.

The planned activities are with researchers and educators from Africa, Asia, Australia, Europe, North America, and South America. The development of these programs depends on leveraging the diverse collaborative work that has been established with International Cargo Handling and Coordination Association (ICHCA) International Ltd, International Manufacturing Strategic Survey (IMSS), Supply Chain Symposium, and MIOH UTC, and University of Toledo Manufacturing Management Alumni network.

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Project Dates: 05.08.2007 – 12.31.2008

Project Awarded: FY 2007

UT-UTC Designation: UTUTC-SC-2

Funding:

UT-UTC Grant Amount	\$49,994
Match Amount	\$57,809
Total Project Budget	\$107,803

TECHNOLOGY TRANSFER

The Third Great Lakes Workshop: From Data to Markets to Shipping Opportunities

A workshop titled *“Great Lakes: From Data to Markets to Shipping Opportunities – The Third in a Series”* was held at The University of Toledo October 26, 2007. Sponsored by the Great Lakes Maritime Research Institute (University of Wisconsin - Superior and University of Minnesota - Duluth), the University of Toledo Intermodal Transportation Institute and University Transportation Center, UT’s Geographic Information Science and Applied Geography Center, and the Toledo-Lucas County Port Authority, the workshop aimed at increasing freight movements on the Great Lakes.

The two previous meetings focused on data needs and sources. This third meeting centered on implementation of the data delivery system including mapping ports and docks, and developing a vessel tracking system. The goal is to develop a comprehensive information resource accessed at a single location that will support a variety of interests. Additional discussions addressed ship technology and shipbuilding on the Great Lakes.

Dr. Peter Lindquist and Samir Dhar of the Geography Center gave a report on the recent development activities of the database following a progress report by Carol Wolosz, Assistant Director, on the projects at the Great Lakes Maritime Research Institute. During lunch, uses of the database to define market opportunities and how the information could aid economic development efforts was discussed.

Integral to shipping opportunities on the Great Lakes are new designs and new uses of ships themselves. David Singer from the University of Michigan presented his research on opportunities for ship building on the Great Lakes. The workshop closed with a very frank discussion on the development of a specific program plan for commercialization.



Dr. Peter Lindquist, Chairman of the Department of Geography and Planning, and Carol Wolosz, Assistant Director of GLMRI, both presenters at the Great Lakes Workshop, talk with doctoral student, Erika Marsillac before dinner

Attendees included representatives of the U.S. Army Corps of Engineers, Great Lakes Commission, the Port of Monroe (Michigan), the Toledo-Lucas County Port Authority, the Detroit/Wayne County Port Authority, the Maritime Administration, the U.S. St. Lawrence Seaway Development Corporation, the U.S. Coast Guard, Steiner & Associates, and the Lake Carriers Association. Also in attendance were students from the classes of Dr. Lindquist, who wrote short papers on the presentations, plus many graduate students from the Department of Geography and Planning.

Transportation on the Great Lakes

Ship and Port Design for Short Sea Shipping on the Great Lakes

Short Sea Shipping is the ability to move freight by water as an alternative to overland hauling via rail or truck. Marine transport has increasing relevance as more possibilities develop in the St. Lawrence Seaway and the Great Lakes as the result of deep water port expansion in the Straits of Canso along Canada's eastern coast. Transporting containers inland to the Midwest via water requires the development of new technologies in ship and port design. Director Martinko has been closely involved with local groups in educating and facilitating initiatives in marine associated intermodal transportation.

Dr. Pete Lindquist, PI of the UT-UTC project gathering data on the Great Lakes maritime transportation system, along with members of his research team and UT-UTC staff, participated in the Toledo-Lucas County Port Authority sponsored gathering "Modern Ship Services and Ship Building on the Great Lakes Think Tank #1" to discuss innovative new services and vessel designs that are being considered now and in the future to better serve commerce on the Great Lakes/St. Lawrence Seaway system. Attendance included Port staff, terminal operators, shipping customers, naval architects and shippers. A follow-up conference is planned focusing on technology and the environment to be held in September. These forums are a natural and welcomed extension of the Great Lakes Data Workshops that the ITI/UT-UTC has held at the University the last two years.



