Discussion of Issues
Affecting
Freight Transportation

Changes in Intermodal Operating Agreements

There are several major problems in the intermodal network. First, there is a lack of high-speed data transfer between shippers, carriers, terminal operators, and government agencies. Another major problem is a "missing link" between many large port facilities and rail operations. Also, there is no standardization on information, such as commodity classification, load manifests, equipment identification, physical equipment, such as a standard container, etc. is available (1).

There is a need for improvements in the transit and delivery times. The VP-Intermodal of Santa Fe R.R. was quoted as saying that the cycle time between loadings for intermodal trailers is 15 days whereas trucks is only seven days. A study at Conrail's intermodal terminal in Morrisville, PA showed that goods were in possession of the company for an average of 2.3 days from receipt to departure of the shipment. Between 1992 and 1994, annual intermodal loading increased from 3.1 million to just over 8.1 million. Intermodal Association of North America found that intermodal shipments accounted for 18% of long-haul (over 500 miles) shipments with a possible national average of 25% by 1997 (3).

As different forms of transportation have developed over time, regulating government agencies have been formed as the need arose. This has led to a patchwork government system that is often competing against itself to receive government funding and grants. The government agencies regulating different modes need to work in unison to advance intermodal transportation rather than intramodal transportation (12). Another step that can be taken by the government is further deregulation of the industry. Deregulation has led to more intense competition that has lowered prices, but if one mode of transportation would be allowed to own and operate another mode, then an efficient system could be constructed by the business to provide services to a wide range of customers (12).

Again along the lines of deregulation would be permitting wider, longer trailers that better match up with rail equipment. Such equipment would be benefit the motor carriers by making larger loads possible, but there is the concern of the public's safety with such large loads on the highway. Another issue important to the motor carriers is the weight limitations, again less stringent rules would allow motor carriers to haul more bulk loads from

railroad/truck transfer points, but the possible safety hazards from large loads is a concern of many from the public sector (12).

Drayage, "movement of a container or trailer by highway carrier between the rail intermodal yard and point of origin or destination within the local area or region of the rail yard" (12), constitutes a large percentage, 15–20%, of the total shipper's cost. In general, smaller companies have performed drayage. Draymen, being the least influential part of the intermodal process, are typically overlooked in terms of efficiency of the process. With little focus given to streamlining this leg, congestion and delays at the terminal or gates or frequent occurrences. These delays ultimately raise the cost of intermodal transportation (12).

A major issue for the rail industry is clearance with the development of double-stack technology. Many old tunnels, underpasses, and etc. are not equipped to handle such tall loads. A sign of how important it is to making double-stack technology accessible to cities is the fact that from 1984 to 1993 the number of cities able to handle double-stack loads has increased from 7 to about 50. Also important to the rail firms is the potential to exceed current line capacity. With 50 years of downsizing, line abandonment, selling of property, and tearing out excess terminal and storage capacity, the growth of rail intermodal transportation is starting to affect the railroads' ability to handle the volume of traffic. The railroad industry now has to invest in new rail construction or reconstruction. Also complicating the scene is the growing interest in developing commuter services and high-speed passenger trains. High speed passenger trains sharing lines with the heavy slow freight trains can create not only a scheduler's nightmare, but also creates technological problems. (12)

A study to predict the reduction in vehicle accidents involving truck traffic used accident data from Michigan, Tennessee, several national studies and the projected growth of the intermodal industry to predict the reduction in vehicle accidents involving truck traffic. Every freight container sent by intermodal services will reduce the truck traffic on the highway system thus reducing the total amount of minor and fatal accidents involving trucks. (3)

The problem arises when terminals are located on local level roads. Many of these roads have inadequate lane width, pavement thickness, subgrade, turning capacity, etc. On this type of road, trucks may have a much higher accident rate than on the interstates, which

was shown to be true by one of the studies on truck accidents that researches looked at. The researchers then decided to use data which was more relevant to interstate highways, since they assumed the major reduction in truck mileage would occur (3).

Using accident data and the predicted reduction of truck miles by intermodal shipping, it was found that intermodal transportation reduced the nation's fatal highway accidents between 0.6% and 1.4% and reduced the nation's total highway accident between 0.2% and 0.46%. In the case of larger trucks, intermodal transportation decreased fatal accidents by 5.99% to 12.92%, and reduced the overall accidents by 3.39% to 7.57%. (3)

TransCAD 2.1 was used by the researchers to predict the amount of reduced truck miles and accidents in two specific carrier cases (3).

