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TRANSPORT News

The TRUE Cost of Transport - Will it be Environment vs Mobility ?

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Editorial

The agenda of the future will be the Environment, and that indeed is the correct focus too. Any other consideration would be myopic, and self-defeating in the long run. The Planet must be capable of sustaining life, and in turn, be sustained by life itself.

Transport experts in railway and waterways have been generally smug in this regard, up to now. In the new debate, questions are however, being asked, and specific sectors being asked to come up with tangible arguments.

One of the least energy consuming modes is water transport. This has seen its growth, both in terms of low overall transport cost to producers and consumers, and in favour of the environment. In the future, questions hitherto unaddressed will be brought up before granting any waterway rights. What are the species of flora and fauna that inhabit the proposed route? What are the ambient levels of sound that will be generated in the water, and will it be detrimental to the normal life cycle of underwater life? Will the vessels disturb their habitat, causing migration, and depletion in number? This could cause a chain reaction across a wide spectrum of issues on the hinterland. Waterway companies will now have to evaluate these questions, and come up with the right answers, before being allowed to commence operations.

Railways has also had it environmentally good, till now. On Indian Railways, managers are quick to point out that “we are six times as energy efficient as road”. However, there are no recent detailed studies to prove this point, especially after massive changes in both road and railway technology over the last two decades.

A case in point is the PRC sleeper. It is definitely a replacement for wood. It is however not clear whether the extra mining involved in making cement and steel for the PRC sleepers is causing less environmental damage. Perhaps, it would be better to go in for managed forest plantations, and continue with wooden sleepers.

For railways, there are other issues - of noise levels in vicinity of railway systems, and large quantities of effluent discharge from stations. The generator cars on trains cause an unacceptable 95 decibels of ambient noise at stations, when the norm laid down by India’s Central Pollution Control Board specifies 65 decibels. Norms do not exist as yet for emission control on railway locomotives.

All these, and a hundred other questions will be asked of transport systems in the future, and they will have to prove that they have, at the very least, an even relationship with the environment. This may raise the overall cost of transport, and traffic managers would do well to factor in such environmental costs into their future rating and marketing strategies.

Moving Toward Integrated Transport Planning - Energy, Environment, and Mobility

Curitiba, Brazil - The city of Curitiba, Brazil, has integrated sustainable transport considerations into all of its plans for business development, road infrastructure development, and local community development. Curitiba first outlined a preliminary urban plan and a Master Plan in 1965, with the main goals of limiting central area growth and encouraging commercial and service sector growth along two structural north-south transport arteries, radiating out from the city center. The Master Plan also aimed to provide economic support for urban development through the establishment of industrial zones and to encourage local community self-sufficiency by providing all city districts with adequate education, health care, recreation, and park areas. With the structural transport axes, the Master Plan ensured linear development of the city, reducing the traditional importance of the downtown area as the primary focus of all transport activity, thereby minimizing congestion. The plan called for the integration of traffic management, transportation, and land- use planning to achieve its goals, and maintained flexibility in its regulations to allow for different future development scenarios. The Master Plan also proposed the creation of the Institute of Urban Research and Planning of Curitiba (IPPUC) to coordinate, modify, and oversee Plan implementation.

The Master Plan established the guiding principle that mobility and land use can not be disassociated with each other if the city's future design is to succeed. Curitiba's officials created a zoning and land-use policy that requires mixed- use high-density development along the north-south structural arteries in order to create the necessary population to support profitable public transport use. Thus, residential development focuses along the arteries, with essential services such as water, sewage, light, telephones, and public transportation provided. Further residential development occurs in four designated zones, in which all development must occur within close proximity of bus routes. An industrial park (called the "Industrial City") was built in 1973 in the western part of the city and plays an important part in the local economy.

What IS a Community?

Homes, jobs, shops, agriculture, leisure facilities, all of these and the many other needs of a civilized society are part of what may be called community, and transport is the vital link which holds together the community's component elements. Random development of individual elements without a proper consideration of their relationship to the whole will not create communities that work, as past policies have clearly proved.
We need to re-think the whole community concept and provide some fundamental working definitions.

Let us begin from basics and ask: what is a community? The word is derived from two ele-

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ments: *con* meaning *with* or *together,* and *munity* which comes from the Latin *munire* meaning *to fortify*. Our word *community* means literally *to fortify together.* How did this meaning come about?

People lived their private, scattered lives in villages, farms and remote small holdings. But in times of danger they could come together to the town or city for the purpose of mutual defense. All the old towns and cities of Britain and Europe had their stockades or walls, and many of these old city walls with their massive gateways remain intact today. In those medieval times the community was a place in which people came together for mutual defense and protection. *Community. Con munire. To fortify, together.*

As time passed, the need to *fortify* became less important. Towns and cities let their old walls and gates fall into ruin. In 1848 Vienna demolished its entire fortification complex of walls and gates and replaced them with the *Ring Strasse,* a treed boulevard encircling the city lined with fine cultural, administrative and commercial buildings.

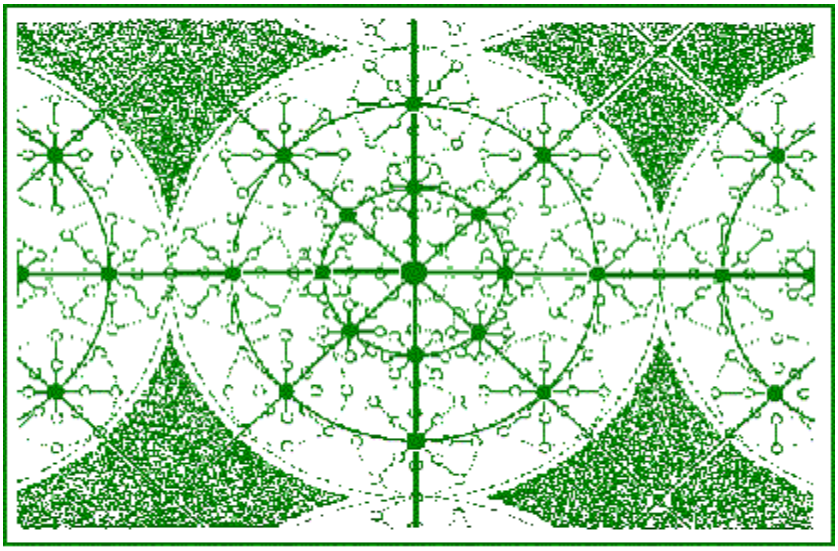
This was the new city: a city in which people came together not for defense but for commerce, trade and culture. The need to *fortify* is gone. But the *con,* the *together* aspect remains, reflecting one of the most fundamental facts of human nature: that man has two sides, a personal individual side, and a social side.

People want to have a quiet home, a place where they can retire and be themselves. But they also want to come together in order to do those things they can only do as a group: to manufacture and to shop, to use and to enjoy libraries, exhibitions and concerts.

That is the modern Vienna, and that is the purpose of our modern community: a place where we can live as separate individuals, and come together to do those things we can only do as a group.

These two basic needs, for individual privacy, peace and quiet on the one hand, and for social inter-activity on the other, define the nature and purpose of the community. Around the outside, we live in isolated homes or small village neighborhoods in quiet countryside, or perhaps around the perimeters of small towns or larger cities. We come together to the town or city center, for purposes of joint social and economic activity, along lines of movement like the spokes of a wheel.

A theoretical pattern of outer habitation and central communal facilities, with radial interlinking movement is thus established.



In more practical terms: the home, with its individuality and privacy, is a single unit. 500 homes or so link to form a village neighborhood with its general store, church, kindergarten and recreational green; the town of 5,000 or more with its linked surrounding villages offers a wider choice of goods, services employment and activities; and finally, at the center of the region, a city of say 500,000 inhabitants would provide those highly specialized employment opportunities, goods, services and activities which can only be supported by an overall regional market approaching a million or more.

The totality is the County or Region, of say three-quarters to a million people, self-sufficient in jobs, in choice of goods and services, cultural and intellectual amenities, and with surrounding land offering space for market-gardening, leisure and recreational facilities.

