E-Mobility as a Service:

A conference sponsored by
Agrion: A Global Network for Energy, Cleantech and Corporate Sustainability

Conference Outline:

This conference, held on June 26th, 2012, in San Francisco, explored the notion that current developments and trends in technology, demographics and social software networks are impacting how residents of certain major metropolitan areas are approaching the means by which they are getting around their city or region. The current transportation models have evolved into a dichotomy between the private automobile on the one hand and publicly funded and operated transit systems on the other.

Invited panelists & moderators at the conference were, in order of presentation, as follows:

- Jessica ter Schure: Principal, Nelson/Nygaard [Moderator – Panel 1]
- Peter Albert: Manager - Urban Planning Initiatives,
  San Francisco Municipal Transportation Agency,
- Elliot Martin, PhD: Research Engineer,
  UC Berkeley Transportation Sustainability Research Center
- Shelby Clark: Founder and Chief Community Officer, Relay Rides

- Therese Tierney, PhD: Associate Professor,
  University of Illinois at Urbana-Champaign [Moderator – Panel 2]
- Wade Bryant: Design Manager of the Strategic Vision Team, General Motors Advanced Design Center, Warren, Michigan
- Gerry Tierney: Senior Associate, Perkins+Will, Architects
- Ben Feldmann: Senior Associate, Mia Lehrer & Associates, Landscape Architecture

The conference was structured into 2 panels, in which each panelist made brief presentations, following which was a question and answer period. This conference summary is based upon the presenter's transcripts and the Q&A session that followed for each panel. In addition, over lunch there were "Start-up Showcase" presentations featuring Roadify, Local Motion and Zimride.

Introduction:

In keeping with Agrion's mission to "connect thought-leaders and executives, spanning a wide spectrum of industries and sectors, within and across borders, for the purposes of business development, education, idea-sharing, and networking", most of Agrion's meetings deal with a relatively high level of specificity, however every now and then it is useful to take time to pull back and look at broader, more contextual, issues.

This conference is one such meeting and as such, one its goals was to look at scenarios situating some of Agrion's members "market areas" (for example Electric Vehicles, Smart Grid and Energy Efficiency & Green Buildings) in the context of emerging developments related to vehicle technologies, social media and demographic changes in society. By offering the opportunity to hear from a diverse panel of speakers representing public planning agencies, academic transportation researchers, mobility providers and innovators, the auto industry as well as urban designers and architects, the potential impact that these emerging developments may potentially have on urban design and the public realm was examined.

As we plan for the future of electric vehicles and smart cities it is essential to broaden the discussion beyond the sustainable vehicle community, beyond the OEM's, to include the broader realm of stakeholders such as public policy planners, researchers, the urban design and planning community as well as the general public, who are most definitely stakeholders, as they are the ones who have to live with the decisions being made.

The "E-Mobility as a Service" conference builds upon the "AGRION Smart Cities Symposium" held in March 2012, which highlighted some of the work being done to transform urban centers into data-driven, integrated cities where green building, sustainable transportation, and renewable energy generation all comes together. This conference also builds upon UC Berkeley Transportation Center's "Sustainable Mobility and Cities" conference, held in February 2012, which set out to address Housing, the Economy & Transit.

What is meant by E-Mobility as a Service?

Current developments and trends in technology, social media and demographics are impacting how residents of major metropolitan areas are approaching the way they get around their city and region. These developments are challenging the current model, based as it is, on the dichotomy between the private automobile and publicly funded and operated transit systems. So one of the questions that needs to be addressed is, must this dichotomy continue or is there a middle ground, perhaps a more nuanced approach to urban mobility, regarding its physical as well as operational and planning aspects?
Another question to consider is sustainability? If our vehicle usage could be made more efficient, could we look at reclaiming the public realm from transportation related uses, such as roadways and parking lots, and give it back to the city users? If we look at contemporary North American and emerging Asian cities, we experience a public realm favoring transportation modes over the city user and pedestrian.

And what if the means of urban mobility, the way we get around our city, was to become more ubiquitous and "back-grounded" in much the same way as other essential utilities like water or electricity are. What if mobility simply became a "service" that we regarded in much the same way we regard water when we turn on a faucet or electricity when we turn on a light switch? How would that impact our relationship to the automobile, public transit, the public realm, sustainability and the city itself? Can mobility simply become a service or utility?

The mobility planning decisions made by OEM's, public agencies and policy makers have long-term impacts on how we use and experience our cities. Maybe it's time we broadened this discussion to reflect the diversity of realities, experiences and priorities that go into make-up of a successful contemporary metropolitan area.

Ultimately these mobility-planning decisions are quality of life decisions, and it is within this context that this conference's proceedings were situated.

Panel 1: Existing urban mobility, trends and data

Panelists & Topics:

Peter Albert: Manager - Urban Planning Initiatives San Francisco Municipal Transportation Agency

- Existing Infrastructure & Agencies:
  - · The role of public transit & agencies in a multi-modal system
  - · Is there a role for public / private partnerships?

Elliot Martin, PhD: Research Engineer, UC Berkeley Transportation Sustainability Research Center

- The impact of shared use vehicles: The Real Data
  - · What other mobility models could this lead to?

Shelby Clark: Founder and Chief Community Officer, Relay Rides

- The Future of Car Ownership:
  - · The private automobile; its integration into a mobility system for the City
  - · Is there a future for devolved ownership and what could this lead to?

Moderator:
Jessica ter Schure: Principal, Nelson \ Nygaard Consulting Associates

Peter Albert: Manager - Urban Planning Initiatives San Francisco Municipal Transportation Agency

Introduction

This is a great opportunity to talk about how the public sector can do things differently and I think that is one of the main themes of this conversation. I work for SFMTA and I am in an unusual role. It is a pioneering role to have a transportation planner in the mayor's office of economic development. What I really do is facilitate large projects that are significant to San Francisco and really push the envelope for what San Francisco

does. I try and round up the right transportation people because the projects move too quickly and the transportation agencies are sometimes too preoccupied with running a service or with liability issues that it is hard for them to think about getting ahead, and being a part of the urban infrastructure that we need them to be in.

In my development role I have worked in the planning department and in the private sector. It surprises me how people view the general plan as something that could be a threat. When we lay out a general plan for a city, people need to remember that we are not trying to put a limit on what people might do because we are afraid that they will ruin the city. We are actually inviting developers to join us in building a vision of what a city should be. That is a theme that we have not emphasized enough in San Francisco.

Municipal Development

One of the challenges is that we have a negative legacy in America. Americans generally do not like cities. I think we are getting to like them better, but if we think about the typical fears that Americans have about density, congestion, or the loss of privacy, in many ways, this is what the city offers. However, we have designed cities for the last century to avoid embracing the idea of living close to each other and living a very public lifestyle. The state of our world, however, requires us to think differently.

With energy being such a critical issue the way it is, the demographics of the people moving to America expecting a different life are such that they are used to urban lifestyles and density. We are ready to look at the city in a different light. The cities that understand this are the cities that thrive. If you look at the cities that are doing well, especially after this hard economic cycle, it is the cities like Boston, New York, Washington DC, or San Francisco that are drawing people to them. They are the cities that actually survived the foreclosure challenge to the best degree.

We like to think that we are doing things well in San Francisco. We have the risk of being complacent, however, because to be a leadership city you cannot sit on your laurels and tell everyone else to be like you. It is a dynamic world, a changing world, and we have to stay ahead of it to be competitive.

Future Development in San Francisco

Where would we like to be in San Francisco? We like a pretty place. A big part of our economy is that we attract tourists from all over the world because we are pretty to look at. I could not emphasize the point more by looking out the windows here.

We like a walkable setting. It is interest how much walkable environments end up being the decisive factor on the value of real estate. We are getting more into the realm where a walkable environment is a desirable environment. In terms of clean air and clean streets, those are two of the things in the last 50 years that America has made terrific progress on. We have clean up the quality of the environment so that it is a healthy place to live. The healthy economy is something that we obviously want and a variety of people is what makes a city dynamic. Variety is not just your background, but it is your age, abilities, and experiences. This is why people want to be in a city. It is because they are exposed to people who are not like themselves.

We often talk about the four 'E's – Environment, Equity, Economy, and Esthetics. The esthetics is the urban design factor that really makes a city compelling. In this

conversation we look at land use not just as part of a accommodating the economy, but land use as part of a transportation solution. When we provide parking, we are actually consuming land. When we put a building in a location relative to the sidewalk, we are making a land use decision that directly effects how people approach that building. A city that is a healthy city is one that understands that and is a city that understands the importance of transportation as mobility, access, and choice.

Legacies from Past Developments in San Francisco

San Francisco is close to where we want to be, but we are still not there. Some of the challenges that we face in San Francisco are the politics and the regulatory environment. We still work with planning code sections that were developed in the 1970s, and even the 1950s. We have got to start hacking away at those. We have parking requirements that do not respond to the needs of the urban environment and we have developer and lender expectations. We might have the right idea for a great development type, but unless the developers and lenders are comfortable financing that type, it is hard to make those developments happen. There has been a lot of progress in the last ten years, but I can tell you the very conversation about parking becomes stymied by a cautious developer or lender.

In the public sector, we tend to work based upon the premise that developers are bad and that we have to be careful about working with them and accepting their help. We need to change that. For too long we have been doing things as a public sector on the public sector's back, with the public sector's dollars, and without being strategic or leveraging private dollars as best we should. The private sector has its' own fear, which is that working in the city is a quick sand bog. This goes back to regulatory concerns and the public process. How do we get past that?

If we want to make everyone more confident that we want to build a city that we like, we can do a lot with data. Analyze and present the data that shows that a prototype works, and you measure the experience that you have had. If we measure carefully the performance of transportation or a building, we need to be careful that what we are reviewing is actually the right kind of indicator. One can make a lot of mistakes measuring too many indicators and misinterpreting what they say. We need to be clear and simple about what it is that we are analyzing as we watch developments.

I worked at BART (Bay Area Rapid Transit) for seven years. When BART first came on the scene it was criticized in years two, three and four for not achieving its potential. Today, we could not imagine the Bay Area without BART. We tried to a couple of weeks ago when there was a fire near the tracks that shut down half of the system. It shows us that being premature in assessing how well infrastructure links us to the city is damaging. It is also important to remember that time can be our friend. To make sure that people understand the role of good development, smart development, and transit oriented development, we need to be strategic about what ambassadors we promote.

There are great examples of transit oriented development and there are not so great examples. If we put a good example out there and have people tour it and if they see that people can walk to services, or that density can be a good thing, then that helps them become comfortable in accepting that kind of development. If we put the wrong ambassador out there, people will run the other way.

For instance, in the 1960s people were afraid of the 'Manhattanization' of San Francisco. Well, Manhattan is a pretty nice place and if we really challenge people on what their notions are, they may say they want one thing and not another. We educate the decision makers to be a bit more subtle and sophisticated in how they are thinking and what decisions they are making. Decision makers include the Planning Commission and the Board of Supervisors in my work. I am pretty happy to say that with the major developments that have been approved in San Francisco, they are a pretty educated and sophisticated group.

We need to reward risk takers. Even in my agency, people who do something that has never been done before are scared because we are a transit agency and are often sued. If an agency is afraid of being sued for doing something different they are not going to do anything different. We need to think about the role of nurturing that kind of entrepreneurialism. With all of those, we can hold hands and jump because that is how we make progress.

If we are afraid to jump, we have to ask ourselves what would happen if we did not. To that I want to remind everyone that time can be an enemy. If we wait too long, get all of the agreements in place, and everything looks good, and then hem and haw, the coalitions and consensus that made the development seem right will fall apart. The project I am going to take you through really pushed the envelope.

The Park Merced Development

The Park Merced Development in San Francisco was a major project that I worked on just last year. We were successful in getting a significant amount of development in the southwestern part of San Francisco, which is a relatively low density, conservative part of the city. We got the community to support the project, and the developers to do the right kind of thing, by engaging and educating the community as to what the issues were. We worked with a smart developer who knew what quality lifestyle and transit oriented development could be and we asked our public agency partners to be more nimble and a bit more creative.

To get to the point where all of these people could agree we had to define what the conditions of the Park Merced environment were. Once we figured out that 19th Avenue, which goes right up against the Park Merced boundary lines, would only become more congested if we did nothing, it set the right tone. We worked with amenities from the developers to see if they would find a way to make 19th Avenue and the whole project work better and then we looked at what could come that would be bigger and better than that one development. With that, we locked down the agreements for the direction that we wanted to go.

The 19th Avenue Study showed that it would get more congested, even if we did nothing. The trends were worse for pedestrians, for transit, and for commerce. Making it clear to everyone that the street in 30 years would be worse than it is now and how the developer's investment could make the transportation system work better unlocked a lot of apprehension from the community, the lenders, and from the city.

We talked about Tiers 1 – 4, which are layers of development that might happen. Each successive layer has its own infrastructure that they would underwrite. Then we got to Tier 5, which assumed that the Park Merced development was approved. Based on that

assumption we asked what we could do with the next big project, which includes San Francisco State University and the Stonestown Mall, to make this section of the city work better. Working with those three neighbors we got an idea of bike sharing, car sharing, shared public ways, and alleys for pedestrians. SFDPW (SF Department of Public Works) felt a little unsure about supporting the alleys, but they went ahead and approved this kind of concept.

We worked with transportation demand management and worked with the Home Owners Associations to make sure that everyone owning a condominium in Park Merced was paying for and getting a transit pass. This is a new concept in San Francisco and was another goal we achieved. We are managing parking to have less of it where there would be more transit ridership and we are using the transportation network itself to underground the M-Ocean View street cars that come into Park Merced. This will dovetail underneath 19th Avenue, not interfere with vehicle flows, serve the project, and get out. This is one piece of the overall decisions that everyone can be excited about. Even looking at something like shuttles as a gap closer until the transit got there was another key tenant to the agreement.

