New Mobility Hubs in Chennai

Prepared by Raj Cherubal, Janaagraha / City Connect Chennai

Objective

- To pilot integrated urban mobility and accessibility initiatives in Chennai, and developing a working alliance of key mobility and accessibility representatives involving a range of participants, in particular from the private sector.
- To catalyse integrated mobility and accessibility innovation that could both be applied locally and shared or marketed elsewhere.
- To promote smooth, seamless integration of multi-modal transportation system that provides access, mobility and choice for all citizens of Chennai, and hence encourages greater use of public transportation.

Partners in Pilot

The New Mobility Hub pilot in Chennai is an initiative of City Connect, Ford Motor Company and the University of Michigan SMART.

Other private sector organisations that have expressed interest in the pilot, though the exact nature of their participation needs further discussion, are Ashok Leyland, Cisco, TI Cycles, Suvidha Parklift, TVS Electronics and architectural firms.

Our colleagues in Bangalore have formed similar partnerships with companies like Airtel and Honeywell.

The project has also received enthusiastic support from the Secretary of Transportation, Secretary of Highway, Secretary of IT, TNRDC and, MTC. Similarly, in Bangalore, BMTC and other government organisations involved in introducing transport solutions to Bangalore International Airport Limited airport have given their support to our pilot in Bangalore.

Pilot New Mobility Hub in Chennai

Phase I

This phase will complement government's initiative (introduce dedicated bus lanes, company specific charter A/C buses, etc.) aimed at passengers to and from the IT corridor. The pilot aims to initiate pilot feeder services and mobility hubs along the IT corridor for bus and MRTS customers. This pilot will help in the integration of various modes of transport, greatly improve customers' opportunity to seamlessly transfer from one mode to another, especially from MRTS and other vehicles to the proposed A/C and non-A/C buses that will ply on the corridor and thereby increase usage of public transportation.

Rationale for choosing IT corridor

It is estimated by the traffic police of Chennai that solving the congestion and traffic issues on and around the IT corridor will have very positive effect in the overall traffic situation in Chennai.

Many of the cars that clog the streets of Chennai during peak hours are going to or from IT corridor. This is logical since many of the passengers who can afford cars work in and around the IT corridor and travel to the corridor.

Providing alternatives to such passengers, in the form of other customer friendly, yet ecologically friendly modes of transportation, will have profound impact on the quality of life, in terms of traffic and transportation, in Chennai.

Success in this pilot will act as catalyst for solutions in other parts of the city targeted at other passengers from various strata of society.

Proposed solutions in pilot

The following are the possible solutions under consideration:

- MTC will supply A/C buses that will ply on IT corridor. Depending on the demands from the IT companies, these buses will include charter buses operated by MTC.
- Redesign of MTS depots in Adyar and Thiruvanmiyur to facilitate passengers transfer from other modes to A/C buses. These stations would be some of the hubs, among others, where such transfer will occur.
- Pilot team will employ/volunteer with planning and architectural redesigning of these hub facilities to maximize its utility.
- Similar facility at MRTS stations on IT corridor.
- Private feeder vehicles that are customised to the requirement of the passengers. The pilot will help understand the various categories of such passengers and demand for various types of feeder.
- Private initiative in providing rental cycle and cycle parking at hubs. This may include cycle paths that are safe and comfortable for cycle riders who will transfer to buses and MRTS.
- Lift operated car and bike parks at hubs to provide adequate parking facilities while conserving space.
- Pilot wire-free buses and technologies to enable work while travelling. Companies that have employees travelling long distances to their premise may find this very economically beneficial.

Phase II and other proposed solutions

The following are additional solutions to be considered:

- Pilot electronic ticketing using smart cards and cell phones. Such tickets can help share revenue between buses, trains, autos, taxis, share autos, etc.
- One technology already being piloted by our colleagues in Bangalore and Chennai is the use of cell phones to collect passenger movement data. This data can be used to forecast traffic and transportation needs in a dynamic fashion.
- Build intelligence into cell phone systems and integrate it with transportation to provide up to date information to passengers. Such information can reduce waiting time; help take less congested routes; etc.
- Alternate fuel vehicles as feeder and pickup near companies and campuses.
- Sustainable economic model for cycle rentals in and around hubs.
- Adding mobility hub designs and concepts into mall, housing and other constructions in Chennai, especially on IT corridor.

