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Turning cities inside out: transportation and the resurgence of downtowns in North America

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Abstract North American urban areas have changed dramatically over the last four decades. While downtowns were thought to be in long-term decline 40 years ago, central business districts are today the most vibrant residential and commercial centers throughout a largely suburban continent. This paper examines the role of transportation technology and policy in the earlier decline and recent revival of American downtowns and examines challenges to the continuation of urban regeneration. Major recent investments in physical improvements in central cities have been complemented by a dramatic shift in the locus of logistical and goods processing activities from city centers to outlying areas. While many tout the energy efficiency and environmental benefits of walkable and denser inner cities, a more complete accounting of their impacts also requires analysis of increasing urban congestion and the steady rise in urban goods movement in support of the new development patterns.

Keywords Land use · Urban form · Policy · North America · Freight

Prelude

It has been a pleasure and privilege to be associated with *Transportation* throughout the tenure of Martin Richards, who has led its growth and development since its fledgling days. I have enjoyed watching this journal grow steadily to prominence among academic transportation journals as Martin deftly guided numerous authors, editorial board members, and publishers' representatives. He was the gatekeeper both assuring the highest standards and sometimes taking risks as appropriate, for example, when young scholars submitted

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unconventional manuscripts that could be path breaking but just as well could be flops. Martin always sought advice from those of us who cared about the Journal, yet he accepted responsibility for decisions with respect to editorial policy and manuscript selection. There is no question that the rising importance of this Journal is the most fitting tribute to his judgment and commitment to his task. We wish him good health and happiness as he retires from this work.

Four decades of change in North American cities and transport

The North American transportation system has changed dramatically during Martin's four decades as editor. This is partly the result of dramatic changes in transportation technology which have had substantial impacts upon the economy. In many cases policymakers have been slow to recognize the social value of emergent technologies, but over time the influences of technological innovations have motivated increasingly influential policy shifts that have accelerated the speed of urban restructuring.

Since the beginning of time, transport technology has shaped economic and social life by providing ever increasing access. Its continuing central role in society is readily taken for granted by most citizens, including elected officials responsible for the development of transport policy. Changes in the transport sector, alongside other technologies and policy responses inspired by them, have been turning North American society inside out. Most functions related to passenger movement, logistics, and goods movement were once at the center of the city but in response to technological innovations are steadily moving to the edges. Four decades ago the residential and commercial functions of the city were sub-urbanizing, the inner city was in decline, and there was great pessimism about the future of cities. As Martin Richards completes his service to this journal, the present and future of North American cities seem far brighter than anyone expected when he began them. Today the dynamic of change is bringing population and commerce back downtown. Changes in transportation technology are among the major causes of this great urban inversion, and gradually public policy has explicitly made the reversal of central city decline an explicit goal. At the same time the greatest policy challenges to transportation in urban areas are the result of the ongoing transformation of the city that have been encouraged by transportation programs but poorly articulated by policymakers.

Transportation and the decline of the inner city

Forty years ago, there was no doubt that North America's central cities were in a spiral of decline. Newspaper headlines and scholarly works described accelerating suburbanization as leaving the continent with dozens of "dough nut" cities. Downtowns seemed to be in economic, social and cultural death throes. Population and economic activity were increasingly relocating to the outlying surroundings of what had been historic urban centers, leaving the downtowns in various states of physical and financial decline leading toward emptiness. While the specialized financial districts at the very heart of New York and San Francisco continued to thrive, a flood of families moved outward in search of space, greenery, and better schools. Commerce followed in search of a growing labor pool, cheaper land, and lower taxes. The media reported that inner cities were increasingly being abandoned to the homeless, criminals, and drug dealers. Broken windows of empty and rusting factories were often photographed as viewed from passing highways and railways

carrying suburbanites to and from the remaining financial centers downtown (Jacobs 1961, 1969). A police captain's memoir made into a motion picture portrayed the once dense and lively residential south Bronx as "Fort Apache," an allusion to the wild west (Walker 2011), and as sequel an urban commentator descried the once teeming streets where abandoned buildings had burned to the ground as the "Little House on the Prairie" (McDonald 1997). There simply was nothing was left but rubble in many old urban neighborhoods.

