Building the New Mobility Economy

... and supplying the emerging New Mobility Solutions for an Urbanizing World

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This report was prepared for UM-SMART drawing from the *Catalyzing the New Mobility in Cities* project supported by the Rockefeller Foundation and the New Mobility Solutions project supported by the Alcoa Foundation.
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Introduction

Transportation – the very way we move people and goods to meet our various needs -- is at a tipping point, and evolving rapidly. But evolution doesn’t happen at a smooth, continuous rate, or in a straight line. We are living at a time that punctures the equilibrium, that shakes a dominant mobility paradigm -- in this case the personal vehicle mono-culture dominant in the western world for the past 75 years, and morphs it into a whole system, distributed ‘New Mobility’ landscape defined by multi-modal, multi-service networks, and made possible by game-changing information technology, social networks, and business models.

Stephen Jay Gould, and later Chuck Sabel and Michael Piore have described the way political economies evolve and change:¹ They describe the dynamic of systems evolution in which there are periods of punctuated equilibrium where a dominant species or industrial organizational paradigm—working hard to protect itself—is overrun by a new “species” because conditions change (continents collide, mutations occur, disruptive technologies emerge). The new species and paradigm consolidates and perpetuates itself until some new disruption changes the world again.

A combination of forces have converged at this moment to drive the most recent paradigm shift in transportation. These forces include global urbanization, the need for sustainable solutions, the rise of an innovation–based economy and the replacement of blue–collar with knowledge work as the dominant form,² disruptive technologies (IT), changing demographics, lifestyles, values, and cultures, the rise of social media and networked solutions, work, and living. All are combining in major metros around the world to change transportation from single option to a distributed network or system.

A picture of how this New Mobility will unfold has not entirely come into focus. It is a time of rapid, disruptive experimentation, entrepreneurship, creativity, and growth – as well as competition among many different ideas, technologies, modalities and business models. Dominant protocols, system integrators, technologies, products and services, regulations and policies – are all still being defined. And particularly in the US, the birthplace of the automobile and car culture, the old paradigm does not shift easily—established players in the auto sector, and traditional providers and managers of transportation services are looking to either block, guide or adapt themselves to change. “Urban mobility operates in an environment hostile to innovation” is the conclusion of the Arthur D. Little in “The Future of Urban Mobility.”³

The question then becomes, which metros in the United States—as the nation’s economic engines of growth—will participate in (and benefit from) this revolution? Who will help to establish it, and potentially lead its growth? And who will subsequently reap benefits in the form of growing business sectors, export markets, jobs, sustainable development, and even denser talent integration and interaction? How and to what extent will that in turn drive more economic growth, and attract even more talent, in part via lifestyle and value cues that are “coded” in New Mobility DNA? And beyond the traditional industry and competitiveness measures, what other societal and economic benefits are there for metro mobility leaders to anticipate—better connecting and lifting marginalized populations into the economy? Growing global research, education, and innovation leadership? Even better citizen health, and quality of life?

As importantly, given the rapid advance and deployment of integrated mobility solutions in metros elsewhere around the world: What needs to happen to help US and Michigan Metros (including metros like Detroit that have been the historic cradles of the auto paradigm and economy) to accelerate their embrace and participation, and even potential leadership in this still shape-shifting New Mobility reality? And how can they not only participate in, but perhaps even reap the economic benefits of defining the next stage of mobility development and lead in its deployment?

What can federal, state and local policy and practice do to accelerate New Mobility industry “pickup”, and culture building? To overcome obstacles to its embrace and growth? And perhaps to overcome the biggest obstacle of all—the natural interest in self-preservation of the auto-centered regime—which understandably won’t give way easily?

This paper describes the nature of and the forces behind this New Mobility reality. It illustrates what leading metros within a state and national government context are doing to advance their own New Mobility realities, and the nature of the new products, services and business models vying to replace, complement, and in some cases extend or redefine the personal auto paradigm. It identifies some of the key issues and actions that can support the market-making and shaping, public-private infrastructure laying, incentives, support systems and network building that will accelerate adoption, and lead to new definition in this fast-evolving New Mobility reality.
The Mobility Revolution Past and Present

In the 1800’s the railroad, the telegraph, and then telephone fostered the rise of national and international markets as new communication and rapid distribution networks were built. The first great vertically integrated companies emerged to fully link raw materials, production and send products to broadly distributed customers. Sears Roebuck could ship consumer goods ordered from afar through its mass distributed catalogue. Armour meats could move beef from farm to slaughter house to urban markets in freezer cars. Farm implements, consumer appliances, cars and trucks, were assembled and distributed through networked supply chains. Standard Oil cornered the oil market. GE took Edison’s light bulbs to homes. The great industrial and factory economy in America was built as mass produced goods and related services could be made, sold, and transported to a national marketplace.

As this factory economy grew, the farms and small towns emptied, and cities grew, and new urban forms and patterns of living emerged. Factory districts around railyards defined the urban and small city landscape, living patterns revolved around short-distance “commutes” by horse, buggy and streetcar to work, home and store.

The revolution afforded by the automobile and truck, the laying of roads and ultimately the construction of national highway networks -- accelerated economic integration, but also individualized it, personalized it, and spread it – and with it new economic models and urban form emerged. No longer were communities having to cluster around rail-lines and urban disembarkation points. Freedom to drive meant freedom to move, to live and work wherever: suburb, center, exurb. The auto-based culture created well-documented effects on living and work patterns, economic development (urban flight and decay), community design, shopping and consumer options (the strip-mall, the drive-thru).
A new type of economy and community grew around the interstate highway nodes, and residents of once congested urban cities were spread across the landscape. Railroads were supplanted by trucks, buses and highways. Rail and transit based links were pared back or wiped away completely -- street car, trolley and rail lines disappeared in most US cities.

European and other global cities, with denser development patterns, and high-end living in the urban core versus the suburb, and diverse multi-modal transportation links already — maintained more of their transport diversity. But even they mimicked the development aspirations and infrastructure built around the auto. Developing-world communities added to their portfolio of transport, more auto-centered transportation links as well. And once established, as in the US, with many communities almost completely built for the auto -- the personal auto-based paradigm becomes incredibly hard to shake, or to reconfigure.