The fundamental definition of the community, its nature and purpose recognizes that the community or county is not simply an assemblage of unrelated parts, but is in its own right a coherent service which needs fundamental planning if it is to function efficiently whilst preserving character and a pleasant livable environment.

The importance of establishing Regional Centers lies in focalizing commercial development at the center and providing coordinated transport links. Without this sense of urban focus, industrial, commercial and retail developments spring up haphazardly. American cities once suffering from freeway congestion at peak times and on roads into and out of the city only, are now experiencing similar problems on circular and cross routes as people drive between work in suburb A, shopping in suburb B, college in suburb C and medical center in suburb D. The phenomenon of cross-route congestion has now become a major, day-long concern.

Re-establishing the natural radial pattern of movement from outside to the center revitalizes the center and allows a coordinated movement pattern to be established.

Transport: Personal or Shared

The question of transport *mode* is also important, and here we are faced with two choices: the private car versus shared public transport. Each system tends to perpetuate itself with its own chain of results and influence.

When habitation and urban functions are widely, thinly and haphazardly spread, the individual private car is the only practical solution. But the car itself tends to perpetuate and increase urban and rural spread. The private vehicle system "opens out" housing development densities with its land-consuming roads and sight-lines; it spreads suburbia over a wide area, and it breaks open towns and cities with its demands for roads, intersections, and not least for parking. This in turn makes walking impractical and unpleasant, and makes shared public transport non-viable.

But with the identification of regions each with its center and defined regional movement pattern, combined with a move towards more compact residential and urban developments, shared public transport becomes viable and convenient. Public transportation can be frequent, comfortable, and technically innovative, with convenient interchanges between inter-city and regional services, and electric hire cars at major stations.

With shared transportation playing a larger role, town scale can be humanized and centers pedestrianized with improved amenities; walking now becomes practicable and enjoyable. The environment both urban and rural is improved; shared transportation makes smaller demands on land and fuel; old and young now have full access to transportation and thus to town or city amenities.

Central urban planning should stress compactness, the concentration of development at the core and the exploitation of unused or waste land within that area. Commercial centers can be reinvigorated through environmental enhancement, pedestrianization, and full integration with public transport facilities.

New residential development should take place around country stations, thus strengthening the viability both of the village neighborhood and of the public transport which serves it. Country stations can be developed as social centers for the surrounding area, offering perhaps a village shopping center, post office, a pub or café, and a few budget hotel rooms for walkers and tourists. Regional transport should also link up with country footpaths, parks, rural leisure facilities, lakes, and scenic spots to provide a pleasant day's outing.

By concentrating rather than sprawling new urban and residential developments and by linking them with the regional transport system we can provide both transport for the community, and customers for the transport.

Moving Around: Facing the Reality

Is it right that we should concentrate on the extension and improvement of public transport? Many still see the car as the ultimate reflection of personal freedom of movement, and public transport as a rundown, over-subsidized anachronism. The reality may now be reversed.

"Since World War II, the American dream has been a house in the suburbs," says Carl Pope, executive director of the Sierra Club, a US environmental organization. "But that dream is turning into a nightmare of traffic, air pollution, lost open space and higher taxes."

According to the report, "The Dark Side of the American Dream: The Costs and Consequences of Suburban Sprawl," Atlanta ranks as the worst city of 1 million residents or more for urban sprawl, losing some 500 acres of farmland, forest and green space each week. Suburban sprawl is the fastest growing threat to America's environment as prime farmland is replaced with malls, parking lots and housing developments, the Sierra Club reports. Growth in the suburbs means increasing traffic jams, rising costs of public services, wasted tax revenue and increased air and water pollution, loss of open space and prime farmland.

The need for radial transit routes coupled with centralized commercial developments and compact residential neighborhoods has been recognized, and attempts have been made to address this challenge.

Not all that long ago, Canada's largest city, Toronto, was a textbook case study for urban planners. The first of the city's two subway lines opened in 1954, giving residents quick access to the downtown financial and shopping district bordering Lake Ontario. In 1967 the Province of Ontario started a commuter rail service for those downtown workers. Rather than surrendering to sprawl in the 1970's, Toronto tried to guide the process by promoting "town centers", office-and-shopping complexes that could be reached by subway and bus, not just by car. Since the 1980's, a network of pedestrian tunnels has spread beneath downtown streets, allowing subway and commuter-train riders to reach their offices comfortably even in the midst of a Canadian blizzard.

But then the city lost control over the planning process, the city is decentralizing rapidly, and new residential developments are neither compact nor linked to present or planned transit routes. City employment is down, suburban employment is up. 1998 was the year in which the population of Toronto's suburbs exceeded that of the city itself. Even within the city limits, big

office and housing complexes are sprouting miles away from railway and subway stations. The city's spine is no longer Yonge Street, which stretches north from the lake, but rather Highway 401, a 16-lane east-west freeway 6 miles north of the center, which is bumper-to-bumper by 6.30 am and stays that way well into the evening.

The city's traffic studies track the trend. In 1985, just over 1 million vehicles crossed the city limits each day. Ten years later, the daily count exceeded 1.5m. The number of vehicles entering areas closer to the urban core, however, has barely grown. Almost all of the additional trips are to or from low-density regions where public transport is infrequent.

Even though public transport does have indisputable advantages – a single bus can carry as many people as 60 cars and a single train does the work of 1,000 cars – public transport is not efficient in serving areas with low population or employment densities. Low usage means infrequent service, and infrequent service, in turn, deters users. Decentralization and urban sprawl is an almost insurmountable challenge for public-transport systems.

Baltimore, in the American state of Maryland, offers a clear example. The city's sole heavy rail line stretches 14 miles from Johns Hopkins Medical Center, a big employer, to Owings Mills, a suburb where office parks and shopping malls are seemingly springing up everywhere. Yet those new developments are scattered over such a wide area that they are not within easy walking distance of the Owings Mills station. To get there, people need to take first the subway and then the local bus. No wonder that few of them travel by subway from their city homes to suburban "business-park" jobs.

Seattle is not an exceptionally large city famous for its traffic problems like Los Angeles, and it has all the toys that motorists could wish for in the way of freeways and wide urban streets. Yet the road system fails to provide reliable transportation. Average freeway speeds are down in the teens, bumper-to-bumper traffic jams can be expected in every rush hour, commuting times are lengthening, pollution is growing and tempers fraying.

By the spring of 1993 a new Plan for the wider Puget Sound region had been formulated, and included upgraded public transport in the form of new heavy and light rail commuter lines, increased buses and dedicated bus lanes. It was discussed in a two-hour program produced by a local television station. The upshot was that for a total cost of nine billion dollars, the city would achieve nothing more than a two-year breathing space. In other words, it would be putting itself back to the pollution and traffic-jam levels of two years ago. A `stop-gap' solution if ever there was one, and costly too. For the new millennium, Seattle is back to public transit again with new plans; whether the good citizens will bite the financial bullet or let things go on getting worse remains to be seen.

The fundamental cause of Seattle's transportation problems is not the mode of transport in itself, but the planning process which over the last twenty years permitted scattered and widely dispersed development unrelated to the transportation needs which such development would generate.
The problems are similar in Britain. Cambridge has a buoyant economy that attracts commuters and shoppers from miles around. At Stevenage and Peterborough, footbridges lead directly from the station into the shopping center, and many shoppers and office workers come in by train. But the Cambridge railway station is a mile out of town, remote from the shops, so most people come in by car. Cambridge should have left the historic center to the University and the tourists, and concentrated shop and office development around the railway station. Now the damage is done, and planners should not expect the transport industry to rescue them from the results of their errors. Good transport depends on good planning.

The same problems and challenges exist in the developing world, though the pollution effect is increased by older vehicles and lower mechanical maintenance standards.

By the year 2010, about 500 cities in the world will have more than 1 million people; 26 of them will have over 10 million. Will they all be like Mexico city, Bangkok or Jakarta, overwhelmed by traffic jams and blanketed with smog? Most of the developing countries where cities are growing fastest would rather not land themselves with huge public debt to finance urban railway systems. But here again, the remedy is readily at hand: fully planned integration between development and transport. Providing the planning is in place, it is not even necessary to rely on hi-tech and expensive rail projects.