While there were many causes of North American urban decline, at least one important target of blame on the part of the intellectual community was the federal Interstate Highway program that started in the 50s and peaked in the 70s (Caro 1971; Foster 1981; McShane 1994). Coupled with tax deductions for home mortgage interest, and racism that led to "white flight," transportation policy delivered the six-, eight-, and ten-lane freeways that then were being built through urban cores. These simultaneously made suburbs more accessible to automobile commuters and cut up stable urban neighborhoods that stood in the path of construction, while aging public transport networks were barely being maintained and almost never modernized or expanded (Swift 2011). The media sensationalized these trends, and intellectuals were uniformly pessimistic. What could the future hold but more of the same? American cities would soon be dead, victims of the automobile and the interstate highway, racism, and the flight of capital. Urban critics renewed and intensified predictions of central city decline when growing use of computers and the internet promised the "death of distance." If people could communicate with one another instantaneously from any location, there was no need for them to physically concentrate downtown to live or work, where living and office space was expensive and crowded, streets congested, and the air polluted (Cairncross 1997).

The reversal of central city decline

North America is today a metropolitan continent. In the US the 356 designated metropolitan areas in 2010 contained 84 % of the nation's population (Wilson et al. 2012). As anticipated, a substantial majority of Americans both reside and work in the suburbs of these metropolitan areas (Hobbs and Stoops 2000), central city schools struggle to improve, and Detroit and Cleveland certainly continue to languish. The census reported that during the last decade of recession, while metropolitan areas of over a million grew in population by 10 %, the proportion of their population in poverty in the core cities grew by 25 %. Still, contrary to past predictions, there is a pervasive sense that downtowns—the central business districts in the core cities—are springing back to life. Of the 27.3 million population increase during the first decade of the new century, 92.4 % was in the "cores" of the metropolitan areas, mostly in the principal cities of those metro areas (Wilson et al. 2012). Census definitions of "core," and of principal city usually includes entire cities as defined by their political boundaries, while understandings of "downtown" or "central business districts" are more subjective and certainly refer to areas much smaller than the official "cores." Most urbanists have observed a resurgence particularly of the central business districts of North American cities, especially the largest ones as part of this growth in the cores that includes them.

Without denying the broad array of urban economic and social problems, New York, Chicago, and Baltimore boast downtown areas that are flourishing, and Toronto and Vancouver are held up as models of the modern urbanity. Once unexpected commercial ventures, culture, and entertainment now dominate downtown Atlanta, Charlotte, Los

Angeles, and Houston, cities formerly mentioned as the "poster children of sprawl." Dense apartment developments are springing up alongside new urban rail stations. Walkable downtowns from Boston to San Diego feature a wide range of exotic cuisines, art galleries, and too many offices of small telecommunications and media "startups" to count. Young, highly educated professionals move downtown and consciously reject the suburban cul de sacs where they grew up. Millions of senior citizens of means are choosing to retire in central city locations increasingly served by Starbucks, Whole Foods, and Trader Joe's markets. They live around the corner from former warehouses and office towers that have been converted into expensive luxury apartments in cities like San Francisco where monthly rents soar higher than the new residential and office towers (Leinberger 2011). Today a lively and growing literature describes the resurgence of urban centers. The story that is being told, however, rarely analyzes in depth the central role that changes in transport technology and responsive policy have played in the rebirth of North American downtowns. Nor are the implications of these changes for the future of the transportation system fully analyzed.

The brilliant and readable best-seller by Harvard's Edward Glaeser, *The Triumph of the City* (2011) describes how cities, our "greatest invention, make us richer, smarter, greener, healthier and happier." Acknowledging that cities—and especially their centers—are all about accessibility among people and businesses and that they give rise to endless opportunities for agglomeration economies of many types—from economic to cultural—he elaborates about the role of transport policy almost exclusively when advocating congestion pricing at the centers of many cities in emulation of Singapore and London.

Similarly, in a recent work entitled *The Great Inversion and the Future of the American City* (2012), journalist and author Alan Ehrenhalt describes the surprising attractiveness to residential redevelopment of the Wall Street Financial district in New York, and notices that even car-oriented Phoenix and Charlotte are turning over time into "real cities" with genuine downtowns while suburbs attempt to achieve urbanity through increases in density, mixed land uses, and transit oriented development.