Interesting scenarios for consideration

The following are some scenarios that can be explored and used for developing new ideas and solutions in the pilot:

Koyembedu Solution:

Koyembedu bus depot could be one such hub. As part of the pilot, IT and other employees travelling to the IT corridor from around the Koyembedu area, including

Anna Nagar and Mogappair, could be given lift based car and bike parking solutions in the Koyebedu bus stand. From here they can take comfortable A/C buses all the way to and from the IT corridor, thereby reducing the need for individual private vehicles for the journey.

A full or partial dedicated lane at all time or dedicated lane for A/C buses during peak hours and similar solutions can be explored to ensure that these buses move fast and without hurdles, thereby encouraging more such passengers to transfer to these buses.

Adyar bus depot Solution:
The Secretary of Transportation has expressed interest in exploring newer ways of using MTC facilities in and around Adyar and Thiruvanmiyur bus depots as hubs. Feeder buses and other vehicles could drop passengers at these points where they transfer to A/C buses for the journey on IT corridor.

MRTS (overhead rail) Solution:
MRTS stations on IT corridor could be an ideal hub. Here additionally parking, cafes and other facilities can be provided. Also, these could be drop off points for bus passengers by the feeder vehicles. Passengers then travel in A/C buses along IT corridor.

Alternate Fuel and Cycle Solution:
IT employees who disembark and embark near their companies or campuses can be picked up by other feeder vehicles. Here electric vehicles and cycles could be provided for the short distance trips in and out of the campus.

MRTS and Cycle Track Solution:
As an experiment, land below the MRTS track can be used to provide cycling pathways. These pathways can be illuminated and funded by advertisement and made safe and clean for cyclists. Passengers who use MRTS can park their cycles in secure parking facilities or rent cycles from stalls. MRTS/cycle combination can be greatly useful for passengers who live Adyar area within cycling distance of the MRTS.

Call taxi:
Call taxi and auto services, which already exists in the IT corridor, can be enhanced via cell phone technology, thereby serving passengers who have to use taxies and autos for various reasons.

Pedestrian pathways:
Hubs need to be viewed in a holistic manner. Hence pedestrian access near hubs becomes very important to make hubs user friendly. As part of the pilot, nearby pedestrian and cycle access and pathways can be redesigned for comfort of passengers and pedestrians.

Points to consider

- Scalability; use technology and services already available as much as possible.
- Solution should not be only for rich or poor. But for everyone.
- Solutions should not depend on policy changes.

- Good planning from government and private sector is very important. But Hubs should not solely be depended on long term and mega sized plans.
- Niche markets are the key. For example, different feeder vehicles for different customers' choice.
- Freedom to collaborate and innovate among all stakeholders is key and will be catalyst for multiplying new solutions.

Benchmarks for Success

- Awareness of options & benefits (important in the period before ridership figures show).
- Qualitative responses – Best Practice: Bogota survey.
- Ridership (in particular modal shift).
- Vehicle-Miles of Travel (VMT) reduction (as distinct from modal shift).
- Congestion.
- Accessibility indices (possibly using origin destination stats and place of work figures).
- Air quality (this is over longer term and the tricky part is having a base line).

Links for similar solutions and case studies:
www.movingtheeconomy.com
www.vtpi.org

New Mobility: The Next Generation of Sustainable Urban Transportation

Susan Zielinski

We are on the verge of a transformation in urban transportation called New Mobility.

In a classic 1950s photograph, a scientific looking man in a light suit is dwarfed by a mammoth mainframe computer he's programming. It is unlikely that the idea of a "nanopod" would have entered his mind, let alone mesh networking, GIS, or "Googling." He wouldn't have conceived of the connectivity that a mere half-century later has brought these elements together, transformed the world, and evolved into one of the fastest growing, most pervasive global industries.

Today, we are on the cusp of a comparable transformation for cities called New Mobility. Accelerated by the emergence of new fuel and vehicle technologies; new information technologies; flexible and differentiated transportation modes, services, and products; innovative land use and urban design; and new business models, collaborative partnerships are being initiated in a variety of ways to address the growing challenges of urban transportation and to provide a basis for a vital New Mobility industry (MTE and ICF, 2002).

