

Improving Freight Transportation in the Upper Midwest and Great Lakes Region

Ernie Wittwer (corresponding author)
 Director, Midwest Regional University Transportation Center
 University of Wisconsin-Madison
 1415 Engineering Drive
 Madison, WI 53706
 Phone: 608-263-3175
 Fax: 608-263-2512
 Email: wittwer@engr.wisc.edu

Travis Gordon
 Assistant Project Director, Midwest Regional University Transportation Center
 University of Wisconsin-Madison
 1415 Engineering Drive
 Madison, WI 53706
 Phone: 608-262-6639
 Email: gordont@cae.wisc.edu

Teresa M. Adams, PhD.
 Professor, Civil and Environmental Engineering
 University of Wisconsin-Madison
 1415 Engineering Drive
 Madison, WI 53706
 Phone: 608-262-5318
 Fax: 608-262-5199
 Email: adams@engr.wisc.edu

Peter S. Lindquist, PhD.
 Associate Professor, Dept of Geography
 and Planning
 The University of Toledo
 Toledo, OH 43606-3390
 Phone: 419-530-4287
 Fax: 419-530-7919
 Email: plindqu@pop3.utoledo.edu

Laura Franke
 Graduate Student, Civil and Environmental Engineering
 University of Wisconsin-Madison
 1415 Engineering Drive
 Madison, WI 53706
 Phone: 608-263-2664
 Email: franke@cae.wisc.edu

Sue McNeil
 Professor, Urban Planning and Policy Program
 University of Illinois at Chicago
 412 South Peoria Street (MC 357)
 Chicago, IL 60607-7065
 Phone: 312 996 9818
 Fax: 312 413 0006
 Email: mcneil@uic.edu

Kazuya Kawamura, PhD.
 Assistant Professor, Urban Planning and Policy Program
 University of Illinois at Chicago
 412 South Peoria Street
 Chicago, IL 60607-7065
 Phone: 312-413-1269
 Fax: 312-413-2314
 Email: kazuya@uic.edu

Word Count: 5676
 Figures (1): 250
 Tables (5): 1250
Total: 7176

ABSTRACT

The Upper Midwest Freight Corridor Study developed out of meetings of freight transportation stakeholders in the Upper Midwest/Great Lakes region. The study is a first step in moving toward greater cooperation among the states in the region to address freight. This paper reports the findings of the first stage of the study, where the research team brought together freight stakeholders from the public and private sectors. This first stage was a one-day workshop in which participants took an enthusiastic part in sharing information and ideas. This workshop, along with a review of the literature and national data, produced many tangible products. Among these are a better understanding of the perspectives of the participants, the data required and available for freight studies, and the issues that must be dealt with in a regional freight effort.

BACKGROUND

In April 2002, the Midwest Regional University Transportation Center (MRUTC) hosted a meeting of approximately 75 stakeholders in the region's freight transportation system. It was the first meeting on regional freight transportation to be held in this area. For two days, the participants discussed the needs of the region and looked at different ways to begin working together to address freight transportation. One idea, supported by the participants, was the creation of a regional effort on the model of other efforts around the country, such as the I-95 Corridor Coalition, the National I-10 Freight Corridor Study, and the Latin America Trade and Transportation Study (1). The end result was the Upper Midwest Regional Freight Corridor Study.

The Upper Midwest Regional Freight Corridor

The study follows a corridor that stretches from Manitoba, Minnesota, and Iowa in the west to Ontario and Ohio in the east. Figure 1 shows that the corridor is generally defined by interstate highways 94, 90, and 80. Although the corridor follows roads, the study is multi-modal, looking not only at major roads, but also the rail network, inland waterways, the Great Lakes, pipelines, intermodal facilities, and major cargo-handling airports.

This corridor is crucial in the movement of freight for the region, nation, and continent. Not only does the corridor handle the major east-west movements of freight, it is also becoming important in the north-south movements of freight in the region and continent. Table 1 summarizes the amount of freight in terms of tons and dollars that either originated or was destined for the seven states in 1998. One figure that stands out is that the region is responsible for about forty percent of this nation's international trade in terms of dollars (2). The values in Table 1 do not include the freight that is simply moving through the region, neither destined nor originating in the region.

The relationship of the states in the region to the two Canadian provinces to the north, Manitoba and Ontario, is important for both parties. About thirty-five percent of Ontario's merchandise trade with the United States in 2001 either went to or came from the seven states of the region (Tardif, R., Ontario Ministry of Transport, unpublished work). Thus it was beneficial to extend invitations to both provinces to participate in the study and the workshop.

The Study

The objective of the study is to establish a regional approach for improving freight transportation in the Upper Midwest based on a multi-state, multi-jurisdictional partnership of public and private sector stakeholder interests. This partnership will consider and address short- and long-term issues surrounding anticipated increases in freight movement within the region and the likely impacts on the region's infrastructure and economic health.

Participants

Three primary groups are involved with the study. The steering committee is made up of representatives from funding organizations, which are all state DOTs. Each funding state has a representative from the DOT and their divisional Federal Highway Administration office. In addition, invitations were extended to other states and provinces in the region. Manitoba and Ontario accepted this invitation and have a non-voting seat on the steering committee. This committee is ultimately responsible for the direction of the study.