In perhaps most widely cited work of this genre, Richard Florida sees *The Rise of the Creative Class* (2012) as the principal explanation for the rebirth of city centers. He describes the present—a time in which consumption is emphasized in the city more than production—as a period of transition from the older economic order, dominated by industry and manufacturing, to a new economic and social order dominated by intellectual, artistic and institutional creativity, which is most intense in central city locations.

According to these authors, the connectivity provided in city centers—their uniquely valuable locus of interpersonal exchange and interaction that has characterized downtowns since antiquity—is being reborn all over the world. But this change is perhaps most surprising in North America, where transportation policies, land use regulation, and highway system investments appeared to many critics to have made universal automobile dependency inevitable and suburban living preferred. To intellectuals almost everywhere, transportation investments and, most especially, the automobile and urban highway policies, have been the culprits. While quick to see transportation policy as a central cause of prolonged urban decline, few mention its role in what appears to be its resurgence. It is important not to overemphasize one factor of many that in combination are contributing to a complex of change, but it is also important to bring transportation systems more clearly into focus as part of the picture of what is happening in North American cities.

The role of transport in the reversal of urban decline

Most North American cities owe their existence to the transportation patterns of past centuries. New York is located where a fine harbor, coupled with river access to the north, created a natural advantage for trade that determined the economic role of the city and its surrounding region for centuries. Boston, Philadelphia, Charleston, Savannah, New Orleans, and Vancouver all grew as a result of waterborne transportation and connections to both oceans and inland locations. Chicago was located at the meeting point of a river and Lake Michigan, and grew to prominence as a railroad interchange, which led to the location at that site of many industries, such as meatpacking. Many other cities grew as a result of the construction of cross-country rail lines and the movement of agricultural products to markets. San Diego had the better natural harbor, but Los Angeles grew more prominent because it was home to the largest coastal plain on the Pacific Rim and benefitted from much lower mountain passes to the interior of the continent.

By the second half of the twentieth century, transport functions that had much earlier determined the location and nature of many of the continent's metropolitan areas were already being transformed by the evolution of technology. The Chicago stockyards had closed and east coast waterfronts had declined in importance because of several simultaneous transportation changes. Refrigeration of rail cars meant that meatpackers could locate farther from consumers. Containerization of freight quickly took hold after being introduced by Malcom McLane in the mid-50s, lowering shipping costs dramatically and reducing port employment opportunities. It was cheaper to build container ports on available land away from the older waterfronts, and these were often farther away from the center. So, for example, the New York port shifted to Newark and San Francisco's moved to Oakland as containers came to dominate ocean shipping.

At exactly the same time, transatlantic jet passenger aircraft curtailed the demand for international passenger ship traffic and reduced the need for marine passenger terminals located near the cores of port cities including New York, Philadelphia, Boston, and Toronto. Shipyards in these cities closed as far higher productivity was achieved by their competitors in Asia. The plummeting cost of jet air travel also reduced the volume of cross country passenger rail travel and complemented massive suburbanization of the population by reducing the role of downtown passenger rail terminals, like Washington's Union Station, in the life of the center city. The large railroad companies made business decisions to discontinue passenger service and concentrate on the far more lucrative freight market whenever federal regulators allowed them to do so. When this Journal began publication, rotting wharves, rat infested warehouses and idle drydocks were common sites at North American waterfronts and cavernous urban rail terminals were increasingly empty of passengers. In Pittsburgh, steel mills, located where ore and coal could reach them by water and rail, were closing and the city was perceived to be in hopeless decline. Transportation technology was playing central roles in the transformation and urban policy innovation was lagging.

Over half a century, however, the enormously important economic functions that had been the dominating urban land uses and the biggest employers in large cities gradually were replaced thanks to more cost-efficient transportation innovations and policies that increasingly encouraged more logical policy interventions. Containers made ocean shipping far less costly, while jet aircraft and deregulation of the industry made passenger travel more economical and extended flying to the masses. Complementing improvements in transportation, modern telecommunications made it possible to replace warehouses with "just in time" delivery of raw materials and parts for assembly. Freight rail operations, for

example, could manage the rapidly growing flow of goods using far less trackage, and dramatically less space was needed for warehouse storage of components for manufacturing and finished goods ready for market. While at first the abandoned rail yards and empty warehouses seemed to be signs of failure, over time they have emerged as important land resources from which the new city is drawing some of its strength.