We locked down these agreements with the developer and the developer said they would be willing to pay for 100% of the new transit realignment for the neighborhood, and use their $60 million as a local match for the much bigger and better vision for rethinking the streetcar. That is the next big picture that we hope to get to. Thus, we have the developer on the hook to pay 100% of the transit, but if we partner with SFSU and the Stonestown Mall to take the entire street car line and do something more important with it than just bringing it into this one development, it will have greater impact for the community.

Because of this, we score brilliantly with the federal government in terms of having a strong private sector match for making the project happen. We locked down those agreements, but we allow the developer flexibility. If we drag our feet, he will proceed with building the streetcar line the way that he envisioned it. If, however, we get everyone else onboard and we can really rally the funds for the bigger and better project, he is onboard for that.

Building Partnerships

These are some promising ideas about that partnership. Technology ends up being incredibly important. We can do a lot with transit, with sidewalks, and we can do a lot with better streets. The technology helps people make smart choices, which frees them of so much uncertainty. This includes real-time information, and what a difference that would make on MUNI.

If people can walk out to a bus stop and see that the next bus is coming in the next 4 minutes instead of 40 minutes, they can then be sure that they will not miss their bus. Smart streets that understand signals, busses, and who is using them are important. Even SF Park is a smart street concept of a monitor in the street that tells you when a parking space is occupied or not. Giving people real time information about on street parking is a major advance.

Trip planning is another area to develop. I worked on the America's Cup Project. They will be developing an App so that people will be able to stand on the waterfront and

know whether the cabs are coming, what the bike share availability is, when the transit lines are arriving, etc. These are some ideas for technologies, but one thing that I have learned is that we have to look at tourism.

San Francisco is a fundamentally an attractive tourist city. Tourists tell us so much, but we never listen to them because they come, spend their money, and then go. What is it that they like? What is it that they suffer through? We are so focused on the commuter at SFMTA that we actually need to pay attention and listen to a lot of people who are paying our bills in order to understand how urban design impacts the overall picture.

We should also use transit-oriented development differently. It is not just about putting a lot of people at the transit oriented stations downtown, it is managing development up and down a streetcar line or a subway route, so that we have a lot of trains going the reverse commute that there now is a development at the end of that reverse commute. This will make sure that those trains are full in both directions. BART has done a lot with that and I think that SFMTA can do more.

Conclusion

We need to focus on mobility and choice. We cannot keep beating people over the head and say that they should take transit. We have to understand that they want choices and that they need mobility. Transit is part of an overall healthy infrastructure, but only part. We need to develop the partnerships that will get us well beyond what we can do alone.

Think of the Park Merced example. The developer certainly got what they wanted, but the developer was more than willing to sit down with us and work with two other neighbors, and the community, in order to envision a much better part of San Francisco that none of us would have been able to build without the partnership.

Elliot Martin, PhD: Research Engineer, UC Berkeley Transportation Sustainability Research Center

Introduction to Car Sharing

What is car sharing? Individuals access vehicles by joining an organization that provides access to cars on a shared use basis. In doing so, the individual gains the benefits of vehicle ownership without the costs of vehicle ownership. That is the primary motivation for these services being provided. Why would anyone join? Vehicle ownership is expensive and it is especially so in cities. Most of the costs associated with owning the vehicle are generally fixed. There is one major variable cost that everyone pays attention to, which is fuel costs, and there are a few other variable costs like depreciation and maintenance. People do not change their driving behavior based on the maintenance and depreciation costs, but they will for the fuel costs.

The important rational to explain is that when people own a car they have sunk in most of the cost that they will be paying for that vehicle. As a result of this, their marginal cost is less relevant to driving, and therefore they drive more. Car sharing provides automotive access while unleashing the fixed costs of vehicle ownership and changes them into variable costs. That is the big economic hook of what car sharing does at any given level. Most users pay monthly membership for car sharing, or on a per hour/mile

used rate. These costs vary based on the company, membership plan, application fee, and deposit. Critically, users usually do not pay for gasoline, insurance, maintenance, or the depreciation of vehicles. Thus, it changes their relationship to the costs of owning a vehicle.

Emissions Study

In terms of the study, we looked at the impacts of car sharing broadly in America. This was done through a survey of the members of 11 major car sharing organizations in the United States and Canada. The survey itself was done in the late fall of 2008 and we analyzed the data over several years. The survey was designed to evaluate the Green House Gas (GHG) emissions change that was associated with car sharing use. It was conducted online in a before and after evaluation of travel lifestyle. This survey was coupled with the operational data from the vehicle to evaluate the full impact of car sharing.

The unit of analysis in this study was the household. We consider that to be important because when a single person starts to use car sharing it can affect the travel behavior of the entire household. A single person deciding to shift their behavior may cause a vehicle that is being used by one person in the household to shift to another person in the household. That sort of shift in the household is important in order to evaluate what is happening overall in the household.

We do not ask questions about the individual. We ask questions about the overall household. That can change depending on which model of car sharing we are evaluating. For example, if one is evaluating college car sharing, you are going to have to consider the household to be a bit different because households do not necessarily share vehicles. The households change very rapidly and they do not share income. Thus, the travel behavior of one member of the household is not necessarily going to influence that of the other.

In the case of neighborhood car sharing, which was the focus for this particular study, it is more of a household unit of analysis. Thus, we look at the whole picture in that respect. Our sample size in this study was 6,281 households. Some select units of measurement include changes in vehicle miles traveled, total change in vehicle holdings within the household, and change in travel behavior.

Car sharing simply allows people with cars to live with fewer personal automobiles. That is the sustainable transportation side and the reduction side of the equation. At the same time, car sharing allows those who do not have cars to drive more. Thus, there is this dichotomous direction of change and there is an open question as to whether giving people without cars access will encourage them to use the service instead of transit and what the impact of that is.

There are also people who do not have cars, who might need a car, and then join car sharing instead of buying a car. Thus, you have a household that joins car sharing and appears to be driving more, but in fact the impact of car sharing being available allowed them to drive less. This is because if they had bought a car they would be driving more. This is an important aspect to evaluate when measuring the impacts of car sharing. What is the overall effect of these populations joining car sharing and how can we measure it? The observed impact is one thing to look at.

Observed & Full Impacts

Looking at the observed impact, there are different effects based on what type of population is using car sharing. One population joins car sharing, gets rid of their car and uses that solely as their mode of transport. This includes them using car sharing in lieu of other modes of transport. In doing so they are driving less. This is what we would call the observed impact. We can measure this decrease in emissions because we can see it. At the same time there are other people who are car-less, and they join car sharing, which increases their emissions. This is a visible increase in emissions that can also be seen.

There is also the full impact. We take the same person who joins car sharing and we see them increasing their emissions. We also have to consider what that person would do in the absence of car sharing. If in the absence of car sharing they would have acquired the vehicle and emitted a greater amount of emissions with that vehicle, then there is a net decrease in emissions. This is the full impact; it is the avoided emissions associated with the emissions that would have happened in this alternative future. It is a mouthful, but it is a real effect.

Overall, car sharing does lower overall GHG emissions. But, most people who join car sharing do increase their emissions. Within this dataset it is a true statement to say that a majority of people who join car sharing are driving more. But, on balance, those that reduce their driving do so at magnitudes greater than the overall emissions associated with car sharing.

Looking at a graph of the distribution of annual distance traveled in car sharing vehicles by car sharing members, it shows that the distribution drops off very quickly. People who drive car sharing vehicles do not put a lot of miles on car sharing vehicles. The amount that they drive in these vehicles is generally less than 2,000 kilometers per year. That is far lower than the traditional or typical driving distances of most Americans. Reviewing a graph of total household distance traveled in personal vehicles and the shift in habits after joining car sharing reveals that the miles driven drops considerably. There is a large shift towards zero miles driven on their personal vehicles.

When someone joins car sharing, what is the overall change in annual green house gas emissions associated with taking the net effect of their personal driving and their use of car sharing driving? Looking at a graph of the observed impact, there is a spike of people who are increasing their emissions by a very small amount. They are within a range of 0 - 0.25 metric tons of emissions for the observed increase. There are some who do increase their emissions; however the number of people doing that drops off precipitously from the spike.

Looking at a graph of the full impact, when we take into account what people would have done otherwise; there is a more considerable shift towards negative. Some of those people that we observe increasing their emissions are actually decreasing their emissions. This leads to the statement that most of the people joining car sharing are increasing their emissions. But, if we actually account for and add up the emissions that people are increasing, we get a different picture.

This different picture is the overall impact that is observed. Looking at the emissions change that is observed, the amount of people decreasing their emissions is larger than

those who are increasing their emissions in both the observed and in the full impact. In terms of the average change in emissions, the average reduction for the observed impact is 0.58 metric tons per year. The average full impact is 0.84 metric tons per year. This is the average across the entire sample. This change is statistically significant, under a variety of assumptions and stresses to the data.

Ownership Demand Impacts

Moving on to look at how car sharing impacts vehicle ownership demand, there is a change that can easily be seen in a graph. There are many non-car sharing members who are joining car sharing, and as a consequence they get rid of a vehicle. We classify that as a vehicle shed. We also have to consider those people who have no vehicles at the time that they join car sharing, which means that there is no vehicle shedding to be observed. Then, at some point later in life, those people may transition to a state in life where they need a vehicle, but since they are a member of car sharing there is no vehicle being shed. In this case it is a vehicle avoided. This is where the survey aspect of the study and the survey aspect of the evaluation are very important.

We have to ask people what they would have done otherwise, or what they need now, in order to be able to measure the full and complete impact. Looking at a matrix of what people did, in terms of owning vehicles, from where they started and where they ended up there are some key things to note. The first is that the majority of people who join car sharing do not have a car beforehand.

In our sample, there were 3,686 households that did not have any cars to begin with. There were also 1,250 households that transitioned from one car to zero cars. That is the largest component of translation within the data. Most people go from one car to no cars. The second largest move in the number of vehicles is two cars down to one car. There is action elsewhere, but these are the highlights. Some other key aspects to observe include the large shift observed where 62% of households joining car sharing had no cars, and within the sample 80% of the sample had no cars. Therefore, car sharing allows most people to transition to a car-less existence.

As part of the data, we asked the participants to provide the year, make, and model of their vehicles if they had any. We then took that information and mapped it our using the EPAs fuel economy database in order to see what the aggregate fuel economy is for the vehicles they were driving. We then evaluated that in the context of vehicles shed and also vehicles added. We also asked the participants what model of vehicle they used most often when using car sharing. In our sample there is a large spike for the Prius and the Honda Civic Hybrid.

A key question that was answered was what the average increase in fuel economy that people experienced was when they started car sharing. That increase is about 10 mpg per household. Looking at the average age of the vehicles shed, they were around 8 – 10 years old, but there were also older and newer cars shed as well. There is a difference between the US sample and the Canadian sample in this statistic. The Canadian sample had slightly older vehicles. The overall average is more skewed because some very old vehicles were shed, but the median age is about 11 years.

In terms of estimating the aggregate impact, we estimate that each car sharing vehicle replaces about 4 – 6 vehicles and in terms of overall vehicles, it replaced 9 - 13 vehicles. This means that 4 - 6 vehicles are gotten rid of for every car sharing vehicles that is put

out there. When we also account for the vehicles that are avoided, it increases to 9 - 13 vehicles removed.

Car Sharing Travel Patterns

I also want to look at some presentation data about travel patterns and car sharing. Respondents to the survey answered questions about how their travel behavior changed. We collected things like home and work location because those data points are very important in ascertaining how people travel and we also wanted to understand what their commutes were. We were able to determine the distance of their commutes and then categorize them in that fashion.

One thing that we discovered about people using shared use vehicles is that they have shorter driving distances to where they work than that average population. The results of the survey show that people who are more prone to adapting to a shared use lifestyle have a shorter distance to get to work. This distribution is remarkably stable across regions. We had an excellent distribution of regions in the survey, and the distances traveled are on average the same for the eastern parts of the US and Canada as they are for the western parts of those countries. The high level point is that in the data there is a net neutral to a slight decline in transit use associated with car sharing. We found that overall, however, that non-motorized transportation and transit use increased.

For example, one of the big winners from this shift is biking and carpooling. The major components of the shift are that people share rides more or use bicycling/walking to a greater degree. We did find that overall in the shift from motorized to non-motorized travel that there were more people shifting towards non-motorized travel than there were shifting to it. We also found that there were more people reducing the number of days they commute by automobile than increasing them.

The Next Stage of Car Sharing: Peer-to-Peer Car Sharing

Peer-to-Peer (P2P) car sharing is one model of car sharing that allows people to share their personal vehicles. It allows people to get into the business of car sharing through a particular operator. People can set the price for sharing their vehicle and earn money with the P2P operator. This is an interesting dynamic because it really opens up car sharing to a much wider geographic and population scope, in terms of joining and using car sharing. It has the real potential to influence how car sharing networks grow and are utilized.

One of the most fascinating aspects of what P2P car sharing may be able to do, and we will see as it grows, is that it allows car sharing to go places where it traditionally has not gone. It can exist in cities, but it also has the versatility to exist elsewhere. Car sharing in rural areas is not something that we often think about because car sharing is not going to establish itself there as a major network. But, with P2P car sharing it is possible that people can spontaneously generate their own networks. That kind of versatility, in terms of network growth and opening up car sharing to a much greater diversity of vehicles has a huge potential.