An advisory committee is also part of this study. The charge of this committee is to give the steering committee different perspectives and insight on regional freight transportation issues. This committee is made up of representatives from other public agencies, private freight carriers, and freight shippers. Examples of members on this committee include representatives from the Chicago Area Transportation Study, Ports of Indiana, American Transportation Research Institute, Canadian Pacific Railway, and Iowa Corn Growers Association.

The final group is the multi-disciplinary research team. Three university transportation centers are represented on this team: the MRUTC at the University of Wisconsin-Madison, the Intermodal Transportation Institute at the University of Toledo and the Urban Transportation Center at the University of Illinois at Chicago. The disciplines of the researchers include engineering, geography, planning, and business.

Approach

The study is focusing on an inventory of the existing system including performance metrics, capacity, administrative issues and usage. Through a series of workshops, interactions with the participants and a review and synthesis of the literature and available data, the research team will address the following goals:

- Compile and synthesize existing plans and efforts
- Create a setting for coalition building through regular communication and data sharing
- Identify and document the conditions and needs across all modes of freight transportation for the identified corridors in the region
- Understand the market activities that generate goods for shipping that impact this region
- Look at the possibility for applying standardized designs for key infrastructure – interchanges, weigh stations, or administrative practices

Workshop for Identifying Regional Freight Issues

On June 3, 2003, both the steering and advisory committees came together to meet on the campus of the University of Toledo. About 35 people attended from the two committees, excluding the research team. There was also remote access to the meeting, with groups participating from Michigan, Minnesota, and Wisconsin.

Goals

The goals of the meeting were established prior to the meeting. They were to:

1. Inform people of the study process and gain their support,
2. Gather information on the four broad topic areas,
3. Begin a process of communications and teambuilding that will carry the study to sound conclusions, and
4. To define an agreed-upon and achievable plan of action for the project.

Elements of Effective Regional Freight Transportation

This study is the first critical step in establishing a regional approach to improving freight transportation in the Upper Midwest and Great Lakes region. It will be the foundation for future cooperative efforts by documenting and analyzing the current condition of freight transportation in the region. The following sections describe the elements of the study in more detail; all are critical to any regional freight effort.

Performance Metrics

How should the operation of a freight transportation system be evaluated and measured? What is really important to the movement of freight and the operation of a transportation system as it moves freight? The study should identify potential performance measures that could be used to evaluate operations and infrastructure performance.

Best Practices

Many multi-jurisdictional projects related to freight transportation are now underway. A review of those experiences is necessary to capitalize on those experiences, replicating successes and avoiding failures.

Synthesis of Efforts

Other freight transportation projects, plans, or studies are underway within the corridor region. As a part of defining a true base of experience these other studies must be compiled and made available to the participants.

Demand/Usage

A key question is how the transportation system is being used. The research team must also analyze demand or usage data collected from a variety of sources, including state, federal, regional, and local agencies. The objective of the analysis will be to give the stakeholders of the study useful information on how goods move to, from, and within the region.

Capacity

Another data intensive part of a freight study should be the collection and analysis of capacity levels for all modes of transportations along and feeding into the corridor where appropriate. This part should work together with the Demand/Usage results to analyze bottlenecks in the region.

Administrative Issues

Identifying the freight related administrative and legislative issues that might impede the flow of freight is another part. Collecting regulations into a matrix, with one axis being the states and the other axis containing the issues, will allow the research team to identify the impacts of the differences and what could easily be changed.

DEFINING CONCEPTS AND WHAT IS DESIRABLE

The workshop focused on performance metrics, capacity, administrative issues and usage building on a “wish list” of desirable data to support the study, and discussions with some state representatives. As the process developed, it became clear that the participants saw considerable overlap among the focus areas.

Performance Metrics

The National Cooperative Highway Research Program (NCHRP) in its project 8-32(02) defines performance measurement as:

“...the use of statistical evidence to determine progress toward specific defined organizational objectives.Performance measures provide information to managers about how well that bundle of services is being provided. Performance measures should reflect the satisfaction of the transportation service user in addition to those concerns of the system owner or operator.” (3)

The definition of performance measures given by NCHRP highlights several elements that should be of concern to the managers of the freight infrastructure:

1. The key starting point is defining fairly precisely the bundle of services to be provided and the quality of those services.
2. Customer or user perception is as important as the “hard” measures that a facility owner might employ.
3. Performance measurement should provide a component of management information to the owner of a facility.

As several participants in the workshop pointed out, the key to useful measurement is that measures be carefully crafted and used appropriately. Measures that are not well thought out can produce blurred views of reality and distort the actions of people in all involved organizations. Measures that are used inappropriately become nothing more than threats to all involved, causing further confusion and gaming. One private sector workshop participant put it bluntly when he said: “We’ve got all kinds of performance measurements, but I don’t want you [indicating public sector participants] to use them to beat me over the head.”

Yet another significant element of successful performance measurement is defining measures for which data can be found without extraordinary effort. As the product of the session is reviewed, the importance of this element will become very clear.

The group identified a large number of factors that are important in the operation of freight systems. These factors can be grouped into five categories: efficiency, environmental impacts, reliability, safety, and security. Each of these, in turn has one or more specific factors, many measures, and some data sources. These are summarized in Table 2.

