



News of Advanced Transit

ATRA members are encouraged to forward this newsletter to friends and colleagues or post it on appropriate websites.

May/June 2013

BOSTON'S INFRASTRUCTURAL MOMENT

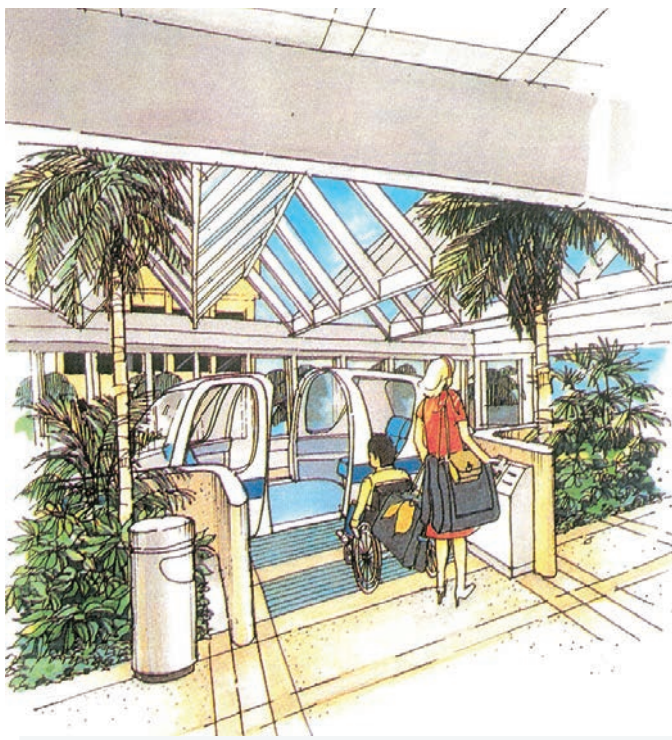
Last April 15 Boston sustained a shock that rocked the nation and the world. It recovered with amazing speed to the ugly loss of four lives and the deliberate dismemberment of over 100 people gathered to celebrate the annual 26-mile Boston Marathon. What is clear is that today is not yesterday. It is time to rethink tomorrow.

Already \$20 million has been donated to assist the victims, and Boston moves on stronger than before. For the city that led the American Revolution at the end of the 1700s, then became the *Hub of the Universe* in the 19th century, and last century evolved into a world research and academic center second. It is time to take a deep breath and explore 21st century transportation policies.

Full Cycle from the 1960s

In the early 1960s when suburbanization was in full bloom, four hours of infamous gridlock forced a top level Boston policy rethink that killed several highway projects and opened Eisenhower's Highway Trust Fund to transit. Eventually Boston built transformative transit improvements and took down elevated highways and transit. Downtown boomed. Suburbs stayed green. Today onerous debt on the MBTA (Greater Boston's transit authority) may bring more cutbacks in service.

Another *Infrastructural Moment* has come to Beantown. Across the Charles River in Cambridge last month MIT held a conference that looked at infrastructural "monuments". "The automobile has stolen our public spaces," declared former Minnesota Congressman Oberstar as he called for better transit around the country. MIT's Center for Advanced Urbanism looks toward "dramatic innovation" with forty-year impacts.



IN THIS ISSUE

San Jose's Mineta Institute.....	3
Uppsala Steps up to the Plate	4
ATRA to San Jose: Think Positively	5
Thinking About Advanced Transit.....	6
ATRA: Reaching for an NSF Grant	6
Sustainable Urban Transportation	7
TRB Summaries	8
What is our POD Future ..	10
ATRA at Automated Vehicle Workshops	10
Airports	11

Boston talent brings grace and color to PRT thinking. – courtesy of Ron Woods.

At the other end of Cambridge, Harvard University is confronted by a need for transport investment to integrate a new campus district with its historic core. Stakeholders south of downtown Boston are exploring innovative means to link the JFK Library and expanding UMass-Boston to regional transit. Boston planners are open to a solar-powered PRT to supplement clunky rail serving core neighborhoods. It seems like a new era is dawning.

A Boston Spring?

