INTERMODAL FREIGHT TRANSPORTATION IN THE U.S.A
A SYSTEM THAT WORKS

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Intermodal Freight Transportation
System That Works
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Intermodal Freight Transportation
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Intermodality is so broad that it is difficult to encompass all of its aspects in a single volume of reasonable size. I am trying to touch briefly on as many aspects as possible, but also I'm attempting to put the emphasis on land-sea cargo transfers, as well as a very brief view on air surface cargo transfers. (Enclosed is a draft guide lines).

Intermodality can be observed from viewpoint of mode, type of cargo, category of terminal, or combination of these viewpoints. I am going to present not just a statement of status quo and views of changing nature of Intermodality, but the purpose is to try to make this volume useful as a reference to the ongoing changes in Eastern European Countries and in particular in Bulgaria. As you may notice Eastern European Countries turn their economies about 180 degree around to a free market conditions and it is to be expected that the deregulation will take place sooner as we are prepared for. So it would be better if we know something about what has happened in the USA during that period, what were the trends then, what are they now, what are the basic principles that make Intermodality a system that works.

Intermodality is a flexible response to changing marketing and distribution requirements, but it contains certain constant principles. No commercial endeavors reflects as sensitively the advantage of freedom from government control, or vice versa the stultifying effect of heavy-handed government regulation as Intermodality does. The reason is that Intermodality in the USA develops from free play of competitive forces among carriers of all modes, balanced with just the right degree of incentive among them to cooperate with each other in their own self-interest where necessary to meet customers' demands. It also requires a sufficient level of competition among shippers to cause them to demand the ultimate from carriers.

Government and industry transportation specialists have been groping for a way to effect an integrated national transportation system in which all carriers and modes would be coordinated to the benefit of commerce and national defense (as the situation with Bulgarian national transportation system is now). The integrated transportation system was to have been legislated to provide the public and the national defense with a coordinated intermodal network functioning with optimum efficiency. This has not resulted from legislation and regulation but may come through deregulation which permits the establishment of transportation "supermarkets" a trend already in progress.

Intermodal movement of cargo in the USA is part of two larger subjects - domestic and international transportation. Generally I'm going to stay within the framework of Intermodal activities within the borders of the USA, but in order to make more balanced picture, I'll try to present a few selected practices in other countries.
Intermodal Freight Transportation
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1. Intermodal Freight Transportation - Description from historical point of view
   1. How Intermodality Developed in the USA.
      - Early Ro-Ro
         One system in common use in those early days antedated the modern Ro-Ro procedure of accommodating wheeled vehicles aboard waterborne vessels. Ferries, rafts and barges were used to cross harbours, lakes and rivers and horse-drawn carriages were rolled on and off this waterborne units.
      - Canals
         The Industrial Revolution nurtured the development of more organized methods of intermodal transfer in the early 1800s. These improvements focused on barge canal operations. The Pennsylvania Canal between Philadelphia and Pittsburgh, opened in 1839, involved both water and overland segments.
      - Rail - Steamship
         From 1847 to 1896 the New York, New Haven and Hartford Railroad and the Fall River Steamship Line jointly experimented with an early type of intermodal container to coordinated freight movements between them.
      - Rail
         Railroads quickly outstripped the early canals, thereby dominating the history of U.S. freight transportation from the mid 1800s up until the 1920s. Railroad freight service was station-to-station; freight shippers were responsible for delivery to, and pick up from, rail stations and team tracks. Containers, where used, were largely for improving station-to-station LCL service, and for reducing railroad costs, but not for intermodal movement.
      - Unit Trains
         As the U.S. economy expanded, improved means of transporting large volumes of cargo had to be developed. Railroads were in the forefront of development because they accessed the basic long distance network with the broadest coverage. In the 1800s unit trains were introduced to haul commodities such as grain, coal, and other ores. Later, in the 1950s, unit train use was helped by the relaxation of regulatory restrictions, which had limited the employment of through competitive rates. Many long-distance means of transporting bulk commodities are designed with the purpose of avoiding intermodal transfers. For example, a unit train for transporting coal consists of 75 to 100 hopper cars, each carrying about 100 tons, moving as one unit at a steady pace from the origin at the mine, through to the final destination, thus avoiding intermodal transfers en route. Today unit trains are not limited to single modal purposes, but are used for intermodal movement of general and bulk cargo frequently in minibrigde and microbridge
service from and to seaports. Intermodal transfer of both bulk and general cargo takes place at each end of unit-train carriage.

- Federal Operation of Railroads and Coastal Shipping

Railroads and coastwise shipping were taken over by the federal government during World War I, and remained under federal operation until 1920. The takeover allowed the government to allocate scarce wartime capacity, and to coordinate the railroads to ensure the proper flow of traffic and the proper interchange of railcars. Prior to the takeover there had been a pileup of empty boxcars at East Coast ports, threatening to strangle the U.S. rail-dominated transportation system. The government’s coordination goal, therefore, was single-modal, not intermodal.

- Growth of Trucking

During the war, the truck proved its capability and versatility in moving troops and goods, but it had nowhere to go in the United States because there were no paved interstate highways. Congress had passed a national highway law in 1916, enabling states with highway departments to construct specified national highways, for which the federal government underwrote half the cost. The roadbuilding effort, spurred by the 1916 legislation and the World War I experience, spread throughout the nation. In the early 1920s route numbers began to appear. By the end of the decade there was offered one of the first commercially available semi-trailers. By 1930 solid rubber truck tires were replaced by pneumatics. In the mid-1930s, with trucks and trailers, steadily improving, the American Trucking Associations was able to compile a classification 185,313 "for hire" trucks. Expansion also brought federal truck regulations in the form of the Motor Carrier Act of 1935. World War II reemphasized the importance of trucking as an integral part of the U.S. transportation system in time of crisis. Between 1940 and 1950, truck revenue ton miles increased by 190%. In 1956, President Eisenhower signed the Federal Aid to Highways Act authorizing construction of the Interstate Defense Highway System throughout the U.S. Today the Interstate system consists of approximately 45,000 miles of highway, linking 90% of the U.S. cities that have over 50,000 inhabitants. The railroads had their national network in place for over a century before the paved highway network started to spread across the country, and the final impetus was not given to trucking until the 1956 Federal Aid to Highways Act.

- Early Rail-Truck cooperation

After the World War I a number of railroads developed LCL container service. Some railroads used it only as an online service, giving shippers the extra advantage of protection of their goods, while others used the containers as intermodal units in conjunction with truck pickup and delivery. The first recorded carriage of freight by intermodal truck trailers on railroad flatcars was in 1926. Piggyback services grew slowly, but steadily until mid-1950s, when the pace quickened.

- Early Rail-Truck Competition

Meanwhile railroad services with LCL containers were dropped one by one, because railroads were subjected to new LCL freight competition from expanded trucklines and from freight forwarders who consolidated LCL/LTL shipments into carload/truckload lots to be forwarded by rail or truck. The
development of long-haul rail-truck intermodality was hampered between the 1920s and the mid 1950s by the growing rail-truck competition for long haul traffic and by inflexible government regulations. Today’s widening intermodal operations are attributed to the relaxation of regulatory restraints starting in the mid 1950s. In 1931 the Interstate Commerce Commission (ICC) issued a decision in the container service case, which was an additional roadblock to faster rail-motor intermodal development. The decision required that rail rates for intermodal containers be related to the class rate structure. It required that no container traffic move at less than carload rate or more than one class lower than the any quantity basis applicable to the commodities in question. The carload rate on the highest-rated commodity would have to be applied to the whole container load if it was higher than third class. In 1935 the Association of American Railroads further thwarted intermodal cooperation adopting a resolution against through routes and joint rail-truck rates except where such arrangements would not constitute invasion of another railroad’s territory.

- Opening the Door

An open piggyback tariff and a joint motor-rail motor tariff were published by the Chicago Great Western Railroad in 1936, and an open piggyback tariff was published by the New York, New Haven and Hartford Railroad in 1937. The significance of the open tariff was that it made intermodal service available for use by all shippers, forwarders and carriers. Nevertheless, since long haul routes were not covered by these rates, the extent to which they could be used was limited. On one hand the railroads were reluctant to cooperate with the truckers in any manner that would help the competitive position of the truckers, and the truckers were against cooperation when it might help the railroads. On the other hand, many railroad managements realized the real competitive possibilities offered by intermodal piggyback operations. In order to clarify these possibilities, the New Haven railroad petitioned the ICC in 1953 for a declaratory judgement on the legal status of piggyback in many of its ramifications. The ICC issued findings the following year that generally favored the development of piggyback services as an intermodal instrument. The Transportation Act in 1940 had recommended "... developing, coordinating and preserving a national transportation system ..." and the ICC’s report was one of the beginning steps toward such development and coordination. The ICC found that through routes and joint rates between railroads and motor common carriers were permissible. It also delineated the roles of railroads, private carriers, contract carriers, freight forwarders, shippers, and others in relation to piggyback carriage.