The articulated tug is one design already in use that may provide a solution to serving new markets on the Great Lakes and St. Lawrence Seaway system.

BGSU Logistic Students Tour Toledo Port

The Toledo-Lucas County Port Authority and Midwest Terminals hosted a tour of the Seaport for Dr. Hokey Min, a UT-UTC researcher at partner Bowling Green State University, and BGSU students in their logistics program. Following the tour, the students and Dr. Min were able to participate in the First Ship Welcoming Ceremony on board the *M/V Tuscarora*. The event was reported in the Seaport newsletter, April 2008.

UT-UTC Hosts Area Think-Tank Meeting on Intermodal: Transportation and Logistics ... Driving Economic Development

On March 20, 2008, Director Martinko brought together more than 30 leaders from private industry, the utilities, government, and the public and private transportation sectors to participate in a think tank forum, "Transportation and Logistics ... Driving Economic Development." The purpose of the event was to focus on specific strategic development opportunities for the Northwest Ohio transportation and logistics sector and to present a new concept, Transportation Opportunity Districts.

The session began with a presentation by Ed Burghard, Executive Director of the Ohio Business Development Coalition, who led a discussion on place branding, its definition and the keys to its success.

Director Martinko followed by presenting information on truck traffic, truck bottlenecks, freight tonnage growth forecasts, the emerging megaregions in the U.S., the area gateways, and area transportation assets and what they mean. Aided by a benefits calculator, he showed the group what can be gained from transportation assets. He closed with Transportation Opportunity Districts (TODs): water port anchored, airport anchored, surface transportation anchored. After presenting the concept he explained the necessary commitment needed to make TODs a reality in the region.

Although this think tank gathering can not be credited solely with the interest that developed in the community and the media surrounding intermodal transportation, it did put transportation and its potential effect on the economy of the region in front of a group of powerful area leaders, many of whom rarely think about transportation opportunities.



ITI/UT-UTC Leads Regional Development of the Transportation Opportunity District (TOD) Concept : Building Success . . . Putting the Pieces Together

As the Northwest Ohio community became more interested in the opportunities that transportation could provide in bringing businesses and jobs to the area, Director Martinko was called upon by a wide range of venues to speak to the issue. Interviewed on radio and television, and quoted in the print media, he also made personal presentations to area leaders and groups.

PowerPoint presentations were given at the breakfast event "Eggs 'n Issues" sponsored by the Toledo Area Chamber of Commerce; to the board of directors of the Regional Growth Partnership, a private economic development group; to the Transportation Council and the Passenger Rail Committee at the Toledo Metropolitan Area Council of Governments, the region's MPO; and to the Economic Development Council of the City of Toledo.

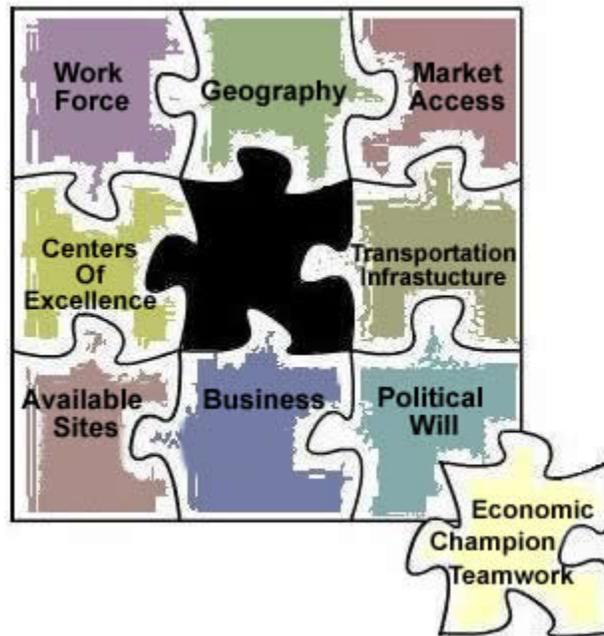
The main characteristics describing a TOD include:

- A Transportation Opportunity District (TOD) is a geographically defined area that focuses on businesses whose success and competitive advantage is primarily dependent on transportation and logistics.
- A TOD takes advantage of a location where designated economic incentives and strategic geographical assets of major pipeline, highway, sea, air, and rail transportation converge.