Connectivity

An early and very successful example of integrated innovation in New Mobility is the Hong Kong Octopus system, which links multiple transit services, ferries, parking, service stations, access control, and retail outlets and rewards via an affordable, contactless, stored-value smart card. The entire system is designed and engineered to support seamless, sustainable door-to-door trips (Octopus, 2006).

A more recent innovation, referred to as New Mobility hub networks, began in Bremen, Germany, and is evolving and spreading to a number of other European cities, as well as to Toronto, Canada (Figure 1). New Mobility hubs connect a variety of sustainable modes of transportation and services through a network of physical locations or "mobile points" throughout a city or region, physically and electronically linking the elements necessary for a seamless, integrated, sustainable door-to-door urban trip (MTE, 2004). Hubs are practical for cities in the developed or developing world because they can be customized to fit local needs, resources, and aspirations. Hubs can link and support a variety of diverse elements:

- multiple transportation operators, modes, and services
- taxis and car-sharing of a variety of vehicle types and sizes
- "slugging" (Slug-Lines.com, 2006)
- free or fee-for-use bicycle sharing (Bikeshare/CBN, 2006)
- walkable, bikable, and transit-oriented spatial design and development (Kelbaugh, 1997)
- cafes and meeting places
- wi-fi amenities
- electronic fare-payment options and pricing mechanisms for all transportation modes and services
- satellite-enhanced, real-time, urban traveler information for all modes of transportation provided at on-street kiosks and by pda

Factors Driving the Development of New Mobility

The evolution of New Mobility is inspired by emerging innovations and propelled by pressing needs, not the least of which is rapid urbanization. Although a few cities are shrinking, especially in the developed world, by 2030 more than 60 percent of the world population and more than 80 percent of the North American population will live in urban regions (UN, 1996). With increasing motorization, traffic volume and congestion are already resulting in lost productivity and competitiveness, as well as health and other costs related to smog, poor air quality, traffic accidents, noise, and, more recently, climate change (WBCSD, 2001).

At the same time, sprawling, car-based, urban-development patterns can mean either isolation or chauffeur dependence for rapidly aging populations, as well as for children, youths, and the disabled (AARP, 2005; Hillman and Adams, 1995; O'Brien, 2001; WBCSD, 2001). In developing nations, aspirations toward progress and status often translate into car ownership, even as the risks and costs of securing the energy to fuel these aspirations rise (Gakenheimer, 1999; Sperling and Clausen, 2002; WBCSD, 2001).

Engineering for New Mobility

The factors described above have created not only compelling challenges for engineering, but also opportunities for social and business innovation. New Mobility solution building is supported by new ways of thinking about sustainable urban transportation, as well as emerging tools and approaches for understanding, implementation, and commercialization. In this article, I focus on three frontiers of thinking and practice for New Mobility: complexity; accessibility; and new business models.

Complexity

Tools for Understanding

A variety of tools and approaches have been developed to support the analysis and modeling of complex urban transportation systems. At least three types of complementary systems analysis (top-down, bottom-up, and simulations) can be applied to transportation and accessibility. Top-down analyses generally start with self-generated variables or hypotheses and develop a causal-loop diagram using software that highlights patterns, dynamics, and possible intervention points. Once a basic analysis is complete, more in-depth data gathering and modeling can be done. Some of the most extensive transportation-related work of this kind has been undertaken by Professor Joseph Sussman at M.I.T. (Dodder et al., 2002; Sussman, 2002; Sussman and Hall, 2004). Figure 2 shows a passenger-transportation subsystem for Mexico City.

Bottom-up, or agent-based, models, are computer-based models that use empirical and theoretical data to represent interactions among a range of components, environments, and processes in a system, revealing their influence on the overall behavior of the system (Axelrod and Cohen, 2000; Miller and Roorda, 2006; Miller and Salvini, 2005; Zellner et al., 2003). Ethnographic research can also be applied to transportation as a bottom-up research tool. By giving subjects documentation tools (e.g., cameras) over a fixed period of time, patterns of behavior can be observed without interference by researchers.
Simulations and scenario-building software can draw from and build upon both top-down and bottom-up analyses. Simulations graphically depict and manipulate transportation and other urban dynamics to inform decision making and identify opportunities for innovation. MetroQuest (2006) is a good example of an effective urban-transportation simulation tool.