- Piggyback Plans I – IV

The ICC actions launched Piggyback Plan I (traffic moved subject to a substituted service rule in the motor carrier tariff) and Plan II (Railroad service at rates competitive with motor carrier rates). In 1955 the Pennsylvania Railroad inaugurated a Plan I type of service for trucklines. Until this time the railroads had favored piggyback services that were under their complete control, including rates and billing. Plan III and
IV (less complete services involving flat rates per trailer regardless of contents), useful mostly to freight forwarders, were introduced later. In 1964 the ICC issued another set of rules concerning piggyback operations in a proceeding referred to Ex Parte 230, in which the numbers of plans was extended to five. Plans I and V were categorized as "joint intermodal", Plans II III and IV as "open tariff", permitting their use by all types of carriers and shippers. Although the railroads challenged the open tariff aspect, it finally was affirmed by the Supreme Court in 1967.

- Ocean Shipping

Containerization of ocean cargo for intermodal purposes was not an important factor until the 1956 "container revolution". The June 1960 article of Via Port reports that trailer-on-flat car (TOFC) services offered by 51 railroads in the USA were continuing to score record gains, having been responsible for hauling nearly 80 000 trailers during the first 8 weeks of 1960 - a 48.6% increase above the same period in 1959. However the article further states "...In most case, export TOFC freight must still be unloaded on steamship piers and then stowed conventionally aboard ship. Except for isolated instances, non "break-bulk" movement of export-import cargo by TOFC is not yet generally available." The land-sea interchange point was one of the last to receive the benefits of containerization for intermodal movements of general cargo, since it is the point where freight necessarily has to be transferred. When it eventually was put to expanded maritime use, the intermodal container provided additional advantages in reducing time and expense of loading and unloading ocean vessels. While the size and speed of ocean vessels had increased over the years, loading and unloading methods had not changed and little consideration had been given to intermodality. Ocean shipping companies used small, nonstandard containers to consolidate and protect shipments, but not for intermodal purposes. The 1960 Via Port article says: "... Many steamship lines offer container services from New York steamship piers to points in Europe, the Caribbean area and South America, but the small odd sized containers in these services are not highway trailers. It is conceivable, however, if a trailer of TOFC freight is delivered to a pier for unloading, the freight could be shifted directly from trailer to one of the small containers. By doing this the exporter would secure many benefits of 100% containerization - lighter packing, less pilferage, complete protection against the elements while in transit, and of course, enjoy the all weather reliability of the joint truck-rail service...."

- Inland and Coastal Waterways

Canals figured prominently in early economic development of major cities like New York and Philadelphia. The railroads quickly moved into the forefront and battles that started then between water and rail carriers continue to the present day. The water carriers, being geographically fixed in position, are especially dependent on intermodal exchange of traffic with the rails. They accuse the railroads of routing
traffic around them rather than making use of logical intermodal interchange points.

- Pipelines for Petroleum and Other Products
  In 1865 oil pipelines were first employed in the Pennsylvania oilfields. They operated with small guages and for relatively short hauls, until the late 1870s, when several 6-inch diameter lines with the length of haul over 100 miles were put into operation. The network continued to expand and the ICC was given jurisdiction over for-hire interstate oil pipelines in 1906, jurisdiction was later transferred to the Dept. of Energy in 1977. During World War II two long-distance lines were constructed and operated by the U.S. government from Texas to the Northeast. One line "The Big Inch" had 24-inch diameter and carried crude oil, while "The Little Inch" had a 20-inch diameter line and carried refined products. In 1977 The Trans-Alaska Pipeline System began moving oil in 48-inch diameter pipes from Alaska's North Slope to the Port of Valdez on Alaska's south coast, a distance of 800 miles. Today pipelines transport almost half of the U.S. domestic petroleum, with motor and and water carriage in second and third positions respectively, and rail moving about only 1% of the total.

- Air-Surface
  Small-scale commercial air operations started after World War I and developed slowly between the wars. Prior to the World War II The Railway Express Agency under the name Air Express, performed pickup and delivery services and administrated the overall program of air-carriage of goods with the cooperation of most airlines. The volumes of traffic and the size of air shipments were so much smaller than those of surface transport that air-surface intermodality measured by surface terms was insignificant until post-World War II growth began to take hold. Today intermodal movement of air-freight cannot be considered insignificant, but the average shipment size is still much less than that by surface means (although value per pound is much higher) and the use of intermodal containers is extremely rare.

2. The Container Revolution.
   The Revolution was properly dubbed the "container" not the "intermodal" revolution, because it was the container's unique role as common denominator among modes that was revolutionary. Consequently when it was publicly demonstrated in 1956 that standard containers could move goods successfully on a land-sea intermodal journey, a commercial revolution was started.

- A New Sub-Industry
  As a result of the container revolution, the container manufacturing and service industry emerged as a new industry. Container leasing, maintenance, and repair have become important businesses. Containerports have grown into separate independent facilities at many major maritime gateways. Cranes, transporters, and other container-handling devices represent big business for heavy equipment manufacturers, and fixed investments of many millions of dollars for the ports.

- The Guiding Role of Malcolm McLean
  Malcolm McLean, a trucking executive in 1956, is the one person most responsible for the container revolution. Using
the operating rights of the Pan Atlantic Steamship Corporation as his medium Malcolm Mclean guided in 1956 initial sea-land experiment. The service was successful from the beginning. At the outset it used converted tankers. The fleet was soon expanded by two more converted tankers. In 1957 the company took delivery of the first ten containerships, each with capacity of 226 35-foot containers and shipmounted cranes. The company name subsequently changed to Sea-Land Services. Today Sea-Land Services is the world largest containership line.

Prior Intermodal Exchange Efforts
Several intermodal container efforts preceded McLean’s breakthrough.

* In the late 1920s, intermodal container services by land were operating within the U.S. Although truck-trailer van shipments by rail had been made, they ran into difficulties with ICC rate regulations. Nevertheless TOFC and COFC services had commenced and were increasing in frequency.

* In 1929 Seatrain Lines fitted rails on decks of several of its ships.

* The Alaska Steamship Company began operating vessels, each accommodating 90 truck size vans between Seattle and Seward in 1953.

* During the 1950s the Bowling Green Storage and Van Company of New York offered a transatlantic "lift-van" service for moving mainly household goods and specialized commodities.

Containerized But Not Intermodal

The first decade of the container revolution constituted mostly just that - a container revolution with few land-sea intermodal aspects. Intermodality was confined primarily to local pickup and delivery of containers by trucks. Competitive animosity between land and sea modes, combined with institutional lethargy, caused land-sea intermodality to progress slowly.

First Transatlantic Containership Operations

In 1956, Sea-Land invaded the transatlantic trade with the first containership operations. The company was soon joined the U.S. Lines. Most of the other transatlantic operators, as well as operators on the routes to Japan and Mediterranean ports, showed great ambivalence. Some experimented by showing containers on the decks of conventional cargo ships, while others made halfway modifications to their vessels, and still others ignored the possibilities of carrying containers. They were slow to adapt to the efficiencies of the container revolution. Their delay is attributed to indecision and failure to grasp the advantages of the new system. The indecision was fostered by several obstacles, making the choice an exceptionally difficult one for the ocean carriers.

Investment Required

One major obstacle was the investment in containerships, containers and terminals required for containership operation. Cost savings could not be realized simply by loading containers, like any other pieces of cargo, on breakbulk ships. As the industry advanced, full cost savings could be achieved through uncompromised containership operation.

Labor Union Objections
Labor Union did their part to slow down the progress of containerization because they were afraid it would lose jobs for longshoremen.

**International Complications**

Although containerships had operated successfully on coastal routes, complications existed in the international arena that made many ocean carriers hesitant to adopt the containership approach. There were differing load and size restrictions for inland road and rail transport in foreign countries, and customs officials took varying approaches to container clearance.

**Entrance of Foreign Operators**

Until 1966, containership operation was primarily a domestic U.S. phenomenon operated by American carriers. Several foreign shipping lines soon recognized the efficiencies of container operation and realized that they should join the new wave of risk being outmoded. After Sea-Land invaded the North Atlantic with containership operation in 1966, foreign carriers began joining the bandwagon by instituting containership service on major trade routes.

**Government Intervention: Pro and Con**

Arguments in favor of legislative action to protect and subsidize U.S. shipping lines and shipyards stress that many foreign shipping and shipbuilding companies are subsidized, that foreign crews and workers are paid substandard salaries, and that in terms of defense, America needs a strong merchant marine and shipbuilding industry. Opponents of continued or increased subsidies question whether taxpayers should contribute to keeping selected private companies in business. They believe the result is the same as erecting trade barriers in any industry—protection of inefficient producers and raising of prices to consumers. These opponents argue that the more protection it is given, the more outmoded and inefficient U.S. shipping and shipbuilding becomes. They believe that the more successful U.S. companies are those that are the most innovative and the least dependent on government help.

**ICC and FMC Controls**

The ICC and the Federal Maritime Commission (FMC), each in its respective sphere of land and sea, has exerted tight control over rates and conditions of carriage. Such rigid government control over prices and conditions discouraged a more rapid development of land-sea intermodality. The ICC and the FMC have made little effort until recently to coordinate their rating or other policies, and they have done even less to promote land-sea intermodal carriage.