One South American city has shown that it is possible to avoid gridlock and bad air pollution through planning alone. Curitiba, capital of the state of Parana in south-east Brazil, grew from a population of about 200,000 in 1950 to over 2 million in the late 1990s. Luckily for the city, its mayor for 25 years, Jaime Lerner, was an architect and town planner with a vision for making rapid urban development bearable. He was keen to encourage a modern high-density city that would give its inhabitants easy access to offices, shops and amenities, avoiding the long distances of America's or Australia's low-density urban sprawls.

Instead of allowing development to take place haphazardly in ever-widening concentric circles, he arranged for new buildings to be grouped along five radial roads leading into the city center. In the median strip of each are two lanes reserved for express buses, flanked by standard local roads. At bus stops, passengers step up into enclosed tube-like structures to buy a ticket, then board the bus at its floor level through extra-wide doors. This speeds boarding and hence reduces journey times. Where traffic is heavy, the bus services use two or three coaches connected by articulated links. Thus Curitiba's buses mimic features - such as dedicated track and fast, organized loading - that are normally found in more expensive rail systems. The system is so handy that about three-quarters of the city's commuters take the bus. Fuel consumption per head in Curitiba is a quarter less than the Brazilian average, even though car ownership per head is the highest in the country, reversing the normal rule that high ownership means high fuel consumption. And Curitiba's air is about the cleanest to be found in any Brazilian city.

In Portland, capital of the State of Oregon, USA, planners have been much more responsible in providing public transport and zoning land around public transport, providing green spaces and a green belt around the city. The Portland tram system, called MAX for Metro Area Transit, began with one line; the handsome street-scaping in the city centre which was combined with MAX, the convenience of parking-free shopping, the enhanced urban environment, the cleanliness and speed of the system, all combined to make MAX an immediate success.

Next, the line was extended in the other direction through largely green countryside; stations were located "in the middle of nowhere", and new developments created around them.

Can public transport pay its way?

Can public transport pay its way? Or will it always need massive subsidies? Public transport *can* pay its way if it is efficiently designed, built, and operated, *and* widely used. Japanese private railways prove this point quite conclusively. But the high usage, and to a considerable extent the efficient operation of public transport services, requires the full coordination of transport services with compact residential and commercial developments.

Alternatively we might ask: can we afford the motor car?

In 1994, two economists, Richard Arnott and Kenneth Small, put the annual cost of driving delays in the United States at $48 billion, or about 0.7% of GDP. The Texas Transportation Insti-

tute says the delay experienced by the average urban driver in America rose from 19 hours in 1982 to 34 hours in 1994; reckoning $11.50 for each hour lost, including the cost of wasted fuel and driver's own estimates of the value of their time, the institute worked out the average cost per driver at about $400 nationwide and roughly $1,000 in Los Angeles. Appalling traffic morning and afternoon is costing Silicon Valley, California's computer software nerve-center, some $3.5 billion annually in lost productivity and wasted resources.

The European Union's Transport Directorate, in a 1995 green paper, put the cost of congestion in Europe at 2% of GDP. Lex, a British car-leasing firm, says congestion wastes 1.5 billions hours of British motorists time a year, costing the economy $16.5 billion. Such figures are repeated in urban centers throughout the world.

The rule is universal and knows no national boundaries. The city's fundamental radial pattern must be recognized. And transport planning must be coordinated with the planning of the commercial, residential and leisure facilities which the transport is expected to serve.

The coordination of public transit planning with commercial and residential development is an aspect of the wider issue of land use.

Speed Creates Distance

The history of the American city makes it clear that we have reached the limits of economic growth. At first, growth made our cities more livable; but during the last few decades, we reached a point where growth began to make our cities less livable.

Before the nineteenth century, all cities were built as "walking cities." Because they had to be compact enough for people to get around by foot, cities were made up of three to six story buildings. People lived in apartments and in rowhouses that were less than twenty feet wide. Streets were narrow, buildings were not set back from the sidewalk, and there was often shopping on the ground level. The older parts of European cities and towns are still built in this form, and the earliest American cities were just as intense and congested: the streets of eighteenth century Philadelphia looked like the streets of London, though there were vast areas of open land nearby.

Early in the nineteenth century, steam powered ferries and horse-drawn omnibuses let the American middle class move to lower density rowhouses. The new neighborhoods typically were made up of three-story rowhouses: streets were wider, houses were set back a few feet from the sidewalk and had larger backyards, and trees were often planted along the sidewalks. Lots were larger: a house was commonly built on one-twentieth of an acre.

Beginning in the 1870s, horse-drawn streetcars on steel tracks, cable cars, and electric trolley cars let the middle class move to what we now call "streetcar suburbs." These neighborhoods were made up of free-standing houses, with sizable backyards, small front yards, and front porches facing on tree-lined streets. Houses were commonly built on one-tenth acre lots. Today, we think of these as the classic American neighborhoods.

Streetcar suburbs felt spacious and quiet, but their most important form of transportation was still walking -- even though they were one-tenth the density of the "walking city." Streetcars were used for commuting to work and for occasional trips to other parts of town, but everyone lived within walking distance of Main Street or of a neighborhood shopping street. Though you could catch a streetcar on the main street, you usually you did not have to, because you could find shopping, doctors' offices, and other everyday services right there in your neighborhood. As they walked to the main street, people nodded to neighbors sitting on their porches, and they invariably met people they knew at the neighborhood stores.

As astounding as it might seem today, most middle-class Americans who lived in cities or small towns did not own vehicles one-hundred years ago. Maintaining a carriage was a sign of wealth, and was beyond the means of the middle class. Booth Tarkington's novel *Seventeen* gives us a good picture of the way of life in middle-class towns and streetcar suburbs. At the beginning of the book, a teenage boy is walking home from the soda shop on Central Avenue. When he gets home, he finds that his mother has bought some wash tubs at an auction. Because the store that sold them is going out of business, it will not deliver and the tubs must be picked up by the end of the day, so there is no time to hire a delivery man; the boy has to walk

a mile and a half across town and carry the tubs home. It is only in this sort of extraordinary situation that the family is inconvenienced by not having a vehicle. The book was written in 1915: it was not so very long ago that American teenagers walked to the local shopping street rather than driving to the mall.

Many people like cities, but for those who prefer a suburban way of life, technology and growth brought real benefits during the nineteenth and early twentieth century. From the walking city, to the rowhouse neighborhood, to the streetcar suburb, middle-class neighborhoods became greener, quieter, more spacious, healthier, safer for children.

As the twentieth century progressed, Americans moved to even lower density suburbs. After World War I, middle-class neighborhoods were built around the automobile, and they were made up of bungalows on one-sixth-acre lots: often, the neighborhood stores were not quite close enough to walk to, so people drove a few blocks to buy their groceries. After World War II, middle-class neighborhoods were rebuilt around freeways, and they were made up of suburban homes on quarter-acre lots: to get to a shopping center to buy groceries, people drove on high speed arterial streets, where the traffic was nerve racking.

Yet consuming all this extra land and transportation did not make the suburbs more livable. The automobiles made neighborhoods noisier, more congested, and less safe for children. The nearby farmlands and open space that attracted people to suburbia were replaced by freeways, strip malls and tract housing. The old sense of community disappeared, as local shopping streets were replaced by anonymous regional shopping centers. Today, suburban neighborhood groups invariably organize to stop new suburban development near their homes; everyone knows that this style of urban growth makes cities less livable.

The most important trend in urban design in American today is a reaction against modern suburbia, which is called the New Urbanism or Traditional Neighborhood Design. Architects such as Andres Duany and Peter Calthorpe are building neighborhoods modeled on the streetcar suburbs that were built in America before World War I. When Duany first built this sort of neighborhood at Seaside, Florida, real estate experts predicted that the houses would not sell -- they did not see why anyone would buy a house at Seaside, when they could pay the same amount and get a house on a third of an acre lot in a conventional suburb -- but Seaside was a tremendous success, because home buyers wanted the sense of community that you have when you can walk to the town center or sit on your front porch and see neighbors walk by. Several cities and counties have adopted Traditional Neighborhood Design zoning ordinances as alternatives to their conventional suburban zoning, so developers are not required by law to build low-density, automobile centered suburbs, as they still are in most of the country, and a couple now require Traditional Neighborhood Design rather than conventional suburban development.