- A TOD provides one-stop access to and support for incentive programs currently available from federal, state, and local authorities. One such example could be designation as a Foreign Trade Zone. It can also assign creative incentives that are unique only to a TOD.
- TODs can offer economies of scale in infrastructure, and operating improvements that encourage private-sector companies to invest and locate manufacturing, transportation, and distribution facilities in a region. Incentives such as reduced start-up time through favorable zoning, clearances, and expedited approvals encourage companies to locate in a TOD. They also reduce significantly initial investment cost, and/or continuing operation costs.

Presentations given by Director Martinko on TODs and logistics and multimodal in Northwest Ohio can be found at <http://www.utoledo.edu/research/iti/taskforce.html>

The TOD concept was developed over a number of years. The original white paper can be found at <http://www.utoledo.edu/research/iti/TOD.html>



Intermodal Transportation in the News

Intermodal Transportation became a hot topic in Northwest Ohio in the spring of 2008. Both the public and private sectors became involved in a lively debate surrounding the opportunities intermodal facilities might bring to the region. Radio, television, and newspapers all carried stories on intermodal and the possible sites under consideration, sometimes including considerable conjecture. Director Martinko was heavily involved in helping the area leaders and those normally not involved in transportation issues understand what all the excitement was about.

A list of newspaper articles with access to the publications can be found at <http://www.utoledo.edu/research/iti/intermodnews.html>

2007 Ohio Conference on Freight: ITI Leaders in the Spotlight

The Toledo Metropolitan Area Council of Governments (TMACOG) held the first annual 2007 Ohio Conference on Freight (<http://www.tmacog.org/ocf.htm>) September 17th and 18th in downtown Toledo. Among the 200 plus attendees were transportation professionals from all regions of Ohio plus six other states and representatives from Canada's border crossing services, trucking interests, public sector leadership, airport and seaport operators, and academic researchers.



Tony Reams, TMACOG President (left), and Jim Hartung, Toledo-Lucas County Port Authority CEO/President (right), enjoy a moment at the Freight Conference with keynote speaker Terry Johnson, Jr., Administrator St. Lawrence Seaway Development Corp.

Members of the ITI Executive Committee and UT-UTC administration were prominent contributors to the event. Rich Martinko, UTC director, made a presentation along with former director, Mark Vonderembse, in the workshop section "University Transportation Centers and Freight Planning." Dave Dysard, Ohio Department of Transportation District Director and member of the ITI Executive Committee gave the keynote address at the Tuesday luncheon titled "Ohio's Challenge: Growth in Freight Demand." Mr. Dysard also served as a session moderator along with other ITI Executive Committee members Tom Kovacik, Executive Director of the Transportation Advocacy Group of Northwest Ohio (TAGNO) and Warren Henry, Vice President of Transportation, TMACOG. Jim Hartung, CEO/President of the Toledo-Lucas

County Port Authority and Chair of the ITI Executive Committee, introduced the dinner speaker, Collister "Terry" Johnson, Administrator of the Saint Lawrence Seaway Development Corporation.

Along with the workshop session on UTCs and Freight Planning, topics included Public Private Rail Partnerships in Ohio, Performance Measures and Travel Time in Freight Planning, the Ohio Trucking Industry Perspective, Transportation Finance: Funding for the Next Century Infrastructure, Engaging the Private Sector in the Freight Planning Process, Canada/United States Border Crossing Perspective, Innovative Financing for Freight Projects, Rickenbacker Intermodal Facility: A Public-Private Partnership, Planning for a New Detroit River Crossing, The ODOT Freight Planning Projects, and Federal Freight Legislative Perspective – SAFTEA-LU.