**The Ocean Carrier Conference System**

The FMC encouraged U.S. ocean carriers to join conferences in order to set minimum rates and conditions of carriage, and in the mid 1970s it assessed heavy fines on U.S. and foreign-flag carriers for setting rates outside the conference machinery. The FMC has since eased its controls and policies, in line with overall American deregulatory trends, but deregulation has not progressed as far in ocean shipping as it has in other modes. Maritime legislation adopted by Congress in 1984 takes an attitude toward the ocean conference system. In recent years, non-conference carriers have established intermodal
rates – known as microbridge or interior-point pricing (IPP) rates – to interior points that were lower than the port-to-port conference rates.

- **Capital-Intensive Business**

The business of operating ocean-going vessels or other large transport vehicles is a capital intensive one. The container revolution made an already capital-intensive business even more capital intensive by reducing dockside labor costs and increasing capital costs. In a capital-intensive business any change in volume or price quickly can turn fortune into disaster, or vice versa. Under competitive pressures, especially in a capital intensive business, it is wise to carry freight at a price lower than fully-allocated cost, than not to carry it, or in order to expand the market, or to get a higher share. However if such low-price freight becomes too large a proportion, and or the practice continues for too long, the carrier can suffer great financial difficulty. The three major outside influences of the early 1980s – fuel price increases, deregulation and a decline in traffic – combined to pose a cumulative challenge to containership operators. Even though business conditions have improved since 1983, the fundamentals for fortune or disaster still exist, because the business is so capital intensive.

3. **Government Regulation and Deregulation**

The records show that government control of transportation in the U.S. limits and stultifies intermodality and conversely, that deregulation liberalizes and facilitates it. Government regulation of any commercial enterprise tends to make it more rigid and less subject to change. Intermodality is a science that is developing with the aid of new concepts and technologies. Such a rigid regulatory system simply does not provide the flexibility to allow for more frequent change and development. This point of view is not shared universally. There are a number of voices calling for regulation. Some experts feel that certain practices, such as carrier liability should be kept under government control in order to ensure intermodal uniformity and protection of the shipper. And there are those who feel that the growing importance of intermodality calls for more rather than less regulation in order to legislate uniformity and cooperation among otherwise antagonistic and competitive modes.

- **Federal Government Regulation in The United States**

There is another aspect of federal regulation that works strongly against intermodality – regulation has been legislated and administrated on a singlemodal basis without any thought to coordination among the modes. Historically, regulation of each mode has been approached at separate points in time, as each mode has developed to the extent that it has come to the notice of the legislators. First to be regulated were the railroads in the mid and late 1800s, then the steamship lines in the early 1900s, followed by pipelines, motor carriers and airlines in the mid-1930s. Although legislation for each mode was patterned along the lines of earlier models applicable to other modes, it nevertheless was established as a separate statute
applying to a particular mode, without consideration of intermodal coordination.

- Separate Commissions
  Separate commissions (the Interstate Commerce Commission, and the Federal Maritime Commission, and the Civil Aeronautics Board) have been set up under different acts to regulate each mode. Each commission has been charged with the promotion and welfare of that particular mode, which put even the commissions in competition against each other, rather than working toward an integrated intermodal system. There are some exceptions to this rule. For example, the ICC regulates inland waterways, trucklines and pipelines as well as railroads, but it still has separate legislative authority and separate promotional responsibility for each.

- Competition for Grants
  Another facet of the government regulatory process, which serves to pit the modes against one another, rather than encouraging them to cooperate on an intermodal basis is competition for government roadway, airway, or waterway grants, or for tax easements, or for permission to raise weight or size limitations for loads carried, or for subsidies or grants of one kind or another. The regulatory commissions become involved on behalf of their respective modes in this competition. The size of the grants has a major effect on the relative cost competitiveness among the modes and on their incentives to cooperate intermodally.

- Intermodal Ownership Restrictions
  Additionally there have been legislative prohibitions against ownership of carriers of one mode by carriers of another. For example, railroads could not own water carriers, freight forwarders could not own direct carriers, and surface carriers could not own airlines. These prohibitions limited opportunities for developing intermodality through common ownership.

- Situation Prior to 1940
  The antitrust laws were supposed to ensure free and open competition to give the consumer an opportunity to get the lowest price, and the commissions had authority to suspend the effect of the antitrust laws if they found cooperative agreements among the carriers to be in the public interest. One might have thought that the commissions would have been prompted to encourage intermodal agreements as being in the public interest, but it did not work that way at all. Regulations promulgated by the commissions favoring through routes and rates and interchange points were almost without exception uni-modal not intermodal. Each commission felt that intermodal facilitation was beyond its scope. Each commission felt its powers were limited to regulating the specific mode, or modes, assigned to it by the Congress. There have been government and industry working groups to facilitate intermodality, but these working groups have made relatively little progress because the underlying legislation was directed at the single modes, and did not give the commissions any significant intermodal authority.

- Movement Toward Deregulation
  The first small glimmer of light appeared in 1940 with a Statement by Congress of a National Transportation Policy:
Reduced government economic regulation and planning rather than a single mode approach is needed for this objective. The focus on the transportation system, rather than transportation policy in the USA, is essential to improve transportation policy. The National Transportation Policy Statement of 1979 was entitled National Transportation Policy Statement. It was approved by the President and has been followed up by a report to Congress. The National Transportation Policy Statement, issued in 1979, was entitled National Transportation Policy Statement of 1979.

Intermodal cooperation should be encouraged to eliminate unreasonable barriers to travel. It is crucial to ensure that all modes of transportation are equally accessible and that subsidies are proportional to user charges. The DOT also provides that all modes of transportation should be equally accessible and that subsidies are proportional to user charges. The DOT should develop a new statement on integrated transportation policies. The DOT also provides that all modes of transportation should be equally accessible and that subsidies are proportional to user charges. The DOT also provides that all modes of transportation should be equally accessible and that subsidies are proportional to user charges.
treatment among modes; more competition and improved efficiency by placing maximum reliance on market factors; subjecting policy to economic analysis; more streamlined government organization; greater coordination of government efforts; and utilization of the private sector to a maximum degree. All these recommendations, if diligently pursued, would advance the cause and practice of intermodality.

- No Single Intermodal Statute

In the history of the U.S. transportation legislation there has been no single unifying statute enforcing or promoting intermodality — and there is none now — which probably, in the long run, is for the best, because intermodality thrives under free competitive conditions where carriers have open options to negotiate interline rates and conditions with each other, and shippers have flexibility to select among carriers and combinations of carriers of the various to obtain the rates, timing and conditions best suiting to their needs. A single unifying statute favoring intermodality might have enforced some uniform conditions for intermodality, which would have detracted from the freedom and flexibility that permits innovation.

- Impact of Deregulation

Deregulation of many aspects of transportation was implemented in 1970s and the early 1980s through acts of Congress, and in steps taken by the regulatory commissions to eliminate or liberalize rules and regulations that were considered unnecessary or unduly restrictive or burdensome. These regulatory moves made intermodality more feasible, but transportation deregulation is not total, nor has the deregulatory process been carried out uniformly, or to the same extent in each of the modes. The net effect has been a big plus for intermodality, but a great many regulatory restraints remain, depending on the mode combinations involved.

- Rail-Truck Deregulation

The mood in the regulatory commissions and in Congress favored deregulation in the late 1970s, and steps in that direction were taken by some of the commissions without waiting for statutory direction from the lawmakers on Capitol Hill. In May 1979, the ICC deregulated rail rates on fresh fruit and vegetable shipments, resulting in a 26% increase in rail produce traffic in the first year. With their newly-found freedom, railroads sometimes changed rates on produced traffic on a day-to-day basis. The ICC also gave railroads freedom to establish special contracts with large shippers based on volume and service. Much produce and contract-rate traffic was diverted from through truck haul to an intermodal truck-rail-truck haul.


The Motor Carrier Act of 1980 relaxed requirements for entry into business as a truckline and, as a result, the number of new trucking applicants in the first year of deregulation more than quadrupled, with the percentage of applications approved rising from 69.8 to 95.4 percent. Many restrictions on truck routes, types of traffic carried and areas served were eliminated. The Staggers Rail Act was not as liberal. It only made it easier for railroads to abandon non-remunerative lines,
and for shippers and others to purchase lines proposed for abandonment. There has been a measure of rate deregulation in both trucking and rail modes. One effect of these changes on intermodality has been that they have given shippers a wider range of carriers and intermodal combinations of rates and joint-rates, to choose from. The Motor Carrier Act states "...to promote intermodal transportation as one of its policies regulating transportation..."

- Deregulation Liberalized Joint Ownership

An even more important of these Acts on intermodality was liberalized permission for carriers of one mode to own and operate carriers of the other mode. In a decision under the new legislation, the ICC, effective January 6, 1983, eliminated regulatory restrictions enacted in 1935 to protect the then infant trucking industry from the railroads. This new flexibility was greeted warmly by the rail carriers but with some dismay by the trucklines because rail carriers are expected to have a greater ability to acquire or develop new wholly owned trucklines than trucklines will of acquiring or developing railroads for joint operation. The importance to the intermodal shipper is that wherever consolidation of carriers takes place he will be able to ship intermodally with a single company. Additionally, railroads now have greater freedom to merge with each other, which provides greater flexibility, since single-line rates are not subject to rate bureau considerations and may be set or changed on a day-to-day basis. Although railroads were restricted in past years from buying trucklines, they did have permission to establish their own trucking services as an adjunct to rail service, under strict controls by the ICC. Now that they have wider authority, their enthusiasm to do so varies widely from carrier to carrier. Some rail managements see it as competition against their own rail services and others have been hurt by the poor performance of their trucking subsidiaries in the business recession that came on the heels of deregulation. On the other hand, still others have taken advantage of technological advances and the more relaxed regulatory atmosphere to initiate successful new online truck-rail piggyback intermodal service.