Post-war suburbia, with housing on one-quarter or one-third-acre lots, is less livable than the streetcar suburbs built before World War I, with housing on one-tenth acre lots. All the extra land that we consumed to build suburbia did not give us more livable neighborhoods.

Likewise, all the transportation that we consume to travel through suburbia -- the freeways and the two or more family cars -- did not make it more convenient for us to get around. As speeds increased, suburbs sprawled further and malls got bigger, so people commuted further to their jobs and drove further to go shopping.

Research has shown that the amount of time that Americans travel to work has remained constant since the 1840s, when suburbanization began, despite the vast changes in technology since then.The total amount of time that people budget to transportation also tends to remain

constant: Americans travel about 1.1 hours per day.

In Great Britain, where there is a very active anti-freeway movement, a recent report led the Dept. of Transport to adopt a guidance document saying that cost-benefit studies on new freeways must assume that elasticity of demand with respect to trip speed is as high as 1.0 -- that is, that travel increases proportionally to increased speed, so that time savings can no longer be claimed as a benefit of freeway construction.

In the United States, cost benefit studies assume that freeway construction has no effect on trip length: they begin by projecting development patterns and travel demand on the basis of current trends, and then calculate how freeways will effect the amount of time it takes to travel the projected distances, so that they count time savings as a major benefit of new freeway construction. But this is beginning to change: at the annual meeting of the Transportation Research Board in Washington, D.C. in January of 1997, Kevin Heanue, the Federal Highway Administration's director of environment and planning, said that an FHWA study of Milwaukee found that traffic created by new highway capacity between 1960 and 1990 wiped out 8-22% of the time savings the new capacity had afforded. But at the same meeting, professor Mark Hansen of the University of California said his studies of highway expansion in California showed a 10% increase in highway lane-miles induced an immediate 2% increase in traffic at the county level, and a 6% increase within two years. When he also counted induced traffic in neighboring counties, Hansen found that a 10% increase in highway capacity induced a 9% increase in distance traveled.

Planners are beginning to realize that higher speeds do not save people time. They just encourage people to travel longer distances to lower density suburban homes and to bigger regional shopping malls. Speed creates distance.

Limiting Growth

Modern suburbia places a tremendous economic burden on the average American. Americans spend about 50 percent of their disposable income on housing and transportation, and most have no choice but to live in low-density suburbs, where families absolutely need two or more cars. During the post-war period, the federal government actively promoted this sort of development in order to stimulate the economy and create jobs: the FHA only insured the mortgages of new suburban homes, and the Highway Trust Fund provided a constant flow of funding for new freeways. Today, most zoning laws still require automobile-dependent suburban design -- low-density housing separated from other uses, so residents cannot walk to shopping and other basic services.

Yet the extra costs of suburban housing and transportation no longer increase our well-being. During the nineteenth and early twentieth century, neighborhoods became more livable, as the middle class moved from the walking city, to row houses, to streetcar suburbs, but by World War I, middle-class Americans were already living in neighborhoods that were adequate. The streetcar suburbs gave families enough space, enough privacy, enough quiet, a big enough yard. Modern suburbia does not bring any significant added benefit, despite all the extra land and transportation it requires, but it does bring significant new environmental and social problems -- such as air pollution, the depletion of fossil fuels, automobile accidents, congestion, the ugliness of shopping strips and parking lots, the loss of farmland and open space, the breakdown of community as local shopping is replaced by regional malls. We have reached a point where the costs of urban growth outweigh its benefits.

By now, it is widely recognized that we must limit growth to make our cities more livable.

One useful tactic is the Urban Growth Boundary, which has been required in Oregon since

the 1970s and is being imitated elsewhere. Oregon required towns to forbid urban growth beyond this boundary line in order to preserve agricultural land and open space, but the Urban Growth Boundary has also made Portland, Oregon, the most livable city in America. It let the city concentrate new development in downtown and in pedestrian-oriented neighborhoods built around light-rail lines. Portland now has the most interesting street-life on the west coast: refugees from Los Angeles say that their neighborhood shopping streets are so lively that they go walking in the evening. Even The Wall Street Journal, not usually known for being anti-growth, has said that Portland's Urban Growth Boundary has made it an "Urban Mecca," so livable that planners from all over the country are coming to study it.

It is also widely agreed that we also need to limit automobile use to make our cities more livable. Most of our cities' environmental problems -- such as noise, congestion, and air pollution -- are costs of automobile use.

Pricing is Not Enough

Environmentalists often say that we should tax driving to make drivers pay the full cost of automobile use. Currently, for example, America's hidden subsidies to parking alone are worth about $250 billion per year. Several recent studies by environmental groups concluded that to eliminate this sort of direct subsidy and also to require drivers to pay for the environmental damage they cause, we would need a gasoline tax of about $5.00 per gallon.

Economists call this sort of hidden subsidy an "external cost," because it is not paid by the person who makes the decision about whether to drive. It is clear that people drive more than the economic optimum, because the automobile is more convenient for the person who uses it but creates more external costs for society than other forms of transportation. For example, it is more convenient for most people to drive to the grocery store than to walk, take the bus, or bicycle; but driving to the grocery store creates more noise in your neighborhood, more danger to children playing on your neighborhood streets, more congestion on the arterial street leading to the grocery store, and more congestion in the grocery store's parking lot, than any of these other forms of transportation. When people make the decision about whether or not to drive to the store, they think about their own convenience, and not about these social costs.

Imagine a freeway where congestion has slowed traffic to 30 miles per hour, but where people could travel at 60 miles per hour if there were 20 percent less traffic. Let's say that the average trip would take a half an hour by car at 60 miles per hour, one hour by car at 30 miles per hour, or two hours by bus. If 20 percent of the drivers decided to take the bus, it would take them an hour longer to get where they were going, but they would save the other 80 percent of the drivers a half hour each. As a result, it would take less time for all of the travelers combined to get where they are going. Even ignoring the environmental costs of automobile use, we can see that transportation would be more convenient overall, in this example, if 20 percent of the people took transit -- but people will not take transit and double their own travel time, in order to save time for other drivers.

This is why economists say we should have "congestion pricing." If we charge extra to drivers who use bridges or freeways during peak hours, we make them pay for the congestion they create for other drivers, and we give them an incentive to use alternative transportation and make the entire transportation system function more efficiently. This extra fee internalizes the external cost that they create for other drivers, makes them pay this cost out of their own pocket.

Likewise, if we make drivers pay for the noise, air pollution, and other environmental costs they create -- and for parking, road maintenance, and other costs that are subsidized directly by the public -- then people will choose to use other forms of transportation when the benefit of driv-

ing to themselves is less than the full cost of driving -- both the cost to themselves and the cost to the public. For example, they might bicycle to the grocery store if they only have one or two things to buy, and drive only if they have heavy packages to bring home. According to economic theory, this will optimize overall well-being: people use their cars only when the benefit of driving is greater than the full cost of driving, rather than ignoring some costs because they are borne by other people.

It does make sense to end subsidies to the automobile, but it is wrong to think that pricing policy is **the** solution to excessive automobile use. Economists think of pricing as a way of optimizing the use of resources at any level of income; as growth continues and income increases, they expect that people will be better off economically, because they will be able to spend more on all goods and services. But this way of thinking no longer makes sense when we realize that we have reached the limits of growth.

The economist Fred Hirsch uses cars and suburbs as prime examples of what he calls "positional goods," goods that are most useful when you have them and other people do not. There was a tremendous advantage to having a car early in this century, when they were still rare -- you could get to work, shopping, and unspoiled parts of the countryside much more easily than anyone else -- but, as more and more people got cars, the traffic became slower, it became hard to find parking where you worked and shopped, and the unspoiled countryside was paved over. Likewise, the first auto-oriented suburbs made it easy to live near the country and drive to the city, but as more and more suburbs were built and the city stretched on endlessly, it became more difficult than ever to live near the country.