In combination with investments in manufacturing technology and low wages outside North America, revolutionary changes in trans-oceanic transport technology and policies that relaxed trade barriers gradually translated into economic growth in Asia coupled with massive but for the most part temporary urban decline in North America. What appeared to be an unmitigated disaster in American cities became a prelude to the restructuring to the consumer society and information economy so familiar to us today. International trade increased and air travel grew at new locations that were mostly on the outskirts of large cities. Dulles International Airport outside Washington, Atlanta's Hartsfield, and the Denver International Airport are but a few well-known examples of these facilities. The Denver Airport, for example, covers 140 km^2 and is located some 40 km from the center of the city on formerly military land and away from residential communities that would object to the aircraft noise. Successful North American downtowns need to be connected to their counterparts around the globe since their economic, cultural, and social functions are now thoroughly embedded in worldwide exchange networks. Because of the lack of space downtown and the environmental impacts of flight patterns, these critical urban functions lie away from urban centers but are critical to their success.

The importance to the health of the central cities of these global connections is symbolized by the many transit connectors between outlying airports and city centers being provided at substantial cost to the metropolitan transit authorities that build them and the federal government that subsidizes them. Within the past few decades, urban rail transit connectors have been built or are under construction to airports in San Francisco, Newark, Chicago, Philadelphia, Seattle, Cleveland, Portland, and Washington, D.C. A complex and expensive people mover at New York's Kennedy Airport connects it to two different city subway lines and the suburban Long Island Railroad. Cities have other pressing transit and highway needs, but the significance of global connectedness to their success becomes obvious when we note the high a priority given by policymakers to airport connectivity to the city center even though these facilities carry a tiny fraction of urban trips and only a small proportion of airport travelers as well.

In urban areas the land at the center previously was occupied by transportation-related activities needed to provide the city's accessibility a century earlier had become dysfunctional, ugly and dangerous. But, over time, those wastelands proved to be the land resources that were gradually transformed into the new and today vibrant central city. The investment needed to accomplish this change has been enormous, especially given that often toxic remnants of the past had to be removed before new uses could be developed. The economic potential of the new downtowns has been so attractive to investors and public policy makers that despite the cost changes these transformations are monumental and ongoing.

South and west of Chicago's Loop, a massive former railroad yard has become the location of new central city housing and commercial activities and farther south the former stockyards are the site of a burgeoning mixed use community. In Los Angeles, just north of downtown, the Cornfield Railroad Yard—named for cornstalks that sprouted between the tracks after overflowing grain cars from the Midwest arrived in the city—has become the largest new urban park in a recreation-starved area of the central city. In Boston, dockside warehouses have been converted to luxury condominiums, and in New York City along the

west side of Manhattan the Highline—a former railway berm on which slow freight trains brought animal carcasses from former docks and rail yards to a meatpacking district—has become an elevated promenade and landscaped linear park, integrating into its flower beds some of the old tracks and ties. This has contributed to the ongoing transformation of the meatpacking district into a resurgent and highly desirable residential neighborhood. Washington's Union Station, located a short walk from the national capitol, reflecting its earlier role bringing members of Congress from their home districts, is now a hub for regional trains rather than cross county travel. This stately building has creatively been transformed into a retailing and dining—as well as transportation—center.

Making the new urbanity accessible: freight and the urban edge

While obsolete and decaying transportation-oriented land uses in the city centers—former ports, shipyards, rail marshaling yards and rights-of-way, and small old-fashioned urban air fields—have become land resources on which the shopping centers, office towers, and condominiums of the information and knowledge-based city center have flourished, the functions once carried out on those lands also have been transformed. Massive quantities of food, consumer products and fuels are still necessary for the sustenance of the city—to be consumed by the consumer society. The growth of megacities depends upon reliable delivery of greater quantities of freight to consumers than ever before just as it does also upon personal mobility within metropolitan centers. Transportation-related land uses—railroad yards and logistics hubs—while increasingly efficient thanks to advances in transport and telecommunications technology, are still increasing in scale and today are more likely to be located in the suburbs or the "exurbs" far from the city centers. While this transformation began in response to technology and opportunity, it has been increasingly accelerated by public policy interventions.