Several professionals recommend the following Regulatory/Legislation Changes: (1)

1. Removing or revising antitrust legislation that provide restrictions on modally integrated services.

2. Revising design requirements. Such as requirement on highway and container chassis, railcars, and rail-compatible or intermodal containers. Such changes could greatly decrease the time spent transferring goods from one mode to another.

3. Federal legislation or incentives that encourage an increase in system unification.

Changes in Technology in Transportation

A workshop was hosted by the Center for Transportation Research and Education (CTRE) to identify relevant issues on four Intelligent Transportation System (ITS) categories. Attending the workshop were representatives from motor carriers, the ITS industry, state agencies from Iowa and the six surrounding states. The four focus categories for the workshop were electronic verification, electronic clearance, Commercial Vehicle Operations (CVO) administrative processes, and safety. (11)

During the workshop, the motor carrier representatives stated four criteria that are central to the acceptance of ITS by the trucking sector. These are 1) voluntary participation, 2) high performance under harsh conditions, 3) cost reduction of operations, and 4) ability to interface with ITS-CVO systems across the nation. (11)

Intelligent Transportation Systems for Commercial Vehicle Operations (ITS/CVO) is the primary focus for new technology in carrier industry. CVO includes not only the operations associated with the movement of goods, but also the movement of passengers via commercial vehicles. The regulation of necessary activities of commercial operations through out the North American highway system also falls under the jurisdiction of CVO.

The direction of new ITS innovations that deal with the data exchange between government agencies and CVO's can be classified into two general areas. They would be technology used while en route to reduce travel time and technology that would reduce the time of the application procedure. To reduce the time of the application procedures, use of Electronic Data Interchange (EDI) or allowing carriers to petition one office for all required clearances are the two solutions in the forefront of ITS/CVO. Electronic toll collection and electronic preclearance (checking of weights and credentials electronically) are the two main directions for en route ITS innovations. As common sense would tell one, electronic toll collection and electronic preclearance would have to be done at mainline speeds in order to be time saving devices (7).

Mobile Data Communications (MDC) and EDI technology are two ITS technologies that can be used within the carrier itself. MDC allows dispatchers and drivers to communicate with the use of satellites, and therefore there is no longer a need for the driver to find an open phone. MDC also allows last minute changes to be made to loads, which

reduces the number of trips and service time for the client. Along with the savings in communication, fuel, and time costs; a reduction in maintenance and a positive return-load is possible. In countries with "open and liberal legislation", the MDC has been found to have a more profound impact. Also important to the success of MDC is a competitive environment and a well-organized company. (8)

For electronic verification and electronic clearance, there are many issues that are yet unresolved. Paramount to states is the liability from a precleared truck that is involved in an accident. The visual inspection is an important tool to insuring that the truck operating on the highways meet the safety standards. From a system policy standpoint, a state or agency would need to be chosen to organize and lead interstate efforts. Also, a standard procedure for determining if clearance should be granted. For operating policies, a central authority would be required to manage the systems and database and be responsible for correcting any system errors. Critical to the states is that they have access to the data at all times, especially if the database is managed by a different organization. Whereas the motor carrier industry is concerned that industry privacy is insured to protect against a new tax system, the use of data by competitors, or the possibility of false applications. (11)

CVO administrative processes were identified as having three issues important to ITS-CVO. The first, database and system management deals with developing a data standard for the electronic interchange between different entities. Also dealing with this first issue is ensuring that the data is streamlined by eliminating redundant entries. The second issue, system-operating policy will focus on ensuring a prompt response to states and motor carriers. There will also be a need to cross-reference data to detect false applications. The third issue, data integrity and security are much like those identified under electronic verification and electronic clearance. (11)

Under the safety category, a large percent of funding from the federal government will be required to implement many ITS-CVO innovations with the current, unfavorable benefit-cost ratio. At the same time, funding for other safety needs will need to be met. The states will also need to agree on determining a uniform set of safety criteria, policy, and enforcement. Another issue raised is that any new in-vehicle equipment should require a minimum of the driver's attention while providing up-to-date road & weather conditions and advisories.(11)

Other examples of new transportation technology and the impacts/benefits.

- **Traffic Signal Control Systems**

  Adjust signal timing and patterns to match real-time traffic flow. Computerized traffic signals in Lexington, KY decreased accidents by 31% and reduced the traffic delays by roughly 40% (4).