Now, imagine that we made drivers pay all the externalized costs of the automobile, and the higher price cut driving in half. If you were wealthy enough to drive whenever you wanted, your automobile would be a pleasure again. There would be no congestion or parking problems. It would be much easier for you to go to work or go shopping than for people who cannot afford to drive. Everyone would want to earn more money, so they could afford to drive more -- and growth would continue until driving became such a misery that we had to raise its cost again.

Because driving and suburban housing are positional goods, people will keep spending more money on them indefinitely in order to get ahead of everyone else. Charging people more to drive would actually increase the pressure for economic growth: people would want to step us the growth rate and earn more money, so they could drive more.

Limiting Speed

To end growth, we need to put direct limits on automobile use, and the simplest way to do this is by limiting speed. As we have seen, increasing speed in the past simply increased the distances people traveled: because the time people spend traveling remains constant, higher speeds generated suburban sprawl far from where people worked and regional shopping centers far from where shoppers lived. Contrariwise, gradually reducing the speed limit for automobiles would not only shift longer trips to public transportation; even more important, it would encourage people to shop locally rather than regionally shopping, and to live nearer to where they work. Increasing speeds generated suburban sprawl by letting people travel further, and reducing speeds would stop and ultimately reverse sprawl. Speeds should be reduced outside of cities as well as in the city: it should be clear by now that it was a mistake to build freeways through all our rural areas. The freeways turned much of our countryside into exurbs filled with commuters: for example, much of southern New Hampshire is now essentially a suburb of Boston. Because they were designed to speed transportation, the freeways by-passed small towns: all over the country, new developments near the interchanges drained business from nearby Main Streets. By fragmenting the open countryside, the freeways reduced wildlife populations.

We should reduce the speed on these freeways and ultimately replace them with ordinary rural roads, with a speed of thirty-five or forty miles per hour -- with curves to keep traffic down to the speed limit and with traffic lights or stop signs rather than overpasses where roads cross. When these roads go through the Main Streets of towns, they should be slowed to the speed of local traffic: they would bring Main Streets more business, rather than bypassing small towns to keep traffic moving quickly, as freeways do. Slowing down automobile travel would shift long-distance travel and freight to high-speed rail: there are abandoned and semi-abandoned tracks all over the country that could be upgraded relatively inexpensively, without the cost of purchasing new rights of way. Roads would be used primarily by local people and for pleasure driving: you would actually get a feel for the countryside and the towns as you drove through them-rather than just feeling the monotony of driving on a freeway. Small towns that have been neglected during the last fifty years would revive, once they had a railway station in the center of town and cars driving through on Main Street.

Limiting automobile speeds would help restore our small towns and countryside, but it can do even more in the city. The next two sections will look at a number of different limits on the automobile in the city, to see what effects they would have on the city's form. First, we will look at the most extreme, a ban on automobiles in the city, to show clearly how wasteful the automobile is, and then we will look at some less stringent limits on the automobile. After looking at these ideal types, which show what cities would be like if automobile use were limited in different ways, we will look at how to begin changing our existing cities.

A Traditional City

Our cities would be most livable if we reduced speeds enough to ultimately phase out automobiles completely as a form of in-city transportation. City dwellers would still use cars for recreational trips to the country, and motor vehicles would also be used for deliveries and other services. But walking, bicycling, mini-buses, light rail, and commuter rail would be used for in-city personal transportation.

Banning cars and limiting the scale of development could give us cities that look like the better neighborhoods of American cities early in the century. Because the country is wealthier now, almost everyone who wanted to could live in neighborhoods like the streetcar suburbs where the minority of Americans who were middle class lived before World War I, when middle-class Americans did not own vehicles. The streetcar suburbs are widely considered a high-point of American urban design, with their tree-lined streets of private houses, with shopping and trolley lines within easy walking distance, and with stores that offer delivery of groceries and heavy goods. Yet many people would also want to live in neighborhoods of row houses or of apartments, once these higher density neighborhoods were no longer overrun with cars.

It would be possible to provide very frequent transit service in these compact cities, where private automobiles do not compete with public transportation. We would also expect many improvements on the bicycle to appear, once people no longer could drive, such as bicycle trailers to carry small children or cargo and pedi-cars, with light-weight convertible roofs made of aluminum and nylon, that you could use on rainy days. Even more important, people would not have to use as much transportation: it would be quicker to walk to the local store or doctor's office than it is for modern suburbanites to drive to the shopping mall or medical center.

Compare this city with the cities we have today. It obviously would be more livable -- quieter, safer for children, cleaner, and more neighborly. And it would be about as convenient as our cities today: people would spend the same amount of time getting to work, to shopping, and to other destinations. Yet it would cost far less than our cities do today. Americans now spend about 20 percent of their disposable income on their cars, and virtually all of this cost would be

eliminated, because trip lengths would be so much shorter. In addition, Americans now spend about a third of their income on housing, and housing would be much less expensive because of reduced land and parking costs: land cost now represents up to 40 percent of total housing cost in the country's most expensive housing markets, and over three-quarters of this cost would be eliminated. There would also be savings because of shorter utility lines, because businesses would not need to provide "free" parking and public agencies would not need to acquire land to stop sprawl, and so on. There would be some increased costs-for example, because stores would be smaller-but there would be tremendous savings.

Americans spend about one-half of their disposable income on housing and transportation.[12] We could save about half of this by walking and living in streetcar suburbs that are more livable on the balance than modern suburbia. The trillions and trillions of dollars that Americans have spent on suburban homes, cars, freeways, and parking lots do not make the average person any better off. Proposals to ban cars used to be ridiculed as unrealistic, but there are now auto-free zones in the centers of most European cities, and the majority of voters in Amsterdam recently decided to ban cars from the entire central part of that city, with about 10 percent of its land area and 15 percent of its population. This plan is more sweeping than anything that has been proposed in the past, and environmentalists believe that other cities will imitate it if it is successful.

Speed Limits and Urban Form

It is also plausible to aim at less stringent limits on automobiles than a total ban. As a second ideal type, to illustrate the effect of different limits on the automobile, consider a speed limit of 15 mph for private vehicles within a city, which would let people use cars for local errands but shift them to higher speed public transportation for longer trips. Because of the low speeds, automobiles would no longer dominate transportation and exclude other users: bicycles and small electric vehicles similar to golf carts could travel along with the automobile traffic. Shopping streets with slow traffic would be friendlier to pedestrians; and traffic would be slowed down even more on neighborhood streets, to make them safe enough that children could play in them.

With this sort of speed limit, there would be a massive shift to public transportation for commuting and for regional shopping. Development would naturally tend to cluster around transit nodes and corridors, in order to appeal to customers and clients who use public transit. Because it would take longer to get to regional shopping, most every-day shopping that is now is done in regional malls would shift to local shopping streets instead; but you would have some auto-oriented stores on these shopping streets, instead of old-fashioned, pedestrian-oriented stores: shopping streets would be fragmented by occasional supermarkets with big parking lots. Though densities would not be as high as they were in the Victorian streetcar suburbs, they would be higher than in modern American suburbia.

This city would have some of the advantages of streetcar suburbs, such as nearby shopping streets and good transit service, though it would be less neighborly, less compact, and noisier. It would also have some of the advantages of suburbia: automobiles would let people live in neighborhoods with larger lots, haul loads of groceries to the basement deep-freeze, chauffeur children around, and generally live a more suburban way of life.

As a third ideal type, consider a city with an even looser limit on automobile use, an in-city speed limit of 30 miles per hour. Even this mild speed limit would do much more to solve our cities' problems than the elaborate regional land-use and transportation planning that environmentalists are calling for.

Long-distance commuting that is now done by freeway, would shift to public transportation on

high-speed rail systems. Commercial development would tend to cluster around the rail stations, to take advantage of the regional workforce and customer base that comes by rail: freeway oriented regional shopping malls would be replaced by mixed-use shopping and office complexes (with plenty of parking) at rail stations. Some of the suburban sprawl at the edges of the metropolitan area would also recede, because it is totally dependent on high-speed freeway access and would be isolated without it.

