Podcar City 2023 Conference Proceedings: The Future of Automated Shared Mobility

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Overview

Personal Rapid Transit (PRT), also referred to as podcars, automated transit networks (ATN) or guided/railed taxis, is a public transport mode featuring small low-capacity automated vehicles that typically operate on a network of specially built guideways although some systems may be designed to operate at-grade sharing rights-of-way with other surface modes of transportation.

The event highlighted the potential role PRT could have on transportation in the coming decades. The event facilitated a discourse among more than 100 participants from public-sector organizations, private companies, non-governmental organizations, and educational institutions. Government, industry, and academic thought leaders presented and participated in panel discussions with the audience about the opportunities and challenges growing and scaling PRT/ATN systems.

The event addressed three key goals:

- Supporting industry and institutional readiness and capacity building to plan and prepare for PRT;

- Convening the public and private sectors on issues impacting the planning, management, growth, and adoption of PRT; and

- Identifying potential policies, standards, and research needs that could support PRT.

Key insights from the event include:

- The critical importance of developing standard terms and definitions that can be used by the public and private sectors;

- The need for institutional champions to be stewards of PRT projects;

- Potential opportunities for PRT to provide users personalized, on-demand, and sustainable mobility strategies in a variety of contexts;

- Potential opportunities for PRT to provide operators right-sized transit operations with lower capital and operational costs;

- The importance of standards development organizations (SDO) and a stable regulatory environment to foster transportation innovations;

- The role of public-private partnerships and scaling to support sustainable business models and expedite project delivery;

- The need to integrate PRT, both physically and digitally, with other modes of transportation;

- Challenges engaging underserved communities to understand and identify the mobility gaps that PRT might be able to serve; and

- Challenges with education and outreach on what PRT is, and how it could potentially benefit communities and local governments.

PRT is an emerging technology. As contemporary demonstrations come online, more research may be necessary. This synopsis covers findings and discussions from the event. The event commenced with opening remarks from Matthew Lesh, Spectrum Mobility. Following opening remarks, the day's agenda included three panels in the morning, lunch and keynote speakers, followed by four panels in the afternoon. The event agenda is provided as Appendix A.

Opening Remarks

The event opened with remarks by Matthew Lesh of Spectrum Mobility. He discussed the importance of leveraging automation to address critical challenges confronting society. As emcee, Lesh provided an overview of the agenda. Lesh introduced Christer Lindstrom of INIST and Dave Muyres of Streetscope. Muyres asked Lindstrom *"How do you view today's transportation landscape? Do you think we have arrived now that everyone has begun talking about electric vehicles and batteries?* Lindstrom emphasized that its not about what you do (i.e., the technology) but the way you do it (i.e., shifting from private vehicles to public transport). Muyres discussed the importance of showcasing the future of transportation at the upcoming 2028 Los Angeles Olympics. Opening remarks were concluded with a welcome by San Jose Mayor Matt Mahan who welcomed participants to the event. Mahan emphasized the importance of developing transportation technology and policy strategies to encourage sustainability, a high quality of life, and address population growth in the coming decades. Mahan also discussed a few ongoing and planned initiatives such as the electrification of Caltrain and the BART to San Jose Airport connector.

Session 1: Thought Leader Roundtable

The first session of the program featured a thought leader roundtable moderated by Karen Philbrick of the Mineta Transportation Institute at San Jose State University. The panel included Dave Muyres of Streetscope; Frederick Federley, a former Parliamentarian of the European Union; and Christer Lindstrom of 4Dialog.com. Philbrick opened the session by discussing the importance of diversity and having a plurality of voices build community support and address the nation's mobility challenges. Philbrick explained that transportation is a critical infrastructure and lifeline to opportunity connecting communities, places, and people. Muyres discussed the importance of actual and perceived safety. He explained that perceived safety is one of the factors limiting the adoption of automated vehicles today. Muyres concluded by reminding the audience that they are not designing transportation for themselves, but rather for future generations. He said what inspires and motivates the next generation might be very different than what inspires and motivates travelers today. Lindstrom also discussed the importance of designing for safety, in addition to