- Piggyback Deregulated

An important deregulatory boost to intermodality was to free rail piggyback carriage from all ICC regulations. This was accomplished not alone by legislation but through an exemption promulgated in an ICC rulemaking procedure under the umbrella of the Staggers Rail Act. The ICC proceeding was entitled Ex Parte N230, the results of which became effective March 23, 1981. Actually the Ex Parte 230 proceeding was instituted on August 21, 1978, prior to passage of the legislation, but it was not pursued vigorously by the Commission until late in 1980, after both the Motor Carrier Act and the Staggers Rail Act had become law. This action gives railroads greater ability to price piggyback competitively against truck hauls and railroads have increased flexibility for routing traffic on joint rail-piggyback hauls involving rail-owned trucklines. The ICC instituted another rulemaking proceeding, similarly aimed at exempting truck rates from regulation in joint piggyback operations with the railroads. But there is some question about the Commission's authority to
administratively deregulate in the Motor Carrier field, as easily
as it can in the rail field. It is important that this be done
either through legislation or by the Commission if the full
potential of intermodal piggyback service is to be exploited.
Even many railroad managements support such a step and of course
railroads would participate in the haul. Deregulation of rail
piggyback combined with increased long haul trucking costs from
higher fuel taxes and highway user fees, promises a change in
long-haul shipping practices. Prior to rail piggyback
deregulation, long haul truckers were able to price their
services below rail piggyback. But now, with the combination with
the rail piggyback deregulation and increased highway costs the
trend may be more in the direction of the intermodality, with
trucks providing mostly the initial and final portion of the
transportation. This rails not only have greater pricing
flexibility but they are testing and introducing new intermodal
rail and highway cars, trailers, and double stack container
systems that increase efficiency, cut fuel costs by reducing
power requirements, and speed service.

- Effect on Freight Forwarders

Changes in long haul shipping trends probably will help
freight forwarders. In 1940s and 1950s forwarders had built a
business by consolidating LCL shipments to into CL quantities,
and then moving them on an intermodal truck-rail-truck routing.
Then along have come trucklines which were able to lure customers
away from forwarders, consolidating the shipments as the
forwarders had done, and then moving the traffic by truck all the
way with low truckload rates. The truckers were able to undercut
the rail rates and the railroads did not have the flexibility to
retaliate. Most of the freight forwarders went out of business as
a result, - but a handful became truckers. Now that rail piggyback
deregulation is reviving the popularity of the intermodal truck-
rail-truck haul, the forwarders are returning to their old stand.
They will have two new competitive threats to worry about. The
first is that with the newly found door-to-door intermodal
capability of the railroads, they might supplant the trucklines
in consolidating and moving freight, once again foreclosing the
market to forwarders. The other threat is the coming into being of
so many other types of intermodal middlemen, who will compete
vigorously against forwarders for the business.

- Rail Mergers Deregulated

Authority for mergers among railroads has been
liberalized, and this has generated a wave of combinations
resulting in fewer but larger rail networks. Along with
deregulation of piggyback and freedom to negotiate contract
rates, greater network coverage has given some railroads
increased ability to offer, long haul low-rate intermodal
Carriage. At the 1982 annual meeting of the National Industrial
Traffic League (NITL), many of the large shippers such as Ford
expressed their satisfaction with the new intermodal advantages
they have obtained from rail deregulation. They also expressed
concern about the growing monopoly power of railroads through
merges. Deregulation causes reevaluation of shipper options in
many respects - mostly favorable but not without some drawbacks.

- Rail-Truck-Ocean Deregulation
In addition to freeing piggyback traffic from all regulations, the ICC also deregulated intermodal container movements between mainland US on one hand and Puerto Rico, Alaska, and Hawaii on the other hand. Deregulation of all piggyback is credited with a substantial promotional effect on long haul intermodal rail-ocean traffic. It is helping to expand the amount of "railbridge" traffic-minibridge, microbridge and landbridge. These services were introduced beginning in 1972 and in many cases offer a single rate with a single bill of lading. In the early years there were many restrictions, including the requirement to file single and combination rates with the commissions. The new deregulation legislation in addition to giving the railroads freedom to pricing, dispenses with the need to file the intermodal rates and divisions of those rates with the ICC. Rail and ocean carriers may now establish through joint rates, adjusting them daily and carriers no longer are required to file a statement with the ICC as to how the revenues will be divided among the participating carriers. This makes it more difficult for competitors to obtain data for objections to the ICC on specific rates. However ocean carriers still must file the ocean rate with the FMC.

- Maritime Legislation Affecting Intermodality


- U.S. Shipping Board

The 1916 Act provided antitrust immunity, permitted carriers to form open conferences and created a U.S. Shipping Board to regulate and promote U.S. ocean commerce.

- Federal Maritime Commission

The name of the U.S. Shipping Board subsequently was changed several times, finally becoming FMC, which in 1961, was established as an independent regulatory agency.

- Maritime Administration

Promotional activities on behalf of the U.S. Merchant Marine were assigned in 1961 to the newly-separated (from the FMC) Maritime Administration (MarAd), reporting to the Secretary of Commerce. In 1981, MarAd again was transferred from the jurisdiction of the Department of Commerce to that of the Department of Transportation.

- FMC Functions

* regulating ocean carrier ratemaking on foreign and domestic routes;
* investigating discriminatory rates and practices among shippers, carriers, terminal operators and freight forwarders;
* licensing ocean freight forwarders
* ensuring that all carriers serve the public interest.

- MarAd Functions

The major mission of MarAd is to develop and maintain a U.S. flag merchant marine. In carrying out this mission it administers federal ship construction and operating subsidies to permit the U.S. Merchant Marine to compete against lower-cost foreign operators.
Deregulation of Land-Waterway Transport

The theory of deregulation is that marketplace should prevail without undue influence of restrictive government regulation. User charges should be assessed on carriers and ports to permit the government to recover its costs of maintaining facilities. This is another way of letting the marketplace prevail—by allocating to each mode the actual cost of operating in that mode. Payment of user fees would raise costs of inland waterway carriers relatively more than those of carriers in other modes. In testimony to the House of Representatives' Public Works Water Resources Subcommittee in 1982 Director Rivlin of the Congressional Budget Office has stated that in 1980 the waterway industry had received 3.9 mills per ton-mile in federal subsidies compared to 2.2 mills for the railroads and 1.8 mills for trucklines. She has stated also that inland waterway subsidies covered one-fourth of their costs, and long term cost recovery by the federal government would result in a more efficient transport system. Ocean ports also are being required to repay the government for its maintenance of harbors and facilities.

Competitive Relationships Among the Modes

The federal government is pushing for cost recovery and to the extent that it is successful, it may change the competitive position of each of the modes involved. The greatest beneficiary currently seems to be long haul rail piggyback operations, especially in competition against long-haul truck carriage. Rail piggyback is a cost effective, efficient means of long-haul transport of general cargo. It may benefit further from user fees and taxes that may be assessed on truckers and inland water carriers.

Air Cargo Deregulation

Airfreight has been the first transportation mode to be deregulated by formal legislation in the wake of the National Transportation Policy Statement of 1975. The amendments to the Federal Aviation Act implementing deregulation of airfreight have come effective November 9, 1977. Deregulation of air passenger transportation comes later and the rails and trucks still later. In addition to being first, airfreight has been foremost, in that it's been deregulated almost entirely in terms of entry or withdrawal by carriers and in terms of freedom of ratemaking.

Air Regulatory and Deregulatory History Differs

An interesting regulatory difference between air and other modes is that the Federal Aviation Act deals mostly with passenger carriage, whereas freight has been—the dominant objective of most surface transportation regulation since its beginning.

Airfreight Deregulation Implemented in Two Steps

Airfreight deregulation, effective Nov. 9, 1977, has been implemented in two steps, one immediately applicable to the so-called grandfather carriers already engaged in the airfreighter operation, and the second a year later, opening the field to all applicants and completely liberalizing airfreight ratemaking.

Inter-Government Regulation of US International Intermodal Air Trade
International Transportation Regulation involves two
governments or in the case of multinational regulation, several
governments. Therefore, it takes relatively longer time to
negotiate and to ratify than does US domestic transportation
regulation. Other governments in many cases were not as ready to
move the deregulatory path as was the United States. As a matter
of fact, many other countries resented and objected to the
deregulatory bent of the United States, interpreting it as an
effort to give multiple US-flag air carriers and advantage over
the single or limited number of airlines operating under the flag
of the other country.