Capacity

Citing work by Morlok and Riddle (1999), TRB Special Report 271 recognizes a lack of any widely accepted definition or measure of system capacity in transportation (4). The report reviews attempts to estimate capacity along economic and engineering approaches, but much of the committee’s attention focused on “...aggregate trends in traffic, performance, capital expenditures, and capital stock for freight modes; developments related to congestion at freight terminals, at border crossings, and in urban areas, especially on facilities shared by passengers and freight; and underlying trends in productivity, finance, and technology.” (5)

This diverse set of themes was mirrored closely in the discussion among session participants on June 3. In contrast to the specific objectives of the workshop, a substantial portion of the discussion revolved more around these general themes than in focusing on the mechanics of generating an operational definition of capacity among modes that can be “plugged into” a set of formulae for reporting capacity estimates and relating them to demand.

There was general agreement among participants that any measure of capacity must include time. Participants noted that total time from origin to destination is not sufficient, but that average transit times and consistency among transit times are essential measures. Reliability is also an essential element in these computations. In addition, the components of travel time must include transit time, dwell times, and throughput times at transshipment points and terminals. Additional discussion of capacity measurements involved the measure

of flows in terms of volume over time and linking theoretical flows to practical flows within the system. The discussion then moved to the various components that influence capacity within the system.

Physical Components

Physical components of capacity were among the largest set of factors, and they reflect aspects of infrastructure development, network density, geometric design, and capital investment in terminals and transshipment points. Considerable attention to volume/capacity relationships is focused on this component. Session participants discussed at length bottlenecks in the system such as grade separation problems, clearances for double stacked containers, river crossings, and construction projects.

With respect to terminals, ports, and intermodal facilities, session participants noted the importance of handling capacities, suggesting that these facilities may provide aggregate data on dwell times and throughput times for freight if it does not lead to disclosures that would compromise their competitiveness. One participant noted that equipment limitations are also a problem, citing inadequate trailer strength for lifting in trailer-on-flat-car (TOFC) transfers. Weather conditions and the response of public works agencies to weather events were also noted.

Operational Components

The factors comprising this set of capacity components relate to the management of the transportation system. Session participants strongly suggested that the study team record peak traffic times and volumes in the capacity study, and noted its importance for scheduling shipments during off-peak times within specific areas. A brief discussion also included strategies to increase capacity in congested urban areas (e.g., charges for urban deliveries in congested time periods).

Legal / Jurisdictional / Political Components

The factors comprising this set of capacity components deal primarily with regulation and enforcement of freight movements among the states and provinces within the study region. Variations in speed limits for trucks among states and provinces were discussed, as were variations in load limits and equipment regulations on highways. Representatives from railroads cited the effects on railroad capacity due to load limits on short line railroads. Border crossings and their relationship to homeland security were also discussed by participants on both sides of the U.S.-Canadian border, particularly with respect to their impact on dwell times for trucks at customs stations.

Where capital improvements are concerned, participants discussed zoning restrictions and political opposition to the location of terminals, highways, and intermodal connections and their impacts on the efficiency of freight movements. Again, the ageing North American transportation infrastructure is also an important element to this component—especially with respect to vulnerability of carriers to closings of portions of the infrastructure for repairs. Participants discussed the use of public funds for parallel investment in public transit to reduce traffic congestion, as well as public funds for intermodal projects that involve infrastructural improvements for railroads, which have traditionally been privately financed within The United States.

Interconnectivity Components

The factors comprising this final set of capacity components deal primarily with improving the connections between freight networks and coordinating transfers between modes. Participants discussed the importance of maintaining the accessibility of through traffic into the corridor and the importance of better use of existing links in the transportation network. Participants from the railroad industry discussed the importance of connections to underused short line and regional railroads for their access to local industry and potential for economic development. Another important aspect of short line railroads is their potential to provide redundant links in the railroad network for national security in the event of emergency closure of Class I railroad track segments. Other participants discussed the importance of the capacity of intermodal highway connections (e.g., the National Highway System Connectors) and the limiting factors associated with “the last mile” in movements from the National Highway System.

Administrative Issues

This workshop allowed those attending to identify their concerns regarding the administration of freight travel, and these are summarized in Table 3.

Policy

Lack of consistency in truck configuration and size/weight regulations is a source of frustration in the highway freight industry. Legal size and weight limits for trucks depends on which state the truck is in, whether it is traveling on designated or state highways, and whether it is a straight truck or has a trailer.

Policy issues arise because “one size doesn’t fit all.” The states may introduce their own regulations, but they cannot be more stringent than the federal regulations on designated highways. Traveling on designated routes limits these discrepancies, but they are still present. Therefore, it is important to have local and jurisdictional cooperation in regards to regulation planning. Table 4 contains a summary of truck size and weight regulations in the upper Midwest.

Another policy concern dealt with financing the freight infrastructure, e.g. freight facilities and safety enforcement. National or industry specific taxes or fees were posed as a possible solution, such as a harbor maintenance tax or Coast Guard ice breaking assistance. One participant thought that the federal government should issue directives guiding the direction of the transportation industry. Another participant replied that freight is “mode agnostic” meaning that the market chooses the most efficient mode, not any government directive.

Safety and Security

Safety and security issues are a concern across all modes of transportation. The American Trucking Association took a proactive approach by establishing the Highway Watch program. The program’s goal is to train professional truck drivers and truck-stop employees to be “America’s Trucking Army” and to report suspicious activity on the public roadways. The program includes a centralized reporting system (7).