Until recently. Today in both the developed global cities, and the fast urbanizing developing world—the personal auto based paradigm is breaking down. A range of forces from fundamental changes in the nature of work, attitudes and lifestyle; to the massive press of demographic change, congestion, pollution and climate change, and unsustainable infrastructure, fuel and environmental costs of perpetuating the auto model, have closed in.

Developed global cities both don’t want, and can’t sustain a personal auto-centric paradigm, and emerging-region cities can’t continue to replicate the pathway mature regions followed — without exacerbating their own, and the planet’s problems.

A vision of a fully developed New Mobility future is seen clearly by some: “breakthroughs in IT and spatial design will address infrastructural and economic challenges posed by global urbanization. New connected systems will fully integrate all modes of transportation (public and private) in a seamless, open source format to provide multi-mode, multi-service information technology-enhanced grid supporting the door to door trip”.

Elements of this vision are appearing on the ground: New transportation modalities and technology systems are rising, and traditional ones are experiencing a rebirth. But whether it is the rebirth of transit, rail, bike and pedestrian options in US systems—or ‘smart solutions’ to better manage, network and make more efficient and sustainable existing transport modes; or the new intelligent transportation systems and applications providing connection to, and information about, travel modes and times; or wholly new business and service models (shared ownership of transportation modes, bike and car-sharing) in US metros, none are fully deployed and connected throughout the entire transportation network. There is a long way to go to better develop and deploy these innovations to offer an integrated system that will serve the user, the city, and the economy. Today, in any
major US metro, we may find over here an “app” for an on-time taxi-service, transit line info, or parking structure; over there we may find a smart highway, car-share, or bike-to-bus network. None of it is yet integrated – so we get one piece of better information, one new transport choice, one time saving smart travel function — but not consistently across the community, or across travel modes.

As noted in Smart Mobility for the 21st Century: “This is comparable to the first few years after computers were invented…(the computer) did not become a game-changer until their presence was ubiquitous and Internet allowed individual companies, data sources and networks, to connect in a seamless interoperable way.”

We are at an inflection point in mobility systems —even in the US and even in such auto-dominant cities as Detroit — where a new downtown rail line is financed through public-private partnership, bikes grow in numbers on the streets not just on the recreational paths, auto pioneers like Ford Motor are working to reposition themselves from a “car” company to a “mobility” company—and New Mobility business growth is seen as one of the key drivers for Detroit and Michigan’s future economy. We are at the early stages of an analogous shakedown in New Mobility to the one experienced by the computer industry, and in the first flash of growth of the Internet. New players, products, business models, and public–private infrastructure development is well underway.

Meanwhile fundamental issues are still to be resolved around what are the “rules of the road” in new mobility—“who” and “what” will emerge as dominant players, protocols and technologies. At this moment—when the “Internet of Things” is being defined, and the business of new mobility is up for grabs, which of the early movers will endure? Who will be the “left-behinds” – the DECs, the Wangs, the Gopher and Netscape of New Mobility?; who will emerge as the Googles, Microsofts, Apples and Facebooks? Will it be a New Mobility “beta” or “VHS” -- Mac or PC? We don’t know yet.
The Drivers of New Mobility

The forces pushing a new model and that will continue to push a new model

As Brooking Institution’s Bruce Katz and Jennifer Bradley note in the recently published book The Metro Revolution:"Profound demographic, cultural and economic shifts are altering radically the place preferences of people and firms and, in the process, re-conceiving the very link between economy shaping, place making and social networking”. These forces have direct impacts on how people and goods move around. A confluence of trends is leading companies and consumers to flock to globalizing city-regions, with new options and preferences for communication, collaboration and work modes. As the industrial revolution spurred by transportation and communications advances once reshaped living and mobility patterns; the current information revolution, and networking reality are reshaping physical assets and connectivity, communication and transportation needs and reality of our communities.

Katz and Bradley describe the growing metropolitan reality: A diverse, and growing urbanized population and diversified knowledge-driven economy means greater options and new choices in terms of community design and transportation, new choices and preferences in where people live and where firms locate. Today’s economy everywhere is driven by the knowledge worker. The race to create conditions that nurture, attract, retain and connect talent is the dominant economic development priority and opportunity for all metro regions.

With generational change, education advances, and changes in work modes, values, and new social networking opportunities—today’s dominant occupational cadre of knowledge workers—particularly the young—value cities, not only for amenities and lifestyles they afford, but also as nexus where people, and ideas can connect easily. This interaction can fuel innovation and new economic activity as knowledge can be transferred easily and seamlessly between people and firms, enabling the creation of new ideas that fuel even greater economic activity and growth. This still-in-process revolution to an as yet unconsolidated New Mobility paradigm to serve an innovation-driven knowledge economy in metros across the globe, is being pushed by disruptive emerging forces and technology innovations.
Place Preferences

Place preferences among knowledge workers are one driver: The living, lifestyle, social interaction and working preferences of this growing cadre of workers is pushing walkable urbanism and related community design patterns to the fore. The philosophy being that dense, mixed-use neighborhoods with cultural, recreational, and retail amenities will be attractive to highly educated, innovative, entrepreneurial individuals, and lead to economic activity concentrations that also benefit existing residents— not least of which by providing new job opportunity more proximate to historically isolated urban residents. These place preferences interact with preferences for how to travel; how to move efficiently (in terms of getting work done), sustainably (in terms of limiting planet damage), collaboratively (in terms of networked and shared solutions), and healthily (physical fitness). All are driving how people interact, how ideas flow, and how places—including moving within and among places— are actually designed.
Demographic Shifts

Demographic shifts – Around the globe the growing cadre of skilled knowledge workers is concentrating in growing cities; and the unskilled are flocking to the world’s urbanized economic activity centers in search of jobs and opportunity.