— Compromise solution

Entry rules for new carriers were eased and ratemaking
was relaxed, but both remained restricted to the extent that the
United States and foreign governments continued to participate in
regulation to varying degrees, depending on the countries
involved. The conference system of the International Transport
Association (IATA) continues to be approved and given antitrust
immunity. Deregulatory moves, nevertheless were made by the
United States on a fairly unilateral basis:

1. Requirements for air cargo rate filings were
   eliminated.
2. Enforcement of IATA cargo rate agreements was
dropped.
3. Cargo agency commissions were freed from regulation.
4. Airfreight forwarders were released from regulation.
5. Transportation of property in the US by motor
   vehicle as part of a continuous domestic or international
   movement was exempted from the provisions of the Motor
   Carrier Act of 1980. This means it is free from of motor
   carrier regulation.

— UNCTAD Liner Code

For many centuries the freedom of the seas was an
accepted concept: ships of any nation could trade among ports
regardless of which flag the vessel flew. The only restriction
was that ships of one nation usually were prohibited from
carrying on domestic trade of another nation. Today under the
UNCTAD Liner Code of Conduct, there is a new way of allocating
ocean trade by flag carrier. The Code was developed and refind in
meetings held under the auspices of the United Nations
Conferences for Trade and Development and put into effect in
1983. The Code proposes that liner trade between any two nations
be allocated equally to the flag carriers of those two nations,
with smaller parts of the trade being set aside for vessels of
third countries or "Cross traders". The standard allocation is
40-40-20, (40% being specified for the flag vessels of the two
primary countries and 20% - for Cross traders.

4. Intermodal Through Carriage Documents,
   Liability, Rules and Facilitation

With intermodal cargo shippers expect to receive
services similar to those that would be available if the shipment
moved via only one mode. The shipper expect to submit only one
document of carriage for an intermodal shipment, just as would be
required for a singlemodal shipment, and be subjected to a single
set of conditions of carriage, not having to cope with two, or
more differing sets. The shipper wants to know the liability limits of the several carriers involved in the intermodal movement. If liability of carriers varies from segment to segment, the shipper wants to know this, and also the shipper wants to know about collective liability in the event it is unknown on which segment the loss or damage may have occurred. The shipper wants to deal with only one carrier — the one most convenient to deal within case a claim for loss or damage must be filed. Finally the shipper wants to contend with a minimum amount of paperwork in intermodal movements. For the most part, the shipper is able to obtain these services, but must be watchful for the occasional instances in which these service advantages are not available. These advantages may be divided into three categories: 1. Through carriage documents; 2. Liability rules; 3. Facilitation.

- Through Carriage Documents.

When a shipper tenders cargo to a railroad, water carrier, truckline or airline for domestic carriage, the carrier issues bill of lading (air transportation — airway bill). The operations document prepared by surface carriers for their internal use is called a waybill. The bill of lading or airway bill is a receipt for the cargo, a statement of the value of the cargo, charges for transport, and a listing of the conditions of carriage and liability of the carrier. It is the contract between the shipper and the carrier.

- Uniform Bill of Lading.

ICC has prescribed uniform bills of lading for rail carriers and for motor carriers. These uniform bills of lading are two types: the straight bill of lading for simple transportation use and the uniform order bill of lading for use when delivery of the shipment is conditioned upon payment for goods via a bank, or other financial institution. The uniform bills of lading for both modes are similar. The order bill of lading is used as a financing document in international and domestic transportation. It permits the shipper to move goods to destination by putting the carrier under the obligation to deliver the goods at destination except to the person who produces a verified copy of the bill of lading. Thus the shipper is able to finance the transaction through a bank, and is able to make sure the consignee does not receive the goods until they are paid for. This also lets the shipper decide, while the goods are in transit, to whom the goods will be sold. In air transportation the airway bill is not used as a financial document as is the other bill of lading in surface transportation. Air shipments are handled differently because the speed of air delivery makes it difficult to get a verified transportation document into the consignee’s hands prior to arrival of the goods at destination. To achieve this end in air transportation, the shipper may consign the goods to a selected bank at destination, and will direct the bank not to release the goods until the consignee pays the required amount.

- Through Documentation

As intermodality gains in popularity, use of through documents increases. In air surface intermodal transportation the airway bill usually covers movement of cargo on all segments of
the journey. For many years the US government and representatives from various federal transportation departments and agencies have met periodically to try to perfect through documentation and uniform liability standards.

- Liability Rules

Through carriage documents and liability rules are being dealt with separately in this paper in order to be quite clear on each as they are involved in intermodality. However the two subjects are very closely intertwined. The action of the ICC in prescribing uniform bills of lading was largely an effort to simplify and codify the liability rules. Through origin to destination liability provisions are important to intermodality. It is desirable that uniform conditions and limitations be applicable to each mode in a through movement. An equally important requirement is that the documents of carriage spell out the conditions and limitations applicable to each mode and carrier. Since federal government regulation has been directed at each mode separately, significant differences have existed with regard to liability in regulatory requirements among the modes. Interagency task-forces have worked on establishing uniform provisions and limitations of liability for a through intermodal movement, but without great deal of success.

- Liability Provisions Changed Under Deregulation

Deregulation has eased government control over liability provisions and limitations, and this has caused some protest and debate. Some specialists in liability contend that carriers in many modes have taken unfair advantage of deregulation by lowering their liability limits. They feel that most shippers are not aware of their new vulnerability until they meet with a problem - and then it is too late. They advocate that liability standards be separated from other measures, and that legislation be adopted prescribing uniform liability limits, and other reasonable standards for all modes of transportation. The 1982 annual meeting of the Shippers National Freight Claim Council endorsed these goals, thus recommending a return to regulation in respect to liability rules, in order to protect the shipper and consumer. It constitutes an interesting position of theories, since deregulation generally is supposed to be in the shipper's and the consumer's favor. The Shippers National Claim Council has not opposed deregulation in it's other aspects.

- The UN Convention on International Multimodal Transport

In 1973 the Economic and Social Council (ECOSOC) of the UN requested that the Trade and Development Board of UNCTAD establish an Intergovernmental Preparatory Group (IPG) on International Intermodal Transport to prepare a preliminary draft convention "bearing in mind, particularly, the needs and requirements of developing countries". The UN Convention on International Multimodal Transport was finally adopted in May 1980. The basis for liability set forth in the Convention is that standard limits of liability are specified for each of the modes, and the Multi-Transport Operator is liable for the goods from the time it accepts them until it makes delivery. There is a considerable opposition of the Convention in the United States.

- Two Approaches to Multimodal Liability Provisions
There are two approaches - regulatory and deregulatory - regarding loss or damage to intermodal cargo. The regulatory approach imposes a uniform system to replace what otherwise may be a confusing patchwork of differing modal liability limits and procedures. The deregulatory approach lets competition seek the lowest rate level for the benefit of the consumer. The two approaches are still being debated.

- Facilitation

Currently much is being done to streamline paperwork, reduce red tape, and eliminate as many unnecessary documents as possible in order to facilitate freight movement. For the most part, facilitation improvement attention is directed at international shipments at the streamlining of both non-transport and transport documents and at the reduction of customs clearance paperwork and procedures. International facilitation advances also benefit the US domestic systems and procedures. Intermodal shipments occasionally must meet tight delivery requirements, especially in the case of air-surface intermodal shipments. Facilitation efforts have been aimed at reducing time taken by intermodal procedures at transfer points between modes. In international transportation the intermodal transfer usually takes place at the same location where import or export documents are prepared and customs clearances are performed. This compounds facilitation problems. Since a large proportion of intermodal freight is in containers, customs inspection occasionally takes a long time. In some countries the inspection procedure is rigorous in order to prevent prohibited articles, which may be hidden inside intermodal containers, from entering the country. Advances in facilitation that reduce customs clearance, paperwork, and other complications, as well as those that give customs inspectors advance notice of the containers, the commodities carried and consignor and consignee names, have been very helpful in facilitating movement of intermodal freight.

- Computerization

The computer is one answer to facilitation problems, such as assimilation of detailed data inputs, transmission of data presentation to customs, carriers and consignees. Computers also are being used to solve related intermodal transportation problems such as rating, routing, document transmission, tracing, billing and other functions. Despite many facilitation advances by groups like NCITD (National Committee for International Trade Documentation), basic functions such as creating, duplicating and delivering transportation-related documents had not been susceptible to change until the advent of computer. The Transportation Data Coordinating Committee (TDCC) is another non-profit association of industry executives working to speed intercompany commercial transactions. TDCC's scope is wider than NCITD's in that it deals with all sorts of business transactions, and is not limited to those relating to transportation and trade, but it is narrower in the sense that it is limited to electronic data interchange. TDCC's membership consists of carriers, manufacturers, shippers, warehouses, banks, and merchandisers. The Committee assists companies in substituting electronic data transmission for paperwork. It publishes standards, data dictionaries, communication guides and manuals. Computer systems
for intermodal transportation purposes have been available for several years, but they have not been universally adopted. The computer revolution in transportation still is in its beginning stages. In 1979 NCITD tested the Cargo Data Interchange System (CARDIS) among a selected group of shippers, ocean carriers and freight forwarders. The test of the system, which processed and transmitted documents, was declared a success, but the system itself eventually was dropped. Universal adoption of the CARDIS system, or one like it, was prevented partly by its initial cost and partly because potential participants were concerned that something better would come along, with which CARDIS would not be compatible. The concept is still alive and probably will be integrated into whatever program eventually is adopted. The computer revolution probably will turn out to be as important, if not more important to intermodality as the container revolution.
II. The Intermodal Decision Making Process

Speaking of the decision making process, I'd like to stress that in addition to government bodies at federal, state, and local levels, there are also many interested private sector parties, including interest group associations and industry representatives that contribute to this process. While port container capacity investment, airport access and other intermodal issues are of considerable concern to decision makers, the institutional structure and process by which these issues are resolved is largely fragmented.