In the past the term "inland port" was used to describe maritime facilities located on rivers or the Great Lakes, but today there are increasingly enormous logistics centers called inland ports that are not located anywhere near bodies of water. Often these facilities are "break of bulk" centers on huge tracts of corporate-owned land far from the downtowns of the largest cities and are dependent on outstanding rail and highway connectivity. Containers arrive on trains, filled with goods for distribution to those cities, and the contents are processed in huge buildings in which the emptying and refilling of container contents is highly automated and computer controlled. The goods that have been received and sorted are shipped into the city in trailers, trucks and vans, or reloaded onto trains for delivery elsewhere. Increasingly, in addition to logistics facilities, inland ports include assembly plants at which components of consumer goods received by train are joined together to create the final products. These outlying inland ports are similar in function to the waterfront wharves and railroad yards that played central supporting roles in the creation of the central cities in past centuries. But, they are much more productive. Handling and information technology results in the productivity of these facilities in terms of dollar value of cargo handled per unit of time per unit of area being many times what could be achieved by the ports and rail yards a century ago, and this productivity growth allows cities to grow physically, economically, socially, and culturally. These facilities are on the outskirts of the city rather than at its core, because they require large expanses of land. Because they are remote, many new urbanites know nothing of their existence.

The development of some inland ports is of surprisingly large scale, in some cases completely occupying former farms or major military facilities that have been made

redundant and available for reuse by the evolution of the military. Strategically located south of O'Hare International Airport, and immediately accessible to the national rail network and Interstate Highway system, for example, two such centers were developed in proximity to one another by a single private company named "CenterPoint." Developed in collaboration with the Will County Center for Economic Development, the larger of the two is on the site of the former Joliet Arsenal. It was developed at a private cost of over $2 billion and includes a 3,600-acre (1,500 hectare) integrated logistics center, 18 million square feet (1.7 million m^2) of industrial space, a 2,200-acre (900 hectare) industrial park, a 950-acre (380 hectare) intermodal facility and a 450-acre (180 hectare) equipment management area (CenterPoint Intermodal Center—Joliet Illinois 2013b).

Just down the road is the "Elwood, Illinois Intermodal Center," the result of another private investment of over $1 billion managed by the same firm. It includes a 2,500-acre (1,000 hectare) integrated logistics center, a 1,400-acre (570 hectare) industrial park, a 1,000-acre (400 hectare) intermodal facility operated by the Burlington Northern Santa Fe Railroad, some 12 million square feet of industrial facilities, and a 100-acre (40 hectare) equipment management area. Each of these two enormous facilities contains an expanse of land kept as a wildlife habitat conservation area. These facilities were encouraged by and benefitted from tax forgiveness incentives but they provide thousands of employment opportunities in the outlying suburbs of Chicago. Their productivity measured as the ratio of economic turnover to employees is very high. The presence of these enormous complexes is quite miraculously almost invisible to most Chicago residents and businesses, but they play crucial supporting roles in the growth and prosperity of the central city (CenterPoint Intermodal Center, Elwood, Illinois 2013a).

Outside Los Angeles, in the "Inland Empire" that includes western Riverside and San Bernardino counties, two of the most expansive counties in the United States, a logistics hub of similar size and complexity comprised of logistics and intermodal centers supports to the Ports of Los Angeles and Long Beach from which goods are shipped to destinations throughout North America. While similar centers can be found near Houston and other large North American cities. The steady relocation of such logistics support centers to the periphery means that as downtowns become denser and land uses at the core are more concentrated, the critical support functions at the urban edges are becoming more dispersed. The average distance of freight terminals from their geographic center of gravity has increased from 17 to 20 miles (27 to 32 km) in Atlanta and from 26 to 32 miles (42–51 km) in Los Angeles over the past 20 years, while the same "sprawl indicator" for all business establishments, representing economic activities in general, has increased at a lower rate over the same time period—by 1.3 miles (2.1 km) in Atlanta and 0.1 mile (0.16 km) in Los Angeles. This means that more miles are driven by trucks connecting their increasingly urban destinations with freight terminals (DaBlanc 2012) and results in the consumption of more energy and the production of increased emissions and greenhouse gases to support the supposedly more energy efficient smart growth at the center. Little note has been taken of this by most urbanist writers and critics who prefer to focus on the benefits of the dense, mixed use, central city residential and commercial neighborhoods in which most of them live.