Sophisticated Solution Building
Complex transportation challenges call for sophisticated solutions. "Single-fix" approaches (e.g., alternative fuels alone, pricing mechanisms alone, or policy changes alone) cannot address the serious urban challenges and conditions noted above. Informed by complex systems analysis, systems-based solution building involves "connecting the dots," that is, enhancing or transforming existing conditions with customized, integrated innovations in products, services, technologies, financing, social conditions, marketing, and policies and regulations (ECMT, 2006; MTE and ICF, 2002; Newman and Kenworthy, 1999). Sophisticated solution building usually involves multisector interdisciplinary collaboration.
A good example of systems-based solution building is the New Mobility hub network described above. Hub networks can catalyze engineering and business opportunities related not only to the design and implementation of individual product and service innovations, but also to the engineering of physical and digital connections between them.

Accessibility
Over the past 50 years, measures of regional and economic success have become increasingly linked to (motorized) mobility and speed of travel (TTI, 2005). This association originated in the West and has been widely adopted in cities of the developing world. However, transportation is only a means to an end, or a derived demand, so measures and applications of accessibility do not focus on how fast or how far one can travel in a certain period of time. Instead, they focus on how much can be accomplished in a given time frame and budget or how well needs can be met with available resources. For example, on a typical day in Los Angeles, you may drive long distances at high speeds to fit in three meetings. In Bremen, Germany, a more accessible place, you may be able to fit in five meetings and a leisurely lunch,

covering only half the distance at half the speed and for half the price (Levine and Garb, 2002; Thomson, 1977; Zielinski, 1995).

Accessibility can be achieved in at least three ways: wise land use and design; telecommunication technologies that reduce the need for travel; and seamless multi-modal transportation. Among other benefits, connected accessibility options can help address the demographic, equity, and affordability needs of seniors, children, the poor, and the disabled. At the same time, integrated accessibility can help build more adaptable and resilient networks to meet the challenges of climate change and emergency situations in cities. Dynamic and flexible accessibility and communications systems can support quick responses to unforeseen urban events.

The University of Michigan's SMART/CARSS project (2006) is currently developing an accessibility index to compare and rate accessibility in metropolitan regions, as a basis for urban policy reform and innovation (see sidebar).

New Business Models

In a 2002 study by Moving the Economy, the current value and future potential of New Mobility markets were measured in billions of dollars (MTE and ICF 2002). New Mobility innovations and opportunities go beyond the sectoral bounds of the traditional transportation industry. They encompass aspects of telecommunications; wireless technologies; geomatics; e-business and new media; tourism and retail; the movement of goods; supply chain management (Zielinski and Miller, 2004); the design of products, services, and technologies; real estate development; financial services; and more.

New Mobility innovations not only improve local competitiveness and quality of life (Litman and Laube, 2002; Newman and Kenworthy, 1999), they also provide promising export and economic development opportunities for both mature and "base-of-the-pyramid" markets (Hart, 2005; Prahalad, 2004). Because urban transportation represents an increasingly urgent challenge worldwide, and because urban mobility and accessibility solutions can, in most cases, be adapted and transferred, regions, nations, and enterprises that support New Mobility (supply-side) innovation, as well as industry clustering and the development of new business models, stand to gain significantly from transportation export markets in the coming years (MTE and ICF, 2002).

Engineering and Beyond

New Mobility has the potential to revitalize cities and economies worldwide and can open up a wealth of engineering and business opportunities. But obstacles will have to be overcome, not all of them related to engineering. For example, increased motorization and the high social status it represents in developing countries, along with seemingly unstoppable urban sprawl in the West, are challenges that must be addressed on psychological and cultural levels, as well as infrastructural and economic levels. Progress toward a positive, integrated, and sustainable future for urban transportation will require more than moving people and goods. It will also involve the complex task of moving hearts and minds.

Acknowledgments

Thomas Gladwin and Jonathan Levine, University of Michigan, and Moira Zellner, University of Illinois, Chicago (all members of SMART/CARSS), made helpful contributions to this paper. Background research was provided by Sathyanarayanan Jayagopi, a student in the master's program, University of Michigan Institute for

Global Sustainable Enterprise.