Conclusion

In conclusion, overall car sharing does lower GHG emissions and the demand for household vehicles in cities. Car sharing is shifting people into more efficient vehicles

and car sharing increases the use of non-motorized modes of transport in cities. Lastly, P2P car sharing has the capacity to expand the diversity and geographic scale of car sharing into new regions.

Shelby Clark: Founder and Chief Community Officer, Relay Rides

Introduction

Thinking about the future of mobility, when I was growing up as a child of the 1980s, one of my favorite movies was the *Back to the Future* series. In *Back to the Future II*, the character Marty McFly goes into the future to 2020. There he has a pink hover board to move around on. As a young kid seeing this, my imagination went wild and I started to think about what transportation will be like in the future. Are we going to have hovercrafts and jet packs, or maybe some awesome gold wing corvette limos? Since we are getting closer to 2020, what is mobility actually going to look like as we close in on that date? I am going to talk about what mobility means today and how it is changing. What are some of the recent trends and what does the future of mobility look like? When I talk about the future of mobility, I am talking about the ten year horizon.

Relay Rides

To give you a little background on myself, I founded a company called Relay Rides. Relay Rides is the world's first P2P car sharing marketplace. We spend a lot of time talking about car sharing, but Relay Rides differs in that we do not own a fleet of vehicles. Instead, we are a marketplace for car owners to rent out their own vehicles when they are not using them personally. The car owner sets the price and the availability. The average car owner makes $250.00 per month, while providing convenient and affordable transportation to people in the neighborhood, which makes it easier for people to live without a vehicle in their neighborhood. Relay Rides provides insurance to make the transaction safe and a marketplace to make everything convenient.

Mobility Today

I want to start out by talking about what mobility means today. Like any good researcher, I started out on Google, and apparently Google thinks that mobility is electric wheel chairs and strollers. At least that is what came up on a Google image search. In reality, mobility to most people means lots of cars and driving, particularly in America. Right now there are 260 million cars on the road in the United States. If you are counting, that is more cars than there are drivers, at 1.2 cars per driver. That is outrageously wasteful in my opinion.

Even with that many cars, we do not use them very much. The average American car is driven less than one hour per day, and therefore sits idle 92% of the time. Personal vehicles and driving are a major driver of GHG (Green House Gas) emissions. Thus, this is wasteful on an economic front, and an environmental front, and it is really a harmful pattern that we can hopefully start to get away from. Fortunately, some recent trends are leading people away from driving.

The biggest shift that we have seen recently has been the rise in what has been called the 'sharing economy' or 'collaborative consumption'. At the heart of this is the concept

that access to goods and services can be better than owning them. We have started to see this really grow and accelerate over the last few years. The first services for sharing began popping up about a decade ago.

Netflix is a name that everybody knows. The founder of that company realized that people do not care if they own the movie; they just want to watch it. Thus, they made it really convenient to get that content into the consumer's hands. Zipcar really took car sharing, in the United States at least, from this niche concept and into the mainstream. It really became a hip lifestyle choice to be able to access a vehicle as an alternative to owning one.

Some recent trends that we have been seeing have been these sharing platforms becoming P2P in nature. Relay Rides is an example of that and so is AirBnB. AirBnB is a P2P accommodation website where basically someone can become a host of a bed and breakfast. You can rent out some of your personal space – anything from a couch to a bedroom, to a castle. There are literally castles that you can rent out on AirBnB. Neighbor Goods is another good example. You can rent out anything that you have lying around your house. Popular items are things like tools, stepladders, or power drills. These are things that you have that are relatively expensive and are sitting around your house 99% of the time. Thus, making it easier to access these goods, as opposed to needing to own them.

We are also starting to see a lot of new mobility options. The more mobility options there are, the easier it is to get away from traditional car ownership. Zimride is a ride sharing service, which is essentially enabling car pooling between people who were previously strangers that is convenient and efficient. Bike sharing is the world's fastest growing form of transportation. This is essentially providing bikes on-demand to people scattered throughout a city. For a lot of people this makes biking a new mobility option if they did not have a bike before.

Scoot has been called the Zipcar for scooters. If biking or walking is not feasible, it is great to be able to access some sort of motorized form of transportation. Maybe you do not need a car or parking is really bad. Having access to a moped can provide that motorized access with something that has a better GHG footprint. UBER is one of the newest sites that we have seen. This is an on-demand black car (limousine) service. Users can pull up this App, press a button, and in less than five minutes a black car is going to come and pick you up. It is incredibly expensive at well over twice the cost of a taxi, but it is easy, fast, and reliable.

This is perhaps the most interesting example for me because it is growing very rapidly and what it says is that people are willing to adopt a new mobility option. In fact, they are hungry for it and they are willing to pay almost outrageous prices for it. Thus, it really says that the market is ripe for new mobility options.

Some of these new models are allowing alternative mobility to reach into areas they would have never been able to before. Traditional car sharing models, like Zipcar, where a company owns and maintain a fleet of vehicles, are extremely expensive to run. They can only operate in a handful of dense urban areas that are really well served by public transit. Those are the only areas that can have the demand to maintain high utilization rates that can support traditional car sharing.

In the P2P model, we do not have those overhead costs. Thus, by leveraging cars that are already on the road we can start to work anywhere. This past March we launched nationwide and we now have cars in almost every state across the country. Literally from Juno, Alaska to the tip of Florida we have cars. It is interesting to see car sharing work in these areas. We really feel that we are democratizing car sharing and making it possible for anyone who wants the benefits of car sharing to have it in their neighborhood in less than five minutes.

Fortunately, all of these mobility options and trends are already leading to a decrease in driving. We do still have a long way to go, but we are getting things off to the right start. Historically, there has been a steady increase in the number of vehicles on the road since World War II. The first time we saw a decline in the number of vehicles was in 2006 and it has plateaued since. Along with that, there has been a decrease in the total amount of driving. We still have a long way to go and these new options are starting to yield some benefits.

Mobility in the Future

What does this mean for mobility of their next ten years? The future of mobility is about having access to the most efficient transportation, when and where you need it, and at an affordable cost to you and the environment. Much to my eight year olds chagrin, I do not think that hover boards are going to be a part of the equation right now. At some point they might, but it takes many years for entirely new modes of transit to be invented and proliferate. The immediate future is more about platforms and applications that allow us to better utilize some of the modes of transit and making them available to people in more places and at more times.

A couple of the key words I wanted to touch on were 'access' and 'efficient'. With 'access' it is really important that it is real time, dynamic, and reactive to the conditions. Thus, what is the weather like? What is the traffic like? My needs are going to be different, so having options and platforms that make it convenient and easy to know what is happening right now are important. One of the most interesting things that I think we have seen is public transit data becoming open. We can now see where public transit is at and if it is on time. That makes it more reliable for riders, and therefore a more viable option. The more that we can integrate different types of transit in real-time the more attractive those options become. I may be a bit biased, but I do think that the future of mobility is in it being highly shared.

Efficiency

Having access to more types of cars in more places is a major benefit, also. All too often we see a single person driving a large SUV. That is incredibly wasteful, but if that same person had access to a smart car or a Prius, those are more appropriate for them and it is a lot cheaper in terms of both the vehicle and the fuel. Thus, they would have that for their everyday usage and then the SUV for the few days a year they do need to carry abound six kids and a dog they would be able to access that SUV. Mobility is becoming increasingly connected so that there is a two-way dialogue between us, modes of transit, and objects. We are seeing this with real-time transit data that is being directly provided from those modes of transportation.

Relay Rides recently created a partnership with General Motors, which we are getting very close to launching. What we did was a technology integration with GMs OnStar

technology. Thus, a GM car owner can sign up and link their OnStar and Relay Rides accounts. Then, whenever you walk off from your car, you can unlock it with a text message or an App for another member of relay rides. Thus, we are interacting directly with the vehicles. We are sending messages to the vehicles and the vehicle is sending us the information, in terms of location and trip data. That kind of connectivity is reducing trip friction from the experience, making those vehicles more accessible and making those options more available.

The other thing I want to talk about is 'efficiency'. It is very important that we have a personalized transportation mobility App. so that you and I, based on our preferences, where we live, and some of the things that we own, can search for the same route and get different transportation options. Also, whenever you factor in real time data, it is very important to know that the same route is not always going to give you the same options. Making sure that we have the right information for the right people is going to lead to the most efficient form of transportation.

Autonomous Transportation

The last thing that I wanted to talk about is that we are going to start to see things becoming more and more autonomous. The Google Self Driving Car is a reality today. It has already logged hundreds of thousands of miles and it is already legal for a car to drive completely autonomously in Nevada. This legislation was passed last year and is already in effect. The way that it works is that the car actually gets a license instead of the person. This is already happening and is being tested out of the streets of Nevada.

Imagine if you could walk out, press a button on your phone, and your car would come and pick you up. The average American spends 52 minutes a day commuting. What if you could take that time and make it into something productive? You could read, do work, text message, or whatever it is you want to do. Whatever it is, it is making things way more efficient and smarter.

Also, it will make things a lot safer. The most unpredictable thing in a car is the human. Thus, if you can automate that and take that unpredictable variable out, it becomes way safer as well. There was an article in an insurance journal in May, 2012 talking about what happens to insurance when cars do not crash anymore. 1.2 million people die every year from car crashes and this is a huge step forward in helping to prevent those.

The way that I can see this happening is by having platforms and applications that tie in all of these different concepts together. Thus, when I wake up in the morning, my calendar knows that I have an appointment in Palo Alto and it pulls together the transportation options and looks at what the traffic and weather are like at that moment, and then it takes those into account with what my preferences are. It understands that I could be optimizing on environmental impact, cost, and/or time. If I am not in a huge hurry today, maybe I am optimizing on environmental impact. The program takes a look at all of the options and then strings them together in multi-modal form, because it is going to be the most efficient based on what I am trying to optimize for.

Q&A Session

Multi-Modal Apps

Question from Peter Dempster (BMW Group): *"I am wondering if the multi-modal application that you were describing for the America's Cup is going to be just for that event, or is it something that will continue after the event concludes?"*

Peter Albert (San Francisco Municipal Transportation Agency): "The whole idea about this multi-modal App is to pilot things that could have a legacy beyond the America's Cup. The particular App itself has not been selected. We have had a bunch of people proposing to provide that service, but the City is very interested in things that go well beyond 2013."

Comment from Moderator Jessica ter Schure (Nelson\Nygaard): "That would be a really good tool from a larger transportation/land management perspective as well. The integration that SFMTA, the County Transportation Authority, the Planning Department, and what the Department of the Environment is doing to get the right balance are important things."

Peter Albert (San Francisco Municipal Transportation Agency): "The last slide that we saw from Shelby's presentation, where the person is deciding to take Zimride to Cal Train to bike sharing, that choice is driven by the information that you get. If that becomes the efficient and intuitive choice, and the App is helping you make that decision, you get a Zimride and use Cal train because there is an accident on the 101. The bike share you already know is available. The problem with real time information is that if you do not have it, the bike share might be taken and Cal train might have a delay. Thus, I think that the App is the glue that holds that whole trip together."

The Next Step in Multi-Modal Transport

Question from Paul Stith (SUM - Project Green Onramp): *"Going to multi-modal integrated transport, how do you see your personally owned vehicle in a multi-mode? Say you live out further and you need to make that transition, how do you see the Apps evolving? How do you see the junctions and charge points at rapid transit stations, and so forth?"*

Shelby Clark (Relay Rides): "If you do have a car, P2P car sharing is certainly a link to that. There are a couple of things that will be required. One is the availability of multi-modal options. If you live in San Francisco there are a wealth of options. You could certainly imagine driving your electric vehicle, or driving your vehicle in general, to the train station. You could maybe drive 5 – 10 minutes, leave your car at the train station, take the train into the city, and maybe use a bike share to make it the last mile to work.

"Meanwhile, your car is sitting at the train station. Hopefully, that could become a multi-modal leg for someone else. Someone else coming down the peninsula could take the train down and find your car that is sitting there. The hours your car is available is set in advance. The person can then drive off in your car. So, you are making money and it is becoming more affordable for you to own that vehicle and to get from your house to the

train station. At the same time, you are providing a new transportation option to somebody else."

Dr. Elliot Martin (UC Berkeley Transportation Sustainability Research Center): "One thing that I can reflect on in my own experience, since I live in the northern part of the SF Bay Area in a town called Petaluma, is that up there the transit options are limited. I had been accustomed to living in the East Bay but upon transitioning to the North Bay, I still wanted to get to my job in the East Bay using a transit mode.

"Currently, I van pool. One thing that I have noticed about the options of van pooling and other ride sharing options that are limited today, is there is an aspect of van pooling and ride sharing costs that are hard to overcome. In particular, it is hard to start a van pool, or a large rise sharing units, but it is easy to join. So, one aspect that can improve that is improved information about the availability of ride sharing alternatives, which is very important. Improved information about the availability of vehicles is also necessary, as Shelby had mentioned. But, also the improved information about where people are starting and going is also needed.

"We could do a lot better if we had collective information about where people are starting from home and where they are ending their commute, and then combine that information to find collaborative ways in which people can sort of join up in larger vehicles. That aspect has potential to improve the way that we do transportation in areas that are underserved or are not well served by transit, for instance."

Peter Albert (San Francisco Municipal Transportation Agency): "I think that economics are a big part of this. The reason that San Francisco is so attractive is because there are so many things that you can have that are so close by. People pay a lot more to live here and they cannot live here very long and think that you can keep multiple cars in the city, like they would in the central valley. It is too expensive and you make a hard choice.