1. Federal Role

While local and state governments play the predominant role in the planning, construction and maintenance of public works infrastructure, but actually the federal government supports all these activities through its funding role. To a limited extent, intermodal transport themes, like regulatory or planning priorities are conveyed to states and localities by federal influence and funding assistance. Frankly speaking there is little evidence to indicate that state and local transport infrastructure planning include intermodal functions due to federal policy. In fact the structure of federal decision making institutions is single modal and there is no federal body exists to represent intermodal views to state and local organizations charged with making relevant infrastructure decisions.

It can be argued that intermodal transport concerns merit a more active federal support role. The issues raised by intermodalism certainly meet the traditionally criteria for federal involvement in infrastructure. Intermodal traffic passing through the MidWest or creating congestion near EastCoast ports have external effects which are disbenefits to the many states or localities involved. Because these activities are in the interest of the economy as a whole, the federal government has often taken steps to compensate affected areas and help them deal with specific problems that are created. The federal government has also sought to encourage economic development, both regional and national. Intermodal technologies create economic efficiencies which allow the U.S. to be more competitive internationally. Probably the most germane argument in favor of active federal support for intermodalism is its complex character. Traditionally, the federal government has played a very useful centralized coordination role in the planning and management of public works facilities. Intermodalism requires such a role to deal with the array of states modes and modal interest groups, local authorities and new technologies. It might also be argued that the appropriate federal role is not to create new program. Mechanisms for funding intermodal aspects of transport are already included in the single mode programs. Furthermore, the majority of intermodal technologies, although possessing national economic importance, are being developed and utilized at the local level. States and localities are closer to the issue and
should be responsible for planning appropriate responses to intermodal developments. What is necessary at federal level is to set priorities and through more research and more inter-agency coordination to insure that states and local entities take this new concepts and technologies into account in their own planning and management. As more than half of all federal grant-in-aid programs provide funds to states and localities for planning, the federal government already has a mechanism by which to encourage intermodal planning.

2. State Roles

In the beginning of the intermodal approach there's been a forecast saying that "a decade of steady, hard work could be expected before a truly comprehensive multi-mode transportation planning process would be established on a continuing basis". Later on, the literature suggests that state transportation planning and decision making remains more concerned with single modes than systems of modes largely unconcerned with intermodal transportation issues. This is my guess that it is partly due to the relatively late evolution of the state DOTs (till 1974, there were still 25 DOTs), which began as a set of separate transportation boards, commissions agencies and authorities dealing with single modes. While placing these diversing interests under one umbrella set the stage for state-wide transportation planning, limited funding generally means that more attention is paid to the management of existing systems through maintenance, rehabilitation and replacement than is devoted to planning of future systems which might include intermodal concepts.

Most states possess a wide range of potentially intermodal interests and responsibilities. In highway issues they are involved in system design principles, locations of primary and interstate routes and determination of investment levels for their construction and maintenance. Investment issues and generalized airport decisions are state responsibilities in air passenger and freight traffic. With regard to rail and truck freight, there is a likely intermodal component in state concerns with rail investments, terminals (especially TOFC/COFC) and rail truck coordination. Truck size and weight are in additional concern and waterway investment and maintenance and relationship of waterway systems to highways and rail are issues that are often raised at the state level. States are involved in levels of capital investment especially in ports, interport coordination, and port access to rail and highways. While state responsibilities in principle intersect with intermodal issues, in practice, these are conducted only in a generalized policy sense.

The policy planning role is an important one. States possess the potential of having more well trained staff and facilities than do most localities. State-wide transportation are commonly developed based on single mode approach and only
Michigan and Washington state used to have the capability for substantial multi-mode simulation. Nevertheless, it's possible to predict that state planning will become increasingly intermodal. This movement will be a logical response to the importance of intermodal impact on the transportation network and the economy of individual states. The new intermodal technologies mean shifts in mode demands, potential wear on highways, and changes in the locations of economic activity. The rise of systems of enterprises (i.e. combinations of farm, railroad, grain storage companies and international shippers) that work together has introduced new considerations for state planning that bring transport and other economic and social factors into a broader picture. As foreign trade grows, the role of ports and rail and road connections become more significant to state governments. Although local planning is important in the implementation process, the fact that intermodal transportation systems reach beyond a locality’s service area and as such become the responsibility of state and federal government, indicates the necessity of intergovernmental coordination in terms of both planning and funding. This should be a state role. If transportation responsibilities have been properly coordinated by the state, local projects would more likely be consistent with regional and statewide systems and complement national projects without disruptions at any level. The goal of state governments should be to develop a total transportation system plan. One state which has adopted this objective is Iowa. Its DOT considers all transportation modes as interacting elements with the ultimate purpose of proposing and promoting legislative programs to facilitate an integrated transportation system. To assist this process, programming for all modes is conducted by one office (DOT). The end result in such thinking should be efforts by state governments to deal with intermodal issues, reflected in priorities states commonly set for local transport projects.

State governments play a variety of roles in transportation infrastructure. By developing planning procedures which integrate separate institutional modes, state governments are more likely to be able to deal with the new, specifically intermodal technologies and changes which impact on their state.

3. Local Roles

It is at the local level of government that intermodal infrastructure projects are usually implemented. Intermodal issues focus on the meeting of highway and plane at airports, of rail, road and water at local ports. It is local political entities who must make decisions in response to the potential and real impact created by ports and terminals on local constituencies and the transportation network.

While states and federal government are concerned with generalized issues, localities play the chief role in detailed identification of problem areas and gaps in the transport system, and in the development of projects to resolve these. In highway
Appropriate private-sector role in intermodal infrastructure

Requirements of those utilizing the intermodal infrastructure system, in both efficient and effective ways, must be recognized by both the government and the private sector. The government's role is to provide a framework of legal and institutional arrangements that support the private sector, while the private sector is responsible for ensuring that the public and private sectors work together to make intermodal freight transport effective.

Private-sector roles

Strong coordination and powers: This is in part a function of the intermodal issues, yet, to achieve intermodal projects' feasibility, especially for the multi-agency team responsible for implementation, coordination must develop institutional structures which can address both the public and private sectors. Local decision-making must develop institutional structures, between growing pressures of the shifting industry and the new institutions that are being established to deal with intermodal transport issues. A variety of local authorities have been established to make improvements in intermodal transport, especially technical and regulatory firms. It might seek to improve its key institutions, but that may come at a cost, the local transport system needs to adapt to the changes of new authorities.

Whether these responses are produced from above or below,

Responsibility to industries' innovations in freight transport. Many industries have been developed to respond to this system, the nature of the transport network, while it is comprised of the system that will be accessed by many actors. As a result, local authorities are usually accessed by being able to oversee major infrastructure, serve as local decision-makers, and federal decision-makers. Demand for project planning and implementation, local authorities are responsible for setting the transportation infrastructure. Following the identification of needs, they provide major input on route locations, especially with regard to secondary highways. They choose specific freight terminals, with the result that regional growth is fostered.
decision making is to be in the position of having its views heard and taken into consideration by government decision makers. Many analysts have the conclusion that private sector inputs does not become part of the decision making process until after a project is formulated i.e. when public comment is invited on a specific program or design. It is evident as well that the trend toward privatization depends on making private and public services mesh closely. Infrastructure investment in ports, air etc. are not end to themselves. They will be utilized more efficiently and effectively toward the purpose of stimulating the economic development, easing congestion and other goals if all users are made part of the process to the extent feasible.

III. Financing Issues

Before moving on to some specific finance issues it's better to understand how intermodal financing relates to modal financing, generally. Intermodal needs are not a separate consideration from other modal needs. In planning highways, streets, bridges, and tunnels, intermodal considerations should be included into the decision making asa part of the selection process. Similarly, when planning urban truck terminals, intermodal aspects are one part of a range of decisions as to the type and level of capacity, to be provided. The key is not whether intermodalism is being considered; it is whether intermodal transportation is being adequately considered.

Setting the issue of adequacy, the the second main issue relates to how the intermodal facility is being evaluated in terms of the justification investment. The answer is that for public investment in all the transportation sectors the economic criteria of a net economic contribution (benefit-cost) analysis is used for investment selection and approval. If the project is proven to be justified and the intermodal concerns were adequately considered, there will be no need for a separate intermodal evaluation. The evaluation of the financing justification for intermodal facilities therefore, need not to be separated from any of the other aspect of the investment. For example when a port authority or a municipal port department makes plan to invest in a port, proper consideration should be given on an integrated and coordinated basis to all of the modal, intermodal or other requirements identified asa part of the project. If the project has been appropriately developed on an integrated basis, the overall investment requirement will in fact be based upon an appropriate consideration of intermodal needs. Once the intermodal aspect is included in the investment requirement the criteria for selection and approval of the project then follows the criteria that is appropriate to each of the modes and for the public works program involved.