SIDEBAR

SMART (Sustainable Mobility and Accessibility Research and Transformation), an interdisciplinary initiative at the University of Michigan in Ann Arbor, is grounded in complexity theory and practice. The goal of the project is to move beyond purely technical and mobility-based approaches to urban transportation to address challenges and opportunities raised by the complex interactions of social, economic, environmental, and policy factors. A project of CARRS (Center for Advancing Research and Solutions for Society), SMART brings together experts on issues, theoretical approaches, and practical and policy applications to tackle the complexity, sophistication, impacts, and opportunities related to urban transportation and accessibility, particularly for growing urban populations worldwide. SMART works collaboratively across disciplines and sectors to:

catalyze systemic and fundamental transformations of urban mobility/accessibility systems that are consistent with a sustainable human future

harness emerging science on complex adaptive systems to meet future mobility and accessibility needs in an ecologically and socially sustainable way and identify "tipping points" to guide the evolution of such systems

inform and develop integrated New Mobility innovation and business models

provide diverse academic opportunities related to sustainable urban mobility and accessibility

contribute to a growing multidisciplinary, multistakeholder, global network of applied learning in sustainable mobility and accessibility

http://bangalore.cityconnect.in/

AARP (Association for the Advancement of Retired People). 2005. Universal Village: Livable Communities in the 21st Century. Available online at: www.aarp.org/globalaging.

Axelrod, R., and R. Cohen. 2000. Harnessing Complexity: Organizational Implications of a Scientific Frontier. New York: Basic Books.

Bikeshare/CBN (Community Bicycle Network). 2006. Available online at: http://communitybicyclenetwork.org/index.php?q= bikeshare.

Dodder, R., J. Sussman, and J. McConnell. 2002. The Concept of CLIOS Analysis: Illustrated by the Mexico City Case. Working Paper Series. Cambridge, Mass.: Engineering Systems Division, MIT. Available online at: http://www.google.com/search?hl=en&q=sussman+%26+Dodder+The+Concept+of+CLIOS+analysis&btnG=Google+Search

ECMT (European Conference of Transport Ministers). 2006. Implementing Sustainable Urban Travel Policies: Applying the 2001 Key Messages. Council of Ministers of Transport, Dublin, May 17–18. Available online at: http://www.cemt.org/council/2006/cm200603fe.pdf.

Gakenheimer, R. 1999. Urban mobility in the developing world. Transportation Research Part A (33): 671–689.

Hart, S. 2005. Capitalism at the Crossroads: The Unlimited Business Opportunities in Solving the World's Most Difficult Problems. Philadelphia, Pa.: Wharton School Publishing.

Hillman, M., and J. Adams. 1995. Children's Freedom and Safety. Pp. 141–151 in Beyond the Car: Essays in Auto Culture, edited by S. Zielinski and G. Laird. Toronto: Steel Rail Publishing.