"If you take that leap, you will realize how much easier it is to surrender the car. I think that the services like car sharing (which we are a car less household and car sharing is great) or the relay example just smoothes that transition over quite a bit. I also think that there is this sort of social network of people who will support you in making those choices. How difficult is it for you to give up your car if you are friends with someone who did it before?"

Cultural Shifts Regarding Cars

Question from Gerry Tierney (Perkins+Will): *"The comment that Shelby made about taking your car down to Palo Alto and letting somebody else use it for the rest of the day made me think of something. We are going to have to change our attitude about how we regard our cars. Up to this point in time, a lot of people bought a car and then it became something like a household pet. You are taking a very utilitarian view of the car, where it is out there earning money and it comes back to you. There is going to be a social change here that will alter the emotional attachment we have to the car. Should we look at ownership models of cars not as something to own, but as a service or as a utility?"*

Shelby Clark (Relay Rides): "Definitely. You are correct that the car has been a pillar of the American dream for many years. But, this is already starting to change and it is most evident if you look at the younger generation, or the millennials, and see what their patterns and preferences are. I recently read an article called 'Rebel without a Car' and it was about James Dean and the Rebel without a Cause movie. It went into how important the car was for his character in that movie and it provocatively tried so ask what that character look like today.

"It then transitioned to talk about a study where about 50% of millennials identify more with their mobile phones than with their cars. It is more of a personality statement for them and social media is giving them more robust ways to express themselves. There are so many ways that you can share content and ideas that are more expressive of your personality and who you are than simply the physical things that you own.

"Another really interesting statistic is that in 1978 over half of 16 year olds got a driver's license. It was a rite of passage. In 2008, that number had dropped by 40%, so it is now at 31% of 16 year olds getting driver's licenses. That is less than a third. That is a really interesting shift. You are totally correct to question whether a cultural shift will be required to stop viewing the car as such a personality statement. It is already happening and it is most evident in the younger generation.

Demographics of Car Sharing

Audience Question: *"In terms of people using car sharing, were there age demographics that were reflective of what you found in terms of how old these families were?"*

Dr. Elliot Martin (UC Berkeley Transportation Sustainability Research Center): "The age demographics show that there is a fairly wide distribution of people using car sharing. It is not all young people, but it is mostly young people. By young I mean a demographic of people age 40 and below. However, at least 30% of people using car sharing are 40 years and above.

"There is also the distribution of income for people who are using car sharing to look at. Car sharing is used by people across the economic spectrum in terms of annual household income. People who have incomes well above $100,000 a year constitute a non-trivial share of car sharing memberships. The culture shift just described is being driven by a younger demographic, but it is affecting a broader demographic. I have seen in the data that there is a broad spectrum of people in it and it is as much of an attitude shift as it is a demographically driven change."

Burdens of Car Sharing

Question from Sebastian Rouif (French Consulate): *"When we are talking about car sharing, location is the most important thing. City Car Share and Zip car manage to do well by getting really important spots in the city. I was wondering if you have any sort of incentives in the city for Relay Rides in order to get users. I ask because when you want to rent someone's car, either the car is in the street or their garage. You were talking about frictionless usage of the car. If the car is in a garage that is a burden and if it is in*

the street sometimes you have to pay for the parking spot? How do you handle those aspects?"

Shelby Clark (Relay Rides): "You are right that parking is a crucial component. It is particularly difficult in San Francisco, where a lot of people do have garages, but they are shared so they do not want to give access to them. Or, there is on street parking, which is difficult in many neighborhoods in the city. It would be an enormous incentive to car owners if there was some way for priority parking to be given for shared vehicles. If they are doing something to take cars off the road and reduce the parking congestion, to me it is a no brainer for the city to do (i.e. provide priority parking). But, I think that there are only eight on-street parking spaces that have been designated in San Francisco for car sharing. I could be wrong about that."

Peter Albert (San Francisco Municipal Transportation Agency): "The city has really gone pretty far with car sharing, especially with Zip car and City Car Share. We have worked so that when we do a garage we dedicate some spaces to city car share. I would imagine that the challenge to Relay Rides is that if you do not have a garage, you would not really want to give your car to a stranger and have them park it six blocks away."

Shelby Clark (Relay Rides): "That is how it works today, but I think that there is a better experience than that. The cars have a GPS in them, they have a home location, and the car has to be returned to within three blocks of there (the home location)."

Peter Albert (San Francisco Municipal Transportation Agency): "I have worked with City Car Share to locate spots for them while I was the head of my neighborhood organization in Duboce Triangle. We put a car share pod right at Davies Medical Center. It was one of the most successful ones in the city and it ended up replacing 12 owned cars. I do not know that we have gotten to the shared economy yet with RelayRides because how do we give that car the type of stature that City Car Share has. They are officially programmed to be a multiple use car and it is not just free parking for a neighbor who says they are a member of Relay Rides. I say this because there are so many parking spaces we do not use and it is one of the big challenges we have.

"For instance, I am working on the Giant's new development, which includes parking, but there is so much parking downtown that is empty after 5pm. Clearly land is a valuable commodity in San Francisco and clearly we do not want to create more parking if we are not using the parking we already have. The trick is to recognize the kind of car that Relay Rides is in the same way that City Car Share is, and then hopefully reduce parking requirements so that people can get housing to have greater density and have the extra benefit of that mobility."

Engaging Cities about Vehicle Sharing

Question from Moderator Jessica ter Schure (Nelson\Nygaard): *"We do have city car share in a couple of additional locations on the street and I think it is true that it is really hard with relay rides, and getting around to being specific. In a campus environment, but not in downtown cities, it may be easier to get dedicated parking. Is that something that Relay Rides has started yet?"*

Shelby Clark (Relay Rides): "We have not spent a lot of time engaging with cities to date. I will say that in the very beginning we did try to engage with the cities, and we did not have a lot of success. We have not tried here in San Francisco and I think it would be an enormous opportunity that is definitely worth looking into."

Studies of P2P Car Sharing

Question from Moderator Jessica ter Schure (Nelson\Nygaard): "*Elliot, with car sharing and P2P, are you looking forward to doing a study on P2P car sharing as well? Will it be something soon?"*

Dr. Elliot Martin (UC Berkeley Transportation Sustainability Research Center): "Actually, we just released one. Susan Shaheen just published a study in the *Sustainable Transportation Journal* last month and we are looking to do a similar study to what we did with traditional car sharing."

P2P Car Sharing and GHG Emissions

Question from Moderator Jessica ter Schure (Nelson\Nygaard): *"Does Dr. Shaheen's research show the same result, that GHG emissions are reduced by using P2P sharing?"*

Shelby Clark (Relay Rides): "This was more of a broad overview study that looked at what P2P car sharing is. The next two areas they are interested in studying are GHG emissions and its use in less dense areas."

Dr. Elliot Martin (UC Berkeley Transportation Sustainability Research Center): "Along the lines of those metrics, changes in driving, changes in travel behaviors, and also the economic side are some things to look at. I think that there is a fascinating component of P2P car sharing that looks at who puts their vehicle into these systems, how they use it, and how they manage their schedule. What kinds of vehicles are being put in there and what is the benefit to the user. There is that whole component to this which is it is a new dynamic to car sharing that we are very interested in looking at."

P2P Car Sharing and Insurance

Question from Moderator Jessica ter Schure (Nelson\Nygaard): *"Shelby, have there been different insurance issues in the rest of the country compared to here in California and Oregon? Are those the only two states where we have solved the issue completely?"*

Shelby Clark (Relay Rides): "California, Oregon, and Washington are the three states that have passed legislation specifically about insurance issues in P2P car sharing. What we see this legislation doing is codifying what the insurance practices do already. The way that the insurance works for the car owner is that whenever you put the car into the program, you keep your existing insurance policy.

"Almost every insurance policy has an exclusion for commercial use. So, let us say that Jessica has enrolled her car and she has State Farm Insurance. Whenever she drives her car, she is using State Farm to cover herself. If someone else were to rent her car, that usage would be excluded. We expected this to happen, which is why we have an insurance policy.

"Some of the things that the legislation does is it makes clear what will happen. It makes it clear that this usage is not covered by personal policies and it also says that an insurance carrier cannot drop you for renting out the car. We do not think it is possible, or at least that it is very unlikely, for any insurer to turn away a paying customer over an exposure that they do not have risk for. It is great to see the legislation happening in these three states. It is also good for the consumers that the government has thought about this and they feel that this is something that is safe. We are confident it will go out across the country."

End of Panel 1 Q&A Session.

Panel 2: The Potential Future of Mobility and its Impacts

Panelists & Topics:

Wade Bryant: Design Manager of the Strategic Vision Team, General Motors Advanced Design Center, Warren, Michigan

- Planning for the Future Urban Mobility:
  - The industries view of the future
  - A move from product to service provider?

Gerry Tierney: Senior Associate, Perkins + Will, Architects

- Mobility and the City: Connecting the Dots
  - System Connectivity: Ubiquitous transportation
  - Mobility as a service
  - Social access

Ben Feldmann: Senior Associate, Mia Lehrer & Associates, Landscape Architecture

- Reclaiming the Public Realm
  - The potential impact of ubiquitous transportation
  - The reclaimed public realm: New possibilities

Moderator:
Therese Tierney PhD, Associate Professor, University of Illinois at Urbana-Champaign

Wade Bryant: Design Manager of the Strategic Vision Team, General Motors Advanced Design Center, Warren, Michigan

Introduction

"The reason General Motors has been involved in this topic is we very clearly see the future challenges, and we are doing a lot of research to understand what unmet needs exist in cities. There is a whole spectrum of needs for getting around in urban environments and the available solutions only cover a portion of those needs. A big part of our goal is to find the unmet needs and come up with new concepts to fulfill the challenges. GM is currently performing a 'megatrend' study where we are looking at the global megatrends in order to understand the changing needs of consumers, and to figure out how we can address them.

The Densification of Population

"We know that cities are taking action to address the densification of the world's populations. The people living in cities are obviously choosing transportation modes that are right for the job. Frequently, this does not mean a personally-owned automobile. We also know that not only is the mobility of people important, but the mobility of cargo is equally important. In many places, it is even a more pressing issue than the movement of people. Globally, a lot of the mega cities are also large port cities, and the growth rate of cargo transit is faster than the growth rate of populations. Populations and cargo are competing for space on the highways, roadways, and are clogging city streets.

"Looking at the increase in urban population, as more people live in these denser environments, personal vehicle ownership is going to go down proportionately. Therefore, the personally-owned automobile is not the best tool in some cases. Plus, this trend is also being prompted by cities that are taking action to accelerate some of the natural tendencies people have. Not only is parking difficult in these cities, but cities are taking action to discourage personal vehicle ownership in these areas. Congestion charges are happening across the world and they seem to be working so far. London, in particular, is an example of this. A lot of other cities have similar plans. In the research studies we have done, we have been asking people: 'What do you prefer?' 'How do you prefer to use vehicles?' 'What would be your ideal?' GM has gathered a lot of information from asking those questions.

"It is true that a lot of the solutions that are out there are not new ideas, but today's technologies are finally enabling them. Things are moving quickly so we are thinking about all of the opportunities we can do to give people the right tool for the job and how to make every form of mobility as efficient and effective as possible. Today, knowing the challenges that we have around congestion, crowding, energy consumption, safety, and personal convenience is guiding GM in creating solutions.

Transportation Trends

"Watching the trends towards more mass transit, multi-modal use of transportation, and web-based services is focusing GM on these types of solutions in order to create intelligent vehicle systems that can eliminate bottle necks. In general this means lighter, more fuel efficient vehicles that use fewer resources, still giving people the privacy, personal space, security, and safety that they demand. We are working to get all these tools together so that they are integrated and people can have access to them easily.

We are hoping to come up with in-between solutions that will help the transition between today and tomorrow in a way that people are comfortable and familiar.

“If you look at products, General Motors builds cars and trucks. We are in all the global markets, and we hit the core vehicle markets, but that does not answer mobility needs for everybody in every city. There are a range of solutions there that we do not currently offer products in. There are also products on the other end of the spectrum, which integrate better with mass transit, or would lead to the better uses of commercial vehicles, that we do not really offer right now. In terms of the products we offer, we would like to be a full spectrum provider that gives people all the options they need and the right tool for the job.

“GM understands that it is not just the product; it is the way they are delivered through services. Shelby mentioned the ‘OnStar Connection’ through shared vehicle networks as a way to make things safe and convenient for people, and easy to access as part of the system as well. On top of this, there are key technologies – things around autonomous driving, V2V (vehicle–to-vehicle) communication, and a lot of other technologies – that need to be part of the system to make it seamless and easy to use.

Surveying Consumer Needs

“When we did our study, one of the first things we came to realize is that traditionally we have talked to car buyers. We will talk to people who currently own cars and ask: ‘What do you like?’ ‘What do you not like?’ In this spectrum there are different stakeholder groups. There are the commuters themselves, those moving commercial goods through the city, and the city planners/transit experts that are making the decisions and about the infrastructure.

“For commuters, their needs are minimal travel time and predictability. They want the control, the freedom to go where they want, when they want, have the right device for the job, and flexibility. But, they also demand comfort, cleanliness, and a stress-free environment. They want personal space and they want weather protection.

“In the commercial areas, one of the huge things is parking. This is especially true in the denser areas. The movement of goods through dense cities is painful in some cases, and companies are struggling with the poor solutions they have. Similarly, the transit experts making these decisions and implementing long-term visions for the cities are obviously concerned with the public's well-being, the growth of the city, and transportation throughput. GM is trying to do the study so they can understand all three of these stakeholders' needs and wants. Sometimes they oppose each other, but we would like to provide solutions that balance those needs in a way that can work.