Heading the Conference was Tony Reams, President of TMACOG and another ITI Executive Committee member. Quoted in the TMACOG November 2007 newsletter, *The Big Picture*, he said of the event: "It was gratifying to see collaborations between organizations that normally don't encounter each other. I saw railroad people talking to highway planners and construction professionals sitting down with shippers." He promises even greater things for September 2008.

Congresswoman Kaptur and Governor Strickland Visit UT-UTC



Director Martinko (left) talks with Ohio Governor Strickland (right) along with VP Frank Calzonetti

The Governor and Congresswoman Kaptur were especially interested in the association of the UTC to alternate energy, which was the focus of the visit. The research papers and reports that have been generated by UTC projects and the Biodiesel Fuel Study, which is part of the Intermodal Transportation Institute, were also presented.

Ohio Governor Strickland visited the Science and Technology Complex at the University of Toledo which houses the UTC. Director Martinko and Governor Strickland discussed the activities, accomplishments, and future initiatives of the University Transportation Center. Congresswoman Marcy Kaptur (OH-9) and University President Lloyd Jacobs accompanied the Governor. In addition they saw demonstrations by the various alternative energy companies with offices in the building.



Congresswoman Marcy Kaptur with Governor Strickland and UT President Lloyd Jacobs during tour of the UT Research and Technology Complex

ASSOCIATED RESEARCH ACTIVITIES

Partnership in the National UTC CFIRE



In a continuation of work started by the ITI, the University of Toledo will participate as a partner in the UTC at the University of Wisconsin-Madison, the National Center for Freight & Infrastructure Research & Education – CFIRE. Dr. Peter Lindquist in the Department of Geography and Planning is the PI on the project “Analyzing Regional Freight Information Resources” which has been awarded \$200,000 over two years. This is an outgrowth of the work originally started with the Midwest Regional UTC as part of the Upper Midwest Freight Corridor Study.

Partnership in the Michigan-Ohio UTC



The University of Toledo is also a partner in the Michigan-Ohio University Transportation Center led by the University of Detroit – Mercy. Along with the other partners (Bowling Green State University, Wayne State University, and Grand Valley State University) UT participates in projects which share the same basic theme as the UT-UTC. Four projects at UT have been funded. The Director and the Vice President, Research Development both sit on the policy committee of the MIOH-UTC.

UT an Affiliate University at GLMRI



The University of Toledo is an affiliate university in the Great Lakes Maritime Research Institute, a coalition of the University of Wisconsin-Superior and the University of Minnesota-Duluth. PI Dr. Peter Lindquist has received funding for 2007-2008 for Phase III of the project "The Great Lakes Maritime Information Delivery System: A Resource for the Regional Analysis of Intermodal Freight Flows in the Great Lakes Region." The UT-UTC also supports this project.

This project is part of a long-term endeavor to develop and manage a comprehensive data repository and information clearinghouse for the maritime industry in the Great Lakes. To date, the system has focused on the acquisition, storage, and management of data involving vessel and commodity flows, port facilities, physical characteristics of the lakes, navigation facilities and the economy of the Great Lakes Region. This next phase will focus on the development of more advanced data structures in the repository, the analysis of data, and data exchange functions. This system will thus continue to serve as a resource for public policy for linking maritime freight to the economic viability, and environmental quality throughout the Region. The following functions will be featured on the site:

- A detailed data repository for vessel movements, port functions, commodity flows, the intermodal transportation system, the regional economy, etc.
- A GIS data viewer.
- Advanced data analysis functions.
- A formal information delivery site for maps, tables, graphics, text, etc.
- An information clearinghouse and centralized data facility furnishing links to other sites, private vendors furnishing commercial products, and government agencies, etc.
- A data exchange to support user inquiries and furnish information on demand.

The Online Information Clearinghouse can be accessed at www.maritime.utoledo.edu.

See the related article "The Great Lakes Maritime Information Delivery System Project: Beyond Data into a New Phase" on page 29 of this report.