None of the environmentalists who call for regional governments and massive planning bureaucracies expect as much from them as you could get from a simple law limiting automobile speed to 30 miles per hour.

Yet this speed limit would allow everyone to live a suburban life: if the city had a high speed rail system, people could live in residential neighborhoods that look like post-war suburbia. The main differences in everyday life would be that people would shop and work in mixed use complexes near transit stops, which are more interesting than shopping malls and office parks, and that most people would commute by high-speed rail, which would make most commutes less grueling. These changes would cut automobile use in half, dramatically reducing the city's environmental problems.

In the past, American cities have been suburbanized by default. People fled from the city to the most remote, lowest density suburbs they could afford, without thinking about the effect they were having on the region as a whole; planners accommodated this trend by building as much suburban housing and as much transportation as possible; and there was no political control on urban development. By contrast, a speed limit of 30 miles per hour represents a deliberate, responsible political choice of a suburban way of life: it would let everyone live in suburbia without totally blighting the region with freeways, parking lots, and traffic congestion.

It has also become common in to limit speeds in European cities, using what is called "traffic calming." In the Netherlands and Germany, many residential streets have been converted to Woonerfs, redesigned to slow traffic to five or ten miles per hour. Traffic calming on residential streets has also begun in the United States, generally using simple and inexpensive methods such as speed humps, gradual undulations in the road, which make it uncomfortable to drive more than 15 miles per hour: the city of Oakland, CA, recently began a study to determine the best way to protect residential streets from traffic, but there was such strong neighborhood pressure for immediate action that the city decided to install speed humps in five hundred locations all over the city before even beginning the study.

In the 1980's, Germany took a step beyond these schemes to control traffic on residential streets and began what is called "Area wide traffic restraint," slowing traffic on all the streets in an area-major streets and highways as well as local residential streets. The Federal government calmed traffic in six areas experimentally, ranging from an area in Berlin with 30,000 residents to a small town of 2,300 residents. They found that average speeds were cut almost in half but that the time for the average trip increased by just a bit over 10 percent: obviously, one major result of traffic calming was to shorten the length of the average trip. In addition, noise levels and injuries from automobile accidents dropped dramatically. The German automobile association, which was skeptical about the government's data, did interviews and found that, after speeds were lowered, 67 percent of motorists and even higher proportions of residents approved of the change. The German experiment in area-wide traffic calming was so successful that it has been imitated in cities in Denmark, Sweden, the Netherlands, Italy, Switzerland, Austria and Japan. Some experiments in area wide traffic calming have reduced traffic by 30 to 50 percent.

The First Steps

Limiting speeds would have to be a gradual process in the United States. Area-wide traffic calming is easy in Germany, which already has compact cities where it is easy for people to make shorter trips, but we would have to rebuild American cities as we lowered speeds. American metropolitan areas are so freeway dependent that they might begin with a speed limit of 45 miles per hour and gradually reduce it further, at the same time as they built better transit systems and more infill development.

It is usually easy to reduce speeds on local streets, since there is already neighborhood pressure to make streets safer. The time is also ripe to slow traffic on arterial streets, because transit providers are beginning to restore light rail lines on the major streets of many cities. Transit providers have begun to suggest that we can improve transit service on arterial streets by allowing transit drivers to preempt traffic lights with electronic devices that turn the light green as the bus approaches: lights on these streets are currently timed to speed automobile traffic, so that these devices would slow down automobile traffic as well as speeding up transit. Transit providers have also suggested several other methods of speeding buses that would also slow traffic, such as reserving some lanes exclusively for transit. It is much more difficult politically to slow traffic on freeways. Ideally, we would slow traffic on freeways gradually, perhaps by adding traffic lights to meter traffic on the freeways, which could be timed to keep traffic at the speed limit. By the time the speed is slowed to 30 miles per hour, traffic would be reduced enough that we could take the next step by replacing the freeway with an urban boulevard that enhances the neighborhoods around it.

In practice, it is more likely that we will reduce freeway capacity by fighting plans to rebuild freeways as they obsolesce. A waterfront freeway in San Francisco, for example, was demolished and replaced by a grand boulevard after it was damaged by an earthquake, largely because of environmentalist pressure.

This was a spur that did not carry much through traffic, but environmentalists have proposed more dramatic changes. When New York City announced that the Gowanus Expressway had to be built, local activists pointed out that this elevated freeway destroyed the shopping district on the street below it when it was built, and encouraged more people to move to the suburbs. Instead of rebuilding the freeway, they proposed removing it and restoring light rail to the street below, with connections to nearby bridges and tunnels. This would not only revive the shopping street: it would also be a step toward changing the city's entire transportation system.

Even more dramatically, Swiss voters passed initiatives in 1994, despite opposition from their own government and from European Community transportation experts, to ban all freeway expansion and to phase out all truck traffic through the Alps in ten years, in order to force all freight onto rail. This direct political action to limit freeway use is clearly better than the result the we would gotten if the Swiss had considered this issue a technical problem in transportation planning and placed in the hands of a regional planning authority.

Choice of Technology

Now that we have looked at three different limits on the automobile, and at the three different types of city that they would create, it should be clear that there are fundamental political questions underlying the technical questions that transportation planners deal with. A ban on automobiles would create pedestrian-scale neighborhoods; a 30 mile per hour speed limit would create suburbia. These different neighborhood designs involve different ways of life, and so this choice of technology is a political decision, rather than a technical decision that should be made by experts in urban planning.

It should also be clear that putting political limits on large-scale development and on speed would make it much easier for the planners to solve our cities' problems. Some planning would

still be needed, even with a total ban on automobiles: we would still need regional or sub-regional planning to lay out transit lines, control air and water pollution, run large park systems, reserve areas for nuisance industries and the like. With less stringent limits on automobiles, we would need even more planning. Yet even with a 30 mile per hour speed limit, it would be much less difficult than it is today to build an effective transit system, control pollution, and protect the region's open space. Technocratic planners have always called for comprehensive regional planning to solve our urban problems: a single regional planning authority should be responsible for land-use and transportation planning, so it could deal with all of the region's problems in a coordinated way. Regional government should replace the "irrational" patchwork of city, county and state governments, because political decisions should be subordinated to the technical tasks of planning.

In fact, to reclaim our cities, we need to do the opposite of what the technocrats say: we need to recover the political use of government and use the law to limit technology. We do need some special-purpose regional planning agencies that cut across local jurisdictions and are responsible for transportation, for air and water pollution control, and the like, but we do not need a comprehensive regional planning authority to manage all of the region's planning. Instead, we need to begin making responsible political decisions to limit technology, which would leave the planners with manageable problems, which they actually have some chance of solving. If any city makes the decision to lower speeds on its streets, it will help to reduce the entire region's transportation problems. And using the law to set lower speed limits has an important political advantage over technocratic planning: rather than making ordinary people more powerless and dependent on the experts, it gives them more power and more responsibility.

Logistics - A story from the decks of the *China*

Ben Worthen

ON FEB. 16, 2001, six days into its voyage from Taiwan to Seattle, the *China*, a 64,502-ton container ship longer than three football fields and too wide for the Panama Canal, encountered a force-nine storm near the Bering Strait: 40-foot waves and 50-knot winds. It was nothing like the typhoon that almost sank the ship three years before, but it forced *China*'s captain to chart a longer, safer course. A week later, at 10:30 a.m. on Feb. 23, the ship made port in Seattle.

By midafternoon, the four giant cranes that line the Global Gateway North (GGN) terminal where the *China* docked are still motionless and only the occasional semitrailer stirs in the terminal's 158-acre lot. The first load of 8-foot wide, 9-foot-6-inch high, 20-foot long containers should have been off the ship and piled two-high on stack trains bound for the New York area hours ago. But the ship reached port too late to hire a morning crew of longshoremen and so the *China*'s 2,038 containers and the cargo inside them will sit until the next shift comes on. The 1,435 containers to be offloaded in Seattle won't leave the yard until tomorrow at 4 a.m.