“GM is in the middle of the study right now. They have been going out on expeditions to talk to people in cities – the planners, commercial drivers, fleet owners, and the public. We are also doing onsite observations where we have taken pictures of issues we had heard about. By doing this we are trying to learn first-hand what problems the cities and people are facing.

“In the second phase is, GM has come up with a lot of ideas and advanced design concepts for services and products. We will then go back to the cities to do more extensive quantitative and qualitative research for these ideas with the same people

from Phase 1. Looking at mass transit, we wanted to understand how effective and ineffective it is. We also look at issues like parking, freeway congestion, the movement of goods, shared space, use of sidewalks, and the use of street space. We wanted to know where things are working, and where they are not working.

"GM has been to San Francisco, New York, Los Angeles, London, and we see a lot of the same things. People are struggling with certain things. If someone does not have a car, and they have kids, then there are some challenges. In general, access is not equal for everybody. There are issues that people have with general mobility. We know that cars will have a place in the future, but how they are used that will change. Everything from how the vehicle works to how it fits in the environment will change.

"Companies that understand that do not want to park their big truck on the street from a perception standpoint. We saw a lot of these issues. One of the curious things here in San Francisco is how many individuals are taking things into their own hands and are experimenting with solutions. There are more experimental attitudes in San Francisco than in other cities, which gives us hope for some of the new concepts.

"GM also talked to the transit people here. Mass transit wants to be an experience, not just a utility. London had a similar idea. In London, one of the big things we saw was the amazing increase in use of bicycles, and it was not just for short rides. People were commuting ten miles each way on their bikes every day.

"With that information, we looked broadly at all the things that we could do to fill unmet needs. We have a lot of things that are 'works-in-progress.' If we have learned about issues with current forms of transportation that require tweaks, we are applying those tweaks. GM has tested a whole range of technologies, services, and vehicle concepts. We have 15 new vehicle concepts, five key technologies, and six mobility services that we have tested along with 17 benchmarks.

"We asked people how they would use these things if they were offered to them. Would this be their primary mode of transportation? What would they switch from if they like this? GM does research very thoroughly, so we are convinced that the responses we are getting are valid. Of the things that people would really like, some of them exist today, but others do not. We did test electric skateboards and they were the one concept that really tanked. However, the idea of small mobility devices that are tote-able was appealing to some people, just not skateboards.

"We actually tested a lot of the things we proposed in reality, as well as through talking to consumers. We tried to understand where they are coming from, so we quantified people as 'no wheelers,' 'two-three wheelers,' or 'four-wheelers' based on their primary mode of transportation currently. We also looked at what the give and take was among the different concepts we tested. We asked consumers in New York and London based on these categories, is this a device that they were willing to pay-per-use or purchase? Generally, consumers want a lot of choices for pay-per-use. They want the right tool for the job to be as efficient as they can and to pay as little as they can. Almost every concept we tested did extremely well as pay-per-use. If we design something that is entirely new that the consumer could use every day, consumers will purchase it because they will see the benefit if they need to use it frequently. It was an eye-opener for us to see how important and popular the pay-per-use concept was.

“To let you know how we are evaluating these ideas, it is not just a question of whether it works for urban mobility or if it has strategic value to us as a company. We want to hit a white space opportunity where we do not see our competition, from a visionary standpoint that will make a statement. GM is looking at a lot of metrics to measure these solutions by. We are halfway done with our tests, but as we learn what the take rate is globally, we are going to decide which of these concepts to pursue in earnest.

Advanced Concepts

“All the current mobility options have their down sides. A lot of commuters are struggling, especially with first mile/last mile solutions for transit. We can tell people to walk or to ride a bike, but there are some people who already ride through the snow during New York winters. They are tough, but are not that pleased with this option. However, it was their option because there is a lack of east to west buses in Manhattan. Thus, there are a lot of unmet needs. As a team we need to think about all those things together in order to create the right solutions to fix the problems and fill the voids.

“I will share with you a concept that takes advantage of new technologies, new services, personal mobility, and mass transit and links them together in an unusual way. This concept did phenomenally well when we tested it. The question was if we could blend mass transit with personal mobility in order to give people the best of both worlds and whether they be attracted by that. Can we give people their private space, the security, and the freedom of having their own vehicle, but also some of the benefits of mass transit?

“The idea is consumers would have a short-range, electric vehicle that lets them do their short distance commutes on its own. For longer distances, say 20+ miles, they would board it on a host, whether it is on rails or the roads, in order to get longer distances. One might say that this vehicle takes the space of four passengers that one could otherwise take on a bus. This is true, but it also could take the place of a few cars that are taking up a lot of freeway and parking space. This is a compromise idea, but the idea is for people to have most of the benefits they require from their personal automobile coupled with the ability to travel longer distances. In a way this is a low-tech, autonomous vehicle that gives people the freedom to relax and ride for the longer part of their commutes.

“This idea came out of our California Advanced Design Studio where our employees are living this commuting problem every day and can see the benefit in having the ability to tag along in an HOV lane on another vehicle for the longer part of their commute. This is just one of the 15 ideas we came up with, and is one that sparked a lot of interest with consumers.

“Furthermore, the idea is that these nodes for this host could be in the outer areas of a city. In London’s Zone 1, there would not be a station, but if these were posted every 10 miles for people doing longer commutes, it could effectively enhance the system. This is especially true in areas where transit is expanding beyond the dense part the city. Looking at a map of the Paris Metro shows the expanded rail lines going outside of the city center. These are going into fairly low density areas, and the station nodes are pretty far apart.

“Comparing this to a density map we can see where they are proposing some of these new places, it is hard to imagine how they will sustain the transit hub without doing something that lets people come in from a longer distance. Therefore, the idea of having something like this, especially for outer ring areas, seems like a compelling idea. Additionally, the thinking is that while drivers are on board a host, their vehicle could recharge and of course all this would be connected on a smart system that understands where the next pick up points are.

“Related to it is how drivers access the idea, and this gets in a lot to what Shelby was talking about. We tested an idea that we were calling "Mobility Maven," which is basically the smart solution that bundles all the Apps that are available for transportation and condenses them into a single device that is available all the time. It knows your schedule, it knows the weather, and it knows what mobility devices are available. It also has real time street scenes that could say where you are, what shared vehicles are within walking distance, how to do all this, and it could coach drivers, based on their preferences, to get the best transportation load at the given time.

The Next Step

“In our next step, GM is looking for opportunities to try to test some of these things. We would like to pilot some of the ideas. We would like to learn more about autonomous driving, to understand about vehicle classification and regulations, and to see how these things could integrate. We also want to understand consumer acceptance for these new devices, and to really understand what the global applicability is to the system.”

Gerry Tierney: Senior Associate, Perkins + Will, Architects

Introduction

“What I want to focus on today is connecting the dots. When we talk about cities, there are different types of cities and different metropolitan areas. The mono-centric model is what a lot of traditional transit is based on. Some examples are London, Paris, or New York, where there is a central business district, suburbs, with everybody is coming into the central business district and then leaving. That is a very 19th century model that favors having fixed infrastructure, heavy rails, and subways. The reality of North America is we have cities like Los Angeles, Houston, and Atlanta that are poly-centric. These places have very dispersed urban environments that are not ideal for creating a heavy-duty, fixed infrastructure environment.

Public Perception of Transit

“When we talk about transit equaling mobility, the public’s perception really seems to be that it is about waiting and uncertainty. What is it about people's reluctance to use transit? It is largely because of not knowing when it is coming, if it is coming, or if the bus has gone? That has been addressed with the information that is coming out of 511.org for San Francisco. Many of the MUNI stops now tell riders when the next bus is coming. The accuracy of the system is getting a lot better, but it still has a long way to go. Also, when we talk about transit, we are looking at the first mile and last mile problem. This issue provokes people into giving up on transit and driving instead. This is all because of this uncertainty.

“The convenience of the car is a tough thing to beat. People have a right to say they want their own space, to have predictability, and to determine where they are going. Rather than saying cars are bad and transit is good, I would say to designers, urban planners, and the rest, that the convenience of a car should be a design parameter that is factored in. Let us go and meet that design challenge rather than set up the cars/transit dichotomy, which has heretofore existed as cars/bad and transit/good.

Vehicle Technologies

“We want to connect some dots, so what dots do we start connecting? The first dot in there is our vehicle technology. The current design of a car that the auto manufacturers have been asked to come up with is really a compromise. The typical car is a four-door vehicle that can travel on a tank of gas for 400 miles. We do not need that in a city. The majority of people in a city are going to be having episodic trips of 3 – 5 miles and they only need one or two seats. Rather than having a one-size-fits-all vehicle, we need to have a vehicle that is purpose-built for the urban environment.

Social Media

“The second dot we connect is social media. We now have vehicles that can talk to each other, enabled communication between vehicles and drivers, have vehicles talking to networks, and drivers who are talking to the networks. We need a way to leverage social media to set up a series of connectivities.

Demographics

“The third dot is demographics, as Shelby mentioned. He spoke about the declining number of sixteen year olds getting driver's licenses. Another interesting statistic is that 45% of 18 – 34 year olds are making an effort to replace driving with alternative means of transportation. Therefore, there is a demographic trend moving away from the current car ownership model to something that is more of a shared experience.

Public Place

“Then the fourth dot we are connecting is what this all means for the public place. One of the things that we talked about concerning vehicle technology is that the autonomous vehicle is not some futuristic technology. This is a vehicle whose technology exists today.

“It is not a question of "if" but "when." Now is the time to start planning for the "when." Planning for the individual car driving around the urban center is like planning for the horse and carriage. When we start talking about an urban environment with streets that are set up to have high throughput of vehicles, and big parking lots, maybe we are looking at something, that in 10 – 20 years it is going to simply be redundant. Are we building the stables of the future? It is like back in the 1890s, when we were building massive horse stables and that technology was going to be gone by 1915. There were no horse and carts, people were driving around in cars. We are going to have to look at that.

Autonomous Vehicles

"What will the public realm look like if it is freed up of automobiles, or if the amount of road surface given over to vehicles is reduced because of an autonomous vehicle? An autonomous vehicle has a very high degree of efficiency on the road. Let us say we increase the efficiency by 100%. A traffic engineer may think this is great because they can get twice as many cars to go down the street. But, why not look at the equation another way?

"We could actually halve the number of travel lanes, recapture that land and give it back to the citizens of the city for wider sidewalks and the environment. Also, we are not relying on a car to be parked outside the front door, because it will go off and park itself in a parking lot. Doing this would free up the traffic lanes. What would that mean for the city?

Connecting with Apps

"What we are really talking about is a connected system, and a connected system really equals mobility management. Mobility management means a personalized travel plan, and that is really close to having a car. We like cars because they allow us to have a personalized travel plan. Therefore, working back up through mobility management, which is the interface of the social media with the vehicle technology, we have the ability to create a product that replicates the things we like about a car and move on from there. Rather than car/bad and transit/good, let us come up with a shared system that replicates the advantages of a car.

"We have talked about access to the system. What types of Apps do we put on there? It is important that these Apps should be developed in a more organic way. I would caution General Motors to exploit the Apps that are being generated from the ground up, rather than having apps that are only GM created, and be able to plug that into your system.

The Impacts of Being Connected

"Another key thing is social access. By that I mean all our phones have data plans, which cost us an arm and a leg. We have to start talking to the AT&Ts and Verizons of the world because almost everyone has a cell phone today, but everyone does not have a robust data plan. Therefore, if we are going to be talking about all of this connectivity, we must remember that it is going to be costing us a great deal of money, and it is going to exclude a certain amount of the population. This brave new world we are envisioning should include everybody, not just those who can pay for it

"The point is we are not talking about replacing traditional transit. There is going to be a role for fixed transit and everything that we have in the tool box right now. This is simply another tool to be added to our tool box that really tries to act as the interface between traditional transit and cars. We are trying to see if there is this middle ground that can be had. But, journeys do not have to be exclusively one mode or the other; we can mix these modes as we go along.

Conclusion

"Basically, this view of connecting dots is systems planning. We need to be looking at a systemic approach for what we have now. Between the vehicle manufacturers, the

technology manufacturers, social media, and the changing demographics we feel all of this is going to have a profound effect on the urban environment in the next 20 – 30 years. We do not need to surrender our urban environment to the vehicles. We can recapture some of that ground. That is why we should widen the discussion about mobility into an urban planning issue and look at all of the stakeholders that are involved in creating a varied and thriving metropolitan area."

Ben Feldmann: Senior Associate, Mia Lehrer & Associates, Landscape Architecture

The Scale of Cities

"For a decade I lived in the Berkeley, California. I chose that as my home because of the proximity of things and the fact that you really do not need to rely on a car. Yet, I made a decision to move to Los Angeles, and LA is famous for its congested freeway system and its lack of transit. Part of that has to do with the scale of these cities. If we look at San Francisco, we are talking about a 7 x 7 mile square the city falls into. With Los Angeles, it is hard to get ones bearings looking at it up close from above, because there are no defined boundaries to it. But, by pulling back we can finally see Los Angeles is a city that is ten times of San Francisco. This makes it quite difficult, as a city, to juxtapose a lineal type of transportation system for moving people in and around on it, let alone to get people to the downtown environment from the residential neighborhoods around it.

Effective Transit in Los Angeles

"I worked with Gerry on his previous project called 'The Red Car', which was about looking at these cities and knowing there is really no type of transportation plan that a city like Los Angeles can put in place. This is unlike the Bay Area, which actually relies on its natural topography and how it is defined by natural systems. Essentially, we have this protective reserve that constitutes the oval shape of the Bay, which works fairly well with a system like BART or CalTrain.