ITI Biodiesel Fuel Study



The Intermodal Transportation Institute at The University of Toledo is the lead on a U.S. Department of Transportation (Transit Authority) funded "Biodiesel Study" which focuses on the impact of using a mixture of renewable biofuel and diesel fuel on operating costs as well as engine emissions, performance, and expected life in a subset of the local transit authority bus fleet and City of Toledo vehicles. It will also examine the economic and financial impacts of these alternatives on operations. Unique aspects of the project include 1) its large scale signified by the use of new vehicles to set an effective benchmark, 2) the collection of

extensive emission (in-bus, tail pipe) and engine wear data, 3) the examination of the impact of technology and economies of scale on large scale production. The project is funded at \$1.48 million (UT's share \$575,605) and will finish in 2009.

The Summary of the Progress Report for June 2007 states how this project is different from other studies:

With the vision and leadership of Congresswoman Marcy Kaptur, the Toledo Area Regional Transit Authority (TARTA) and the Intermodal Transportation Institute (ITI) at the University of Toledo developed a long-term, large-scale comprehensive research project to understand and assess the impacts of using a mixture of renewable biodiesel (B-20: 20% biofuel and 80% ultra-low sulfur diesel) compared to ultra-low sulfur diesel. The following make this study unique.

1. The first study that does on-road testing of ultra-low sulfur diesel and first attempt to investigate the impact of using B-20 made with ultra-low sulfur diesel.
2. The testing is exhaustive including nearly 60 vehicles over a three year period and involves more than 5 million miles of operation.
3. With three years of data, it is possible to estimate and compare the life cycle costs of using ultra-low sulfur (ULS) diesel fuel versus B-20 made with ULS diesel.
4. In addition to tail pipe emission testing, this study examines in-bus air quality.
5. The first study that examines the use of hydrogen gas as an additive to B-20.

The progress report for the period ending June 2008 will be available in the fall and will be posted on the ITI web site at <http://www.utoledo.edu/research/iti/biodiesel.html>. The report for the year ending June 2007 is currently available on the site. An outline of the 2008 report follows.

Overview of Experimental Procedures

1. Emission profiling
2. In-Bus air quality

Results and Discussion

Emission

1. Effects of real-world on-road emissions from transit buses with variation in fuels
2. Effects of idling emissions from transit buses
3. Effects of idling emissions for Toledo garbage trucks
4. Effects of using different grades of biodiesel on vehicular emissions

In-Bus Air Quality

1. Air quality trends
2. Factors influencing air quality
3. Characterization of particulate matter

Conclusion



RESEARCH PAPERS AND PRESENTATIONS

Papers

Ciocanel, C., Nguyen, T. M., Schroeder, C. and **Elahinia, M. H.**, "Semiactive Engine Mounts: Design, Modeling and Control," *Journal of Sock and Vibration*, in review.

Nguyen, T. M., Ciocanel, C., and **Elahinia, M. H.**, "Design and Modeling of a Mixed Mode Magnetorheological Fluid Mount," *Journal of Vibration and Control*, in review.

Min, Hokey, "The Design of a Two-Level Distribution Network Using the Voronoi Diagram," *International Journal of Operations and Quantitative Management*, in review.

Presentations

Nguyen, T., Ciocanel, C. Schroeder, C. and **Elahinia M. H.**, "On the Design and Control of a Squeeze-Flow Mode Magnetorheological Fluid Mount," ASME DETC/CIE, September 4-7, 2007, Las Vegas, Nevada.

Nguyen, T., Ciocanel, C., and **Elahinia M. H.**, "Performance of an Adaptive Magnetorheological Fluid Mount," ASME International Mechanical Engineering Congress, November 11-15, 2007, Seattle, Washington.

Nguyen, T. M., Ciocanel, C., Schroeder, C., and **Elahinia, M. H.**, "Performance of a Mixed Mode MR Mount," 10th Cansmart Meeting International Workshop on Smart Materials and Structures, October 10-11, 2007, Montreal, Quebec, Canada.