sustainability. Federley joined the panel virtually and discussed how mobility is a cross-cutting issue impacting the economy, sustainability, energy efficiency, ecology, urban planning, housing, and industrial policy. Federley emphasized the importance of taking a wholistic perspective and challenging the idea of what a comfortable life means. Federley said a key political challenge is that people tend to emphasize the current state rather than would life could be. Federley also discussed the importance of democratic leadership, and Europe and North America being aligned to lead transportation policy in the future. Following speaker presentations, the audience asked the panel about the interface between humans and automated systems. Lindstrom explained that he believed placing automated transit systems on guideways could help address some of the safety concerns that have been observed between pedestrians interacting with automated vehicles in a complex urban environment. The audience also asked the panel about how to bring together technologists and policymakers together to advance emerging technologies.

Session 2: Automated communities for a new mobility

The second session of the morning included a panel on automated communities for a new mobility moderated by Krystal Harris of the Atlanta Airport Community Improvement Districts. The panel included Brian Stanke of the City of San Jose; Stan Young of the National Renewable Energy Laboratory; Steve Ruger of the City of Trinidad; Kiet Dinh of the Jacksonville Transportation Authority; and Jim Davis, former Vice Mayor of the City of Sunnyvale. Harris opened the session by discussing three basic human needs: 1) food; 2) shelter; and 3) clothing. She explained that these basic needs are difficult to obtain if you don't have reliable mobility options to get to jobs. She talked about the transit deserts that limit access to available jobs. Young discussed the Department of Energy's interest in energy efficient mobility systems research. He discussed the mobility energy productivity metric, and the need to quantify travel time, cost, and energy. Young explained that mobility is defined as "the quality of a transportation system to connect people to goods, services, and employment that define a high quality of life." Stanke discussed the potential for automated transit systems to reduce costs and expand service coverage and frequency in transit deserts. Ruger discussed transportation and planning policy changes occurring in Colorado, such as the push for more accessory dwelling units (ADUs) and increased density near fixed-route transit. Ruger explained that these policy changes have the potential to increase traffic and parking demand, but also can create opportunities to support transit where it may not have been viable previously. Dinh discussed Jacksonville's plans to build the Ultimate Urban Circulator (U2C) comprised of 10-miles of automated transit service. He explained that the goal of the first phase is to enhance equitable, accessible, and frequent service to connect two parts of downtown Jacksonville. Dinh explained that the second phase will modernize the city's skyway system for automated vehicles. He explained that the third phase would comprise of neighborhood extensions to enhance transit accessibility. Davis discussed the transportation challenges taking public transportation between Sunnyvale and San Jose. He explained that podcars enable travelers to go direct from origin to destination rather than making frequent stops like taking a bus or a train. The panel also discussed the importance of physical and digital integration to enable multimodal travel.

Session 3: Vendors and Automated Transit Networks (ATN). What? How? Why? Who?

The final session of the morning included a discussion of the vendors of automated transit networks (ATN). This session was moderated by Peter Muller of the Advanced Transit Association (ATRA) and included Mark Seeger of Glydways, Alexander Kyllmann of Modutram, Jeral Poskey of Swift Cities, and Kiel Clasing of Oceaneering. Muller discussed six key features of podcars including 1) driverless or automated operation; 2) dedicated guideways; 3) offline stations; 4) small vehicles; 5) onboard switching (resulting in close vehicle spacing); and 6) elevated guideways. He explained that these characteristics can enable a system which has a smaller infrastructure footprint with less waiting passenger waiting and stopping than traditional fixed route rail and transit services. He also discussed the network effect created by increasing the number of stations, ridership, and fiscal efficiency. Muller concluded ATN is unknown, misunderstood, and unproven which is currently limiting its growth. He said these limitations could be overcome through a real-life demonstration, such as the planned pilot in Trinidad, Colorado. Seeger discussed the importance scaling ATN and funding it through farebox revenue. Kyllmann discussed the technology elements that enable ATN, such as the driverless vehicles, charging and battery packs, vehicle and fleet control systems, and passenger management systems. Poskey discussed the challenges of getting people out of cars in a cost-effective way for real estate developers to afford in a suburban context. He explained that the benefit of elevated cable ATN systems is that they can be elevated above ground without the high cost and complexity of surface and underground transit systems. He also discussed two upcoming pilots planned in New Zealand and in the Dallas-Fort Worth region. Clasing shared an example of an at-grade ATN system offered by his company. During the discussion, the panel discussed the speed and capacity of their ATN systems. The panel also discussed traveler safety, potential ridership, infrastructure costs, and business models of planned ATN systems.