The Urbanized population worldwide and in the US is growing—50% of global population today, predicted to grow from 3 to 5 billion by 2030,9 and makeup 70% of world population by 2050.10 Today, the 100 largest US Metros make up over two-thirds of US jobs and population, and three-quarters of national GDP—and these number are growing.11 Global city workers are predicted to make up 86% of world GDP by 2025.12

Aging population – in the US, the population share of over 65 year olds, has been the fastest growing. One important mobility implication is that today one quarter of all drivers are over sixty-five. Many older Americans will both want and need mobility alternatives for lifestyle and safety reasons.13

In the US the young are increasingly rejecting auto-centricity for mobility, preferring if they can, not to drive. There have been rapid declines in young people getting and/or delaying getting their drivers’ licenses—changing dramatically a generational pattern. The young and newly networked generation want quick convenient, sustainable, healthy for them and the planet ways to travel. It becomes both more convenient and more in line with the emerging generation’s values not to have a car.14

Better connecting marginal populations: In both the developed and developing world, the poor and less well off have less resources to pay for auto travel, and must rely on, and are better enabled to participate in the economy, with mobility choices beyond cars. A major concern and driver of new mobility development for many is to help labor markets work better, and build an overall more productive and equitable society. As one informant to this report noted: New Mobility options can both better develop the knowledge class, and provide new opportunities to the urban poor irrespective of their location.15

A nation-wide British study16 illustrates the mobility challenges in developed countries: Nearly one in three households do not have access to a car, because of cost, disability and choice. People in low-income households depend primarily on walking to get around, but also on buses, lifts from family and friends, and taxis; Two out of five jobseekers say lack of transport is a barrier to getting a job.17

In US metros, Brookings Institution Metropolitan Policy Program studies have documented significant mobility disconnects that similarly disadvantage the urban poor in many
metros. In metro communities like Detroit only 22% of available jobs are within 90 minutes reach—well below a poor national metro average of 30%. Poor transit accessibility combines with low service frequency in low-income neighborhoods to isolate families. These metro community mobility deficiencies effectively prevent residents living in isolated and concentrated poverty neighborhoods from successfully accessing existing jobs, and they miss out on the benefits of participating in a denser development, and new economic activity, being driven by the re-birth of urban communities and enabled by new structures of work and communication.

Another giant demographic driver—In developing countries, the rural poor continue to flock to city-regions for economic opportunity and upward mobility as these countries industrialize, then begin to join the knowledge economy. As they developed, most rising nations began to mimic developed countries’ auto-based policies. Many developing city regions implemented policies which reduced the appeal of traditional modes like cycling, encouraging people to travel by motorized means even for short trips. As a result, in Asian cities even with per capita incomes less than one-twentieth of developed countries, over 60% of these short trips under three kilometers are made by motor vehicles, usually motorcycle, moped, or paratransit. Reversing this direction is now a priority. As one Indian entrepreneur reports: “Overseas the car is a status symbol of the growing middle class—while the US is reversing this trend, with people paying more to stay in cities, which are walkable. If we can project this statement to the rest of world, everybody who owns a car shifts to everybody walking and biking.”

Today, an increasing number of city governments in developed and developing cities are moving strategic multimodal mobility development plans and support systems to resist and reverse the advance of auto-centered development. Many have recently begun actively promoting bicycling and walking, and re-examining and elevating traditional and historic modes of transportation as welcome and needed role-players in a more diverse, and sustainable new mobility network of choices.
Sustainability Realities

Sustainability Realities—Another major driver of the New Mobility is the toll taken on climate, our environment, and health; and the unsustainable energy and resource use of the build out of the personal auto model. The auto–based model is unsustainable, almost saturated, and already slowing global productivity. The real costs of congestion, pollution/climate change, infrastructure buildout is pressing upon global metros. Some features of this unsustainable trajectory:

- In the US the economic cost of congestion is estimated at $101 million in 2010;\(^{21}\)
- By 2050 average urban dwellers around the world “time–in–traffic” is estimated to reach 106 hours a year—3 times the norm today;\(^{22}\)
- An Arthur D. Little Study estimates, that without changes in mobility infrastructures, 17.3% of the planet’s bio–capacities will be needed to make urban mobility possible in 2050—five times more than 1990;\(^{23}\)
- In fast growing global cities like Beijing smog keeps professionals in doors, and delays planes;
- Growing health impacts of auto–centered development are being felt, including growing incidents of asthma and other upper respiratory and cardio–vascular disease, in both developed and developing countries; And conventional responses to reducing carbon dioxide, nitrogen oxides, and ground level ozone through tailpipe–focused measures alone is proving exceedingly difficult.\(^{24}\)

Reversing these trends is a prime force behind new mobility development both in US metros, and around the world—where emerging cities can’t continue to replicate the pathway mature regions followed—without acerbating their own and the planet’s problems of pollution, congestion, poorly functioning labor markets and unsustainable infrastructure and fuel costs.

In response, in the US public transport (bus, rail and trolley) is being resurrected, and biking and walking are growing in popularity. Around the world traditional modes of travel — like bikes and cycle rickshaws — are getting renewed interest. They contribute to more efficient, healthier, and planet–friendly mobility options; generate no air pollution, no greenhouse gases, and little noise pollution, and use less road space than private motor vehicles.\(^{25}\) And these modalities can work very well. In fact in most developing cities, average trip distances are extremely short. Often over 60% of trips are under 3 kilometers long. And in many western cities—particularly well planned Western European\(^{26}\) cities, over 80% of trips are also under 3 kilometers and can be made by walking or bicycling.
Social Media & New Networked Culture

Another driver of the emerging new mobility reality is the rise of social media and new networked culture, creating whole new mobility opportunities and shaping a new work and social environment.

While riding a bus, train or even in a car, while walking or riding a bike (even though it may be dangerous)—communication, work, email, texting—all is possible. These new tools can both increase productivity and facilitate social connections, making it easy through multiple modes to connect with friends and co-workers (or just waste time together). These still evolving technologies also interface and interconnect with, and can even multiply transportation options: Telling you—is the train on time? Which bus can I get? Is there a parking space or traffic jam? Also, one can now call or text for a taxi, smart car or bike, or find a shared ride, or shared ride services like bikes or cars more easily. Or one can just meet up with friends through social media and travel together, opening another, more ‘sustainable’ option.27

Technology trends are interacting with changing demographics, and changes in attitudes and culture. The fast-developing facts of the IT technology revolution are staggering: 91% penetration in North America of mobile phones, even higher rates in many metros, and fast growing rates everywhere; smart phones will soon overtake feature phones, 15 billion downloads in just four years on I-phones and 425,000 apps emerged in the same time period, including those providing transportation information.28

These information tools can facilitate and encourage the embrace of new transport modes, and behaviors—including the movement from the personalized mobility of the auto era, to new shared and networked modalities: As a staffer at a leading philanthropic organization notes: “We are moving from an ownership society to a sharing society—which is an exciting generational shift. There is no way to optimize load capacity if everyone has their own microsystem. When people care less about this and are willing to share modes of mobility—willing to own a piece of a bike or car—we see more efficient mobility and higher utilization rates.”29
And information helps: Faced with the loss of “freedom” of giving up their car, a study conducted in Boston and San Francisco found people more willing to forego the freedom of the car, to ride buses or trains, when they were provided “apps” with information about transit schedules, travel times, delays and shops and services enroute. Social networking tools are directly creating new transportation patterns and business opportunities, such as Go Loco and Slugging, which are informal car pool systems greased by social media. Companies based on the new model of sharing and non-ownership of many services including transport—such as Zipcars—are growing fast: 700,000 members to date and expanding. SMART’s Mobi prize and platform are helping connect new mobility entrepreneurs and crowd source mobility solutions.