The participants did not express particular issues with safety inspections and regulations except with regard to the new Hours of Service rules. Unlike size/weight regulations, safety requirements, inspections, and enforcement are uniform across North America (8). Government and industry work together to address safety concerns through the Commercial Vehicle Safety Alliance (CVSA).

Regulatory

Regulatory issues focus mainly on consistency of regulations across borders. Consistent, uniform regulations concerning vehicular inspections, customs laws, traffic enforcement, size and weight limits, and weight policing, which will reduce stopping requirements, are desirable. These differences in regulations between states and countries force truck drivers to become experts in the laws and regulations of all of the states they travel through.

In the past, states imposed numerous minor regulations. Most of these no longer exist because they are not deemed valid in a court of law. For example, Wisconsin used to have a separate hazardous materials permit, the Hazardous Materials Transportation Registration Fee, which truckers needed to purchase in addition to the federal permit. On October 17th, 1996, the Wisconsin Court of Appeals found the fee to be unconstitutional and is no longer administered (9).

The Intelligent Transportation System (ITS) architecture was another topic of discussion. Consistent ITS application throughout the region could improve the flow of freight. Current architecture plans contain nearly twenty specific systems for improving safety and security for commercial vehicles (10).

Financial

Financial issues heavily focus on budget concerns. Government funding and staffing limitations are an ongoing problem, making delivery of transportation improvements more difficult. There will always be competing interests, and the need to evaluate trade-offs. Financing public works, such as roads, could be funded by users, in the form of earmarked taxes, user fees, or by special districts and authorities. However, all three of these options have their drawbacks and states will need to find the option that suits them best (11).

Another concern is fuel tax evasion. The International Fuel Tax Agreement (IFTA) was implemented “to simplify the reporting of fuel used by motor carriers operating in more than one jurisdiction.” (12)

Operations

Regulatory impediments are often cited as the cause of unrealized operational efficiencies. State border crossing stopping requirements, stigmatized as a necessary evil, are now being eliminated with PrePass type programs. PrePass is an identification system that allows trucks carrying a transponder to bypass a weigh station. Trucks are weighed and identified at highway speeds, thus saving time for the driver (13). PrePass is not a universal system, however, and other weigh in-motion programs have been identified, such as NORPASS and Green Light.

Usage

For the purposes of this study our interest is in usage rather than demand. That is, we are distinguishing between the observed behaviors in terms of how and when goods are moved (usage) and the ability to predict how and when goods move based on the interrelationships between the transportation and the socioeconomic system (demand) (14). The theory of demand is derived from the economic theory of consumer choice (15). While we are interested in understanding and predicting the underlying demand for freight transportation, this is beyond the scope of our study.

Existing usage data of freight movements for this study can be divided into two broad types by how the data are organized spatially.

1. Segment or link specific data that includes freight volumes on specific links of the transportation network within the study area. This type of data usually captures all the freight volumes that travel on a particular link.
2. Origin-destination data that includes the freight movements that have at least one of the trip ends within the study area. This type of data is usually collected by a survey.

For both types of data, volume of freight flow can be measured in weight (tons), vehicle trips, or values. For each type of usage/demand we are also interested in more detailed attributes including:

1. Mode – truck, intermodal, rail, air, and water. Truck and rail data can be further subdivided by type of shipment. For truck this includes (16): truckload (TL) and less-than-truck load (LTL). For rail this includes (15): flat car, tank car, bulk, and specialized (e.g. automobile or cattle)
2. Commodity type – For transportation, the Standard Transportation Commodity Code (STCC) is commonly used to indicate the commodity carried. The STCC code is a seven digit numeric code representing 38 commodity groupings. Most freight data either reports the 2, 3 or 4 digit STCC (17).

Data Sources

Several types of freight data cover the entire nation. Some are publicly available, including the Commodity Flow Survey, waybill sample and others. These differ, however, in the modes reported, data type, or most recent release date. At the state, regional, and local levels, there are no consistent formats for collecting or reporting freight usage data. There are many potential sources of data at the state, regional, and local level. These include:

- Traffic counts
- External trip surveys
- Weigh station counts
- Corridor studies
- Traffic impact studies
- Freight planning studies (state-wide, regional, local)
- Rail line grade crossing/accident studies
- Air port master plan
- Port master plan

The states, provinces, and MPOs in the region, who were present in the workshops, were also asked to identify specific data that they hold. Table 5 provides a summary of their responses.

Data Issues

It was sometimes difficult to convey to the participants the importance of having accurate data for existing conditions. Since several agencies are currently developing freight demand models, many participants wanted to talk about how the data can be used for forecasting demand. It seemed that most of the participants equated planning

with demand model development. Such mindset probably has played a role in the lack of regional freight planning activities in the past since it is often not feasible to develop a freight demand model at regional scale.

The amount of available freight data from state and regional agencies is more than expected. However, the lack of consistency among the data will cause considerable challenge for creating a database that would cover the entire study area.

Land Use Components

The factors comprising this set of usage components are concerned with overall land use-traffic relationships and how they impact freight movement. This discussion was driven in large part by assumptions that traffic volumes are directly influenced by the location and distribution of traffic generators and related land uses, which in turn will impact the flow of freight. Session participants again cited the importance of collecting traffic volume data and relating it to land use, but also discussed the importance of understanding the mix of through traffic with local traffic in urban areas. The location of motor terminals was also discussed with respect to zoning restrictions and its effect on traffic congestion.