"When we boil down Los Angeles and the true form of the city, the connection to the south is to the port of Long Beach. But, within that we have 6,500 miles of streets lying as infrastructure and the costs associated of not only building these streets but maintaining them. There is a lost opportunity in terms of how we envision these streets. Should they be more than just streets and how do we get in and around them? As one may notice, about 12% – 25% of the entire city is dedicated to roads, whereas about 5% – 8% is public park space, which will become more and more vital in the future as people live in denser and denser communities.

"When we analyze those systems – the metro, the freeways, and the airports – and overlay them, we are not really hitting the major core areas of the community and we see just how vast this system truly is. Until we break down this planning metric of a quarter mile distance within a five mile walk, and overlay that on the Jeffersonian grid, which defines most of Los Angeles's neighborhoods, we are really not able to get very far within a walk-able community.

"Even within more diverse and interesting communities, such as along the Wilshire Boulevard corridor, we are still talking about a much larger space. To think about the scale of the city, we are talking about a 3 x 3 mile square. Thus, if we are driving at about 25 mph, this gets us in and around that square and getting to all of your destinations in that way, but maybe not getting to all of our workplaces.

"When we lay this metric on top of Los Angeles (see slide 13 in Ben Feldman's presentation), it is about 24 miles from Santa Monica to Pasadena. Within a driving circle of 25 miles per hour, that breaks down to a one-hour drive. The other way to think about this is that all of these circles add up to this new form of the city. They would be these nuclei within themselves. So, it is trying to understand what the right vehicle is for the right distance, as well as this understanding that there is not one system that can solve all of the issues. It is about how we conceive it.

New Transit Concepts

"The concept that we were working towards was to demonstrate that what you are truly trying to work towards is the concept of a transit scrim. At the top there is a unit of measurement that is described by the vehicle and that three mile square, versus a fractional distance that you would achieve via the pedestrian. Then there is this need for overlaying this rapid mobility scrim that would hit across all points in the city as well as major destinations like the airports.

"As Gerry was also mentioning, the traditional planning mode is based on a nodal system. Thus, along those lineal routes there are stops and within a five minute walking distance from them one would expect to find a more dense development typology, such as what we will soon have for the San Francisco Transbay Terminal. However, with the new e-mobility system that we are describing, the city will begin to shift, break down, and become these clouds of movement depending on what is trending within a certain neighborhood, where a new workplace sprouts up, and how these shifts in activity can change over time. The fluidity and ability to re-adapt to space is something to be on the lookout for, not only on personalized vehicles, but also on the development side itself.

The Importance of Walk-ability

"From a comparison standpoint about walk-able space, the greatest cities in the US – New York and San Francisco – rise to the top. But, we really have to look at cities like Houston and Atlanta, which are growing incredibly. The limits of their city boundaries are quite vast. Obviously, we are not going to force any existing neighborhood to leave their homes and move to the city just for the sake that they will have a better walking distance. But we need to find the means to get them in and around in this new area.

"The second piece is described as space. As we all know, one person takes up a lot of space when they are driving in a street. As cities are becoming more valuable, land is appreciating over time as well. Places like New York are becoming more exciting and interesting as ever, and we are actually looking at cities wholesaling the uses of those streets for other purposes. There was a study done looking at Broadway as a fully dedicated pedestrian space in New York. The first thing about this project was the alert from traffic planners saying that there is no way that Broadway could be closed down because it is so vital to traffic flow. Actually, by cleaning up some of the alignments of that street, it allowed for better efficiencies on other streets. Thus, there is a sense of

management over how those flows work. This one is still in the driver's hands, so I think there is something there worth looking at.

Fell Street, San Francisco

"From a concept that we presented last year at the Architecture in the City Festival at the California College of the Arts, we developed a scenario of looking at different conditions within the city of San Francisco. Fell Street, which is essentially a gateway into Golden Gate Park, has three lanes dedicated for traffic with a fourth for on-street parking. By dedicating one of those lanes to a bicycle route, which is of a size that all bicyclists would appreciate, we can begin to insert lanes for a very efficient (autonomous) car that can get people around.

"Then around the edges, you begin to convert that space into storm water management measures. We are going to begin filtering storm water, which is increasingly more important within our cities and is helping with 'greening' this process as well as creating this platform park space along its edge. Market Street in San Francisco is already undergoing a major transformation right now. What does it mean to take all of those cars off of it and have this incredible sidewalk promenade from the Ferry Building to Twin Peaks? It will dramatically alter how we perceive the main artery of the city.

Sunset District, San Francisco

"Some of the anomalies are worth looking at, which are some of these less dense neighborhoods in cities. I was describing other cities like Houston and Atlanta. Out on 40th avenue in San Francisco's Sunset District, there are engineered streets because of codes and standards, and there is a defined right of way. Here the city is going to build what is the necessary capacity, and we may not find too many cars driving along here. Are cars even able to park because there are so many curb cuts to allow for the building typologies that have garage space?

"This kind of design deadens the space, and how do we even think about planting a street tree in this type of environment. If you take that away and think about a new transportation model, where those houses do not need a car to park in their garage, or maybe there are just a few, then the street becomes entirely permeable.

"It truly becomes a garden street because part of the street has been reclaimed. Neighborhood pavilions could also be put in place to fulfill whatever that local community's interests are for some public or civic purpose in these reclaimed areas. This could be something like a cafe, a museum, a clinic, or whatever the community decides. This kind of space can be used to fill in some mixed-use type settings.

19th Avenue, San Francisco

"Finally, looking at the 19th Avenue (Highway 1) route, which has six traffic lanes, it is a fairly big conduit. But, when we begin to fully take hold of it, how do we dedicate these lanes to new (autonomous) vehicle types, separate them from the few (driven) vehicles that persist? They have to be then secondary to what is now a bicycle path. Thus, we are looking at this major conversion of a street profile of about 100 feet, where 80% of the roadway is dedicated to the throughput of vehicles, to something more like where there is only 20% dedicated to that through put.

"That space is shared with bicycles also, and we could open up 42% of that area to green space. Again, this is creating the notion of a permeable city that is greening. We are holding onto our resources, which are going to become more and more vital, such as clean and pure water, and that affect the cities canvas.

"Making a comparison between Los Angeles and San Francisco, San Francisco has about 46 square miles of land. Los Angeles has 486 (square miles). There are 7 square miles of land dedicated in San Francisco, or about 15%, towards streets. If we take that percentage of green space and pull it right out of the streets, on average, that is getting to over 1,700 acres of green space going back to the city. To give you a rough idea of what that equates to, that is the same as 1.75 Golden Gate Parks. For Los Angeles, if you are familiar with Griffith Park, it would be 4.18 Griffith parks, or roughly 17 Golden Gate Parks within Los Angeles. It would account for this immeasurable effect on the city in terms of the greening of it."

Q&A Session

Bike Transit

Question from Dylan Goelz (Roadify): *"My question is for Wade with GM. You guys had the individual ENV (Electric Networked Vehicle) that ported on to these bigger host trains. I am a cyclist; my first vision was for bikes today. We do not even need those ENVs yet because part of the hassle of getting a bike on BART is that there are times when you cannot do it. There is a huge opportunity for bicycles there, and I just wanted to hear your thoughts on the matter."*

Wade Bryant (General Motors): "We have thought about the same thing, and we asked the same question. In general, we felt that it was an easier challenge to solve if someone just chose to do it. Therefore, we did not pursue it as a unique concept because it was so doable. Frankly, there are cities that are better at it than others in terms of what they allow. The only real issue is during peak transit hours; you just cannot find space. I totally agree that there is a huge opportunity for the idea of bicycle mass transit."

Enabling Smart Transport

Question from Shelby Clark (Relay Rides): *"Ben, most of your diagrams had these little red cars. Can you talk a little about what you envision those being? The second thing is it would really be fantastic to have another two Golden Gate Parks in San Francisco. We are starting to see bits and pieces of this with the little "parklets" and some other evolvements around the city. What do you think that it is going to take to see that vision happen? What is the tipping point that could realistically take us to the city that you described?"*

Ben Feldman (Mia Lehrer & Associates): "In regards to the first question, those red cars are place holders for everything that we have just heard described in this room. It is essentially bringing forward the concepts that others are working on for creating an autonomous vehicle system that lessens the amount of cars in our environment. Where do we park them? Do we need to park them? Do they keep going? Do they go into

specially designed buildings? Those are all part of the conversation. The parking issue needs to be thought out in terms of that context. This depends on the need and the ability to fit cars into our environment instead of designing our environment around the car.

"To the second question of how do we make this work or how do we really kick it in to third gear, I would throw it back to the room. What are those incentives and how do people feel about it being successful? Having worked on the Treasure Island development project, which is not too far off in the future, that plan looks to allow for the creation of a robust, high density community of 10,000 new residents to San Francisco. Looking at the fact that they only have the Bay Bridge to get to San Francisco in a car, we have to rely on other models.

"The Treasure Island development project looked at, in addition to a better bus plan, a better controlled ferry service that would get residents directly in, which was a major thrust. Also, we looked at easing the parking requirements to lessen the onus on the developer. We did this because the developer has a big cost associated with that parking. Therefore, by pulling those costs out, the developers are going to be on board to allow their money and their cash flow to go to other causes. There are a lot of opportunities and a lot of opinions on what those incentives would be."

Impacts of Smart Transport on Public Transit

Question from Moderator Therese Tierney (University of Illinois, Urbana-Champaign): *"While we are on the topic, Peter, what do you think? If these sorts of proposals came into existence, how would it transform the SFMTA? Would it mean you would have to become collaborators with the Parks and Recreation Department?"*

Peter Albert (SFMTA): "First of all, the "parklet" idea is already a step in that right direction. In the first presentation, Wade showed us those superhighways that were smart in China, and then what you showed, Ben, with the street being much less part of the physical infrastructure—those are staggeringly different visions of what a city could look like. Thus, I am stumbling a bit on the urban design aspects first, but using streets as open spaces is absolutely where San Francisco is trying to go. The whole Market Street reinvention is part of that.

"Also, I just want to point out when I saw your images of the Sunset district what I see is land banking because it might be that the Sunset cannot really afford to be single-family homes for much longer. Even if you do not physically change the way that the Sunset looks, you create in-law units. The number one reason people have blocked in-law units in San Francisco is because of parking. If you take that out of the equation you might be able to have extended families, three or four of them, living in one Sunset district home. It will still look low-profile but you could actually activate those sidewalks with three times as many families."

Gerry Tierney (Perkins+Will): "To Shelby's question about the little cars, the intent was that this would be basically like a development of what Wade had with the ENVs. It is predicated on these vehicles being autonomous, having a high degree of efficiency, and being able to platoon or work together. Both of which the ENVs do; they run autonomously and in platoon formations.

“Regardless of the ownership model, the idea of the parking would be again going back to the ENV model, where the car does not have to be parked in the garage downstairs or in the spot right outside your front door. When you get home you are able to send it off to park on its own. Gas stations can be repurposed into parking structures. It frees you up from the tyranny of parking and all that goes with it. That follows on into what Peter was talking about. There are no in-law units or higher density in a lot of the avenues on the west side of San Francisco is because the residents all complain about parking.

“Now it is important to point out that within the city of San Francisco right now, if you are developing residential in the east side of the city you will have to uncouple parking. In other words, when you sell a unit you cannot, as a part of that condominium, also include a parking space. You have to buy that separately right now. That is a disincentive because now you see the real cost of owning a car. The buyer has just shelled out $750,000.00 for their condo and now they are going to have to pay another $50,000.00 for that parking space. Not only do they decouple it from the sales point of view, but they also allow for remote parking.

“Therefore, we can have an arrangement like what we have been doing down at the Giants parking lot. We build a parking structure there and you will have remote parking from your unit. That is, in fact, the premise of Treasure Island because the Island has a series of large parking structures. The idea is for a resident on the island to be able to come up to their front door, unload their groceries, and then park their car in one of these structures.

“If you wanted to have a parking space in your building that is very much a demand-driven marketplace, not legislative, so there is real, strong interest. However, if you provide shuttles, a bike-able environment, or a walking environment the market is very receptive to that. It is not a big disincentive not to have parking. Again, it would be enhanced if we have an autonomous vehicle that could basically park itself somewhere.”

Accessibility vs. Mobility

Question from Jessica ter Schure (Nelson\Nygaard): *“Do you all feel that the PRT (Personal Rapid Transit) ENV is part of the future in any scenario, or could we move back towards more walkable, bike-able communities, where it is all about accessibility rather than mobility?”*

Gerry Tierney (Perkins+Will): “I do not see it as an "either/or." In no instance is anything that we are proposing to be privileged over the other. As I mentioned, this is just another tool for our toolbox. Over on Treasure Island, it was consciously set up as a walkable community. The priority is pedestrian first, cyclist, and then vehicle. That was the way it was laid out. We densified the development into two neighborhoods. We have a central core that is going to be served by ferry going back and forth from the Ferry Building. Now you are going to have bicyclists and you can also have a car recognizing that not everybody is working downtown. Therefore, it is not an either/or situation.

“It is really about the appropriate vehicle for the environment you want. As you start coming into the urban core, as I was trying to say, is it appropriate to be using vehicles that have a range of 400 miles and carry four passengers? That does not meet the

average ride profile of most people in a downtown area. We are talking about a different type of vehicle so it is not an either/or. It all has to be part of a system and a scenario."

Wade Bryant (General Motors): "When we did our study in London, there are cities delineated by their zones that each have a different density and a transportation mode plan. That makes a lot of sense because there were certain zones that had a different mix. They found as much as people have migrated, especially with congestion charging, away from personal vehicles in Zone 1 that there is still a limit to the percentage take rate on some of the other modes. To Gerry's point, it is just offering the right thing for the right environment and hopefully allowing the freedom of choice in all the environments for people to pick the right one."