This month a series of ATRA and INIST organized Podcar events will think fresh – in the *hypothetical* – about urban mobility. Harvard Professor emeritus Chuck Harris revived his thoughtful interests in the benefits of 24/7 PRT, and calls for one to enable Harvard's expansion on the Boston side of the Charles River. He convened a meeting of the like-minded professionals who organized two seminars on this topic in 2007 and 2009.



Finding fertile ground in 2013, this group has organized a series of events that will stimulate innovative urban policy and private investment in America's *Walking City*, where many people willingly live without owning a car and walk or bike to transit to move about their proud and beautiful city.

With ATRA secretary Kjensmo Walker as a resource person, these public events scheduled for May 16-18 events are:

1. **"Linking JP/Roxbury"** – Several hundred neighborhood activists in Jamaica Plain (known as "JP" – a genteel, walkable section of Boston) are abuzz about a highway bridge project. Key people have hundreds of emails and local resources and expect to attract 50-100 to an event about "future things" like advanced transit. JP like Roxbury - the historically black neighborhood of Boston - feels that transit (a streetcar) has been taken away from them. Roxbury "lost" an old, noisy, el that was moved to the JP border as part of the SW Corridor project. The gathering will learn about PRT's unique planning parameters and explore its use as a distributor along a stretch of the Orange Line.
2. **"If We Network.."** – There are dozens of engineers and urban thinkers scattered throughout the maze of MIT's corridors. One at the Media Lab is a Skytran fan. He has invited MIT people with interest in modal innovation and local connectivity problems to network together. The meaning will focus on classic on-guideway PRT appropriate for metro and intercity markets, resilient in winter. How does this relate to dual-mode transit? If MIT techies can say publicly that modern transit is worth pursuing, might this put pressure on Harvard to innovate? And MIT and Boston University too?

What is the future of intermodalism at Harvard Square?

3. "To the (Columbia) Point" – Columbia Point is a peninsula into Dorchester Bay about 4 miles south of downtown Boston. It is home to UMass Boston, the JFK Presidential Library, the official Archives of the Commonwealth of Massachusetts, an elite Catholic high school, the Boston Globe, and a few other institutional heavy hitters. Columbia Point has severe parking and access problems, and they are intensifying. The Boston Redevelopment Authority is working on plans to redo a major (for Boston) arterial. Hosted by the Dorchester Bay Economic Development Corporation, this workshop will explore PRT to interconnect these institutions and link them all to the Red Line.

4. "Fairmont Corridor" – An old railroad, currently used for limited freight and commuter rail services, runs through the heart of City of Boston (southwest from downtown which is not the center of the City of Boston). The MBTA is adding stations to adapt the railroad to service urban needs, but there is an inherent conflict. With an investment of over \$200 million, ridership is estimated to grow from 800 round trips to 2700. If a franchise were granted to allow solar collectors above the 9.2 mile Fairmont corridor, they could power 100,000 passengers per day. If a Public-Private Partnership were created to collect power, it could run a service almost as a side venture, and sell extra power. This has great green appeal. A workshop will explore this and how PRT branches can bring Fairmont-Lite service to the trip generators well off the rail line.

If you want to participate or support, email lfabian21@gmail.com ASAP. To top off these investigations into sustainable mobility, enjoy a lobster dinner before a Red Sox game while you're here.

Kjensmo Walker

Before traveling to Boston, Kjensmo Walker will head far north to speak to several groups in Anchorage, Alaska to discuss PRT applications for circulation, parking and connection needs of the University of Alaska. She will also speak to the technical staff of the MPO (metropolitan planning organization) of Albany, New York.

She is available to speak in your city in June or July (at no cost to your and local partners). Contact her at kjensmotwalker@gmail.com

San Jose's Mineta Institute: OPENING ACADEMIC INTERESTS

Responding to the growing interest in innovative urban mobility solutions, ATRA this year is reaching out to academic institutions and like-minded organizations to join our exciting advanced transit programs. There are many legitimate questions surrounding the implementation of ATN – from design, engineering and operations perspectives.

The Mineta Transportation Institute is affiliated with San Jose State University in the heart of Silicon Valley. MTI has joined ATRA as an academic organization. MTI specializes in transportation policy studies and workforce development. Leading a consortium of nine universities, it recently won a \$3.5 million grant from the USDOT. MTI is located in a city that has studied in depth an airport application and near Milpitas, Mountainview and Santa Cruz – all with similar interest in superior mobility solutions.