COMPATIBILITY, AVAILABILITY AND OWNERSHIP OF DATA

The research team began the project without a budget to acquire new data. The project scope and plan from the start was to use existing data held by the federal government, the states and provinces, and the metropolitan planning organizations (MPOs) to construct an overall view of freight movement and the operational characteristics of the freight transportation system in the region. This required some effort to identify the available data. Workshop participants spent much time outlining where that data existed and how it might be collected.

Workshop participants focused less on specific types of data to obtain and detailed descriptions of data sets, but were more concerned with overcoming specific obstacles in the acquisition of data. For instance, the issue of confidentiality, particularly with private firms, was addressed with respect to assuring carriers that data would be reported in aggregate form that would not disclose details to compromise their competitiveness. It was argued that the study team could obtain aggregate figures for dwell times and throughput times for specific facilities without breaking down these data further into their individual components. In addition, participants advised the research team to inspect data carefully for how current it is and its accuracy. Session participants also again advised the research team to acquire data that contain statistics for peak times as well as daily averages.

Another issue was how to reconcile data from different years. Time series data on either freight movement or economic activities would be useful to determine growth rates that can be applied to adjust data from various years to one base year. Participants agreed that growth rates must be determined at a state or regional level rather than a multi-state level. Several states were also concerned about the compatibility of data at the borders with neighboring states and provinces. This may be due to the fact that through traffic is not appropriately accounted for.

How to identify the feeder routes or alternative routes that should be included in the study was another issue raised. For link-based data, the extent of the study segments needs to be defined. Since it requires intimate knowledge of local traffic conditions and alternative freight routes, we must rely on local agencies to define the study segments. Other issues to be considered include the impact of new technology on the pattern of freight movement, the impacts of new infrastructure investment, and changing growth patterns for different regions.

One final topic that was covered in the workshop was a list of organizations to contact for capacity data and related information concerning freight traffic in the corridor. These organizations are listed as follows:

1. United States Department of Transportation
2. Ontario and Manitoba Ministries of Transportation
3. State Departments of Transportation
4. Association of American Railroads
5. Ohio Turnpike Authority
6. United States Customs
7. Bureau of Labor Statistics
8. American Trucking Association
9. AASHTO
10. U.S. Chamber of Commerce
11. National Governor's Association

12. Great Lakes Carrier Association
13. St. Lawrence Seaway Development Corporation
14. National Association of Manufacturing
15. Army Corps of Engineers
16. Intermodal Association of North America

CONCLUSIONS

The June 3rd workshop allowed the research team to draw many conclusions. It did inform and define the overall study effort. Specific conclusions covered many broad topics.

Planning/Procedural/Operational Components of Potential Strategies

Increased efficiency and reduced congestion were repeated themes throughout the discussions involving these factors. Participants discussed route competitiveness on highways, where motor carriers can be redirected to underused routes with low existing traffic volumes. Related to this issue is the location of terminals and transshipment points within urban areas. Session participants discussed relocating hubs to less congested areas outside of major urban areas to improve efficiency. Another session participant noted that railroads face a major problem with empty rail cars and deadheading issues, where better coordination could mean increased efficiency and capacity.

In addition, information sharing and coordination of scheduling between carriers would improve traffic flows in areas with significant congestion. The Chicago Transportation Coordination Office was cited as an example of how these problems can be improved. Better coordination between modes as well as carriers was also discussed, particularly with respect to passenger/freight conflicts. Other session participants cited the problem of bottlenecks at border crossings and suggested that rerouting and consistent traffic monitoring at border crossings would improve capacity. Participants also cited management practices involving dispatcher decisions for routing and timing of truck movements as another factor influencing capacity.

Communication

It was obvious that the participants were not very knowledgeable of the activities being undertaken at other agencies, and potential opportunities to improve accuracy and efficiency are missed. It underscores the importance of developing a communication channel (e.g. a chat room for freight professionals) that facilitates information sharing.

It was also obvious that discussion between public sector agencies and private sector companies is critical. While huge variation in perspectives exists within each sector, the two have fundamentally different sets of experiences, expectations, and understandings. They do not have a history of complimentary interactions.

Finally, all of the participants tend to hold their prerogatives close. Many private sector companies are concerned about the involvement of the public sector in the freight world. States are concerned about how a regional effort might infringe upon their traditionally independent decision-making authority.

Complexity

The issues involved are uniformly more complex and integrated than any of the research team had envisioned. It was difficult to anticipate the breadth of the issues presented. Land use, air quality, efficiency, pricing, regulation, and intermodalism were raised in more than one session.

While the issues were more complex than we anticipated, the potential solutions were also more complex and subtle. Yes, more concrete and steel did come up; but so did better communication, better management, and better planning.

Agreement

While the issues are complex, the data abundant and often incompatible, and the communication wanting, the participants agreed on three basic points:

1. Efficient freight movement is critical for the economic well being of the region.
2. The region faces a critical period. If regional actions are not taken to facilitate the flow of freight, the transportation system will not be equal to the challenge that it is being given.

3. The consequences of freight problems in the upper Midwest will have continental implications, since the region is the crossroads of North America.