The storm that waylaid the *China* caused a ripple in the supply chain. Containers will miss trains. Wait-time snowballs with every delay. A container could arrive in Chicago an hour late but be forced to wait another 12 for the next train to Dallas. That means increased storage costs, increased overhead and decreased profits. Ripples like these are inevitable. Shipping will always be subject to the whims of the sea. But APL, which operates the *China*, has begun employing IT to prevent those ripples from growing into waves.

On the Waterfront

The waterfront has changed a lot since Terry Malloy, Marlon Brando's troubled ex-boxer in the 1954 film *On the Waterfront*, used hooks and muscle to unload ships. Back then, unloading took weeks, and by the time it was done, longshoremen often had looted a significant portion of the cargo. The industry considered the theft a standard cost of doing business. In the 1970s, containerization—the practice of loading freight into boxes that doubled as railcars and truck-trailers—significantly reduced the losses and revolutionized the way goods were shipped. Today, about 55 percent of all international freight is shipped in containers. Thanks in part to what until recently had been a booming U.S. economy and a revitalized Asian economy, container shipments—and profits for the shipping lines—have reached an all-time high. According to U.K.-based Drewry Shipping Consultants, a record 229.3 million TEUs (20-foot equivalency units, or one small container, shipping's standard unit of measure) passed through world ports in 2000, up 10.8 percent from 1999. And the forecast for 2001 is even better: Drewry predicts another record-breaking year with 244.5 million TEUs.

Shipping lines are reporting astounding earnings, including the three largest: the recently merged Maersk-Sealand based in Copenhagen, Denmark, the London-based P&O Nedlloyd and APL. APL's parent company, Singapore-based Neptune Orient Lines (NOL), reported earnings of $178 million in 2000, nearly double 1999's $94 million. (APL accounted for 81 percent of its parent's business.) Even more remarkable is that this quantum leap in earnings occurred with only a 9 percent increase in total revenues. The key to the rise in earnings, experts

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agree, is the efficiencies the industry has gained with IT. Until the 1990s, for example, containers were tracked and routed according to an invoice that was clothespinned to the box. Today, APL scanners automatically update an integrated container-tracking system, informing it when containers enter and leave the yard. APL also uses sophisticated planning software that helps devise strategies for loading and unloading ships most efficaciously. And by combining all that functionality into one terminal management application, the company now possesses supply chain visibility—the ability to see where every container or shipment is at all times.

"APL's investment in technology has worked in their favor from the standpoint that they are now perceived as an industry leader," says Doug Coates, a partner in the San Francisco-based transportation consultancy Manalytics. Indeed, when *The Journal of Commerce*, the global transportation trade magazine, named APL its container carrier of the year in 2000, it cited the increased efficiency the line has gained from IT. That greater efficiency is how APL hopes to differentiate itself in what is essentially a commodity business.

Off-Loading the *China*

At 6 in the evening, seven-and-a-half hours after docking, four crews totaling 88 longshoreman, six semis and one crane finally start unloading the *China.* Two hundred thirty-five New York-bound containers—Gap blouses and the like—have been identified as high-priority and come off the boat early in the operation. The goal is to have them across the terminal and loaded onto a train waiting on the other side of the yard by 1 a.m. Three Union Pacific engines will begin hauling the cargo east three hours later. Every piece of equipment a container touches—ships, cranes, trucks, trains—adds complexity. Before one container of Gap blouses, for example, leaves the yard, it will be touched four times: by the longshoremen on board, by the crane that takes it off the ship, by the truck that carries it across the yard and by the crane that lifts it off the truck and places it onto the train. In carefully controlled tests, APL can perform this sweaty ballet in 57 seconds. It doesn't go that fast in real life, but they get close—about five minutes barring complications.

"We're trying to create efficiencies where the downtime is," says NOL Group CIO Don Liedtke. "And that's logistics." And that's where APL's proprietary logistics system, Sparcs, comes in. Thanks to Sparcs, the Seattle terminal possesses a graphic display of the *China*'s load that was keyed in back in Taiwan. Each container on the *China* shows up onscreen, color-coded by its intended destination. All the blue-shaded containers are unloaded in Seattle. Dark blue is local cargo that will be transferred to trucks; light blue containers will be loaded onto eastbound trains. Green containers will stay on board. They're headed for Los Angeles. APL planners knew the *China* would be late ever since that storm blew up in the Bering Strait seven days ago, and they've used Sparcs to attempt to compensate. The ship will be unloaded in the most efficient manner they can devise. No Los Angeles-bound containers will be off-loaded only to be put back later. Those Gap blouses—a high-priority item for a high-profit customer—will receive special attention.

Sparcs, Liedtke explains, can track individual containers across the yard once they are placed on chassis-wheeled platforms that allow trucks to haul containers. Each chassis has an electronic identity tag so that a mobile inventory vehicle (MIV)—a Ford Explorer with two ultrasonic sensors and a radio frequency tag reader mounted on the back—can drive through the terminal and pick up signals from each of Seattle's 3,000-plus chassis in the terminal. The MIVs transmit the chassis' location through a wireless LAN to a server, which in turn updates the Sparcs system. Sparcs then updates its graphic map of the yard in real-time. When a trucker comes for a container or returns an empty one, automated readers installed in cameras at the terminal gatehouse scan the chassis, and Sparcs tells the driver where to go to pick up his next load.

With GPS, the working map of the yard can be updated. Without GPS, a mistake might not be noticed, and a trucker might not find his appointed chassis until an MIV drives by. It might seem like a small matter, says Liedtke, but "two minutes makes a difference over a million moves." With crews working around the clock, the 1,120 Seattle-bound containers (60 percent of the *China*'s 2,800 containers are destined for Los Angeles) are fully unloaded by 3 a.m., Sunday, Feb. 25, and placed on trains or parked in the yard awaiting truck pickup.

The *China* leaves port for Los Angeles that day. Two days later, on Tuesday, Feb. 27, the *China* arrives at Global Gateway South (GGS), APL's operation in Los Angeles—the largest terminal in the United States. Opened in May 1997, it covers 275 acres and has most of the same technology as its Seattle counterpart minus the experimental GPS tracking and fully automated gate system. The terminal moved 960,000 individual containers in 2000, nearly one-fifth of the port of Los Angeles's record-setting 4.9 million, which was up from 3.8 million in 1999 and almost double 1995's 2.5 million. Those 969,000 TEUs, says Director of Terminal Process Nathaniel Seeds, is more than the entire port of Seattle, the nation's sixth-largest port, handles in a year and is four times the volume of APL's GGN terminal. (See "How Your Home Port Stacks Up".) The sheer volume at GGS makes it a significantly tougher operation to run.

"If you do a million of anything in a year, you need to have a fairly reliable script," says Seeds. Over 3,000 trucks pass through the GGS gates every day—95 percent between 7 a.m. and 5 p.m. The late arrival of a ship like the *China*, Seeds says, creates yard congestion and in a worst-case scenario forces another vessel to ride the tides until a berth opens, resulting in more missed trains and fleets of waiting trucks with frustrated drivers twiddling their thumbs behind the wheels.

That, explains Liedtke, is bad for APL's reputation. "Truckers make their money by the number of loads they can carry," he says. "If they can get in and out, maybe they can carry three or four loads a day. But if they get one where they're sitting in a yard for two hours, they may not want to come over and take a load."

That's the problem confronting the manager of global logistics for a major importer, who asked not to be identified. APL, he charges, has "had growth it can't deal with." His company's truckers, the source continues, aren't eager to pick up APL containers because they say they can get only two in a day versus six from another carrier. "They know they'll be late for dinner," he says.

During the previous peak season, spring through fall, the complaints against APL included long lines at the gates and congestion in the yard itself. The source charges that up to 10 percent of APL containers shipped through GGS arrived at his company's warehouses late. The problem, he says, could be solved by simply expanding the terminal. APL's vice president of operations for the Americas, William A. Hamlin, acknowledges the congestion problem and says that APL has spent millions of dollars to open additional gates, expand operational hours and hire more experienced longshoremen. There are also plans to expand the terminal; another 25 acres opened in April and an additional 75 acres of landfill are planned. However, Jeff Leong, a former spokesman for the port of Los Angeles, explains that it could be anywhere from two to five years before those 75 acres are usable. In the meantime, APL will continue trying to improve its in-terminal efficiency. But even that strategy is fraught with problems.