Other universities that have engaged in PRT studies and are thus amenable to ATRA membership are: In the **US**: Kansas State, Maryland, Minnesota, MIT,



San Jose's Mayor welcomed advanced transit ideas at the 4th Podcar City conference in 2010.

Princeton, Southern Illinois, Stanford, UC-Irvine, UC-Santa Cruz, and West Virginia. In **Sweden**: Royal Institute of Technology, Chalmers, Gothenburg, Lund, Stockholm and Uppsala. In the **UK**: Bristol, London Institute of Technology, and Southampton. **Elsewhere**: Auckland (New Zealand), Bologna and Rome) (Italy), Calgary (Canada), Liechtenstein and Warsaw (Poland).

In addition to universities, there are many non-profit and not-for-profits whose interests overlap with ATRA's. Examples include:

- California-based Association for the Study of Peak Oil
- Cleveland-based EcoWatch
- DC-based AmericaWalks
- DC-based Environmental Defense Fund
- Brussels-based Foundation for the Urban Environment
- Colorado-based Rocky Mountain Institute

If you know of others who would benefit from current information on ATN potentialities and might be interested in joining ATRA as academic members (\$500/year), let Stan Young know at seyoung@umd.edu.

UPPSALA STEPS UP TO THE PLATE

Officials in the Swedish university town of Uppsala are convinced that a ten-station ATN network linked to its main rail station is within technological reach and worth the estimated price of \$100 million. The unknowns of the project revolve around the tendering process itself, desired adjustments to and from the affected urban environment, options for public-private partnership and the use of solar energy as the primary power source.

Uppsala is about an hour north of Greater Stockholm, but easily accessible by train from Arlanda Airport. It is a progressive, knowledge-based community with a growing population, soon to reach 200,000. It aims to be a sustainable society of world class.

Financial Commitment

Uppsala has applied for EU funds to assist with these special knowledge-generating challenges of a podcar project. If approved, the European Investment Bank will loan Uppsala about \$1.3 million which must be repaid in full if the project does not move forward. If it is built and, as hoped, service is in place by 2018, then 90% of this loan will be forgiven. In other words, either way the City and Country have made unprecedented financial commitments – something that has not happened in Daventry and Bath (UK), Bologna (Italy) nor other Swedish cities where PRT has



Financial commitment to a well designed PRT in Sodertalje, illustrated here, have not yet been made.

been studied. Nor in US settings -- San Jose, Santa Cruz, Ithaca, Austin, Minneapolis, etc.

Uppsala's master plan calls for a future that is "almost carbon-neutral". One of the goals is to double transit's modal share of total travel from 15 percent today to 30%. The ATN plan will serve Uppsala University, regional medical facilities, a sports arena and sites for new housing, offices and a transportation hub. There are about 30,000 jobs in this district. Half of the 4km network will be two-way, so there are six lane-km, making estimated system cost per one-way kilometer \$17 million.

ATRA TO SAN JOSE: THINK POSITIVELY



Will San Jose think positively about what ATN stations can be? –1990s sketch by Chuck Harris (Harvard GSD) and Ron Woods

Last month ATRA after much internal dialog and debate formally submitted comments to San Jose -- the capital of Silicon Valley -- on two million-dollar reports by consultants Aerospace Corporation and Arup.

Full text of the letter can be seen at advancedtransit.org. In general ATRA applauds San Jose's initiative and is grateful that a public discussion with professional substance on fully automated and networked transit is once again in the public arena for consideration and debate. ATRA wholeheartedly endorses the study's essential findings that ATNs have the capability to provide a superior quality of transit service, with capital costs lower than APMs, and operating costs initially comparable to buses.

However, ATRA also questions some of the assumptions made and is concerned that these have acted as constraints that have unduly influenced some of the conclusions. It appears not all major parties active within the industry have participated, or have participated to the same degree. This has produced unduly conservative estimates and led to the conclusion that ATNs wouldn't be able to handle the peak capacity. Key assumptions of concern are:

- average vehicle occupancy of 1.4
- minimum headway of 6 seconds
- track utilization rate of 50%
- a worst-case scenario with a large contingency for costs

ATRA points out that the fleet size used for the cost estimate was 300, whereas the report indicate that only 100 vehicles are required in initial stages.