All these forces spur the New Mobility revolution, in which an urbanizing population wants diverse, connected and smart options, increasingly non-auto centric and based on new paradigms of access to transport. “People are starting to think of mobility as a service. This enables sharing and different modalities. Implicitly it is all about more efficiency”. Entrepreneurs are moving fast to create information and mobility applications and services to feed these trends. Car companies themselves are seeing this future and seeking to redefine their core product as a mobility, information and entertainment platform, and extend their product-lines to include new mobility systems.

The monolithic personal auto paradigm is breaking down, but the new mobility paradigm of the future is still shape-shifting and up for grabs.
The Emerging Shape of Global Metro-Led New Mobility Reality

There are exciting illustrations of the emerging new mobility in practice—both in the well-developed strategies of many urbanized metros to strategically build the new mobility into the fabric of their communities; to the more haphazard, chaotic and opportunistic way US public and private policy and business entrepreneurs are developing new mobility applications, systems and services.

Around the world leading Metros are ‘just doing it’, developing new mobility networks, systems, services and protocols that support its growth.

Globally, cities such as Singapore, Seoul, Stockholm, Oslo, Hong Kong, London and Copenhagen have the most fully developed and strategically constructed new mobility regimes—building a more efficient, networked and multi-modal reality, into the daily workings of their urban communities. These cities are multiplying and interconnecting mobility options with information. And accomplishing a more sustainable transportation mix by deploying a range of tools and technologies, from setting goals for emissions,
renewable energy, congestion and shares of multi-modal ridership; to investments in various multi-modal transport construction and modes; smart IT driven systems; incentives that shape behavior, like congestion pricing, vehicle-miles-traveled fees that can vary by pricing zone, time of day, congestion level, and mode of transport; among many means of nurturing their IT and Mobility sectors.

This has enabled them to begin to reap the benefits of lower emissions, more accessible and efficient travel, personal health, and economic benefits accruing to leaders in “smart system” building for their residents and the growing world market.

Most of these successful cities, such as Hong Kong, which ranked highest in a recent global ranking of mobility sophistication and maturity have a well-balanced split among transportation modalities that also purposefully move people away from individual motorized transport. Today in Hong Kong, personal travel is integrated through multimodal mobility cards—which 95% of citizens own, and use to purchase a range of mobility services, as well as other personal services. It even refunds money if you walk to the top of a mountain versus taking the tram—one gets $2.00 equivalent back, and improved health.35

Another leading city, Singapore, developed a master plan in 2008 that details a roadmap to a fully integrated transport system by 2020. Building on the existing integrated ticketing system, which covers public transport, congestion pricing and car parking, the city introduced an integrated fare structure based on distance traveled. Other innovations that take advantage of new networking an IT tools are being developed—for example, in Singapore taxis are often in high demand, particularly when one of the common sudden rain-showers erupt—there is an effort to link upcoming weather information to taxis in order to direct taxis to high demand locations.36

Western European cities are also leaders in new mobility creation:

Gotenburg, Sweden, recently mimicked the successful program developed and deployed in Stockholm since 2007, moving to a congestion charging system, for the urban core—and expanding resources dedicated to financing local infrastructure and transit improvements -- all geared to reduce greenhouse gases and cut traffic in the city center.37

Zurich, Switzerland has increased its share of public transport, walking and cycling participants from an already high 65%, through active development of public-private partnerships and a metro strategy to increase non-auto options. Their plan lays out goals for rail and car sharing for long distances, public transport for in-city, walking and biking
for short trips. To facilitate meeting these goals, for example, the rail-system has rent-a-bike services; city agencies share multi-modal city map and trip planners.

Another leader, Copenhagen has designed its city with spatial efficiency in view and rich in transportation options. There have been tangible benefits as health care costs have declined, with more citizens biking to work; fewer cars, and congestion. Also as Brookings Bruce Katz’ notes—a commitment to a “clean” economy of place has also fueled a concomitant growth in specialized firms, to meet the new demand for clean products and services. As a consequence Copenhagen “green” export growth has outpaced all other sectors --- growing 77% between 2004-9.38

Meanwhile, US Metros lag in terms of a strategic and integrated approach to nurture new mobility. Here innovations are coming piecemeal—sometimes big pieces—but in fits and starts and more consistent with the character of US innovation in public policy and the private market. Historically, the US approach to policy innovation, as we are seeing play out around New Mobility, has been resistance or absence of a national or state/metro “strategic plan”. Rather public leaders and innovators at the federal, state, and metro level push episodic, pragmatic (and often disjointed) solutions to transportation problems.

This is one reason why when Arthur D. Little assessed the mobility maturity and performance of world cities – using criteria that included: public transport share, average travel speed, and transport related emissions; US metros, (Boston excepted) were consistently below average and well below top ranking western European and Asian Metros.