Lunch Speakers

During the lunch hour, Muhammad Amer of the American Society of Civil Engineers (ASCE) presented on ASCE's Future World Vision. He provided some brief background about ASCE and explained that the Future World Vision was initiated to develop deep research about how cities might look in the future through scenario-based planning. He explained that the Future World Vision includes five products: 1) city concepts (i.e., concept papers covering different built and climatic environments); 2) a megacity digital model; 3) virtual reality (VR) guided tours; 4) an online course; and 5) an IMAX movie. This presentation was followed by remarks from Mark Seeger of Glydways. Seeger explained that Glydways provides personalized rides enabled by six key characteristics: 1) small vehicles; 2) small and flexible infrastructure; 3) small build costs; 4) personal rides; 5) demand-responsive service; and 6) small operating costs. He explained the challenge with traditional fixed-route transit is that the operator is paying to move around empty seats because of their relative inability to right-size fleets to actual travel demand. He also talked about planned projects to connect San Jose's Mineta International Airport to the Diridon Train Station and the East Contra Costa County transit connector to provide first- and last- mile connections to Bay Area Rapid Transit (BART). Seeger concluded by emphasizing the importance of the customer experience when designing podcar systems.

Keynote Speaker

The lunch speakers were followed by a keynote from Gerald McDowell of the ATL Airport Community Improvement Districts. McDowell explained that personal rapid transit presents an innovation solution to address the growing urban transportation challenges of the 21st century. McDowell presented a roadmap for the successful implementation of PRT systems in global cities. To be successful, McDowell explained that its critical for PRT to physically and digitally connect with existing public transit systems and intermodal passenger facilities. McDowell said that it will be vital to engage the public and a broad array of stakeholders such as policymakers and transit authorities. He also explained that the deployment of PRT will require a phased approach through early demonstrations to demonstrate institutional feasibility and build public adoption.

Session 4: Regulatory Issues

The first panel of the afternoon explored regulatory issues with ATN and PRT. This panel was moderated by Iris Yuan of Lea+Elliott and included Jim Davis, former mayor of Sunnyvale; Sam Lott of Automated Mobility Services LLC; Jeral Poskey of Swyft Cities; Peter Muller of the Advanced Transit Association; and Blake Barber of Glydways. Yuan opened the panel by discussing the growing interest in ATN and PRT by municipalities. Lott discussed the fiscal constraints of local governments and the difficulty of funding new transportation systems from the municipal perspective. Lott discussed the American Society of Civil Engineers growing interest in ATN and the role of industry standards. Poskey and Barber discussed the importance of technical standards and regulations to ensure safety and encourage industry growth. Muller explained that standards are needed to grow and scall larger scale ATN systems. Barber mature regulation and regulatory stability can help the private sector introduce innovative and emerging technologies. The panel also discussed the importance in innovating procurement processes to enable PRT. For example, agencies can issue a request for proposals for innovative transportation technologies in which more than one vendor can be selected. The panel also discussed the potential of having a bench of approved technologies and vendors that can enable sole source procurement later in the process. Finally, the panel discussed the potential for unsolicited proposal processes to support the procurement of transportation innovations.