ATRA welcomes an open dialogue and will collaborate as an industry representative.

TALKING ABOUT ADVANCED TRANSIT

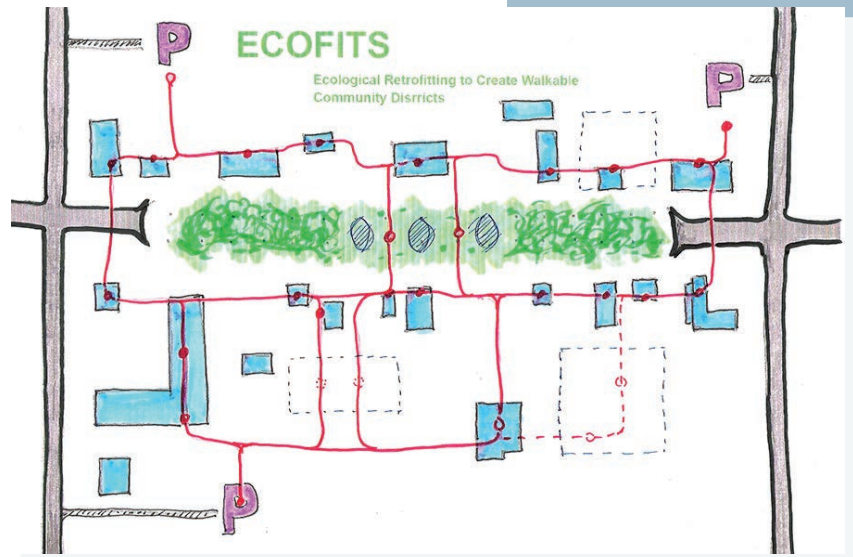
To increase awareness and interest in the feasibility and desirability of advanced transit, what professional groups need to be engaged? Professional groups are different from the general public and elected officials whose scope of thinking is by definition broad. Each profession has its own perspectives, methodologies and vocabulary. Outreach to them should take their specialized thinking into account to be effective. These groups include – but are not limited to:

- Architects
- Car-sharing app developers
- City and regional planners
- Civil and structural engineers
- Construction contractors and unions
- Developers of and investors in real estate

- Distributors and logisticians of cargo
- Facility managers
- Financiers and insurers
- Gerontologists (experts on aging)
- Hotel and resort owners
- Landscape architects
- Mass transit operators

- Parking providers and managers
- Public policy analysts and regulators
- Public safety – police and fire fighters
- School parking and busing officials
- Transport analysts and engineers
- Waste haulers

How can ATN be explained to each group? If you have identified other groups, email lfabian21@gmail.com.



How might civic designers and landscape architects transform suburban retail congestion into whole-some public space?

ATRA: REACHING FOR AN NSF GRANT

Given the enormous advances in automated vehicle and fleet management technology, government officials and private investors are wondering whether there is a better way to manage public mobility. However, the legal and logistical issues of robocars on Interstate highways, other arterials and local streets are immediately overwhelming to auto industry entrepreneurs and highway engineers.

What if “autonomous” vehicles were not part of the Atlantic-to-Pacific Interstate system? What if ATRA selected a campus of a few square kilometers to implement a robocar network? Take, for example, Princeton University and the municipal government of this affluent and culturally rich town. What might result if the range of driverless cars were limited to a manageable scale?

Starting at Princeton?

The complexity of a campus robocar system seems is not overwhelming. Starting



Will robocars cause a rethink of urban traffic management policies?

small and expanding gradually may be the key. It could expand to the county level first, and then to the whole of New Jersey – feeding to rail stations that carry heavy volumes to New York City in the north and to Philadelphia in the south. If Princeton and New Jersey focus on creating public transportation for the 21st century, this could all happen. It's just a matter of due diligence, sound engineering and public consensus.

Construction of a network of simple "low-technology" roadways and off-line stations that would be populated by these evolving automated vehicles delivering on-demand, high-quality mobility between all station pairs 24/7 is possible. The simple guideway is very much smaller and cheaper than normal roadways. Why? Because it serves only small computer-driven vehicles -- possibly different sizes and models, but not large SUVs and personal trucks and certainly not bulky beasts like the semis that regularly ply Interstate roads.