According to Neil Davidson, a director for Drewry Shipping Consultants, the labor situation in the United States makes it hard for new technologies to get adopted without protracted negotiations with Terry Malloy's old pals, the International Longshoreman and Warehouse Union (ILWU), whose members work every port in the country. Indeed, APL officials are hesitant

even to mention innovations such as the automated gate readers, which could someday replace union gatehouse workers.

Looking Inside the Container

While the new technologies APL is testing await full implementation, the company hopes it can count on customer service to set it apart from its competitors. The key to this effort is Homeport (www.apl.com), APL's online container management system. Launched in April 1999, Homeport taps the same database as Sparcs and allows customers to check the status of in-transit blouses, bananas and Barbie dolls. The site averages 1.2 million hits and 200,000 transactions a month. The location information available online is updated approximately every 12 hours. Rod Pyle, APL's e-commerce manager for the Americas, says that the company has the capability to make container information available in real-time but customers don't need that level of detail.

Yossi Sheffi, head of the center for transportation studies and professor at MIT, thinks there's another reason APL does not update its information more frequently. According to Sheffi, too much transparency can be a bad thing. "If you peek into the system, you will see that there are 1,000 loads and that maybe 300 are late," Sheffi says. "Of course, they will take corrective efforts and get them to you on time. But if you think 300 are late, you would panic." The *China* provides a perfect example of what Sheffi means. With real-time updating, customers who logged in to Homeport on, say, Saturday morning, Feb. 17, would have learned that the ship was not where it was supposed to be and was behind schedule. But by Sunday, when the information was actually updated, the gap had been closed and curious Web users would see on-time cargo.

What Lies Ahead

Logistical efficiency, says Liedtke, is the shipping industry's Holy Grail. APL is currently looking into optical character recognition technology, in addition to more GPS technologies, to speed up the loading and unloading process. Sparcs still requires human intervention to plan a ship's load. One day, that may also be automated.

Finally, ships are getting bigger. The largest vessels plying the sea lanes are now 6,600 TEUs; there's no reason why they couldn't grow to 8,000 or even 10,000 TEUs. Of course, larger ships carrying more cargo demand more cranes, trucks, trains and longshoremen, each adding layer upon layer of logistical complexity for IT to tackle.

In the meantime, ships like the *China* crisscross the ocean, traveling between Hong Kong, Singapore and other Asian ports before returning, fully loaded, to the United States.

Right on schedule. Barring, of course, bad weather.

What is the true cost of transport?

European Commission launches debate on fair transport pricing

*The Commission today (*20th December, 1995) *published a Green Paper discussion document (COM(95)691) designed to launch a public debate about how to make transport pricing fair and more efficient. This should ensure that the true costs of transport are borne more fairly by those who generate them. The Commission believes that such a policy could constitute an important building block in developing policies to reduce congestion, accidents and pollution which all represent a significant cost to society*.

"The Green Paper is not anti-car, nor does it bluntly recommend higher road taxes. At the moment, some transport users pay too much, others too little. this system is both unfair and inefficient. Meanwhile, congestion is estimated to cost the Union some 2 per cent of GDP every year; accident costs borne by other people as society as a whole another 1.5 per cent and air pollution and noise at least 0.6 per cent. All in all this amounts to some 250 Becu per year throughout the Union: more than 90 per cent of these costs are related to road transport. The available evidence suggests that road taxation falls far short of covering these costs", said Neil Kinnock.

Europe's traffic system is close to gridlock as the volume of traffic on the roads of the European Union increases daily. Congestion in major cities is so heavy in rush hour that it often takes longer to travel across town now than it took to make the equivalent journey by horse-drawn carriage at the turn of the century.

Against this background, Member States and transport specialists are together engaged in a debate as to how best to get things moving again. Calls for debate at the European level are intensifying and the Cannes Summit in June heads of state and government asked the Commission to review policies to establish fairer competition between modes of transport. There is a growing realisation that, on current policies alone, transport trends are unsustainable. Without substantial change in investments and transport patterns, increasing delays and costs are guaranteed.

This is the re-print of the key issues addressed by a “Green Paper” which was issued by the European Commisssion seven years ago. In principle, the issues remain equally valid today.

Today, the Commission published a Green Paper discussion document designed to focus public debate on the issue of road pricing, to encourage a better understanding of the traffic problems confronting the travelling public and stimulate discussion as to possible solutions.
"Breathing and sleeping are the activities to which human beings devote most time,-the next category is surely travelling. Most of us travel by car but, once we have discounted the cost of the vehicle, we rarely stop to think how much driving *really* costs in terms of treating children with respiratory problems, cleaning up a polluted environment, mending pot-holed roads, work-hours wasted in traffic jams etcetc," said Neil Kinnock, EU Commissioner responsible for Transport Policy.

This Green Paper looks at pricing. This approach marks a change in focus because transport policy has hitherto concentrated largely on direct regulation. The Commission is pledged to develop a transport policy that is competitive, responsible safe and efficient. For the transport system to be sustainable it is important that the those using it may choose the transport mode best suited to their needs; transparent pricing is one way of encouraging that choice.

Efficient, fair pricing is the key

The key to solving these problems, the Commission believes, is to introduce an efficient and fair pricing system, differentiated to reflect the fact that costs differ across time, space and the form of transport used. The aim is not to raise taxes but to use charges to curb congestion, accidents and pollution.

The advances in telematics, and many new developments are the direct result of Commission R&D funding, will now make electronic road pricing a real possibility in the near future. The Commission is anxious to ensure that systems are compatible with each other but the full introduction of Europe-wide systems will probably take a decade and possibly longer.

But the problems are building up now and the Commission discussion paper makes a series of suggestions that could be introduced at short notice:

1. adjusting existing Community legislation on road charges of Heavy Goods Vehicles in order to make progress towards fair and efficient pricing.
2. electronic kilometre charges based on infrastructure damage and possibly other parameters (HGV)
3. road tolls in urban areas
4. differentiated fuel taxes reflecting differences in fuel quality
5. differentiated vehicle taxes linked to a vehicle's environmental/noise characteristics (noisy, polluting vehicle pay more - the consumer can choose to drive a cleaner, quieter vehicle)
6. insurance systems that cover all accident costs and link risk and mileage to premiums paid by individual users,
7. the provision of information on the safety performance of vehicles.

Success depends on getting the structure of tax and charging systems right.

Obviously, much of the data relating to the "hidden" costs of transport is for the moment sketchy but this cannot be an excuse for inaction. The Commission advocate the flexible approach of gradually phasing in new policy and pricing instruments, adjusting the levels over time.

Local circumstances must be factored in to take account of the particular problems of transport in rural or peripheral areas. Clearly those people who have no collective transport systems and are obliged to use a car should be charged differently to those living in urban areas with little parking but excellent public transport links.

What is the appropriate role for the Commission?

Traditionally some transport policy (vehicle standards, minimum duty on fuel) are formulated at Union level while many other actions, (road building, the provision of toll systems) are quite properly the responsibility of the Member States. Therefore there is need for broad agreement on the policy approach to ensure not only the efficient functioning of the single market but the protection of the quality of life of the Union's 340 million citizens. The effects of ozone depletion or acid rain are not confined within national borders.

The Commission hopes to engender a free, frank and creative debate in the interests of reducing congestion, air pollution and accidents. Less congestion equals fewer work-hours lost, fewer accidents equals lower health care costs and lower social charges, cleaner air cuts health bills and increases agricultural productivity (thorough reduced ozone concentration).
Whatever the eventual conclusions of the debate begun today, transport systems will need time to adjust. Location decisions have long lasting implications, technologies to meet customer requirements take time to develop, vehicle stocks can only realistically be replaced over a decade or so.

It is because businesses, people and governments are beginning to plan for the next century that a clear and urgent signal must be given. The Commission Green Paper makes the case that, in the interests of easing European gridlock, improving our quality of life and protecting the environment, we need to introduce pricing systems now that reflect better the true cost of transport and the many different patterns of transport use.