- **Freeway Management Systems**

  Placing variable message signs, adjustments to ramp metering rates and real-time highway information through radio messages help improve traffic flow on the high volume roads. Ramp metering in Minneapolis, MN increased the freeway capacity by 22%, caused a 25% reduction in accidents, and increased speeds by 35% (4).

- **Incident Management Programs**

  The program identifies and responds to motor accidents or breakdowns with the appropriate services. A 50% reduction in the time to clear incidents occurred when the Incident Management Program was put in place in Chicago, IL (4).

- **Electronic Fare Payment Systems**

  Using only one card for all transit and parking transactions. Provides convenience for the users while providing a centralized source of information for transit agency managers. These smart cards' benefits were shown to exceed the costs by more than double in Los Angeles, CA (4).

- **Electronic Toll Collection Systems**

  Allows the collection of toll charges without having to stop the driver. The Oklahoma Turnpike's electronic toll collection system reduced the State's operational cost per lane by 91% (4).

- **Hi-Tech Traffic Management**

  Eight Toll booths were replaced with five electronic lanes on New York's Tappan Zee Bridge. Traffic now moves at an average speed of 40 kph, compared to the literal crawl before the electronic lanes were installed (6).

  Cities including Denver, Baltimore, Milwaukee, and Portland are being outfitted with the Global Positioning Systems (GPS). Gathered information on the location of the buses will allow managers to make schedule changes as needed (6).

- **Technology and Commerce**

  Studies are being done to assign electronic signatures to container shipments. The carrier industry is pushing new technology to replace weigh stations and inspection and increase security (6).

  The Texas Transportation Institute of Austin, TX is using Automatic-Vehicle-Identification (AVI) technology to gather real-time information on 230 miles along eight freeways, 100 miles of high volume vehicle lanes and two toll roads (5).

  The AVI tags are fixed directly to the cars; therefore, no costly road construction is needed to imbed loop sensors into the pavement. With loop sensors, it typically takes two to three years of costly construction including lane closures to imbed the detectors in the highway. With the lack of extensive road construction for the AVI tags, lane closures are minimized. This system also takes considerably less time to install. For example, a 60-mile stretch of road can be ready in four to six months (5).

  AVI tags will gather data by roadside cabinets that will transmit the information to a central control facility. Once the data is collected at the control facility, computers will calculate travel times and speed, and then provide this information for travelers. With somewhere between 40,000 and 50,000 tags already in use, there should be plenty of relevant information for the travelers along the monitored roads (5).

  Travelers (including carriers) should be able to identify congested areas that will increase their travel time. Reduced travel time and fuel consumption for carriers should save money for the shipper, carriers, etc. (5)

Subsidies

According to the NCHRP (page 53) there does not exist any rail subsidies. Subsidies do reduce the cost of transport (NCHRP page 53). Trucks pay less than their share of federal highway taxes (NCHRP pg. 54).

Change in Entry / Exit Barriers

There are several costs incurred when entering the market. These costs include quarterly fuel and tax reports, tolls, and scale tickets, truck repairs, transaction fees, fuel and tires. To stay competitive within the field companies may consider investing in Electronic Data Interchange (EDI), Geographic Information System (GIS), and Global Positioning System (GPS). Before investing in one of these systems the company needs to determine the benefits that will result, the benefit cost ratio and the external assistance that will be needed. The company should also assess the capability of the EDI and if it will be beneficial for the company. The initial costs for these systems would include the cost of educating the company, increasing management and management commitment, purchasing the software and implementation of the system(s). Implementing EDI will impact the "just in time" process and revenue by expanding the geographic market. It will preserve existing revenue by forming stronger relationships with existing customers. A decrease in company costs will occur by reducing or eliminating paper based documents and associated preparation, storage and retrieval costs.

Change in Taxes / Fees/ User Charges

The changes in taxes, fees and user charges depend on vehicle type. User charges depend on vehicle, operating and owner cost. Operating costs vary with travel and ownership cost depends on owning and registering a vehicle. Fuel tax is the primary user charge. There is also a heavy vehicle use tax that is dependent on the vehicle's weight. These fees are the principal means of financing publicly provided infrastructure. The following is a list of the different taxes that truckers pay. (9)

24.4 cents in federal fuel taxes for each gallon of diesel fuel
18.4 cents in federal fuel taxes for each gallon of gasoline
21.1 cents in state fuel taxes for each gallon of diesel fuel
20.7 cents in state fuel taxes for each gallon of gasoline

In 1995 the trucking industry paid the following; (9)

$11.3 billion in federal highway-user taxes
$13.8 billion in state highway-user taxes
$25.1 billion in federal and state highway-user taxes

The Interstate Commerce Commission (ICC) now Surface Transportation Board (STB) provides pricing protection, prevents preferential treatment of shippers administers safety laws and generally had jurisdiction over all financial transactions affecting the structure of the national rail network. For all modes of transportation the 4R (1996 Railroad Revitalization Regulatory Reform Act) and the 1980 Staggers Rail Act and Motor Carrier Act curtailed rail and motor carrier regulation and lifted restrictions on competition within the surface modes. The STB still ensures that railroad and motor carriers operate in the interest of the shipping public and the nation's economy (10).