Thinking Through the Business Model

A confined, fine-tuned local network will be more readily certified for automated operation. All vehicles will necessarily have appropriate operational characteristics. There will be no challenging mixing with human-operated vehicles. Network travel would be much cheaper because of volume of the demand – economies of scale.

A generic guideway with a "half-life" of at least 50 years will be able to accommodate an evolution of vehicles, each having "half-life" of 10 years or less. This would allow such a system to get started, improve, evolve and expand.

An NSF proposal on such a concept along with its urban design and mobility enhancement implications could be ATRA's focus.

SUSTAINABLE URBAN TRANSPORTATION

If mankind were to realize the severity of the earth's trend toward greenhouse gas accumulation and implement emergency programs to reverse global warming and foreseeable damage from ice cap melting and rising ocean levels, what might targets for the mode split of large cities be? The accompanying table presents estimates for existing US, European and Asian cities (the three left columns). Ambitious goals for modal balance to our cities are in the right column.

American cities are dominated by cars. Overall transit accounts for 2-3 percent of urban travel. In large transit-oriented cities, a figure of 8 percent is probably high. Walking and biking account for perhaps 3 and 1 percent respectively.

In large European cities, a much larger share – estimated here at 21 and 6 percent



Comfortable walking and sitting places are part of Boston's modal balance.

– of travel is satisfied by foot and bike. Transit is about 25 percent, and cars and other motorized vehicles account for under half of total travel. In Asia, walking might be the mode of half of all travel. Bikes and transit are “guesstimated” at 10 and 25 percent; autos a mere 15 percent.

A Crash Course to Sustainability

If climate weirding and coast flooding compel dramatic governmental programs to change the unsustainable mode splits of American (and most oil-producing nations) cities, what might be achieved? Road pricing policies would be implemented to make car traffic cover its economic and environmental costs. Revenues could be used to expand and improve transit services and walk/bike infrastructure. Car-sharing schemes could expand. Tax and zoning policies would discourage car ownership and “free” parking.

Healthier lifestyles would emerge as people restored walking and biking to daily routines. Neighborliness would reduce crime as the anonymity of driving and parking moved into the margins of urban life. Air quality would improve. PRT networks would put stations within easy access of everyone and provide taxi-like services.

Is this realistic? If we look at current trends, the answer is no. If we assess the dangers of climate disruption and declining oil production with confidence in the ability of mankind to determine its future, a positive response is possible. If world thinking and politics were inspired by Swedish example and advice of the Institute for Sustainable Transportation, a confident “Let’s move forward” would be heard around the world.

GENERALIZED MODE SPLITS (% OF ALL TRIPS)

	US Metro	European	Asian	Target
Walk	3	21	50	55
Bike	1	6	10	10
Transit	8	25	25	30
Car	88	48	15	10
	100	100	100	100

NOTE: Numbers are for discussion purposes only.

TRB SUMMARIES

Ruben Juster, UMD graduation (rmjcar@gmail.com)

Last January’s TRB Annual Meeting presented hundreds of papers. Three were of particular interest to the advanced APM community:

“Last Mile” Shuttle Corridors and User in New Jersey *by Devajyoti Deka and Stephanie DiPetrillo*

Deka and DiPetrillo focused on the characteristics of “Last Mile” shuttle service in New Jersey. “Last Mile” shuttles transport passengers from rail stations to jobs as opposed to “First Mile” shuttles that transport passengers from homes to rail stations. 311 shuttle users were surveyed. They were younger and less affluent than New Jersey’s general population. They also were more likely to be foreign born, a racial minority, and live in a rented and or multi-family dwellings.

Deka and DiPetrillo used GIS and Census information and shuttle route shape files

to understand the geography of the shuttle routes. In one analysis, a half-mile buffer was created on top of “Last Mile” shuttle routes to show the area that was within walking distance of the shuttle routes. This buffer covered about 9% of New Jersey’s census block groups as opposed to 14% for “First Mile” shuttles. 10% of the land within the “Last Mile” buffer was zoned industrial compared to 5% industrial for the whole area.

A Comparative Analysis of PRT as an Urban Transportation Mode

by Reuben Juster and Paul Schonfeld

Juster and Schonfeld modeled a PRT for the Purple Line, a planned light rail corridor in the Maryland suburbs of Washington DC.