Incentivizing Consumers to make the Right Decisions

Question from Jessica ter Schure with Nelson\Nygaard: *"We are becoming a more and more obese society. With PRT, it seems like we are further encouraging people to get on a vehicle and stay on a vehicle until they get to their destination. Even if we give people the option, if the option of PRT is too easy and too convenient, you will get in your own little pod and just swish down Market Street. Thus, we are further encouraging obesity. What can we do to then help people make the right choices? Like you said, we cannot just expect people to make the right choice. We need to help them make the right choice that if it is a short distance trip, it should be made by walking and biking. If it is a longer distance trip then choose PRT and other modes."*

Wade Bryant (General Motors): "One of the things that came up frequently is the availability of information so people can make the smart decision. Maybe that can be part of the plan. You factor that into your goals too, so it is not just about convenience and time, but also your health. That actually would be a smart add. A lot of people would be interested in that, and maybe they would make their own choices the right way. But, the flip side to it is, in some cities there are a lot of people who just are not able to bike or walk the distances that they needed to."

Ben Feldman (Mia Lehrer & Associates): "The other aspect to layer into it is not only the health factor for the individual but also the social effect within the city. Not only that but from the private sector, all the merchants and all that store frontage becomes highly valuable and sought after as the premiere experience on the street."

Gerry Tierney (Perkins+Will): "That is a really good question but I think it ultimately comes down to creating a walkable environment. We have to recognize that a lot of the urban environment today is not very friendly to the pedestrian; it is not an enjoyable experience. The phenomenon of walking in New York is astounding. If I have to walk from the East River across to the Hudson, because of the length of the blocks it just seems like I am not making any progress at all.

"Whereas if I turn 90 degrees and decide to go uptown, it seems that I am making great headway because the cadence of the blocks comes up so quickly you are not so conscious of these long distances. Even within New York, it is interesting that the cardinal direction you are walking in impacts your perception. When people have the feeling that they are making progress, they will walk. It comes down to how walkable a neighborhood is, and we have to recognize that."

Wade Bryant (General Motors): "A similar thing that came up in our studies was that people in Manhattan were not only put off by the block length but also by the fact that you cannot see far enough to really know where you are going. You can barely see the sky and you know you are going that direction, but you really cannot see the point you are heading to. This is versus London or San Francisco where typically you can see where you are headed and feel like you are making progress."
Transit for Sprawling Cities

Question from Tyrone Marshall (Perkins+Will): *"You brought up a couple of cities, and I think each of us has seen what you are looking at in terms of a city like Houston or Atlanta, something that is different from a city like New York and San Francisco. How do you see these strategies going forward? How do we deal with those areas? You cannot really take a place like Houston, that is more car-centered and re-do that city, so how do we deal with that? How do you take these strategies forward to those places and make those more desirable, healthy places? "*

Gerry Tierney (Perkins+Will): "That is a key question because it goes back to the point that Ben made about scale. We talked about if we could recapture a certain amount of land. Scale also means something different in a city like San Francisco that is relatively dense versus somewhere as dispersed as Atlanta or Houston, or even LA. I do not know what the answer is to that. As planners and architects, we all default to the cities we love walking around, and the real challenge is how do you take dispersed urban centers and tame them. How do you make them hospitable for the full range of mobility options? When I looked at Wade's chart of going all the way from a person on foot to fixed rail and everything in between, it seems as if cities like that are very much privileging one group over another. That is a real challenge."

The impact of Reclaiming Space

Question from Moderator, Therese Tierney (University of Illinois, Urbana-Champaign): *"If we have a situation like Atlanta, Houston, or LA, do you think our efforts towards the reclamation of space would make a significant difference? Or how do you really frame that?"*

Ben Feldman (Mia Lehrer & Associates): "For the Atlanta, Houston, or LA, at that point it is really about what is going to incentivize somebody who is not deterred from driving their car to work and having to pay extremely high costs for parking, or does not experience traffic because the model works and the traffic engineers did their job. How do we look at not only the financial aspects but also the environmental aspects in terms of our stewardship of the land as well as the social, cultural phenomenon?

"The Copenhagen Wheel was the example that we had come across from MIT Labs where they are able to track how much people are riding their bikes through Copenhagen as not only a gesture of just getting out there and doing it, but they are able to actually have a metric of how many miles they have ridden, which actually takes a certain amount of taxes off their revenue at the end of the year.

"There is this need to begin to understand how people use this system and how far this system goes, so that it does not get to the point where we are actually waking up out of bed, are in a vehicle, already at work, our teeth are already brushed, and we are not going to have any interaction. You have missed a whole segment of what today's reality

is. I would just put the question to Wade in terms of GM's local interest and campaigning for the city, do you think Detroit is that model city that is ready to embrace something new?"

Wade Bryant (General Motors): "Well, Detroit specifically is such an unusual case. We have more green space than we know what to do with it. We are trying to farm it and do other things. It is interesting because as we started working on urban mobility, we were asking ourselves what we were really trying to target with the project. With the studio out in LA, which has a whole other set of problems, we realized that there probably is a bigger opportunity in the "Sprawlville" cities that have huge issues because people are traveling every which way and jamming the freeways by going in different directions all day.

"Admittedly, with the idea that we had about hosting vehicles for longer distances, we are doing the studies right now to try to see how much impact could that really have. We know that there is a consumer desire for something like that, but how much can it actually affect throughput? To be honest, we do not have anything conclusive yet.

"What we learned in London was the biggest challenges were people. There were a lot of people that literally commute from the east side of London to the west side of London without the center being their destination. They have a nightmare of a commute even if they try to use mass transit, which is the same as it is in New York where there is the borough-to-borough movement.

"I do not know if there is any one solution. It is just a matter of trying to fill the voids with things that might work for people. To Gerry's point, cars do work well until you get them into a dense area. Then, all of a sudden, you do not know what to do with the thing and you cannot afford to park it. Therefore, if you can solve that part of the equation that is a pretty big gap filler."

End of Panel 2 Q&A session

Presentations: Start-up Showcase featuring Roadify, Local Motion and Zimride

<u>Showcase Presenters:</u>

Dylan Goelz: Head of Marketing and Design, Roadify
- Crowd sourcing – an introduction to Roadify

Clement Gires: Co-founder of Local Motion
- Local transportation is broken

John Zimmer: Founder and COO of Zimride
- Efficient Transportation & the Social Impacts of Ride Sharing

<u>Moderator:</u>
Matt Trocker: Community Manager, Agrion

Dylan Goelz: Head of Marketing and Design, Roadify

Intro to Roadify

"Roadify is essentially a real time platform and App for personalized ground and mass transit information. We have an iPhone application that is available right now for free in the App store. Going through a demonstration of this, what you will see in the App will be an aggregated set of data. In this example we will be in New York City. When the App comes up users will see subways, buses, LIRR, Metro North, and even ferries included in the information.

"Tapping into the subways, users can see the service alerts that are provided by the MTA and they will also see all of the times with the schedule info. Putting in a destination, their screen will show schedule information in real time. Delays are provided by the MTA here as well, and below them are user commentaries that provide more real time information about what is going on. All of this boils down to two simple questions: 'Where is my ride?' and 'Why is it not here yet?' We make it really easy to find that out. It is a global, chronic pain point that we have all experienced. Roadify answers those questions in your hand, in a mobile device, in any environment.

"There is a lot of useful, but hard to find data out there. At first glance, there is not a lot of real time information and there are a lot of municipalities doing a lot of different things. This is the case in San Francisco, as it is in most places. What Roadify is doing is being the hub for multi-modal ground transportation (information). What that allows us to have is a massive amount of scale. This has been possible because of the open data movement that has been pushed by Open Plans in New York City, and Google has helped standardized transit information.

"Roadify can be in 200 - 300 markets as soon as our servers process the information. What we do not do is routing. Google, HopStop, and a lot of these places do that well, so we are based on our real time condition reporting. I do not need a Google map to tell me how to get to work. I do it often enough to know where I need to turn. What we do is for the regular ridership, not the occasional users, and then we layer in official end user content. It is going to be the best situational data there is.

"Numbers are great, but there are times when the numbers or the municipality cannot accurately update the information fast enough, so we can rely on live reporting to provide on the spot information. We then take that information and present it in a platform and an App so that we can distribute it to OEMs, other developers, and anything that could use that information in the 'Geo-Spatial Data Stack.' Right now we are in 9 -- 10 markets. We have consolidated some of them in the Pacific Northwest, but it is the same simple user interface across modes, markets, and it is fun to use.

Crowd Sourcing

"Why does crowd sourcing matter? During an incident where a passenger had been hit by a subway train in New York City, the transit agency was reporting that the trains on that line were running normally, but on the ground reporting confirmed that there were no trains on a portion of the track because of the police investigation. 147 people are struck by a NYC subway train every year. That is every 2 - 3 days on average. The line-

reporting feature also provides a potential public safety reporting mechanism back to larger information sites.

Next Steps

"In terms of the next steps, Roadify is interested in getting into the mobile payment area. Right now we cover every transit system in the bay area that uses a clipper card. What is a better way to understand or refill your balance than to do it in one place? MUNI has created an App that enables riders to see their balance on it. But, as a BART rider I also want that same functionality in an App. Thus, we are consolidating all of that into one space and vision.

"We are also looking for Lead-Gen partners. Nothing says that we cannot do what we do for taxis, trains, or private companies. We have the potential to elevate any of those services to BART status. BART is a huge system that hundreds of thousands of people ride every year. Why not have that same exposure for other cool projects that are going on. Additionally, we can do that across multiple platforms to provide localized information to the individual or community, instead of providing them with a lot of stuff they are not interested about. Therefore, it is more about the personalization of that data.

Conclusion

"Roadify has over 100,000 downloads of the App at this point and we have seen some incredible utilizations that are running about 35% better than industry standards. That was before we introduced our newest aspect, which is our favorites feature. It helps reduce taps for the user. Roadify won the NYC Big Apps award in 2011, we are partners in the New Cities Foundation with UC Berkeley, and we are looking for funding."

Clement Gires: Co-founder, Local Motion

Local Transportation is Broken

"Local Motion started about two years ago. We have spent the last two years tackling a lot of the problems that were discussed earlier today. We think that local mobility is really massive and completely broken, and we are trying to solve that. We are not only talking about mobility in big, dense cities, but also in American suburbs. I think that transportation is bigger and more broken in the US than it is in European countries.

"I have a graph of my local mobility, with where I live and work, where the people I visit live, and all of the shops that I go to. If we got to a ground level view of that, at 9:00 am I am on a stretch of road that is made so that I can go 70 miles per hour on it. Then there are also the dense urban areas of cities, like Palo Alto, where I live. What is interesting is that within a mile of where I live I will encounter two people that I know and, since it is Palo Alto, four people that I wish I knew, and a lot of shops that I regularly go to.

"The big reason that personal transport is broken today is that we use the same technology for both local neighborhoods and freeway driving, which are cars. 95% of the trips that we do are done in cars for those two areas. We think that cars are great for highways, and that most of the technologies invented for vehicles in the last 100 years

have worked to make a ride on the freeway better. But, things are still very inefficient and stupid for local travel.

“In a way, these technologies are completely inadequate. Cars do not understand anything about me, or anything about my usages and patterns. Also, they do not really help me connect with the environment that is mine, and they are really big. About 30% of all of the trips made in the US are less than 5 miles. Conservatively, that is about 1 trillion miles travelled per year in short trips. This is a massive thing and we know that people spend, on average, $0.50 per mile on every trip that they do.”

A Local Vehicle

“What do we do? Local Motion has designed what we think is the first vehicle that is truly dedicated to being local. As you can see, it is a car that is open. The basic idea is that it is something that you can hop in and out of very easily in order to be able to roam through your environment, really explore it, and discover that it is not disconnected you from it. The vehicle is extremely efficient and it is not legal to take it on the highway and it is meant to go onto roads up to 35 mph. This means that it consumes very little energy and it is fairly cheap to buy.

“Local Motion has just finished building the prototype of it about three months ago and we are launching it in San Francisco. There has been pretty good success since then. We want to start by selling these vehicles to corporate campuses in Silicon Valley. The car, itself, is only one piece of the business. What we really want to do is go beyond just selling the car. This car is not meant to be sold to people. It is meant to be sold to places and the actual environment. Thus, we worked pretty hard to make it sharable. We want every single vehicle we that put on the ground to be shared. We do not want to sell to individuals for now. As you all know, in working on this one of the key things is low friction share-ability. There are a lot of things that go into taking a car and making it sharable.

“For example, at a corporate campus you talk to someone in their office to set up a meeting. The meeting is planned in their calendar and our software taps into the calendar to know when they will need to move in the future. Then, when the person is leaving, they will be notified where the vehicle will be waiting for him. Eventually they will get to the car and access it as soon as possible. Our obsession on the product side is to make every single step in that line as low in friction as we can. I think all of that is working right now, especially since we stated a few pilot programs where we were testing this theory on the softer side.

Interactivity

“The third piece, which is really the core of our business, is that the vehicle and our platform are meant to be interactive. This means that every vehicle on the road is actually talking with users and gathering data from them. It can know every other vehicle, it can know how many people were sitting onboard, who they are, and what is happening around them.

Connectivity

“We have proximity sensors around the vehicle that tell us about the urban and social environment around these cars and it also talks with the surroundings. There is a small

LED screen in the front of the car and five minutes before the trip starts it tells everyone walking by that it is about to move, and where the car is going to go. In a sense, we have tried to merge public and private transit, where for every trip that an individual makes it can try to let the entire community know so that they can join the ride.