Changes in taxes, fees and user charges impact highway usage patterns and wear and tear on roads. These charges will affect pricing, competitiveness, the financial condition of transportation and fleet size. Shippers, receivers, passengers and consumers will also be

affected in two different ways, forward shifting and backward shifting. Forward shifting is when the company passes extra charges on to the customer in the form of increased rates. On the other hand, backward shifting is when there are cut backs in the company to compensate for the extra charges that may include reduction in travel distances and packaging. Due to increased user charges local fleets may move to surrounding states where the user fees are lower. Some states do have reciprocity.

Change in Transportation Infrastructure

Some of the changes in transportation infrastructure are; controllers for signals and ramp meters, surveillance cameras, dynamic message signs, electronic toll collection equipment, non-intrusive, weather audio detectors. Refer to Change in Transportation Technology on page 7 for explanations of some of the aforementioned topics.

Change in Heavier Rail and Heavier Truck Policies

A change in heavier rail policies creates a diversion to other modes, modal equity, and loss of revenue by other modes. There are benefits to shippers (rate reduction) and benefits to carriers including operating efficiencies, equipment and operating costs. An increase in track maintenance occurs. Light density lines in poor physical condition are affected most.

Currently the federal truck weight law applies to the Interstate System while Federal vehicle size law applies to the National Network (NN) which includes the Interstate System. Federal law regulates trucks by Truck Size and Weight (TS&W) standards. Exceptions fall under State grandfather rights and special permits. The following are the restrictions set for the current TS&W. State laws control the maximum limits for truck length (15).

- 20,000 pounds for single axles on the Interstate
- 34,000 pounds for tandem axles on the Interstate
- Application of Bridge formula B for other axle groups up to the maximum of 80,000 pounds Gross Vehicle Weight (GVW) on the Interstate
- 102 inches for vehicle width on the NN
- 48-foot (minimum) for semitrailers in a semitrailer combination on the NN
- 28-foot (minimum) for trailers in a twin-trailer combination on the NN (15)

The trucking industry has found ways to get around the aforementioned restrictions. A rearrangement of tires leads to increased load capacity within the GVM limit. Three of the more common arrangements are “super-single” tire, split tandem axles, and lift axles (15).

On the state level Iowa and the surrounding states follow the federal regulations for TS&W restrictions. These regulations affect full truckload (TL) shipments more than less than truckload (LTL) shipments. An exception is made for the above mentioned regulations for LTL international shipments that are potentially overweight. These containers are moved to a terminal under a special permit, unloaded and reloaded in loads of 80,000 pounds or less. Trucks traveling across boarders (Canada and Mexico) need to determine either a least load that would be applicable across all boundaries or determine a transporting strategy that can be

modified in route. For example being able to remove a trailer, reduce the load or moving an axle. (15)

The rail industry also has weight restrictions. Conrail implemented the following restrictions.

- 263,000 lbs. gross weight for “LO” covered hopper cars unless prior approval is made to exceed this restriction

To further investigate the previously mentioned issues engineering and economic models could be created to examine track costs, similar to research currently being performed by Dr. Carl Martland at MIT.

Changes in Transportation Operations

Current business practices have always played an important role in determining transportation operations. For example, a business that is anticipating to ship and receive goods by truck would want to have the plant located near the interstates, whereas a business that relies mostly on railroads will look to set up operations near rail lines. Historically, the spatial distribution of economic activity has been a major influence in transportation modal choices. Traditionally, trucks do relatively short movements and the longer hauls are frequently done by the rail and air industry. Domestically, water transportation is most useful for the low-valued commodities that are being moved from locations near to ports (14).