The Purple Line is expected to have around 65,000 passengers a day in 2030 and to cost \$2.15 billion for its 16.3 mile, 21-station alignment. The average peak hour travel time and wait time are predicted to be 11.2 and 3.0 minutes respectively. The PRT alternative was modeled with Beamway’s *BeamED* software using 2030 origin-destination data (preferred alignment). The PRT version of the Purple Line is estimated to cost \$820 million. The simulation predicted that the PRT’s average peak hour travel time and wait time would be 9.06 and 0.12 minutes respectively with 1100 vehicles.

Juster and Schonfeld performed a sensitivity analysis to see how changing PRT features would affect system performance. Increasing the maximum speed or decreasing the headway did not greatly improve system performance, but worsening characteristics greatly decreased it. They also found that the PRT has additional capacity to accommodate 150% of the 2030 demand.



Modeling the Practical Capacity of Escalators Using a Rule-Based Microsimulation of Pedestrian Behavior

by Peter Kauffmann and Shinya Kikuchi

Kauffman and Kikuchi suggested a simulation method for computing the practical capacity of escalators. The simulation was governed by four pedestrian behavior rules: how pedestrians queue before boarding escalators, spacing between passengers, whether and how passengers pass slower passengers, and how passengers hesitate while stepping on or off escalators. Two quality performance metrics were used to quantify system performance: pedestrian density and queue length.

Kauffman and Kikuchi first tested the fidelity of their simulator by comparing output with empirical capacity data for downhill, uphill, and fast uphill travel conditions. Downhill and uphill conditions were considered separately because studies have shown that passengers create more room in front of themselves in uphill conditions, thus decreasing the capacity. Their simulation conformed well to empirical data. Next, Kauffman and Kikuchi searched for the maximum flow of passengers that allow passing. Using various escalator belt speeds, passenger aggression, and passenger speeds, the maximum flow that would still allow passing was around 20-40% of the maximum practical capacity. The last case tested was the capacity of the escalator with standing only conditions. The researchers found that the standing only case yielded the highest capacity on average increasing the capacity by of 19% over the controlled conditions.

TRB studies how transportation affects community life.

— courtesy of Ethel Vrana, Ithaca NY

WHAT IS OUR POD FUTURE?

Those who “get” PRT are excited by the significant benefits ATN networks can bring by better linking together our communities with attractive service that is often superior to driving. However, ATRA has trouble articulating a clear future in a way that common people grasp the benefits.

Here are some examples to illustrate PRT benefits to the general public:

Parents would be more willing to let **tots** get around

- without chauffeuring: they could their kid in a car programmed to go directly to a station where a partner is waiting to care for them.

- **Students** would get to and from **school** without clunky yellow buses that spew out carbon dioxide and worse.

- **Senior citizens** would get to satisfy their travel needs without driving or owning a car and without begging for chauffeuring or van services.

- Most **teachers** and staff wouldn't drive to **school**, reducing need for staff **parking**. The same would apply to other employment centers: expectations of free parking would disappear.

- More **goods** and **services** would be delivered without motorized vehicles.

- **Parking** headaches would be reduced everywhere.

- Everyone would get to **train stations** and other regional hubs more easily.

- **Blind** citizens and others with mobility challenges would more easily navigate public transit.

- More people will have **walking** as part of daily life, improving health.

More families would forego the hassles and expenses of owning second (or third) **cars**; some will opt out of the hassles expense of owning one at all.

These are in addition to direct transportation benefits that extensive advanced ATN implementations would bring – reduced street and highway congestion and lower GHG emissions.



*How can podcars
be designed into
urban life?
– based on
Swedish PRT
studies for the
city of Gavle*

ATRA AT AUTOMATED VEHICLE WORKSHOPS

The Transportation Research Board's second annual Workshop on Road Vehicle Automation, the premier multidisciplinary research and policy conference in the field, will take place at Stanford University July 16 - 19, 2013, and ATRA will have a prominent role. The conference will focus on challenges and opportunities related to the increasing automation of motor vehicles as well as the environments in which they operate. Around two-hundred are expected to attend.