The focus of most intellectual inquiry about North American cities has been on the central city and writings about transportation have mostly been about the movement of people and the congestion of automobile traffic in the centers of these productive and ascendant metropolises. Yet, the modern economy depends equally upon goods movement and the functions that make cities productive and that were once at the urban core are now to be found in these outlying areas. The centers are being repopulated by the creative class

including artists, boutique owners, hedge-fund gurus, who are increasingly supported by unique retailing and upscale residential functions. Transport engineers and logisticians are building a rapidly growing literature about goods movement and logistics, but it is not yet included in the popular press or in planning scholarship about "the new urbanism."

Making the new urbanity accessible: the new urban core

Forty years ago, the era of freeway building and suburbanization was in full swing in North America. Critics from Jane Jacobs (1961, 1969) to Lewis Mumford (1963) blamed the automobile and freeway for urban problems ranging from pervasive air pollution to homelessness and social disintegration, but professional engineers and planners motivated by the availability of substantial national highway funding were proceeding with commitment and vigor. Today, air pollution has been reduced (though certainly not eliminated) as a key concern primarily because of legislation that produced dramatic technical improvements to fuels and engines. Nevertheless, a new generation of urban critics continues to focus attention on automobility in North American cities, arguing that automobile induced sprawl is unsustainable when we consider the long-term energy consumption and greenhouse gas implications of the last four decades (Neuman and Kenworthy 1999; Benfield et al. 1999).

There are today many suspicions, hopes and deep emotional commitments connecting perceptions of urban form with the health of individual citizens and ultimately the health and safety of the entire planet. Yet there is often more ideology than evidence behind the debates over urban transportation. The physical changes that are sweeping North American urban areas are largely attributable to changes in demographics, tastes and markets but there is also no doubt that transportation investments, systems, and new options linking transportation and information systems are contributing to the ongoing change. The popular intellectual community has turned the connection between urban land use and quality of life on its head. Forty years ago real estate developers and land speculators promoted suburban development and profited from the new automobile accessibility of their large suburban tracts. Without terribly much in the way of convincing evidence, they touted the health and family values that were promoted by low density living and the physical separation of commercial, industrial and residential areas. Today, real estate developers in North America are increasingly likely to be promoting the benefits of inner-city revitalization at much higher residential densities, touting the health and culture of high density urbanity, different land uses in close proximity to one another, linked by walking and transit accessibility.

The Congress for the New Urbanism, for example, continues to seek convincing evidence that health and happiness are related to urban land use or density, but treats the interests of its constituency of developers, planners, and architects as a *cause celeb*. Greener, cooler development of mixed land uses in the centers of urban areas, many assert, will bring health and happiness, and these principles are extended to suburban communities as well. It's "Project for Transportation Reform" promises "Sustainable streets, highways [transformed] to boulevards, walkable thoroughfares, and more!" (Congress for the New Urbanism 2013). These claims are not supported by empirical research that shows at best modest and at worst insignificant associations between urban form, traffic volumes, and concentrations of greenhouse gases (Cambridge Systematics 2009; Ewing and Cervero 2010; Echenique et al. 2012; Transportation Research Board 2009). It is rarely acknowledged that the intended transformation of the urban core is functionally dependent upon the

continued development of land-consuming logistics centers and airports at the urban edge and increasing volumes of goods movement from the edge to the center. The area at the edge devoted to transportation and logistics continues to grow and the movement of goods continues to expand throughout metropolitan America even as data usually limited to consideration of the residential population show gradual reconcentration of population and commerce in the centers of urban areas and modest reductions in household personal travel at those locations.