The question of whether there is adequate funding available for intermodal facilities; the issue of available innovative techniques for financing might be used; the problem of
Expenditures. Currently there are two governmental units account for 2/3 of the
public transportation for intermodal transportation facilities.

1. Financing Intermodal Facilities

Private investment provides for all aspects of the system.

The major exception is in rail transportation, free
and infrastructure related to the air transportation

Public investment is on privatized operations and
interchange.

Interchange, the associated infrastructure, and inter
highway network.

Infrastructural, by and large, the

Private investment is also significant. By privatizing
operations, the

Private trucks, who fund vehicles and associated equip

will operate in the

Similarly, in terms of road transport, most of the

own operation of the

own facilities and arrange contracts and provide needed

Private investment and public

Port authorities provide their own facilities and provide need for

Some carriers take

Public authorities provide

As a result, the need for

Port authorities are

Intermodal facilities at

An important aspect of intermodal transportation is

Investment. The principles of taking and developing revenue

Revenue and the use of innovative financing techniques apply to

They apply to the other component of

Recovery apply to the intermodal

General question of

All these are embedded within the

Generating revenue and cost recovery apply to the intermodal

General issue of intermodal transportation facilities. Policies

The principles of taking and developing revenue

Recovery apply to the intermodal

General question of

All these are embedded within the

Generating revenue and cost recovery apply to the intermodal

General issue of intermodal transportation facilities. Policies

The principles of taking and developing revenue

Recovery apply to the intermodal

General question of
TABLE I

Comparison of Public Works By Mode and Level of Government (1960 - 1985)

<table>
<thead>
<tr>
<th>System Mode</th>
<th>1960</th>
<th>1984</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Federal</td>
<td>38</td>
<td>33</td>
</tr>
<tr>
<td>State</td>
<td>36</td>
<td>32</td>
</tr>
<tr>
<td>Local</td>
<td>26</td>
<td>35</td>
</tr>
<tr>
<td>Highways</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Federal</td>
<td>34</td>
<td>27</td>
</tr>
<tr>
<td>State</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Local</td>
<td>23</td>
<td>30</td>
</tr>
<tr>
<td>Airports/Ways</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Federal</td>
<td>60</td>
<td>57</td>
</tr>
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<tr>
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<td>38</td>
</tr>
<tr>
<td>Water Resources</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Federal</td>
<td>69</td>
<td>54</td>
</tr>
<tr>
<td>State</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>Local</td>
<td>14</td>
<td>20</td>
</tr>
</tbody>
</table>
In terms of Federal, State/local, and Capital/operating expenditures, the proportions of expenditures vary by type of infrastructure. For state/local and federal expenditures, the proportions vary based on the type of infrastructure.

### State/local/Local Spending

<table>
<thead>
<tr>
<th></th>
<th>Capital/Operating</th>
<th>100%</th>
<th>% Capital/Operating</th>
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</thead>
<tbody>
<tr>
<td>Total Transport</td>
<td>40.1</td>
<td>100%</td>
<td>40.1</td>
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<tr>
<td>Total Water Supply</td>
<td>64.1</td>
<td>100%</td>
<td>64.1</td>
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<tr>
<td>Total Water Resources</td>
<td>1.3</td>
<td>100%</td>
<td>1.3</td>
</tr>
<tr>
<td>Wastewater</td>
<td>3.5</td>
<td>100%</td>
<td>3.5</td>
</tr>
<tr>
<td>Other Transport</td>
<td>9.4</td>
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<td>9.4</td>
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<tr>
<td>Highways</td>
<td>9.9</td>
<td>100%</td>
<td>9.9</td>
</tr>
<tr>
<td>State/Local/Local</td>
<td>44.7</td>
<td>100%</td>
<td>44.7</td>
</tr>
<tr>
<td></td>
<td>28.2</td>
<td>100%</td>
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</tr>
</tbody>
</table>

### Federal Spending

<table>
<thead>
<tr>
<th></th>
<th>Capital/Operating</th>
<th>100%</th>
<th>% Capital/Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Transport</td>
<td>15.7</td>
<td>100%</td>
<td>15.7</td>
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<tr>
<td>Total Water Supply</td>
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<td>Total Water Resources</td>
<td>0.6</td>
<td>100%</td>
<td>0.6</td>
</tr>
<tr>
<td>Wastewater</td>
<td>0.6</td>
<td>100%</td>
<td>0.6</td>
</tr>
<tr>
<td>Other Transport</td>
<td>2.1</td>
<td>100%</td>
<td>2.1</td>
</tr>
<tr>
<td>Highways</td>
<td>1.4</td>
<td>100%</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>10.4</td>
<td>100%</td>
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</table>

### Infrastructure Type

<table>
<thead>
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<th>100%</th>
<th>% Capital/Operating</th>
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<tbody>
<tr>
<td>Total</td>
<td>14.9</td>
<td>100%</td>
<td>14.9</td>
</tr>
<tr>
<td>Total</td>
<td>10.2</td>
<td>100%</td>
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</table>

Table II: 1984 Federal and State/local Spending for Infrastructure
capital while state/local spending is for operating outlays. As may be seen from Table II in terms of federal spending of the total $20 billion spent for highways and other transportation almost 80% is for capital outlays. In contrast only 30% of state and local spending is for capital outlays.

2. Sources of Financing

To the extent that intermodal facilities cannot be separately identified within public works expenditures identification of intermodal financing sources is equally constrained. In the public sector, most infrastructure financing uses both debt and non-debt financing.

In terms of non-debt financing, financing, infrastructure funds come from general revenues, user charges, fees and taxes. These revenue sources are used by all levels of government - from the federal to the smallest local unit. For state and local governments there are a number of federal grants-in-aid.

Debt financing involves a broad range of instruments, including bonds, municipal securities, industrial revenue bonds and anticipation notes.

Both general obligation and revenue bonds are often used and in some cases general obligation bonds with a limited obligation may be used as a means for financing specific facilities. Industrial revenue bonds are frequently used as a means for permitting private use of publicly financed infrastructure facilities.

Both debt and non-debt financing methods have been used for every mode of transportation including intermodal facilities. Ports generally use a form of debt financing - most frequently, revenue bonds or municipal tax exempt bonds (where port facilities are operated by a municipality). Local airport operations are also frequently funded by debt financing. In this sector, user charges, fees, taxes, general revenues and federal grants are quite common as well.

In financing intermodal facilities, the private sector uses a combination of internal funding and access to capital markets. They also contribute to public infrastructure through direct and indirect payments for user charges, fees, and taxes, special assessments, leasing, and other arrangements for the use of public facilities.

3. Privatization

The private sector provides and finances its own intermodal facilities and operates as an individual firm in an environment characterized by competition. Finally, the success of investment (and the firm) will be measured by the market (assuming a reasonable level of competition): in the very short run by survival, but in the long run profits and growth.

Since 1980 there has been a considerable increase of interest in privatizing some aspects of public activity. In an economic sense that would involve transferring public ownership to private operations. The sale of Conrail is a good example.
There is, however, a difference between transferring public ownership to private ownership or privatizing public program activities. The focus here is on the techniques and approaches that have been developed to permit greater use of the private sector to conduct government programs.

A variety of arguments are made for the advantages of using the private sector, not the least of which is lower costs either through greater efficiency and/or lower input costs. Setting aside the question of whether there are public interests that may run counter to private operation (and assuming that the cost advantages are real) the use of the private sector for operating public activities represents a "cost efficiency" factor rather than a "financing" participation issue.

IV. Conclusions

Intermodality is so broad that it is difficult to encompass all of its aspects in a single paper of reasonable size. What I was trying to do so far is more or less to capture the understanding of what intermodality is all about in the United States, putting the emphasis on the recent deregulation process and its impact on the development of an intermodal approach as an overall management concept in the transportation system, as well as the great concern of the decision makers and experts in the field of transportation who are to give a flexible response to changing marketing, dealing with this matter at federal, state, and local levels, as well as the private sector participation in the process.

Freight transportation in the United States is currently undergoing so many changes; some of them due to the recent deregulation process, that I previously mentioned, some of them due to introducing new technologies such as supercontainerships, automated movement in ports, double stack container rail service, and integrated truck/train concepts, and some of them due to an ever expanded international and domestic movements of containerized goods. At the same time the shippers are demanding more competitive prices at the increased level of service quality. Sizeable investments are needed for ports/terminals and for carriers equipment in order to cope with the increasing demand. With all of these changes comes the increasing use of intermodal freight transportation.

Intermodal Freight Transportation is a complex system of interrelated activities, each of which performs a portion of the freight movement from origin to destination. Efficiencies demand that, each portion of the movement have an integrated relationship with the others. Further, each of the modal components, for reasons of its own effectiveness, likely to optimize its individual systems. While good for the particular mode it could become suboptimal, when considering the performance of an overall intermodal system. So that's why, so far there is a
1. The Components of the System: Rail, Ports, Water, etc.