And as is also characteristic of America—private entrepreneurs and new mobility business developers move faster than the public sphere, as they look to offer any and all new mobility solutions, from “apps” to car-sharing, for which there may be customers, an emerging market, and money to be made. “Here, policy moves slowly, entrepreneurs move faster, with a higher tolerance for risk”, noted one new mobility entrepreneur.39

However, Some US metros have moved in a more strategic and integrated way:

Portland, Oregon has made a long-standing commitment to sustainable development, and has practically animated that commitment through a variety of means, including: investing in expanded public transport, putting in place an urban growth boundary, and creating a green investment fund for commercial and residential products. They have even developed new technology applied to 17 arterial intersections – in order to synchronize traffic signals, realize emission reductions and get carbon reduction credits – which other cities are emulating.40 As in Copenhagen, creating conditions that foster the New Mobility sector, may also help explain why Oregon overall is seeing growth in its GDP related to mobility.
McKinsey estimates Oregon’s mobility related industry will grow 16% over next 10 years, one of the nation’s fastest rates.\textsuperscript{41}

With leadership from Mayor Bloomberg and a sophisticated set of public managers over the years, the New York City region is also moving a set of mobility changing policies and practices: PlaNYC, the City’s comprehensive sustainability plan, established an aggressive strategy to reduce the City’s greenhouse gas emissions in 2030 by 30\% from 2005 levels. As part of that overall goal, transportation emissions, which currently account for 22\% of New York City’s total greenhouse gas emissions, would be reduced by 44\% by 2030. (But congestion pricing, as in London and other major cities, has so far not made the plan). The Long Island Railroad has integrated smarter transport solutions with existing assets – in this case an intelligent asset management system for maintenance – building a safer, more reliable smarter rail system. New bike lanes, and pedestrian through routes (Highline) contribute to mobility changes, and overall metro quality of life appeal.

However, more often, US metros (and the states that shape some of the transportation policy frameworks in which they operate) have seen piecemeal development of elements of new mobility; alongside a surge of entrepreneurial innovation and activity bringing new businesses and experiments into play. So we have seen a new technology here, and a New Mobility sparking policy experiment there. Some examples of these piecemeal efforts -- producing piecemeal results:

- Washington state’s Advanced Traveler Information System reduced early and late arrivals by over 50\%;\textsuperscript{42}
- Using Digital information and controlling ramp meters, and synchronizing traffic lights in Minneapolis St Paul increased traffic volume the system could handle by 9 percent of overall, and at peak 14\%;\textsuperscript{43}
- Denver’s on-demand van-pools system have cuts costs, and the number of cars for commuters traveling more than 15 miles;\textsuperscript{44}
- In New Jersey, EZ Pass Payments reduce toll station traffic (time and emissions) by 85\%;\textsuperscript{45}
• Texas—first state in the nation that has automated permitting and routing for overweight/size vehicles, issuing a unique permit electronically for that weight and load, and a permit map for trucks that offers turn by turn directions – cutting time, emissions, road repair, and providing bottom-line benefits to companies.46

At the Metro level public bodies are also sharing and opening up data sets – so mobility consumers can benefit, and new mobility business and applications can grow. Several US Metros are facilitating new social media connections to foster innovation in new product and system development:

• Boston and San Francisco transportation systems provide open source data to developers to allow them to create new “apps” that create new mobility options and increase information to customers. To date 30 apps have been created with data from Mass Bay Transportation Authority alone;
• GPS based eco-routing promoted by the US DOT’s Real Time Information Synthesis’ program allows drivers to plan routes mitigating their environmental impact;
• San Francisco’s “Summer of Smart” programs call together and invite public interaction with the region’s software community to design new web and mobile apps to improve options including around mobility.

On the private side—lots of innovative business models and new business practices are popping up:

• Big companies like Qualcomm and Google and their application developers are testing ways to utilize IT integration to make existing infrastructure accessibility better for users, and to develop new types of services in “way-finding”, scheduling traffic management, and how to link public and private transportation through a network.47

• Start-up companies like Moovit are making “apps” with transit data and schedule information, and integrating GPS linkage that allows real-time data to flow—so route, on time and delay information can be rebroadcast and inform other users in real-time.48

• Companies like Best Buy let employees set time, hours and where to get jobs done, improve productivity, and mitigate transport impacts on environment. Other companies are moving to Internal vehicle sharing, Bike to work, walk to work campaigns, or providing transit fares paid as a company perk.
• Social Networking tools are directly creating new transportation patterns and opportunities—like Go Loco and Slugging—that are fostering informal car pool systems.49

• And companies based on the new model of sharing and non-ownership of many services including transport—such as Zipcar are moving into communities around the country.

A challenge for US Metros to adapt and innovate within this emerging New Mobility reality—is that while other countries accelerate the pickup of New Mobility through national support systems and policy enablers—the US largely has not.

Nations that are adopting and integrating whole system new transportation technologies at effective scale—which throughout their transportation networks—are reaping significant economic and sustainability benefits versus the US phenomenon of gradual and episodic innovations, where policy and planning lag experimentation on the ground.

New mobility innovators like Japan, Sweden, Singapore and South Korea, and a growing deployment in China are putting in place advanced transportation networks making travel more efficient and reducing emissions.

• Japan achieved its 2010 CO2 emissions goal early, through improved traffic flow and promoting economy-driving development of new mobility and IT system building;50

• Countries like South Korea, with a strong national plan—has deployed $1.3 billion electronic toll collection system throughout the country—and in so doing is able to guide and price mobility uses more comprehensively.51
The Emerging New Mobility Industry

As these dynamics play out in global metros, they are seeding as well as being pushed by a growing family of new mobility providers and business models—new products, businesses, and services are emerging with tremendous current and potential economic impact.

While the new mobility “industry” in the US emerges in fits and starts, and a new “paradigm” for how it will all shake out is still forming -- the sheer volume of activity here and globally suggests a huge prize in the form of the large and fast-growing market for families of mobility-related goods and services—that can be deployed here and exported across the globe.

Growing urban populations are looking for affordable and more diverse and efficient transportation options, and many governments are investing heavily in a variety of transportation related infrastructures, tools and technologies. Mckinsey estimates the growth in GDP from mobility to increase from $190 billion in 2010 to $250 billion by 2020.54

US Metros that find their way into leadership in this emerging market will reap the benefits in terms of jobs and new business growth, as well as make a values statement about the cutting-edge nature of their community.

