POTENTIAL IMPLICATIONS OF EMERGING MOBILITY OPTIONS ON TRAVEL BEHAVIOR

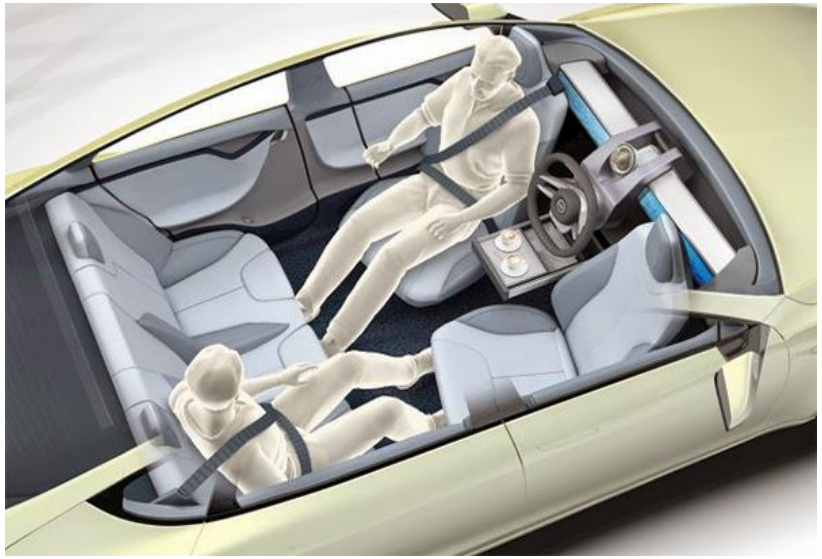
Xia Jin

Florida International University

May 2018 MTF Model Advancement Committee

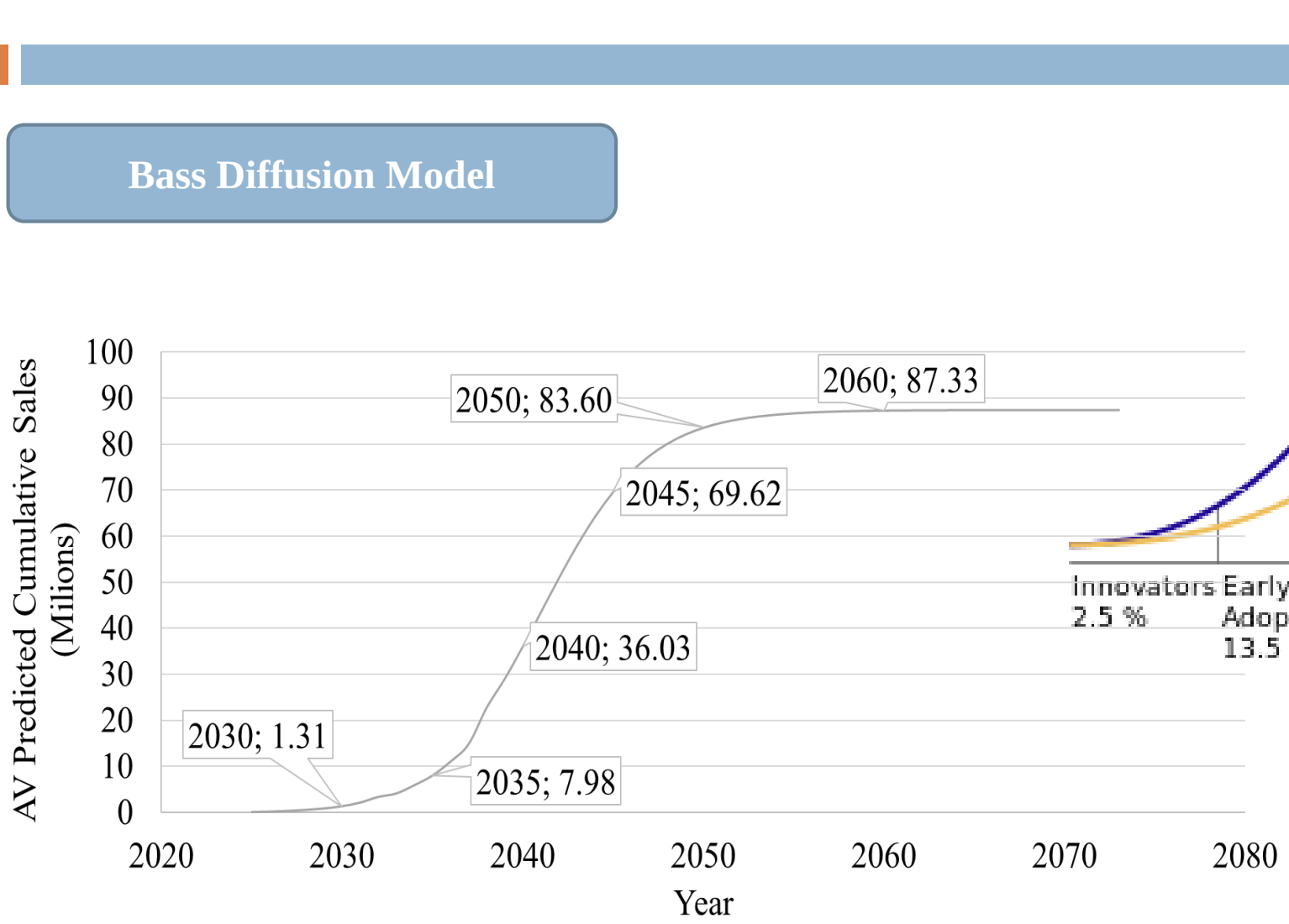
Outline

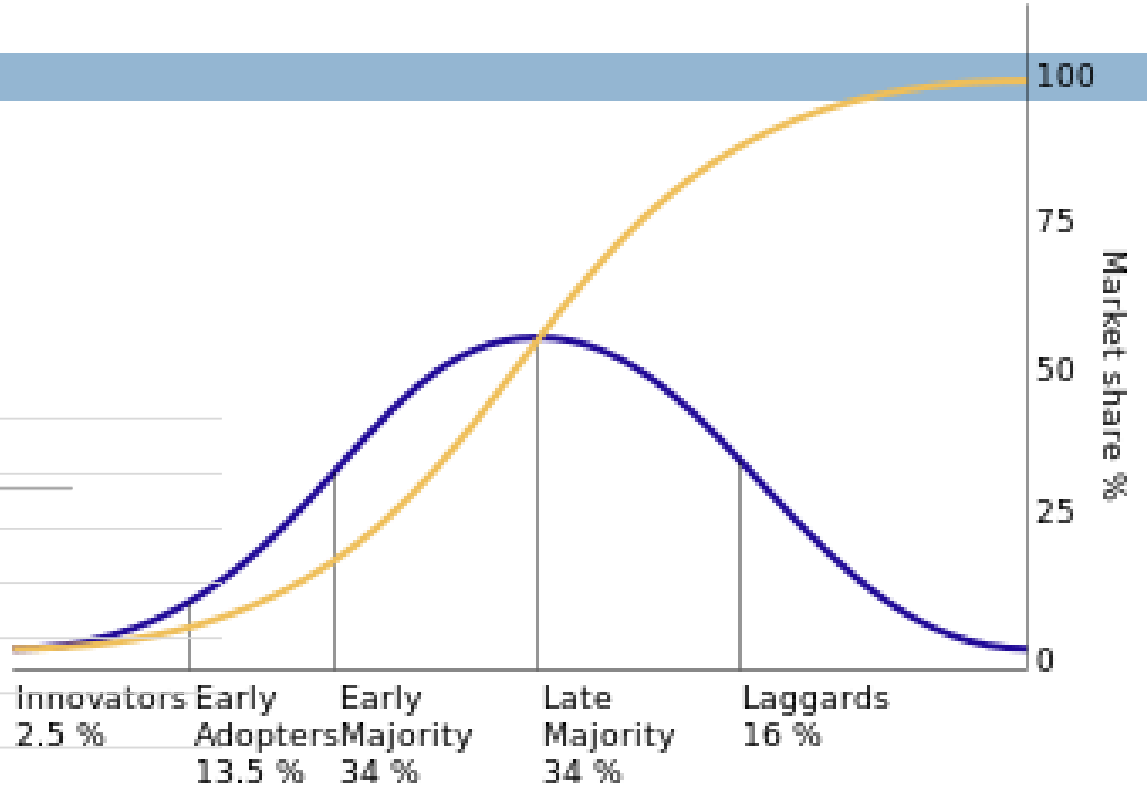
- Background & Motivations
- AV Market Penetration
- Implications on Travel Behavior
- Survey Results on AV Adoption
- Choice Experiments on Mode Choice
- Summary Findings
- Policy Implications



AV Market Penetration

Bass Diffusion Model





AV Impacts – Short-Term & Mid-Term

- Trip generation
  - Enhanced mobility
- Activity participation
  - Drop-off/pick-up by AVs
- Network capacity
  - Automation leads to efficiency and possibly narrower lanes
  - Induced travel
- Auto ownership
  - Shared vehicle/services
- Mode choice
  - Reduced travel costs
  - Transit services may see mixed impacts
- Household Expenditures
  - Reduced transportation costs

AV Impacts – Long Term

- Location choice
  - Reduced disutility of travel time and distance
- Parking demand
  - Self-parking capabilities
- Urban development patterns
  - Dispersed growth
  - Freed up space within the city

Figure 2.17 - AVs' Transformation of a City Block: Surface parking lots, traffic lights, and on-street parking, while common today, may disappear in an AV world. In their place we may find drop off lanes, pedestrian and bicycle amenities, in-fill development, and safer, less cluttered intersections.