"Beyond that, after people start using the system on specific campuses, we will start getting information about how people are connected to each other, to places, and to events. We can then anticipate the flows of mobility that will appear between different buildings. The nice thing is that there is a pretty high density of mobility in the local environment and a fairly limited amount of place. This is why it is fairly possible for us to actually have a very good idea of the mobility picture on a given campus, which is why a lot of the applications are in the suburbs.

"In a harder way we are trying to show you the context. We have done demonstrations in front of corporate buildings. The person who set up the ride and the people joining the ride will have that information physically displayed on the windshield, so that they know which ride they are on. Eventually, people will be able to walk out and tap their corporate badge onto the vehicle to get their ride. This is part of the frictionless experience. The car is not only open physically; we want it to be open digitally. It helps people connect with their environment and it shows them where other members of the community are and what specific events are happening around them.

"Since we are selling this to campuses, it needs to be managed and we have built fairly elaborate fleet management applications in order to know where the vehicles are. This is the mobility intelligence piece, where we tell how many employees are using the system. It also will tell what would happen if one vehicle is added to a specific location and the impact it would have on the emissions for the entire campus, congestion reductions in parking areas, and things like that. There are few products offering this today, at least from the research that we have done.

Value Proposition

"Going back to the value proposition, we like to think of it in terms of how much a ticket costs for any transportation manager to move one person one mile. To figure that out you have to know the frequency of usage and the average occupancy of the vehicle. If you have two people per mile, the cost per passenger is half of just having one. We actually tried to work on the two simultaneously in order to make the vehicle as efficient as possible and have it as fully occupied as we can.

"At the end of the day, we are about three times cheaper in terms of the ticket per person, per mile than any shared internal combustion vehicle, and we are about ten times cheaper than shuttle programs currently running on campuses. I have not made the calculation for actual city transportation because it is not something that we are going up against initially, but it is certainly more expensive than we are. What is really fascinating is that we are actually cheaper than just gas in an internal combustion engine. This means that if you are paying for everything to go that mile, we are going to be cheaper than using the gas in your own personal car. Thus, it is a no brainer to choose one over the other.

Social Dynamics

"When we talk to campuses and fleet managers, they are very interested in the cost savings. But, when we talk to the higher level people, like CEOs and HR people, they are really interested in the potential that we have in changing the way that people perceive, play, and work with their local environments. A campus, or a city center, is a place where tens of thousands of people come together in a very enclosed location so that they can collaborate and create together. Today when we go to a lot of campuses, each department has its own building and they have almost no way to communicate, interact, and exchange. Fundamentally, our long term goal is to make that collaboration easier."

John Zimmer: Founder and COO of Zimride

Highway Efficiency

Today, I want to talk about the inspiration and how we started to think about what we wanted to do with Zimride. Zimride has been in existence for five years and we have over 300,000 users. We started with a focus on university campuses in order to build up critical mass and have been moving to more of a direct consumer approach since then.

"I want to begin by talking about a system that we are all familiar with, which is the brain. Popular culture and common belief claim that we only use about 20% of our brain. That is actually not true. We use a lot more of our brain. But there is a system that we are familiar with, that we have all been talking about today, and which is only 20% efficient. That is our highway system. I was shocked to think about it that way for the first time in college.

"I studied hotel administration at Cornell and so I was always thinking about occupancy. When you think about a hotel, you need to have 70% occupancy to stay in business. When we look at our highways, we are at about 20% occupancy. That really impacted me and I started thinking about what other systems would look like if they were operating at 20% occupancy. If you think about airplanes, those companies would be out of business already.

"Then I dug deeper into the highway system itself. I learned it was the largest public works project ever in the US, at over $400 billion. I learned that there are 2.3 billion long distance trips (over 50 miles) in the US every year. One of the other pieces is that 20% of emissions in the US result from our vehicles on these highways.
Individual Costs

"To an individual looking at the economic impact, one of the highest household expenses in the US is transportation, at over $8,000 per year for the average American household. For US productivity, which directly impacts our economy, we lose about 16 million hours per day of productivity, which results in a cost of $80 billion loss to our economy. That number is expected to double in the next 50 years.

"The good news is that future generations would rather go without their car than without their cell phone. Thus, where in the US the car may have been the symbol of freedom, we now have other means of expressing or having that freedom. Additionally, 78% of

millennials have said that the costs of owning a vehicle are onerous and are something that gave them stress. We are moving to a time where access to transportation is more important than ownership of the vehicle.

Efficient Transportation

"Getting back to what inspired me, I was in a class at Cornell in the City and Regional Planning School, called Green Cities. The class was all about how to create more efficiency in our cities and with large scale infrastructure. The professor began talking about the evolution of transportation and the images he showed were zoomed out views of road systems that have veins going everywhere. In 10 years of presenting about transportation, what would be his next slide? Is it going to be a whole new infrastructure? Is it going to be flying cars? I did not think so and I thought it would be around efficiency.

"This goes back to the idea that 80% of seats are empty. I realized the obvious thing is to get more people in those seats, which means carpooling. My next thought was that carpooling sucks, it is not mainstream, and it has a lot of social stigma. It has not worked, so we really started to wonder why that was. One of the big things is who you are riding with.

The Legacy of Car Pooling

"Prior to what we have done, Craigslist was the biggest source of ride sharing in the US, at between 500,000 and 1 million rides. Riders have no idea who the person is and the contact is an anonymous email address. Therefore, trust was something that we thought was a main component of making this mainstream. The second thing would be critical mass. How does one get enough people in the same area doing the same thing at the same time, is a big challenge that we have addressed. The last is the incentive. We need to make it really easy for the driver, especially until there is enough critical mass, to go out of their way to offer the ride. What is going to allow them to do that is getting paid for it and making that really easy.

"Over the last five years, we have built a platform for social transportation and we made it as easy to book a ride, as if you are booking a train ticket or a flight. We are working on building out routes from every major US hub. We have started with San Francisco, so you can get rides down to Los Angeles and up to Tahoe. Then, in the Los Angeles hub we are starting to build out rides to San Diego and Vegas. Our team is working really hard on that.

Social Impacts of Ride Sharing

"The social aspect is also something that is really important. Before users share a ride with someone using Zimride, they can see whether they would want to share a ride with me, for example. A potential rider can see my picture, whether we have mutual friends, which is really powerful. We require that all of our users log in with Facebook on our public platform. Thus, I can see that maybe I did not know Nick, who wants a ride, but he is friends with my friend Aaron, so that made me a lot more comfortable giving him a ride. The way that we think about it is that we want our drivers and passengers to have the ability to make informed decisions before they share a ride. You can see music

taste, which is important on a long ride down to Los Angeles and you can even see what kind of car they drive.

User Reactions

"Our users are excited about saving money, reducing their emissions, and especially the whole social experience that they have. People have a really low bar with this kind of thing because it has sucked for so long. Riders do not want to be injured getting to where they want to go, which is their goal. We have been able to offer people an experience where they get to meet the person before and then have an awesome time. We have had stories of people getting married because they met in a Zimride. We have had several couples form, best friends meet, and to us that is the future of transportation. It is a lot more social.

"If we go back to that original idea where 20% of seats are full right now, and we all know the experience of sitting on a highway in traffic and seeing all of these empty seats. Together, if we filled them, not only will we have a huge impact on the economy and the environment, but we will also be able to meet other members of the community and live a better life.

LYFT

"I also wanted to mention that we just launched a new product in San Francisco called LYFT. If you have an iPhone, it is available on there as an App. It provides real time ride sharing so that you can go shorter distances. With Zimride we focused on 50 – 500 miles, and we have always wanted the full spectrum of 0 – 500 miles. LYFT is our first approach to doing that, so you should check that out in San Francisco."

Q&A SESSION

Ease of Use

Question from Moderator Matt Trocker (AGRION): *"Thinking about some of these new technologies that are going to make our cities easier to move around in and make them better environments, a lot of times we hear about sustainability coming through new technologies and people think they are going to have to sacrifice something, it is going to be hard to do, and/or it will be expensive. It seems like the things each of you are talking about are easy, fun, and not too expensive. How central was that to thinking about how to introduce a new product into the marketplace?"*

Clement Gires (Local Motion): "It was very central, but to be honest it is an ongoing struggle to convince people that they will always be happy in a vehicle with no doors and more openness than they are used to. Really, the only thing that we need to do is start it and whenever we offer a ride to someone, they understand it instantly. We bike to work and then use our vehicles around our workspace, we just do not want to get back into a car. Regular cars are enclosed, take too much space on the roadway, and you miss something."

Dylan Goelz (Roadify): "We actually started as a text message based way to share a parking spot. Rather than making parking fun, we took the Zimride approach to parking – we want it to suck less. We've extrapolated it to public transit, where it is much more scalable. Instead of 1-to-1, its effects are 1-to-100. Anyone of those tweets, pieces of commentary, or an update from the MTA can affect thousands of riders on any given line. That was profound to think about, and we have had fun making a product that reduces friction, and reduces the anxiety of living, working, and loving an urban environment. It really makes a difference. Studies have shown that one of the major things to getting out of a car is good information. It is knowing exactly when the bus is showing up and the condition that it is in. This replaces someone's hands on the steering wheel saying to go left or right because it is the same cognitive sense of security. If that is fun, then Roadify is making it more fun."

John Zimmer (Zimride): "It was central for us to be able to put a valid case in front of the end user that this is going to be good for them. I do not think that any of us would be doing this unless the end consumer was going to have a better experience in some way, or in multiple ways. We focus on price. The alternative to driving to Las Vegas is flying. That would probably cost about $300.00 to do, as opposed to $40.00 to get a Zimride. Thus, it is a lot cheaper, which was important.

"The other challenge was having it be convenient. That is why ride sharing has not caught on up to now. The reason why we have started to make progress is because of critical mass. If you do not have someone near you or you have to go really far out of your way, no one is going to do it. I think that all of our jobs and goals are to make the argument to the user that this is going to make things better."
Consumer Education

Question from Moderator Matt Trocker (AGRION): *"That is a big educational component to it. First you have to teach them that this is something that can be easy. From your position, your company has been around for longer than the rest of them, but coming into a new space and figuring out how to get people to want to embrace this new technology and application you need to focus on educating the consumer about that. What are the ways that you are focusing on that? Is it strictly web-based, or are you doing other things to get the word out. Are there strategic partnerships that you are looking for?"*

John Zimmer (Zimride): "For us, we have done a little bit of both. In the beginning, it was us dressing up in costumes on college campuses and talking to everyone that we were hoping to have use the service. That worked, but it is hard to scale that. Online methods have helped us crack the next level. Facebook is a great platform for us to get the word out to the larger population, so it is definitely a mix of both.

"The challenge for us with Zimride is that when we are marketing it in person, it is hard to target the individual who needs the service right now. This is because right now, if we are targeting long distance trips, when is the next time a potential user going to Tahoe or Los Angeles? With the new service that we just launched, LYFT, we are doing more street work because they can use it right now. If you want to get a ride back to wherever you are going after this meeting for less than the cost of a cab and with a really friendly person, we can directly ask someone to try it out today. I think that relevancy effects what we do online with our software."

Dylan Goelz (Roadify): "It is always interesting to hear the initial gimmicks, or whatever we do. Ours was to walk around park slope in Brooklyn during the summer. In New York, I do not know if it is legal, but you can double park for about an hour because of street cleaning. We were meeting some of the wildest characters and that is a part of the startup experience. It is about figuring out what works and we have targeted our App at mobile users.

"We have the opposite problem. Everybody who rides public transit wants to know when it is coming, and that is a big user base. Ours is more of an awareness element than learning. Once you give people Roadify, people understand it. It is not a new concept. These guys have new and exciting things going on. We are just trying to reduce friction. I am going to be excited to see what support from a transportation agency would do. Again, with that New Cities Foundation study that has UC Berkeley, GE, and a couple of other big names in it, it is measuring just that. I would be interest to see what a difference we could make with it, whether it is one route we test, or multiple. I think that would be really practical to see."

Clement Gires (Local Motion): "For us it was a challenge because, as you said, our product does not really fit in a pocket. The nice thing that we have is that we want to act in the very local environment. We have a really big sense of community, and even today you can go to Getmotion.com, and if you think that your workplace is a good place for our system to exist, you can start your community and you can let us know what your company's address is. If you get 30 co-workers excited about it, we will come out and do a demonstration for the entire day and bring the vehicle to give gives to everyone. It is one of the things that we have done, which has not worked so well very far, but hopefully the people in this room will do it.

"The nice thing is that when we come and deliver the vehicle, it already pre-exists. The people already know each other and they are already excited to see it come. We have to generate a lot of excitement before the arrival of the physical object, so we have demo days and for the fleet managers we give them access to their accounts way before the cars arrive so that they can start managing their on campus populations. They can even add cars virtually to see how additional vehicles will interact with the system and how it would impact their mobility. We are trying to do as much as we can before the delivery and we are only starting manufacturing in a few months. Therefore, people have been waiting a few months already and they need to be kept excited for another six, or so."

End of Presentation session

Wrap-up, Synthesis & Conclusions:

What a great opportunity this has been to hear from our speakers and the three mobility application developers, Roadify, Local Motion and Zimride, who each have their own practical ideas for implementing a portion of the E-Mobility concept. And we have questions for you to think about and discuss at a future conference:

- Was there an "aha" moment that made you think differently about the potential development of urban mobility?
- Do you have any key questions that you would like to continue discussing?
- What, as a group, should we be doing next? What should be our next steps?