Session 5: Financing and Project Delivery of Automated Transit

The next panel included a discussion of financing and project delivery moderated by Christer Lindstrom of 4Dialog. Panelists included Laura Fingal-Surma of Urbanist Ventures; Lisa Firmender, a certified grant writer specializing in transportation; Mike Thompson of Plenary Americas; and Brian Gettinger of Flatiron Construction Incorporated. Firmender explained that grants will typically not be able to fund an entire capital project. However, she explained that grants can be an important tool to help projects get started, and for the public and private sectors to leverage funding. She also emphasized the importance of tailoring transportation strategies to the unique needs of individual communities. Finally, she discussed the importance of demonstrating climate and equity benefits to qualify for many grant programs. Thompson discussed the opportunities and challenges of public-private partnerships, and the role of bringing developers, builders, and technology providers early in the process. He also discussed the importance of having an institutional champion within cities. Gettinger discussed the importance of having financing partners who will operate a system in the

event a technology partner goes defunct. Fingal-Surma discussed the importance of marketing prospective projects to build public support. The panel also discussed the importance of starting small by connecting critical origins and destinations, and then slowly building a network following early wins. Panelists concluded with a discussion on the importance of changing the perception of public transportation to build ridership and demand for both ATN and other forms of transit.

Session 6: Planning and Research

The third panel of the afternoon explored planning issues and research needs to support the development of PRT and podcars. This panel was moderated by Todor Stojanovski of KTH Sweden cities and urban morphology. The panel included Joerg Schweizer of the University of Bologna; Steve Raney of Swyft Cities; Stan Young of the National Renewal Energy Laboratory; Robert Hilbrich of Eclipse Simulation of Mobility Systems (SUMO); and Steven Jones of the University of Alabama. Stojanovski discussed the human perception of the urban environment and streetscapes. He also discussed the importance of investing in active transportation alongside podcars. Schweizer talked about Bologna's evolution from streetcars to buses to trams/light rail. Sharing research from Europe, Schweizer explained that PRT offers potentially a more cost-effective strategy to cover a larger geographic area. Raney talked about the importance of leveraging PRT to create a "mega transit-oriented development" to eliminate short car trips and create first- and last- mile connections to regional rail systems. Young talked about the need for a roadway for only automated vehicles and the digital infrastructure to enable this future. He also talked about using a public utility business model for this new infrastructure. Hilbrich explained that due to the lack of greenfield development, innovative mobility concepts must align with what's happening in the cities today. He explained that digital twins can help model how innovative mobility concepts, such as PRT, will impact mobility in cities. Jones explained that there is latent demand for transportation, particularly in small and rural communities which have often been left behind. He also talked about the importance of engaging communities, and in particular underserved populations.

Session 7: Concluding Remarks - Youth Projects and A Look Forward

The final session of the day was moderated by Ron Swenson of the International Institute of Sustainable Transportation and included concluding remarks, youth projects, and a look toward the future. Speakers included Burford Furman of San Jose State University; Greg White of Solar Skyways; Kevin Nishinaga of Transit Control Solutions; and Douglas Kamoga of Urbanscape Design Associates LTD and Envision Ride Student Program – Uganda. Furman discussed the vision for PRT at the San Jose State University (SJSU) campus. He discussed a computational aid for solar ATN planning developed by a Jack Fogelquist, a former SJSU student. Furman also discussed a recent Mineta Transportation Institute study which sought to understand if solar could power an ATN and what the user experience would be like. White shared a video and discussed the prototypes under development from Solar Skyways. Nishinaga talked about the scalability of ATN in the context of system speed and capacity. Nishinaga explained that the capacity of a system increases as headways (or the amount of time between two podcars) goes down. Kamoga discussed The Students For Future Mobility, a global program by Envisionride to promote sustainable innovation in public transportation and related issues. He explained the program helps students idealize, design, present, and realize future mobility concepts. Kamoga shared some of the visions developed by student teams, and explained that sustainability, safety, and scalability are crucial in order to grow and mainstream PRT and ATN systems.

Acknowledgements

About the Authors

Adam Cohen served as the rapporteur for this conference proceedings. Adam is a Senior Researcher with the Mineta Transportation Institute of San Jose State University. He chairs the Transportation Research Board Standing Committee on Innovative Public Transportation Services and Technologies (AP020).