ACKNOWLEDGEMENTS

This research depends on the involvement, interest and support of numerous stakeholders. The Ohio Department of Transportation (ODOT) took the lead among the states in the region. The Midwest Regional University Transportation Center provided staff and financial support. Illinois, Indiana, Iowa, Minnesota, Ohio, and Wisconsin are participating in the pooled fund study. The authors wish to acknowledge the interest and support of these organizations and the members of the steering committee.

REFERENCES

1. Switzer, A. Conference Proceedings, 1st Upper Midwest Regional Freight Transportation Workshop. April 4&5, 2002. Chicago, IL. Midwest Regional University Transportation Center, U.S. Department of Transportation, 2002.
2. Federal Highway Administration, Office of Freight Management and Operations. Freight Analysis Framework. December 21, 2002. <http://www.ops.fhwa.dot.gov/freight/adfrmwrk/index.htm> Accessed July 16, 2003.
3. Shaw, T. Performance Measures of Operational Effectiveness for Highway Segments and Systems. NCHRP Synthesis 311, TRB, National Research Council, Washington, D.C., 2003, pp. .
4. Committee for the Study of Freight Capacity for the Next Century. *Freight Capacity for the 21st Century*. Transportation Research Board, Washington, D.C., 2003.
5. Morlok, E. K., and S. P. Riddle. Estimating the Capacity of Freight Transportation Systems: A Model and Its Application in Transport Planning and Logistics. *Transportation Research Record*, No.1653, 1999, pp.1-8.
6. *Vehicle Sizes and Weights Chart*. J. J. Keller & Associates, Inc., Neenah, Wis., 2002.
7. American Trucking Association. Anti-Terrorism Action Plan Outlined. May 13, 2002. http://www.truckline.com/insideata/atap/051002_ex_summary.html. Accessed June 16, 2003.
8. Commercial Vehicle Safety Alliance. <http://www.cvsa.org>. Accessed July 10, 2003.
9. Court of Appeals of Wisconsin. Published Opinion. Case No.: 95-1714. Oct. 17, 1996. <http://www.wicourts.gov/html/ca/95/95-1714.htm>. Accessed June 17, 2003.
10. U.S. Department of Transportation. National ITS Architecture. July 18, 2002. <http://itsarch.iteris.com/itsarch/>. Accessed July 10, 2003.
11. *Fragile Foundations: A Report on America's Public Works*. National Council on Public Works Improvement. Washington, D.C., February 1988.
12. Wisconsin Department of Transportation. International Fuel Tax Agreement (IFTA). March 11, 2003. <http://www.dot.wisconsin.gov/business/carriers/ifta.htm>. Accessed June 26, 2003.
13. Kurtzmann, L. PrePass: What is it and does it benefit the expediter? Oct. 30, 2002. http://www.expeditersonline.com/artman/publish/printer_157.html. Accessed June 12, 2003.
14. Manheim, M. L. *Fundamentals of Transportation Systems Analysis, Volume 1: Basic Concepts*. MIT Press, Cambridge, Massachusetts, 1984.
15. Morklok, E. K. *Introduction to Transportation Engineering and Planning*. McGraw Hill, New York, 1978.
16. Sussman, J. *Introduction to Transportation Systems*. Artech House, Boston, 2000.
17. RAILINC. Standard Transportation Commodity Code. <http://www.railinc.com/view.cfm?cnid=47>. Accessed July 1, 2003.

18. List of Figures

Figure 1. Upper Midwest Freight Corridor Study Region

List of Tables

Table 1 Tons and Value of Freight Moving To, From, and Within the Seven States of the Corridor Region (Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio and Wisconsin) (2)

Table 2 Important Factors in the Operation of Freight Systems

Table 3 Administrative Issues

Table 4 Truck Size and Weight Regulations by State and Province (6)