Nguyen, T., Ciocanel, C. and **Elahinia M. H.**, "Parameter optimization in designing an MR mount," 15th International Congress on Sound and Vibration, 6-10 July 2008, Daejeon, Korea

Lindquist, Peter S., "Recent Developments The Great Lakes Maritime Information Delivery System," Mid Continent Transportation Research Forum, Madison, Wisconsin, August 2008.

Lindquist, Peter S., "A Comprehensive Intermodal Transportation Network for Great Lakes Commerce." Association of American Geographers Annual Meeting, Boston, Massachusetts, March 2008.

Lindquist, Peter S., Vonderembse, Mark A., Wolosz, C., Singer, D. "From Data to Markets to Shipping Opportunities," Great Lakes Maritime Research Institute, University of Toledo Intermodal Transportation Institute, October 26, 2007.

Min, Hokey, "The Design of a Two-Level Distribution Network Using the Voronoi Diagram," Midwest Decision Sciences Institute Conference, Erie, Pennsylvania, April 19, 2008

Murat, Alper, "Dynamic Routing Under ATIS for Congestion Avoidance," Research Issues in Freight Transportation – Congestion and System Performance Conference, Seattle, WA (October 22-23, 2007)

Murat, Alper, "Enabling Congestion Avoidance in Stochastic Transportation Networks under ATIS," 2nd Annual National Urban Freight Conference, Long Beach, CA (December 5-7, 2007)

Murat, Alper, "Managing Supply Disruptions," OEM Global Supply Chain, SAE World Congress 2008, Detroit, MI (April 14-17, 2008)

Murat, Alper, "Dynamic Freight Routing on Air-Road Intermodal Network Using Real-Time Congestion Information," INFORMS Annual Meeting, Washington, D.C. (October 12-15, 2008)

Vonderembse, Mark A., Hong, Paul, "Creating an International Research and Education Panel for Supply Chain Management," 2nd International Symposium and Workshop on Global Supply Chain, Intermodal Transportation and Logistics," Busan, Korea, May 29-30, 2008

Bio-Diesel Fuel Study Papers and Presentations

Kadiyala, A., Kumar, A., "Study of Factors Affecting In-Vehicle Pollutant Levels in the City of Toledo Public Transport Buses Running on Biodiesel," paper #508, Proceedings of A&WMA Annual Conference, Portland, OR, 2008

Vijayan, A., Kumar, A., "Multivariate Statistical Identification of Factors Affecting the Emission Behavior of Public Transport Buses," Paper #674, Proceedings of the 2008 A&WMA Annual Conference, Portland, OR, 2008

Akhil, "Identification of Variables Influencing IAQ in Public Transport Buses," Student poster session, AWMA Annual Conference, 2008

Vinay, "Comparison of Real World Emissions from B20 and ULSD Fuels Used in Transit Buses," Student poster session, AWMA Annual Conference, 2008

Kadiyala A., Kumar, A., "Application of CART and Minitab Software to Identify Variables Affecting Indoor Concentration Levels," Environmental Progress, 27(2), 160-168, 2008

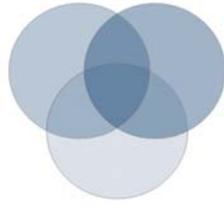
Vijayan, A., Kumar, A., Abraham, M. A., "Characterization of Sub-1.0 μm Particulate Matter Distribution Inside Public Transport Buses," Paper 528, Proceedings of A&WMA Annual Conference, Pittsburg, PA, 2007

Vijayan, A., Kumar, A., "Characterization of Indoor Air Quality Inside Public Transport Buses Using Alternative Diesel Fuels," Proceedings of TRB Conference, Washington, D.C., January 2008.

Vijayan, A., Kumar, A., Abraham, M. A., "Experimental Analysis of Vehicle Operation Parameters Affecting Emission Behavior of Public Transport Buses Operating on Alternative Diesel Fuels," Proceedings of TRB Conference, Washington, D.C., January 2008 and accepted for publication in the Journal of the Transportation Research Board, 2008.