One dimension of this market growth is the fact that countries with fast-growing global cities are making big commitments of investment in new mobility systems -- meaning big business. China alone is building 81 new cities and 170 new mass transit systems over the next 20 years.53

Even in the US there has been growth in sales over the last 20 years in most all “traditional” transport modes, led by light rail cars which have seen the highest relative growth increase (up 114%) among traditional sectors, cars and trucks (up 110%), and commuter rail cars whose market has grown 30%.54

And various analysis suggest the fast emerging ‘new mobility’ segments are huge markets to participate in:

- A recent IBM study estimates the emerging subset of Integrated Transportation Solutions—using IT to integrate mobility tools and its value chain, accounts for 13
percent of total transportation related industry output. This segment ranges from traffic management to data management systems, to vehicle safety. This constitutes an estimated $52 billion market in 2009, making this segment larger already than the motion picture industry, video production, or internet advertising. This market is expected to grow 5.8% per year to $73 billion. Total employment today is 513,0000 and growing rapidly.55

- And Cisco estimates a global investment of $1.2 trillion in ICT and “smart” urban infrastructure over the next decade.56

This all suggests, as a report produced for Ford Motor Company noted in an internal white paper,57 an almost unlimited “blue sky” opportunity for new products, services, business and market growth in mobility solutions—(and for automakers like Ford, a chance to escape the narrowed zero-sum game of auto sales competition.)

And this market is in-flux and up for grabs: As a leading entrepreneur said, “We are at a period now where we are not sure whether and where and when we will get to a new way – probably a long transition period but multiple business models are competing with each other. It’s a period marked by multiple choices and public investors feel they have to choose between them – we’re trying to encourage multiple business models occurring simultaneously.”58

The seminal report Building a New Mobility Industry Cluster in the Toronto Region,59 provided the first full framing and extensive inventory of the emerging New Mobility industry cluster back in 2002. Now in very recent years have come a flurry of new analysis and white papers—many from the private sector and business consultancies—painting a variety of scenarios and emerging business models, real and potential New Mobility related goods, services and market opportunities.
As the New Mobility marketplace shapes, shifts, and forms, a variety of real (today) and imagined (tomorrow) technologies, product and services ideas are competing for attention, funding support, and looking to carve a place in tomorrow’s new mobility reality. By way of illustration:

**Conventional “Transportation” Redefined**

Cars, trucks, buses, bikes, rails, and other transportation providers are already morphing into new forms and business opportunities:

- Autos are becoming loaded with products and services that improve efficiency, entertain, connect with other information resources -- whether it’s people to talk to, places to shop, products to buy, or where to park-- and are being redesigned to ameliorate environmental impact, and enhance user experience. We see growing hybrid, electric varieties for energy saving, individualized cars, EV charging stations, vehicle to vehicle communications, and new safety features being incorporated.

- New models like Uber and Lyft (TNC’S), Car and Bike Sharing services including Zipcar (and internal car–sharing among firms, institutions, and even friends) and peer to peer car sharing redefine personal mobility. Personal car sharing alone could be a $3 billion annual business;

- New technologies for the auto that are close to doable today include: autonomous vehicles, driverless car services, or delivery services, and solar– power roads to serve electric vehicles

- Transportation makers and operators: road and rail networks and infrastructure owners, cities, transit operators -- are all engaged in growing and changing markets —designing and making new vehicles with new features: Smart buses and trains, with communications technology (and bike racks), more fuel efficient vehicles and ITS Intelligent Transportation systems— all in an estimated market of $1.1 billion last year.

- Other “integrator” business models are emerging that include personal mobility and travel service integration (sometimes known as MaaS) —combining public and private customization of travel services-- with pickup cars, branded spaces, train tickets—for the high end consumer.

- And new forms of traditional transportation like bikes are spawning new services and markets: new bikes based on new designs, weights and performance—and even a “Green Wheel” technology -- a solar electric battery boost for bicycles. At the same
time human powered taxis and cycling services are seeing a re-emergence in the developing world.

Mobility System Building & Management

Giant business opportunities are predicted for firms that can manage and integrate whole mobility systems for global cities and their constituents, including serving as general contractor for the multi-modal integration of passenger transport networks:

- Siemens and other large corporations are developing special infrastructure units – to market to cities – to be the system integrator and contractor for parking, vehicle charging, fare collection, bike sharing, city buses, financial services, mobility planning. (Could this be the rise of a new highly integrated industry like the Standard Oil of yesterday)?
- The “Smart Cities” of tomorrow will mean a variety of innovations in urban services linked to transport—which are still under development, but include things like: Smart traffic control, the use of public–private discriminatory pricing models that you can connect to via smartphone, (e.g. to encourage certain modes of travel over others)— smart pedestrian surveillance systems—that can even use information about footfalls, and potential rush in services, to inform system operation.
**IT and the Social Networked Connectivity**

IT and the social networked connectivity of consumers is allowing transportation providers and non-traditional players to work together to drive innovation and technology, and spawn a host of new innovative business models including:

- **Transport Navigator**—A provider of real time transport information on mobile and other devices.\(^64\)
- **Mobility Platform Manager**: Traffic management, Information, planning and payments services and integration.\(^65\)
- **Companies** like the Hong Kong Octopus Ltd. make and operate the Smart Card that 95% of citizens use to move around the city—and they have expanded its use to other retail and institutional services.\(^66\)
- **Big Players** like Qualcomm are expanding wireless networks and wireless charging infrastructure, Google is into intermodal way-finding.\(^67\)
- **Non-ownership mobility services** are growing—shared car/bus, travel services on demand, to better serve seniors, young, and poor.
- **Social Media and GPS** integration are providing new products and services, collaborative and personalized transportation options—call a car or taxi, or your friends to ride with. Using an app link to van sharing, Zip and Car sharing services. Companies like California’s Wheelz Inc. show how Smart phones (and supportive state liability policy) have made it feasible to create a model where the owner of the car sets a price and schedule of availability—revenue is shared by owner and the Wheelz company. An estimate is this could be a $3 billion industry in the US, if enabled by supportive state policies that allow the company to pay for and assume liability.

**Big Data**

Massive and multi-dimensional data and the ability to share it—including big data records of urban activity and movement—personalized with GPS, and IT use technology, means big business in the form of Big Data system building and applications. Major players like Cisco, IBM and Schieder Electric are working to integrate data sets, including traffic flows, weather, route and system changes, in order to manage, manipulate and potentially commercialize this information.
And cities are sitting on treasure trove of data from tickets, journeys and use of public transport, road charging schemes—all raw material for the big data integrators that can help both govern and guide cities and transportation functionality and provide raw material for customer driven applications (and product marketing).
National and Metro Strategies to Accelerate New Mobility

Metro Strategies for Fostering New Mobility

The paradigm shift to the new mobility and new formats for transportation use, and the growth of the new mobility business sector is happening. Also evolving is the picture of what transportation “is”, that can help re-define what the US and its Metros can and should be doing to advance this shift – particularly if they want to participate fully in this emerging new mobility space, and reap the economic and social benefits.