Many urbanists have been amazed, and critics of auto-oriented sprawl appalled, to see from several authoritative sources data that show the Los Angeles urbanized area now has a population density that exceeds that of the New York urbanized area. If density is calculated by dividing official census residential population by the formal designated urbanized areas of the two cities, this startling fact has been true for more than two decades. In addition to establishing that Los Angeles and other cities like it have indeed been "densifying" dramatically, this finding is an artifact of statistical methods of data collection and the geography of political boundaries. Manhattan is surrounded by areas of much lower population density while Los Angeles is developing more uniformly at more modest population densities over a more expansive area. The Los Angeles urbanized area is smaller than New York's and is spreading more slowly. The centrality of New York is as critical to its urbanity as its density, but analysts have better data to measure density than they do to measure centrality. If we measured density as developed floor area per square mile the result might be quite different. In fact, both of these cities are experiencing rapid growth of commercial, logistics, and transportation land uses in outlying areas, which support and enable their more commonly measured central area population densities (Eidlin 2010; Sorensen et al. 2008; Bosselman 2008). Accounting for the complexity of these relationships is challenging but I am reasonably certain that what is widely reported by organizations promoting smart growth is only a small part of the picture.

The demand for smaller housing units at higher densities in urban cores is likely more strongly related to smaller household sizes and the prevalence of highly educated childless households—both young and old—and to their tastes than it is to a commitment to address global warming. Similarly, changes underway in North American urban form are far more likely to be a response to "the rise of the creative class" than a cause of its rise. The apparent "commitment" of real estate developers and politicians to the new urbanism is more likely a response to the market than a principled stance. In the United States, federal subsidies to build new suburban interstates have waned and federal subsidies to "new starts" of urban rail networks have waxed. And, as federal transportation funds remain limited, there is recently much greater commitment of local and state funds and greatly increased willingness to incur bonded indebtedness to finance urban public transportation (Crabbe et al. 2005). If it is common to claim that federal subsidies to automobile transportation created the suburbs, why is it so rarely argued that public subsidies to urban transit systems are helping to promote vital new urban cores? Yet it is more likely that both subsidy programs were political responses to market pressures to a greater extent than they were initiatives that created those pressures.

New urban troubles

The rebirth of urban downtowns is fraught with challenges as well as opportunities, and again transportation issues are intertwined with these as both causes and sources of relief. As downtowns become resurgent centers of development, the process of gentrification

reduces the availability of affordable housing downtown where transit is accessible in most neighborhoods. Increasingly, concentrations of poverty are occurring in suburban areas, where working class and unemployed people have lower levels of access to automobiles than do the middle class. This gives them fewer choices if they wish to find jobs or avail themselves of social services. This problem is the theme of a recent Brookings Institution study entitled *Confronting Suburban Poverty in America* (Kneebone and Berube 2013). The combined costs of housing and transportation are increasing as North Americans either must spend more on transit accessible inner-city housing in areas where public school quality is questionable or spend more on transportation if they live in auto-oriented suburbs with better schools. In the absence of extensive public transportation networks, three quarters of the suburban poor drive to and from work and another 12 % carpool, and the cost of interest on auto loans as well as auto maintenance and rising fuel costs are increasingly burdensome. Households earning between 50 and 100 % of their region's median income were found in one recent study to be spending on average 27 % of their income on transportation and 32 % on housing, leaving little for other household necessities (Hickey et al. 2012).

Another pervasive central area problem is growing urban traffic congestion throughout North America (Texas A&M University 2012). Planners promote increased density and greater diversity of residential, commercial, and retailing land uses in urban cores as a means of alleviating urban traffic congestion, which is often blamed on "sprawl." As noted earlier, sprawl usually is quantified in terms of residential density, though the term also implies a lack of centrality and segregated land uses. The common assertion that denser residential development and mixed land uses in urban cores reduce metropolitan traffic congestion is problematic. This assertion is frequently based on cross sectional analysis comparing cities or neighborhoods and showing that, in the aggregate, higher densities are associated with lower rates of automobile travel (Newman and Kenworthy 1999). First, there is a high risk that the apparent association can be due to self-selection of residences in dense transit-oriented locations by people who prefer to travel less by car, so it is difficult to sort out cause from effect and to attribute causality to the density or land use patterns (Cao et al. 2009). Where it has been shown that the concentration of urban population in the city center leads to reduction in vehicle kilometers of travel per capita or per household, it appears logical for many scholars to conclude that the development of denser urban cores will reduce total travel in a region and this outcome is seen to be beneficial if society wishes to reduce energy consumption and greenhouse gas emissions. This does not however, suggest that new urbanism will reduce urban congestion—which occurs where traffic volumes exceed street and highway capacity—an issue related to but separate from total volume of travel.