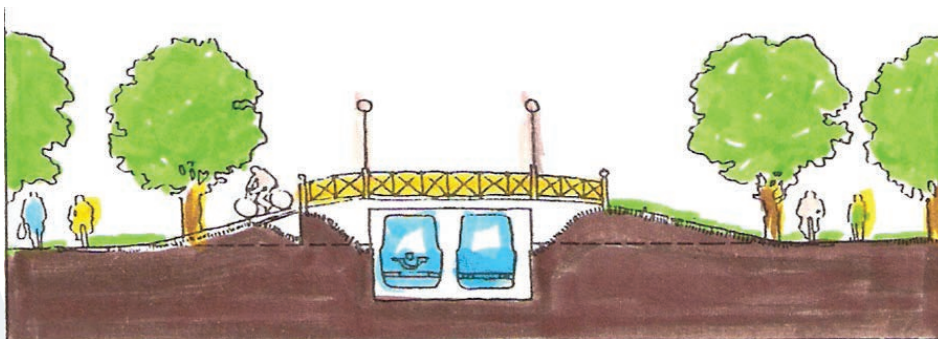
Last year's workshop in Irvine brought 150 key professionals from government,

industry, and academia from around the world to identify research needs in seven areas. This year's participants will build on that work by identifying additional needs and by initiating and advancing research in disciplines ranging from engineering to law to planning. Demonstrations of automated vehicle prototypes and research systems are planned. Opportunities to give direct feedback on the U.S. Department of Transportation's plan for automation research and California's development of automated driving regulations will be presented.

Sessions on testing and certification, infrastructure and operations, human factors and human-machine interaction, energy and the environment, accessibility and equity, public transportation and service models, trucking and logistics, cyber-security, information architecture, risk and insurance, and data ownership, protection are to be held

ATRA members Alain Kornhauser, Shannon McDonald and Stan Young are assisting in organizing the conference, particularly Public Transportation and Service Models. A healthy representation of transit perspectives, including ATN/PRT is expected. Jane Laptin of the USDOT's Volpe Center is orchestrating the program. Check the website <http://www.vehicleautomation.org/home> for details.

In addition, Kornhauser has been invited to speak on transit applications of "connected vehicles" at the ITS-NY meeting in Saratoga Springs June 14 and Rutgers University June 17. ATRA vice-president Ingmar Andreasson is participating in the study of providing dedicated guideways for smart cars that may set standards to sensors, controls and vehicle-to-vehicle communication in Sweden and beyond.



Will at-grade ATN be feasible, as pictured for the Swedish city of Solna?

AIRPORTS

Chicago, Illinois: Long-term plans to create a new western portal to Ohare present "game-changing" development opportunities along a new 25km, \$3.4 billion highway to be built with funds from future tolls and private investments. The APM linking terminals to parking and car rental facilities on the eastern side of the airport is to be extended to the new western terminal. Alstom was recently selected to replace the aging VAL vehicles supplied by Matra in the 1990s before it was absorbed by Siemens. Officials have not announced off-highway means to get to future airfront development on the western front. Have they estimated how many tons of carbon dioxide emissions might be avoided?

New York, New York: The Port Authority plans to partially privatize LaGuardia Airport, which handled 24 million air passengers in 2011 as the closest of three regional airports to Manhattan. Qualifications were received last January and a

RFP to create a “world class” facility will be issued soon. A new \$3.6 billion terminal and new roadways, parking and APM connection to the subway are part of the vision. One of the contenders is a joint venture of ADP (Paris) and TAV (Istanbul).

San Francisco, California: A landside APM feeds to a BART station that serves passengers with stop-and-go service to downtown San Francisco and across the Bay to Oakland and Berkeley. Many prefer at higher cost to take taxis or shuttle services. Six innovative ride-sharing services started luring many app-savvy passengers to ride-sharing schemes, but airport authorities last February issued cease and desist letters claiming that this was “trespassing” without “required” permits raising legal issues of safety and fairness. This portends a new level of competition for landside mobility at airports to counter the limitations of conventional rail and APMs.

Vancouver, British Columbia: There is no airside APM, but the driverless Canada Line is judged to be a “huge success” to serve airport access in numbers that have exceeded forecasts. In 2008 only 3 percent of trips to and from the airport were by transit. Last year, the figure was 17 percent. It is estimated that half of the 4 millions trips per year on the Canada Line are by airport workers.



The aging VAL at Chicago O'hare Airport is getting 21st century colors.