Metros elsewhere around the globe, can and are taking advantage of their role as the new economic engines, the economic unit that matters, where the critical mass of both population and economic activity is concentrated, and are naming their own terms on how they want to redefine mobility. Many Metro regions can are defining and managing a strategic plan for building an integrated mobility future, and are implementing their own policies and protocols to support it. “(We’ve seen) the growing power of cities -- realizing that they can take responsibility for more - and not wait for national government to do things in mobility.”

In the US in particular, where the dominant auto-paradigm is entrenched, and hard to dislodge, and national and state top-down policy and funding is weak or constrained-- an effective move to embrace new mobility must be informed by a corollary change in attitudes and understandings about the nature of mobility itself. “To change to access the new model--we need a change in mindset. Our attitude has been of a civil engineer who builds things: road, bridge, metro- nothing is connected. The paradigm shift we must make is to answer the question: ‘what is it for?’ We need to connect people from house to job, school, and hospital.”
Addressing mobility needs and opportunities holistically at the metro level, appreciating the new diversity in choices and values demanded by today’s mobility consumer—can be a powerful means for metros – on their own—to:

- drive innovation and economic development;
- work more efficiently, sustainably, and afford better health and quality of life for citizens
- better integrate all citizens into the economy
- provide platforms for economic activity, including making and selling the products and services that are networked transportation
- end important values and lifestyle cues making them even more attractive to talent

This last point—particularly in the US where leading metros compete as the most attractive locations for mobile talent -- is crucial. “Transport services can become a differentiator for cities to attract and retain the talent necessary to drive growth—and have a critical influence on the attractiveness and livability of a location.”

However US metros lag behind other global metros in forging and implementing strategic plans for new mobility. We just don’t do, or we actively resist top-down planning like the European or Asian polities. However, we do continue to animate the uniquely American phenomenon of ample state and local policy experimentation, where the “laboratories of democracy” continue their tradition of pragmatic experimentation and adaptation—working alongside perhaps the most entrepreneurial private sector—always looking to develop and exploit a new business opportunity. In moving elements of the new mobility into reality, we continue exhibiting the usual American phenomenon of public and private innovation, piecemeal adaptation, and replication.

So what can metros do on their own (and in the context of states and federal government policy and funding that defines much of their terrain) to create the conditions that drive new mobility development and that support the growth of a robust marketplace for new mobility innovation and entrepreneurship – however it settles out?

There are a number of metro-level drivers:
Local Leadership & Vision

Metro communities that are showing the way, have leadership that is able to set an agenda, and move major elements forward, in spite of the challenges of diffuse power and decision-making. As one respondent put it: “This is ‘on the podium’ of some city leaders who are putting in place smart city regulations and policies to incentivize, and to lift the barriers for new mobility development—driven by goals of wanting to improve the services, wanting and willing to test out and try out new approaches”.

Setting Goals for the Mobility System

These can be public agency goals, and region-wide goals, along with requisite incentives—including (as in leading metros internationally) goals for: curbing greenhouse gases and transport emissions, increasing or meeting targets for renewable energy use; enhancing shares of transportation use by various modalities (car, bike, transit); increasing health indicators, reducing death and injuries, reducing noise, mitigating congestion, and/or narrowing the mobility divide and enhance mobility opportunities.

Metros that are serious about these goals link them to budgets, so agencies, departments and various governmental and public-private entities are serious about changing practices to meet the goals. Other communities provide high-level and active political coordination: Mayor’s “green” or “mobility” czars can cut across departments and support the implementation of best practices.

Public-Private-Third Sector Finance

There is no substitute for direct investment in public infrastructures that put in place new mobility opportunities, such as investing in rail, transit, bike and pedestrian friendly developments and infrastructures. However, a huge challenge in US metros is the insufficient investment in infrastructure—driven by a political system in gridlock, and its inability to generate revenue. As one leading transportation analyst notes: “With the gas tax the primary way to fund infrastructure, and autos becoming ever more efficient— we haven’t kept up with inflation...
and investing in infrastructure.” Third sector funders of new mobility suggest that the US’ ongoing fiscal crisis, at the state level and nationally-- means a shrinking pool of capital, which is a huge impediment developing and making new systems, as well as maintaining existing systems.

Metro communities are by necessity turning to (or reanimating from many years ago) practices whereby private developers financed roads, rails and trolleys. New business models of public–private partnerships, are beginning to develop in interesting ways. Philanthropy, stakeholder businesses, wealthy investors, even outside capital and sovereign wealth funds of foreign governments, are all being looked to, to complement or even drive the major investments in new transportation infrastructure, with state, federal and local public dollars a diminished complementary component.

**Density-Building: Mixed Use, Zoning Changes & Growth Boundaries**

The new knowledge economy reality, fueled by proximity and social media and networking, accelerates the urban “mash-up” of working, living, playing and entertaining in multi-purpose “innovation districts.” A variety of locally controlled policies and protocols can facilitate this new urban design, and in doing so spur the new mobility that services it: Multi-use zoning ordinances and zoning changes; multi-purpose development finance; integrated plans to subsidize multi-purpose density districts; growth boundaries, and travel-cost premiums—all can support the new urban form that is connected by and best supported by new mobility solutions.

**Develop & Share Protocols for Contracts, Finances, Liabilities; Information Sharing & New Mobility Systems**

The auto-dominant and traditional public transport systems have their own rules, forms, and models for finance, contractual obligations, and treating liabilities, that local governments and stakeholders have become grown accustomed to. Change, and the creation of new models, new contractual, and information sharing relationships requires first-movers, experimentation, and emulation. For example, a shared car or bike service that wants to go into a municipality and do business, sharing revenues with the municipality-- needs an agreed upon contract format to deal with revenue sharing and liability issues. Some government agencies open-source their data on transportation schedules and patterns—others do not. The US model in particular works as governments and other jurisdictions emulate established practices that withstand legal and other challenges. Metropolitan government affinity organizations (Municipal Leagues, Mayors
networks) can be one way to share models and propagate innovation in the “how” of new mobility service and business relationships.