Table 5 Types of Data Held in the Region

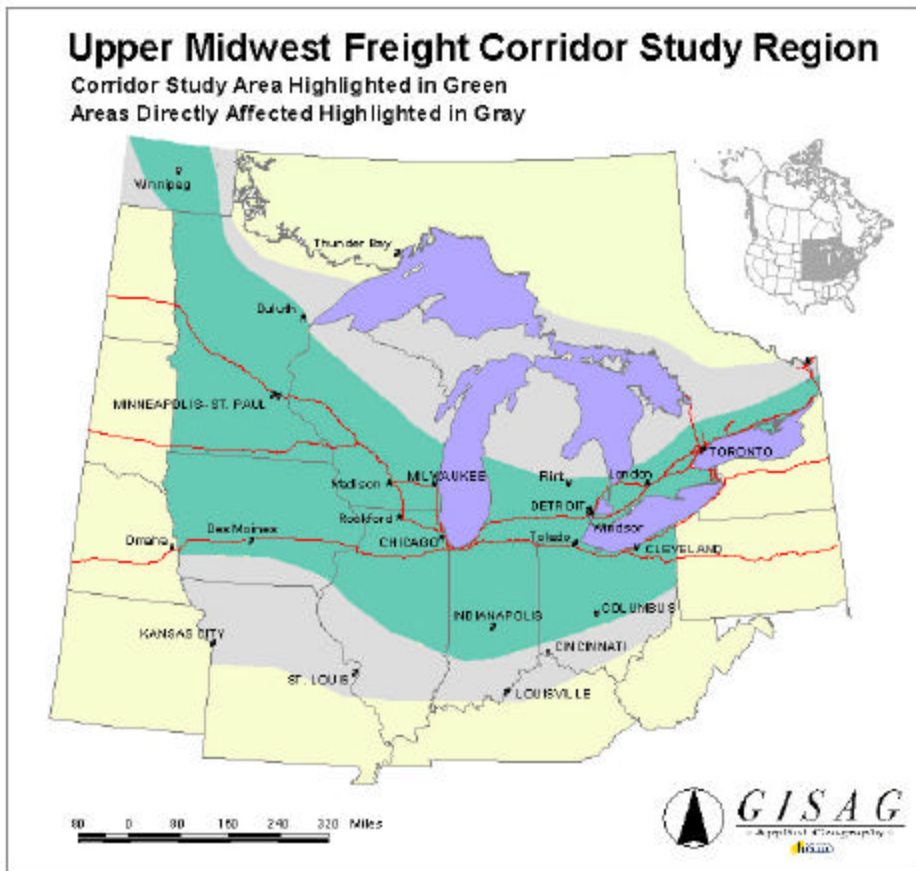


FIGURE 1 Upper Midwest Freight Corridor Study Region.

TABLE 1 Tons and Value of Freight Moving To, From, and Within the Seven States of the Corridor Region (Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin) (2)

	Tons (Millions)			Value (Billions \$)		
	1998 (% national)	2010	2020	1998 (% national)	2010	2020
Corridor Region						
By Mode						
Air	<9 (<5.0)	<11	<16	381 (35.4)	878	1551
Highway	3295 (30.3)	4655	5616	2679 (36.1)	4914	7656
Other	<9 (<6.6)	<10	<10	<7 (N/A)	<7	<7
Rail	1065 (37.8)	1360	1587	422 (65.3)	679	992
Water	543 (37.7)	666	741	52 (35.4)	79	110
By Destination/Market						
Domestic	4577 (33.9)	6206	7294	2957 (37.5)	5274	8015
International	337 (18.8)	493	669	579 (40.3)	1279	2299
Total	4914 (32.2)	6699	7963	3536 (38.0)	6553	10314
U.S.						
By Mode						
Air	18	34	50	1075	2490	4505
Highway	10858	15663	19199	7428	14470	23372
Other	136	199	260	N/A	N/A	N/A
Rail	2818	3618	4153	646	1096	1662
Water	1440	1863	2186	147	284	415
By Destination/Market						
Domestic	13484	18820	22537	7876	15152	24075
International	1787	2556	3311	1436	3187	2879
Total	15271	21376	25848	9312	18339	29954

TABLE 2 Important Factors in the Operation of Freight Systems

FACTOR	MEASUREMENT	DATA SOURCE
Efficiency		
<ul style="list-style-type: none"> The cost of transportation as a proportion of the total economy. 	<ul style="list-style-type: none"> Transportation as a percent of GDP over time. The cost experience of specific shippers. 	<ul style="list-style-type: none"> Federal economic statistics. Surveys of major shippers.
<ul style="list-style-type: none"> Throughput in rail yards as it impacts truckers. 	<ul style="list-style-type: none"> Dwell time in yards. 	<ul style="list-style-type: none"> Rail company statistics.
<ul style="list-style-type: none"> Border crossing inspection time. 	<ul style="list-style-type: none"> How often stopped for inspection. Inspection time. Cross-border carrier on-time performance. 	<ul style="list-style-type: none"> ? ? ?
<ul style="list-style-type: none"> Blocked crossing time and its impact on the local economy. 	<ul style="list-style-type: none"> Minutes of blocked crossings. 	<ul style="list-style-type: none"> Rail company records. ICC study
<ul style="list-style-type: none"> Vehicle maintenance and fuel efficiency costs caused by facility condition. 	<ul style="list-style-type: none"> Measures of pavement quality. Trucker experience with costs. 	<ul style="list-style-type: none"> State DOT reports. ?
<ul style="list-style-type: none"> Value of transportation assets. 	<ul style="list-style-type: none"> Utilization Ability to create value by increasing utilization. 	<ul style="list-style-type: none"> ? ?
<ul style="list-style-type: none"> Connectivity between modes 	<ul style="list-style-type: none"> Availability of connections 	<ul style="list-style-type: none"> Survey of carriers
Environmental Impacts		
<ul style="list-style-type: none"> Air quality 	<ul style="list-style-type: none"> Alternative mode pollution. Congestion and speed changes. Idling time. Border crossing and terminal wait times. Traffic bottlenecks 	<ul style="list-style-type: none"> EPA models EPA models and state statistics ? ? ?
Reliability		
<ul style="list-style-type: none"> Congestion 	<ul style="list-style-type: none"> Models of incident impacts. RR models of incident impact. NYC modeling process. On-time deliveries. Consistent arrival times. On-time performance of intermodal terminals. Delivery as promised. 	<ul style="list-style-type: none"> State DOTs or MPOs RR companies NYC Survey of shippers Survey of shippers Survey of terminal operators Survey of shippers
Safety		
<ul style="list-style-type: none"> Employee safety Vehicle safety Vehicle roadworthiness 	<ul style="list-style-type: none"> Personal injuries per mile Severity of crash Out of service citations 	<ul style="list-style-type: none"> RR and trucking companies Companies or insurance carriers State inspectors statistics
Security		
<ul style="list-style-type: none"> Security of freight movements Efficiency of security inspections processes 	<ul style="list-style-type: none"> Number of security incidents See efficiency 	<ul style="list-style-type: none"> ? See efficiency
? – Data source is either unknown or unavailable		