A doubling of urban density, coupled with a richer mix of land uses in the central core, might reduce per household trip generation by 15 or even 20 %. Hopefully, the transit service and walkability of a community can cause a decrease in auto trips as people choose to walk, cycle, or use public transport where those options have been provided for by careful planning. Still, this one-fifth decline in auto trips in the face of a doubling of households in the affected area will increase local vehicular travel substantially. This is likely to worsen congestion locally where highway network capacity is typically increased only slightly as part of the mitigation program for the new development. This difference between regional reduction and travel volumes and local increases in traffic congestion explains, in part, why planners, real estate developers, and mayors call for increased density of development while homeowners associations oppose it in an effort to protect their neighborhoods (Taylor 2002). Growth in traffic congestion can be addressed to some

extent by zoning codes that reduce requirements for the provision of parking spaces in new buildings that are transit accessible (Shoup 2011; Willson 2013), but neighboring communities often oppose such reductions for fear that parked cars will flood their local streets.

Increased central city density coupled with more reliance on the internet for shopping and the increasing decentralization of goods handling to the edges of the metropolitan areas also result in increasing truck traffic to serve the needs of inner city residents and their commercial support systems. While grocery and fuel deliveries are now made routinely at night in most central cities to avoid traffic congestion, parcel deliveries continue to be concentrated in business hours. Together, these movements of goods reduce at least some of the small benefits in fuel consumption and greenhouse gas emissions that many advocates associate with higher density urban cores and their shorter work and shopping trips and less reliance on automobiles for personal travel.

The new livable downtowns of North America are alive with transportation innovations. In addition to increased density of housing, growth in commercial and retail activity is most obvious. In support of this growth, transportation capital investments include the addition of new metros and light rail systems, but the program of improvements is much broader. Cities are consciously being made more walkable through improvements in signage and wayfinding, the designation of crosswalks by colored and patterned pavements, the addition of small, medium, and large urban parks, and the addition of "universal design" features such as curb cuts and the provision of far more places to sit. Local shuttle services featuring low floor vehicles are being added to the mix of downtown transportation options in virtually every city. Bicycling, long a feature of European and Asian cities has finally become a high priority of most North American cities, which now feature designated lanes, bicycle boulevards, and increasing numbers of short-term cycle rental options. Urban transit and taxicab options are increasingly being complemented by internet-based car services that match commercial and volunteer service providers with their customers. Urban regulatory institutions are not yet coping well with these new innovations, which are being outlawed in some cities at the same time that they are being encouraged in others. The internet and smart phones are a central part of the new urban mobility, making it possible for travelers to optimize their time and movement in accordance with real time information that is widely instantly available. And, urban recovery, as already mentioned above, is critically dependent upon the efficiency of goods movement in these urban areas.

Conclusion: the past as prelude

When the issues discussed above are considered simultaneously, it remains difficult to conclude that the dramatic and popular changes underway in cities and transport networks are producing the benefits that are often claimed and earnestly sought. This is an exciting time in the life of North American cities, but the frenetic pace of change is not fully documented. Research, though accelerating, continues to lag the pace of change in the cities themselves and in urban policies that encourage such change. Of course, this is precisely why further and deeper studies and interpretations are needed and it is the function of this journal to provide encouragement for research into these many issues and phenomena.

It is clear that North American cities are changing in ways that differ dramatically from the trajectories of change that this Journal chronicled and analyzed guided by the steady hand, critical mind, and generous heart of Martin Richards at the time of its founding. If

policy is to be well informed by the results of research, there remains a pressing need for insightful analyses by unbiased researchers. Communities, their travel patterns, and transportation needs have always been complex. Over the past 40 years increasing understanding of that complexity has often clarified but rarely resolved the policy challenges facing society. New data bases are used to analyze travel behavior and to codify public opinion. The mathematical and statistical models that appeared in the early issues of *Transportation* seem relatively simple and often naïve when compared with the analytical tools and data bases that are employed so deftly by today's contributors. This is clearly a sign of the increasing quality of the journal, which is obviously a product of advances in research. Our interpretations of the meaning, and the applicability of this research to wiser decision making, seem as elusive today as at our founding. In the next 40 years I hope that this Journal will continue to bring us better data, more penetrating analysis, and bolder opinions as to how to apply research findings to some of society's most pressing challenges. There could be no more fitting tribute to its editor.

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