Kelbaugh, D. 1997. Common Place: Toward Neighbourhood and Regional Design. Seattle: University of Washington Press.
Levine, J., and Y. Garb. 2002. Congestion pricing's conditional promise: promotion of accessibility or mobility. Transportation Policy 9(3): 179–188.
Litman, T., and Laube, F. 2002. Automobile Dependency and Economic Development. Available online at: http://www.vtpi.org/ecodev.pdf.
MetroQuest. 2006. Available online at: www.envisiontools.com.
Miller, E.J., and M.J. Roorda. 2006. Prototype Model of Household Activity Travel Scheduling. Transportation Research Record 1831, Paper 03.3272. Washington, D.C.: Transportation Research Board of the National Academies.
Miller, E.J., and P. Salvini. 2005. ILUTE: An Operational Prototype of a Comprehensive Microsimulation Model of Urban Systems. Pp. 217–234 in Networks and Spatial Economics 5. Netherlands: Springer Science and Business Media, Inc.
MTE. 2004. Bremen and Toronto New Mobility Hub Case Studies and Day in the Life Scenario. Available online at: http://www.movingtheeconomy.ca/content/csPDF/BremenVideoSummaryAug2.pdf and http://www.movingtheeconomy.ca/content/mte_hubAbout.html and http://www.movingtheeconomy.ca/content/ditl.html.
MTE (Moving the Economy) and ICF (ICF Consulting). 2002. Building a New Mobility Industry Cluster in the Toronto Region. Available online at: www.movingtheeconomy.ca.
Newman, P., and P. Kenworthy. 1999. Sustainability and Cities. Washington, D.C.: Island Press.
O'Brien, C. 2001. Trips to School: Children's Experiences and Aspirations. York Centre for Applied Sustainability. Available online at: http://plasma.ycas.yorku.ca/documents/ontario_walkability_study_rep.pdf.
Octopus. 2006. Available online at: http://lnweb18.worldbank.org/External/lac/lac.nsf/Sectors/Transport/D5A576A039A802C0852568B2007988AD?OpenDocument and http://en.wikipedia.org/wiki/Octopus_card.
Prahalad, C.K. 2004. Fortune at the Bottom of the Pyramid. Philadelphia, Pa.: Wharton School Publishing.
Slug-Lines.com. 2006. Available online at: http: //www.slug-lines.com/slugging/About-slugging.asp.
SMART/CARSS. 2006. Available online at: http://www.isr.umich.edu/carss.
Sperling, D., and E. Clausen. 2002. The Developing World's Motorization Challenge. Available online at: http://www.issues.org/19.1/sperling.htm.
Sussman, J.M. 2002. Collected Views on Complexity in Systems. Pp. 1–25 in Proceedings of the Engineering Systems Division Internal Symposium. Cambridge, Mass.: Engineering Systems Division, MIT.
Sussman, J.M., and R.P.. Hall. 2004. Sustainable Transportation: A Strategy for Systems Change. Working Paper Series. Cambridge, Mass.: Engineering Systems Division, MIT.
Thomson, J.M. 1977. Great Cities and Their Traffic. London: Peregrine.
TTI (Texas Transportation Institute). 2005. Urban Mobility Report: 2005. Available online at: http://tti.tamu.edu/documents/mobility_report_2005_wappx.pdf.
UN (United Nations). 1996. Urban and Rural Areas. Department of Economic and Social Affairs, Population Division. Available online at: http://www.un.org/esa/population/pubsarchive/ura/uracht1.htm.
WBCSD (World Business Council on Sustainable Development). 2001. Mobility 2001: World Mobility at the End of the Twentieth Century and Its Sustainability. Available online at: http://www.wbcsd.org/web/projects/mobility/english_full_report.pdf.

Zellner, M., R. Riolo, W. Rand, S.E. Page, D.G. Brown, and L.E. Fernandez. 2003. Interaction Between Zoning Regulations and Residential Preferences as a Driver of Urban Form. Available online at: http://www.caup.umich.edu/acadpgm/urp/utesymposium/publication/zellner.pdf.
Zielinski, S. 1995. Access over Excess. Pp. 131–155 in Change of Plans, edited by M. Eichler. Toronto: Garamond Press.
Zielinski, S., and G. Miller. 2004. Integration Technologies for Sustainable Urban Goods Movement. Moving the Economy and Canadian Urban Institute. Available online at: http://www.tc.gc.ca/pol/en/Report/UrbanGoods/Report.htm.
Bibliography
Burwell, D., and T. Litman. 2003. Issues in Sustainable Transportation. Available online at: http://vtpi.org/sus_iss.pdf.
Jacobs, J. 1985. Cities and the Wealth of Nations: Principles of Economic Life. New York: Random House.
Kennedy, C., E.J. Miller, A. Shalaby, H. Maclean, and J. Coleman. 2005. The four pillars of sustainable urban transportation. Transport Reviews 25(4): 393–414.
Levine, J. 1998. Rethinking accessibility and jobs-housing balance. Journal of the American Planning Association 64: 133–150.
Levine, J. 2005. Zoned Out: Regulation, Markets, and Choices in Transportation and Metropolitan Land Use. Washington, D.C.: Resources for the Future Press.
Sterman, J. 2000. Business Dynamics: Systems Thinking and Modeling for a Complex World. New York: Irwin/McGraw Hill.
Sussman, J. 2000. Introduction to Transportation Studies. Boston: Artech House.