Components

Change in Industry Structure & Management (Challenges)

A. Industry Structure
   A. Service
   C. Marketing/Pricing

E. Operations (Terminal, Operations & Planning)

I. Investment (Port, Vessel, Rail, Investment)

S. Technology (Innovation & Standardization)

Components

Carriage: Carriage
   Terminals: Carriage
   Rail: Land
   Water: Maritime

Government Role

Competition

Market Demand

Labor & Major Variables

External Factors

The issues involved:

In order to describe how the intermodal transportation system works, let's presume this is a three-dimensional view of a system. Let's assume that there is an interest in the intermodal transportation system to meet customer demands. Cooperation among each other in the United States develops from the intermodal forces among carriers of all modes. The heavy-handed government regulation and intervention is an important factor in this system. The advantages of freedom from government control, at least to some extent, is a sensitive issue for the United States. The non-existant institution that deals with this matter at federal level. Most of the transportation executives in the United States feel that in the long run, this situation for the best. A possible commercial
2. The Functional Characteristics: service quality, operations, marketing etc.
3. The major variable and external factors, that often influence or dictate costs of operational concepts: government role, environmental impact etc.

1. Components

In general, any intermodal move will involve at least three components; namely the two line-haul segments and the connection between the line-haul modes, usually called port or terminal. For example, a TOFC movement involves a truck leg from the shipper’s dock to the piggyback terminal, a shift to the rail leg and then a shift at another piggyback terminal to truck for delivery to the consignee. The intermodal movement, to be effective must pay strict attention to the costs of services involved in all facets of the move.

* Water Carriage involves a wide variety of vessels. The range of vessels is from supercontainerships to smaller ocean going ships, some with special purposes like Roll-On, Roll-Off ships, to smaller vessels that may be part of a load center delivery system, to tugs and barges that are so effective for movement on the inland waterways.

* Ports are those points of connection usually associated with the transfer of movement from water to land. Ports are different in the sense that they are often publicly owned and their activity generally has significant impact on the economic development of the area around the port. Because of this they are often in competition with ports in other localities also seeking economic growth.

* Rail Carriage in the United States covers sizeable network taking advantage of the high efficiencies of steel wheel on steel rail. The railroad industry is generally a private industry that is responding to the demands for traffic, whether intermodal or not. The cars for intermodal movement are usually special ones that efficiently carry either a truck trailer, or a container. These are TOFC and COFC.

* Land Intermodal Terminals generally form the interface between highway movement on truck and the movement by rail. Pick up and delivery by truck is becoming more and more important because of the access to many shippers and consignees is only by highway. Because of land use constraints, ports sometimes operate or use auxiliary land terminals with drayage moving containers from dockside to railhead, or truck terminal some short distance away.

* Highway Carriage involves trucking companies, generally privately owned, with about 40% serving the role of common carrier. The way is usually provided by the public sector. The interstate system provides high speed and safe
involvement for large trucks. Drayage, even of several miles, is also considered part of this movement.

2. Characteristics

The characteristics involved in analysis of the various movements are those that would be identified for any transportation system. Management of movement may be by several individual industries operating individually, as a consortium, as a supercompany, or as a third party. The characteristics chosen to describe intermodal movement are:

* Industry Structure and Management

- The change in industry structure
  One of the results of deregulation for example in air industry is the survival of a few sizeable airlines operating between major hubs. The new airline companies have resulted from complex friendly mergers and from less-friendly buy-outs of often unprofitable or marginal lines. Northwest, through purchase of Republic and Frontier, moves to a very large carrier, as does Continental with the buy-out of People's who had previously bought out Britt. Both of these airlines are in the process assimilating equipment and rationalizing their total route. A similar phenomena is occuring in the freight transportation system as major railroad companies have worked out mergers in order to extend their service areas and provide across-country through service as a single rail company. Strongly opposed under past regulation the CSX mergers first with the American Barge Lines and then with Sea-Land Corporation open the possibility for a single management having complete control of intermodal moves. With the increase of containerized commodity flow, a truly integrated full service carrier becomes much more likely. APL with ownership of double stack rail cars and ocean going vessels is another example of a company that is able to offer service over an entire route.

- New management challenges
  The formation of multimodal "supertransportation companies" requires special management which include training for employees to be successful managers across the breadth of an intermodal company and the development of new cost allocation procedures to manage modes and terminals which have vastly different cost structures. Such management will of necessity involve a broad operational understanding of all facets of the freight movement plus creativity in marketing and planning. Shippers, consolidators and distributors will also need to have a broad understanding of the various moves as well as sufficient knowledge to make the trade off's between competitive forms of transportation to aid in their decision making.
* Marketing/Pricing and Service.

From a marketing point of view, the key to successful intermodal penetration will be the ability to market the right service and to price it competitively. If it is true that intermodalism is a great revenue business, but a poor net revenue business, then the potential sales are there; and it becomes more a matter of improved productivity of both equipment and labor, so that the price remains attractive and the profits improve.

* Operations

Because of its more complex scope, intermodal transport hosts a variety of operational problems; while some are peculiar to intermodalism alone, many simply reflect problems of handling freight within a given mode or at one of the ports or terminals. Here, clues can be found for improved productivity, for improved safety, for increased system-level understanding and for developing management requirements.

- Terminal operations and planning

Terminal transfer costs seem to have the greatest impact on the cost of movement and on the competitiveness of intermodal transport. Improvement is needed in internal logistic planning in order to identify ways to minimize sizable drayage costs, as well as promote efficient handling of the arrival of supercontainers.

Another significant change is the growth of major points of freight interchange, called load centers or hubs. The airline companies have found it profitable to set up hub operations at one or more airports. Such operations tend to improve efficiency and promote better use of specialized equipment. The deregulation of trucking which permitted the small double trailer (27 to 31 feet) has altered the operation of general freight carriers over the last years. The small doubles permit increased truck productivity through more volume. Several ports are considered to be candidates as load centers. Indeed some of them presently operate that way. They not only send containers inland by truck and rail links but they, also load smaller vessels with containers destined for smaller water ports with less extensive dockside capability. At the same time the U.S. Customs Service is in the process of implementing a nationwide system called ACS (Automated Commercial Systems). Some ports are now being use a portion of ACS called AMS (Automated Manifest System) module. Eventually, AMS will ensure on-line processing of present cargo paperwork much more expeditiously by Customs Service through the computer interface. Port or terminal expansion is often looked at as providing opportunity for economic growth for some cities, particularly for an increase in jobs. With containerization, however, the labor component is more likely to be reduced as more and more containers remain sealed as they pass through the port.

* Investment

The investment potential of the industry will dictate how quickly changes take place. The total investment in vessels,
ports, railcars, containers and rail/truck intermodal terminals is increasing every year. When investments in highways, railroads, harbor navigation, navigable inland waterways, and multimodal docks are added, the total investment will be sizable, may be staggering.

- Port and Vessel Investment
  The present investment in ports, containerized ships and containers is about $70 billion and is due to reach about $130 billion by the year 2000. The containerized ships apparently do provide economies-of-scale since they are being designed with significantly more space, promising lower "slot cost" per container. Generally, investments in technology is responding with super cranes, automatic container yards, trains trains that can carry containers in a double stack configuration, adjustable truck chassis, upgraded communication/information systems, etc. designed with significantly more space, promising lower "slot cost" per container.

- Rail Investment
  The railroads are beginning to invest in equipment to support the double-stack services. In several cases it is the shipping line that owns double-stack cars (APL). Double-stack trains are estimated to require about 50% less energy than their TOFC equivalents.

* Technology: Innovation and Standardization
  The technology employed by any system is the basis for productivity, cost-effectiveness, competitive edge, and service quality. Important technology areas of intermodalism are: 1. innovation in each of the system components, especially for improving productivity at the points of connectivity (ports and terminals); 2. an overall management information system (MIS) and 3. questions of standardization and computerized replacement of paperwork.

3. External Factors and Major Variables
  * International Trade has a vast impact on domestic intermodal movements. The recent boom in double-stack trains and the upsurge in domestic containerization indicates one way this has affected the intermodal system. In fact with increased movement from the Pacific Rim to the U.S., just supporting newly "foreign managed U.S. based" durable goods manufacturers should increase intermodal movements. Similarly, growth of the third world countries as well as the recent changes in Eastern and Central Europe will also affect intermodal movements.
  * Government: Role and Policy has a tremendous impact. There are a large number of federal agencies with some involvement in any transportation movement. However, recent deregulation has served to provide much more incentive for developing more competitive environment. State and local governments are almost always involved in the ports because of their role in the region's economy and in economic
development. Government also sets environment policy which can affect each of the transport modes and points of transfer. Environmental rules and regulations can affect both operations and the technology that can be used. Hazardous materials, a commodity often moved intermodally, are also a special concern.

* Competition exists, since for each intermodal move, there is usually competition by a single as well as other intermodal possibilities. The question is whether or not the movement has the price or service advantages to make it attractive to the shipper. Each mode continually strives for improvements in productivity which can lead to lower costs. Such improvements will ultimately impact the total intermodal movement.

* Market Demand is clearly an important factor in a demand responsive system. However, a market can be altered as a function of the service offered by transportation. However, in most instances the shipper is the major determinant in the choice of modes and routes.

* Labor is a major variable because of the vast number of different labor groups involved in a major, intermodal move. Transportation prices and productivity are impacted both by the mix of labor and capital for each component element of the system and by the wide variety of existing labor agreements throughout the system.
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