TABLE 3 Administrative Issues

CATEGORY	ISSUE
Scope	<ul style="list-style-type: none"> • View of Transportation in 10 Years • Handling Current Capacity • Identifying Bottlenecks • Partnerships of Shareholders in Rail
Policy	<ul style="list-style-type: none"> • “One Size Doesn’t Fit All” • State Weight and Size Limits • Local and Jurisdictional Coordination • Financing of Infrastructure • National or Industry Taxes/Fees • Direction Provided by Federal Government • Mode Agnostic Freight System
Security	<ul style="list-style-type: none"> • Security for All Modes of Transportation • Global Trade Security • Safety Enforcement • Inspections at U.S./Canadian Border
Regulatory	<ul style="list-style-type: none"> • Uniformity in: <ul style="list-style-type: none"> Vehicular Inspections Customs Traffic Enforcement Size/Weight Limits Weight Policing • Find and Fix Choke Points • Hours of Service • U.S./Canadian Border Regulations • B-Trains
Financial	<ul style="list-style-type: none"> • Budget/Funding Limitations • Efficiency to Pay for Infrastructure • Fuel Tax Evasion • System Maintenance of Rail Infrastructure • Safety Concerns • Incremental Costs and Benefits
Operations	<ul style="list-style-type: none"> • Identifying PrePass Programs • Shippers/Receivers not Sensitive to HOS • Rail Corridors are not Linear • Regulatory Impediments to Size/Weight • Accessibility to Ports and Intermodal Connectors

TABLE 4 Truck Size and Weight Regulations by State and Province (6)

	<i>Length (Feet)</i>										<i>Height (Feet)</i>	<i>Width (Inches)</i>		<i>Weight (1,000 lbs)</i>							
	Interstate and Desig Hwys.(Des.)					State and Supp. Hwys. (Other)								Single Axle		Tandem Axle		Gross Vehicle			
	Straight Truck	Combinations		Trailing Units		Straight Truck	Combinations		Trailing Units			Des	Other	Interstate	Other	Interstate	Other	Interstate	Other		
Tractor Semi-Trailer		Tractor Twin Trailers	Semi-Trailer	Trailer	Tractor Semi-Trailer		Tractor Twin Trailers	Semi-Trailer	Trailer												
Illinois	42	NS	A	53A	28.5	42	A	A	53A	28.5	13.5	102	96	20	18	34	32	80	73.28		
Indiana	40	Ø	Ø	53B		40	Ø	Ø	53B	28.5				102	20	20	34	34	80	80	
Michigan			58	53C	Ø		59	50	NS	96				D	D	D	D	D	D	D	
Minnesota			Ø	53E	Ø		75	E	53E	28.5E				102	20	18	20	34	34	80	80
Ohio			53	Ø	Ø		Ø	Ø	53	28.5											
Wisconsin			53F	65	A		48	G													
Ontario	41	75	82	53	NS	41	75	82	53	NS				13.6	102	19.8	19.8	39.7	39.7	140	140
Des. - Interstates and federally designated state highways. Other - All other highways and supplemental routes. Combinations - Only tractor-semitrailer and tractor-twin-trailer combinations are considered here. For other combinations, contact the state/province agency. Trailing Units - Semitrailer in tractor-semitrailer combination, and trailer in tractor-twin-trailer combination. Ø - No overall length restrictions imposed, but must not exceed trailer length. NS - Not specified (but must meet trailer length). A - Semitrailers operated on Class I and II hwys. are limited to a maximum distance of 45.5 ft. (42.5 ft. on Class III and other hwys.) from kingpin to center of rearmost axle. On Class III and other hwys. maximum tractor/semitrailer or twin-trailer wheel base is 55 ft. and/or 65 ft. overall length. B - Kingpin to rearmost axle cannot exceed 43 ft.; if the semitrailer is longer than 48.5 ft. C - Semitrailer can only have 2 axles. Kingpin to center of tandem axle can't exceed 40.5 ft. +/- 0.5 ft. and operate on designated routes. D - Variable, contact the Michigan Department of Transportation E - If gross weight is more than 75,185 lb., legal tandem weight is 34,000 lb. F - 53 ft. trailers only allowed on interstate and maximum distance from kingpin to center of rearmost axle not to exceed 43 ft. G - Not allowed (unless have a permit.)																					

TABLE 5 Types of Data Held in the Region

Data Type	On	Oh	Man	Ia	Mi	Wi	MPOs
Roadside survey of carriers	X						
Truck counts		X	X	X	X	X	X
Commodity flow data	X	X		X	X	X	X
Link volume data		X		X	X	X	
Crash records		X		X	X	X	
Transearch data		X		X	X	X	
Port studies and plans		X		X	X	X	
Turnpike gate-to gate flows		X					
Major shippers survey		X					
Border Crossing data			X				
Weight data	X	X	X	X	X	X	
Railroad waybill data				X		X	
Economic value of freight	X						