Foster Local Mobility Innovation

Foster collaboration among education and research institutions, firms and entrepreneurs, and social media developers and the public – in order to find new “apps” for new mobility, and develop cutting edge technologies, and translate intellectual property into commercial opportunity. Cluster/sector development can be supported by a variety of ways at the metro level—providing data, mapping, affinity group support, accelerators/incubators, providing gap financing and other early stage capital provision, etc. There is need and opportunity for new mobility business incubation, capital access and innovation, to be organized and supported at the metro level, with help from business, economic development, university and public–private facilitating organizations.

Federal Policy for New Mobility Acceleration

What does the federal government and federal policy—with its’ limited blunt instruments of policy, spending and market-making regulation—do to both fuel and define the emerging new mobility market, and its growth at the metro level? Particularly given the fact that the type of top-down national “planning” and coherent strategic framework that supports new mobility development in other countries is not the US pattern, interest, nor ability. Absent national policy to support a carbon tax or significant fuel tax increase—which would be a most potent source of support for new mobility and density building, the federal government should engage in a number of priority activities:

Fund Multi-Modal Mobility

Clearly with its not insignificant role in transportation funding, the federal government can enhance funding for all transportation modalities, including ones linked to non-auto new mobility growth (high speed rail, transit, bike, pedestrian).  

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Invest Metro-Strategically

Further it can more strategically invest any resources it does command—and continue to move away from a broad spreading of transportation dollars against a de-centralized highway and road system—towards a more metro-centric, strategically-framed transportation and infrastructure investment policy, with broad metro-level flexibility to support multi-modal transportation functionalities, including experimentation, as best to meet locally defined economic and community performance goals.

Set State and Metro-Level Goals & Performance metrics

Cities around the globe that are above average in new mobility adoption are characterized by high levels of public transport use, walking and cycling, car and bike sharing; a variety of incentive structures to encourage a reduced auto footprint and enhanced multi-modal split, and penetrated by information and smart system enablers such as smart transport systems, and smart cards. They also tend to have a coherent new mobility strategy. The federal government could require as conditions for federal transportation and related funding:

- Regional strategic plans for new mobility growth, requiring goals and activities to support them around sustainability targets, multi-modal use, health, and other indicators;
- Goals and performance funding for meeting targets as defined in these strategies

A New Mobility “Race to the Top” that Reinforces Mobility Performance “Outcomes” to Meet Clear Goals

A proven federal strategy for incenting policy and practice change at the state and local level, could be a new mobility “race to the top” program, modeled on the success of the Obama Administration’s education initiative, that offered federal financial awards to states (and metros within states) that make changes to conform to a set of new mobility performance goals, outcomes and practices. Such a program might include:

- Incentives for states and metros to adopt and integrate ITS in transportation
- Targets for congestion and emissions
- Funding that supports density, and multi-modal participation
- Funding could foster integration with and across industries (IT and multi-modal)
Share Data & Support the Development of Common Standards for ITS Solutions and Open Data Systems

The federal government, through research, funding collaboratives, and standard-setting, can accelerate the development of common standards for ITS solutions and harmonize standards internationally—to ensure interoperability and an open market for providers—taking advantage of protocols already developed abroad. Providing access to standardized data is also necessary, as the lack of standards for open data currently creates a barrier to scaling and deploying existing solutions. Government can assist by providing guidelines for the structure and format of data, to facilitate more standardized open data. And as appropriate at the federal level—deal with protocols for privacy and liability. In any move toward more open data, government also has to help ensure that the privacy concerns of consumers are addressed.

Funding Basic and Applied New Mobility Research

A traditional and important role of the Federal government is basic research. Social, demographic and cultural issues, trends and impacts around mobility; continuing to push the envelope on what intelligent connected mobility systems of the future could look like and their implications; solving problems around vehicle to vehicle communications, new software and hardware; communications technology, consumer electronics, and software—all are arenas for research support.

Another major federal opportunity, that has succeeded in the past, is to support collaborative Industry-University applied research. The ITS industry needs to collaborate across industry boundaries and pro-actively work with cities, public agencies and other mobility providers to develop new and innovative mobility and integrated ITS solutions. There are precedents for this type of successful collaboration: seeded by the federal government in developing the Internet; in fostering energy efficient engines and technologies in the auto industry; and even in such early mobility enhancing technologies as the development and deployment of “OnStar,” a subscription-based communications system that provides services such as automatic crash response, navigation and stolen vehicle assistance. Onstar was collaboration between General Motors, Electronic Data Systems and Hughes Electronics Corporation, and cellular providers. Similar industry research collaborations around mobility system building and testing, ‘big data’ use, protocols for integrated community wide multi-modal system management; and the like will be essential.
Conclusion

2015 is a bit like 1870 or 1920 -- the whole transportation paradigm is up for grabs; a number of jump balls are being tossed and grabbed, and several games being played simultaneously. Exciting and unnerving, as there are no clear guides for private sector opportunity and public policy supports.

Answers will be found in the interplay of dynamic and courageous private sector innovation, with innovative public policy decision-making that can both lead and shape, or lag and respond to this innovation. US Metros, as several vanguard communities are demonstrating, can seize some of the high ground and lead in the embrace, testing, development and deployment of new mobility solutions—and reap the economic and societal benefits of same. The federal government, within the limits of our fiscally and democratically constrained system, so unlike the strong state solutions coming to bear on mobility in other countries, can provide unique strategic direction, financial support and fertilize this hothouse of Metro-level innovation.

Who knows what mobility will look like 25 from now, but a new form is beginning to take shape very different from that of the auto-centered form of the 20th century. If they are to reap the benefits of new mobility jobs and business growth, communities everywhere, and especially Detroit the “car capital”, will have to lead in shaping this new transportation landscape.
About the Michigan Economic Center

The Michigan Economic Center is a center for ideas and a network of state and local leaders and citizens working to:

Advance a vision for Michigan’s economic renewal;

Provide policy ideas and solutions that realize the vision; and

Engage and support a diverse network of citizens, leaders, and organizations in advancing the vision and making ideas for a more competitive, innovative, and global Michigan a reality.

More information is available at www.MiEconomicCenter.org

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About SMART

SMART at the University of Michigan works globally to accelerate implementation of smart, sustainable, multi-modal transport systems for an urbanizing world and to advance the industry and enterprise that will supply them. It does this through on-the-ground projects and demonstrations; research; education; enabling platforms; and capacity building.

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