This report can be accessed at

MTI is a University Transportation Center sponsored by the U.S. Department of Transportation's Office of the Assistant Secretary for Research and Technology and by Caltrans. The Institute is located within San José State University's Lucas Graduate School of Business.

Appendix A. Event Agenda

8.30 – Welcome and Housekeeping – **Matthew Lesh**, Spectrum Mobility

8.50 – Event Kickoff – **Christer Lindstrom** INIST and Dave Muyres, Streetscope

9.00 – Welcome to San Jose – **Matt Mahan**, Mayor of San José

9.30 – "Thought leader roundtable" – Moderated by **Dr. Karen Philbrick**, Executive Director Mineta Transport Institute

Dave Muyres, Chief Commercial Officer and Co-founder, Streetscope

Fredrick Federley, Former Parliamentarian, European Union (Virtual)

Christer Lindstrom, CEO, 4Dialog.com

10-minute break

10.20 – Introduction to Krystal Harris by Matt Lesh

10.22 – ATC – "Automated communities for a new mobility" – Moderated by **Krystal Harris**, Program Director AACIDs ATL Airport Community Improvement Districts

Brian Stanke, Project Manager for Diridon to Airport Connector, City of San Jose

Stan Young, Research Scientist, National Renewable Energy Laboratory (NREL)

Steve Ruger, City Manager, City of Trinidad

Kiet Dinh, VP of Automation and Innovation, Jacksonville Transportation Authority

Jim Davis, former Vice Mayor, City of Sunnyvale

15-minute break

11.30 **"Vendors and Automated Transit Networks (ATN). What? How? Why? Who?"** – Moderated by **Peter Muller**, President, Advanced Transit Association (ATRA)

Mark Seeger, Founder, Glydways

Alexander Kyllmann, CEO, Modutram

Jeral Poskey, CEO, Swyft Cities

Kiel Clasing, Business & Product Development, Oceaneering

12.30 Boxed Lunch & Expo – Glydways, Exhibitors, Lunch Speakers

Lunch VIP Speaker –

Mark Seeger, Founder, Glydways,

Muhammad Amer, Managing Director of the Transportation and Development Institute and Future World Vision, American Society of Civil Engineers (Virtual)

1.48 Introduction to Gerald McDowell by Matt Lesh

1.50 – Keynote Speaker, **Gerald McDowell**, Executive Director, ATL Airport Community Improvement Districts

2.15 – "Regulatory Issues," Moderated by **Iris Yuan**, Senior Associate, Lea+Elliott

Jim Davis, Former Vice Mayor, City of Sunnyvale

Sam Lott, Automated Mobility Services LLC

Jeral Poskey, CEO, Swyft Cities

Peter Muller, President of ATRA

Blake Barber, CTO Glydways

15-minute break

3.20 – **"Financing and Project Delivery of Automated Transit,"** Moderated by **Christer Lindstrom**, 4Dialog

Laura Fingal-Surma, Urbanist Ventures

Lisa Firmender, Certified Grant Writer Specializing in Transportation

Mike Thompson, VP Project Development at Plenary Americas

Brian Gettinger, VP of Product Development Flatiron Construction Inc.

4.15 – **"Planning & Research,"** Moderated by **Todor Stojanovski**, Ph.D. KTH Sweden cities and urban morphology

Joerg Schweizer Assistant Professor, University of Bologna

Steve Raney, Systems Planner, Swyft Cities

Stan Young, Research Scientist, National Renewable Energy Laboratory (NREL)

Robert Hilbrich, Group Manager, Eclipse Simulation of Mobility Systems (SUMO)

Steven Jones, Interim Executive Director, Alabama Transportation Institute, University of Alabama

10-minute break

5.25 – "Concluding Remarks - Youth Projects and A Look Forward," Moderated by **Ron Swenson**, President, International Institute of Sustainable Transportation

Dr Burford Furman, Professor, San José State University

Greg White, Engineering Project Manager, Solar Skyways

Kevin Nishinaga, Senior Systems Engineering, Transit Control Solutions

Douglas Kamoga, Principal Director, Urbanscape Design Associates LTD and Envision Ride Student Program – Uganda