Globalization of the world's economy and just-in-time manufacturing rely heavily on the timing of the arrival of goods. This resulted in a need to ship goods quickly and reliably to meet the growing demands and requirements of the industry. As the distance between origin and destination of the good grows, the need to ship products quickly and reliably may shift a larger portion of shipped freight to the airline industry. Recently, many East Coast companies have converted to airfreight when dealing with Asian goods. Using airlines can save them up to four or seven days over using trucks to move freight from California after arriving in the United States. But with the growing global economy, the manufacture of many goods in Asia is moving westward of Japan and Korea. This shift in production may result in the movement of goods through the Suez Canal and then to the East Coast. This is just one of many illustrations of where the transportation demand for the U.S. and Iowa can change quickly because of the fast pace of the world's economy (14).

When a business changes its operations to just-in-time manufacturing, what the business requires from the transportation can drastically change. Generally, firms will reduce the number of suppliers and transport companies. Since JIT calls for smaller shipments of supplies, one can reason that the total number of shipments and frequency will increase. As an increasing percentage of firms convert to JIT, the traffic volume can also be expected to increase. Eventually the number of companies using JIT will stop growing and may even decline due to the reduced highway reliability form traffic congestion. This can be seen by the decline of JIT manufacturing in Japan after highway congestion got so bad that there was little to no reliability in the shipping industry.

To assist with getting goods to their destinations quicker the Wisconsin Department of Transportation (WisDOT) has engaged in a long-range transportation planning process called Translinks 21. This program includes an analysis of intercity, multimodal transportation, referring to longer-distance trips over a variety of different modes of transportation, including freight rail services (13).

Wisconsin is similar to Iowa in that there is a large amount of coal transported by freight within the state. Wisconsin also transports much lumber, wood, food and farm products (13).

A little background about intermodal procedures are as followed. One form of intermodal movements is piggyback service, or trailer-on-flat-car (TOFC). As stated, this involves placing an entire semi-trailer onto a rail flatcar. Container-on-flat-car (COFC) refers to a mover where only a container is transferred between a flatbed truck a rail car without the trailer chassis. COFC is generally more fuel-efficient that TOFC for the rail portion of the move. Doublestack container movements, where two containers are stacked on top of each other for the rail portion of the move is a more recent intermodal development. A drawback to these movements is that they require a special well-car and require additional height clearance in the rail corridor. A new technology is RoadRailer. RoadRailer consists of trailers with special wheels that ride the tracks therefore eliminating the need for flatbed or doublestack-well cars and the need for special loading equipment.(13)

To develop Translinks 21, WisDOT formed a consulting team comprised of national and state experts to develop freight commodity flows for the state through the year 2020. This committee was also used to assist in developing four freight rail alternative scenarios. Freight experts in the truck and rail sectors reviewed and fine tuned the information developed by the consulting group. The group determined four different alternatives that together would best predict the future of rail and intermodal traffic (13).

Alternative one would be to maintain the current policies and procedures in Wisconsin concerning rail and intermodal traffic. Commodities that are transported by rail today will continue to be carried by rail in the future. The proportions of freight traffic will continue to the year 2020 as they are currently. This does mean that total amounts of quantities would increase but the proportions would remain the same. WisDOT would continue to provide the same amount of funding to railroads in the form of loans and grants (13).

There are two focuses for alternative one. The first focus is preservation of rail service through acquisition and rehabilitation of abandoned rail lines. The second focus is the improvement of existing facilities to assist in more effective rail transportation. Both of these focuses must undergo a cost-benefit analysis to determine the eligibility and priority for funding. (13)

Alternative two consists of reallocating funds from highway to certain non-highway modes. However, the freight rail programs would continue with the current funding and follow alternative one. No additional funding will be needed for this alternative other than the existing monetary allocation. This alternative will provide passenger rail incentives through Translinks 21. (13)

Alternative three consists of the state working towards accelerating the adoption of intermodal technologies to create a seamless transportation system. This future system would give shippers more transportation choices, better mobility, and increased connectivity to highways, roads, local streets and port access. Public safety would be increased from the reduction in modal conflicts. As freight transportation becomes more effective and efficient there would be an increase in economic development opportunities. Rail programs would provide grants to maintain service on light density lines and loans for infrastructure improvements. A drawback to this alternative is that it requires $187.5 million more than the allotted funding. (13)

Finally, alternative four would implement every rail infrastructure program that would provide shippers with more routing options, the capacity to accommodate larger and heavier rail shipments and gains in productivity for railroads (13). In the short range the infrastructure will be upgraded including gaps of main line tracks, track improvements, grade-crossing warning systems, train control and public owned lines. In the long run improvements in the infrastructure system would take place only in segments that would require increased capacity. A drawback to this alternative is that it would require an additional $250 million in funding (13).

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