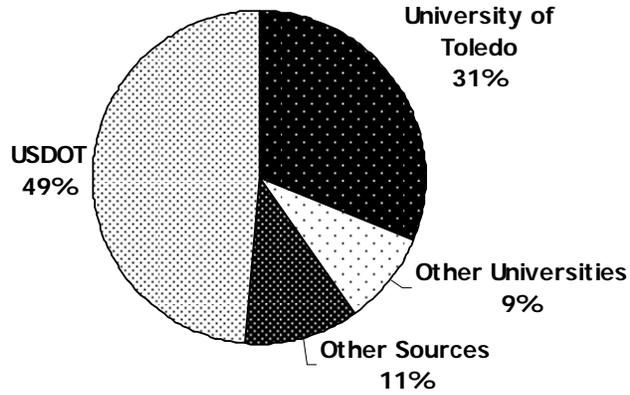
SUPPORTING U.S. DOT PRIORITIES

	US Department of Transportation Priorities				
	Safety	Reduced Congestion	Global Connectivity	Environmental Stewardship - Energy Efficiency & Alternative Fuels	Security, Preparedness & Response
UT-UTC Funded Research Projects:					
Combined Truck Routing and Driver Scheduling Problems Under Hours-of-Service Regulations	✓				
Regional Freight Information Resources for Market Opportunities in the Great Lakes Maritime Transportation System		✓			
Global Supply Chain Management/Transportation Building a Global Network of Scholars and Educators			✓		
Reducing Noise and Vibration of Hydraulic Hybrid and Plug-In Hybrid Electric Vehicles				✓	
Developing and Testing a Framework for Alternative Ownership, Tenure and Governance Strategies for the Proposed Detroit-Windsor River Crossing					✓
Value of ITS Information for Congestion Avoidance in Inter-Modal Transportation Systems	✓	✓			
A Novel Image Database Analysis System for Maintenance of Transportation Facility	✓				
Regional Freight Information Resources in the Great Lakes Maritime Transportation System		✓			
Travel Behavior of U.S. Domestic Airline Passengers and its Impacts on Infrastructure Utilization		✓			
An Analysis of the Status and Impacts of Public Private Partnerships of the Indiana Toll Road	✓	✓			
High Speed Transportation Corridor: A Conceptual Framework	✓	✓		✓	
UT-UTC Technology Transfer Activities:					
Great Lakes: From Data to Markets to Shipping Opportunities		✓	✓	✓	
Think Tank on Transportation		✓	✓	✓	
Intermodal Presentations		✓	✓	✓	
Intermodal Transportation Institute Research:					
Biodiesel Fuel Study				✓	

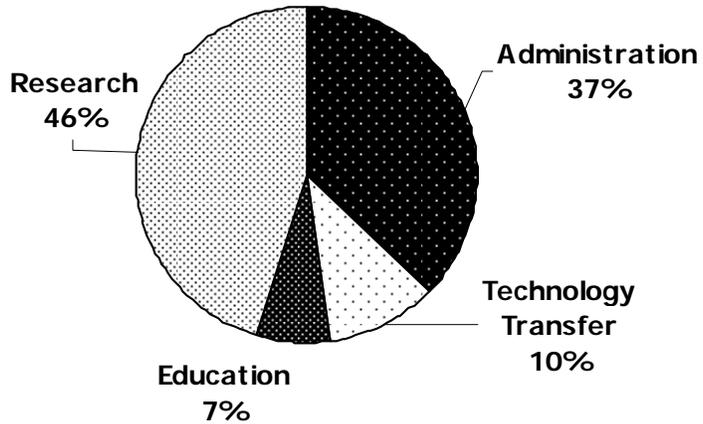


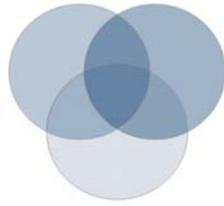
FUNDING SOURCES AND EXPENDITURES

FY 2007-2008 Funding Sources



FY 2007-2008 Expenditures





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