Hypothetical Land-Use Change in Intersections, Source: Chapin et al. 2016

AV Adoption – Public Perceptions

Willingness to Pay

What is the maximum additional price (in addition to the base vehicle price) that you are willing to spend on AV technology for your newly purchased AV?

- Less than $1,000
- $1,000 – $4,999
- $5,000-$9,999
- More than $10,000

Willingness to Relocate

If you could use AVs for your trips, would you live farther away from where you are currently living, for more affordable and better housing?

- Extremely unlikely
- Unlikely
- Don't know/ Can't say
- Likely
- Extremely likely

Preferred Adoption Method

What would be your most preferred way to use AVs that can fully drive by themselves without your active control?

- Own
- Rent an AV as the needed arises
- Use AVs in the form of transit
- Not interested in any form

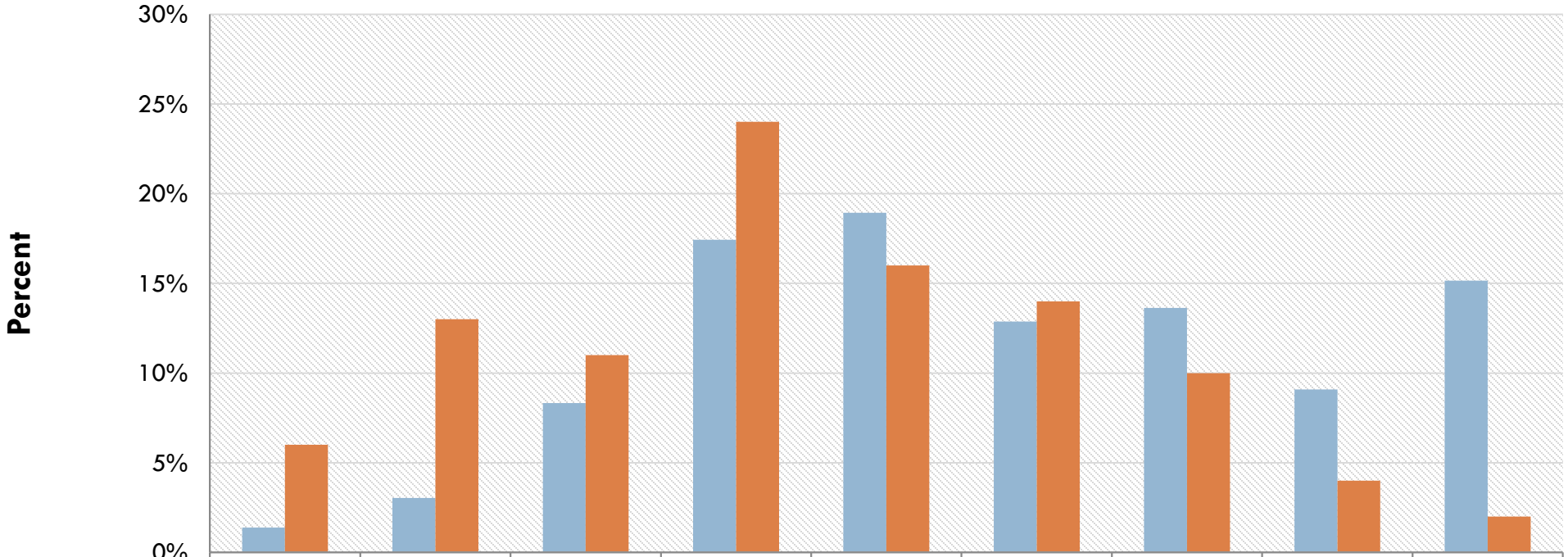
Survey Results – Adoption Method

Way of using AV	Frequency	Percent
Own (purchase or lease) AVs and use them only for personal use or use by family members	70	59%
Own (purchase or lease) an AV and earn extra income on the side by making it available to other drivers when not needed	11	9%
Own (purchase or lease) an AV and earn extra income on the side by providing rides for fellow passengers when you use it	9	8%
Rent an AV as the need arises	11	9%
Use AVs in the form of transportation (taxi, or public transit) provided by a service provider	14	12%
Neither interested in investing in an AV nor using AVs as a transportation service	3	3%

Size	Frequency	Percent
A larger vehicle than what I own now	42	29%
Similar sized vehicle	97	66%
A smaller vehicle than what I own now	8	5%

Survey Results - Relocation

Existing commuting distance and preferred commuting distance if using AVs



	Less than 1 mile	1-3 miles	3-5 miles	5-10 miles	10-15 miles	15-20 miles	20-30 miles	30-40 miles	40 miles or more
Using AV	1%	3%	8%	17%	19%	13%	14%	9%	15%
Before using AV	6%	13%	11%	24%	16%	14%	10%	4%	2%

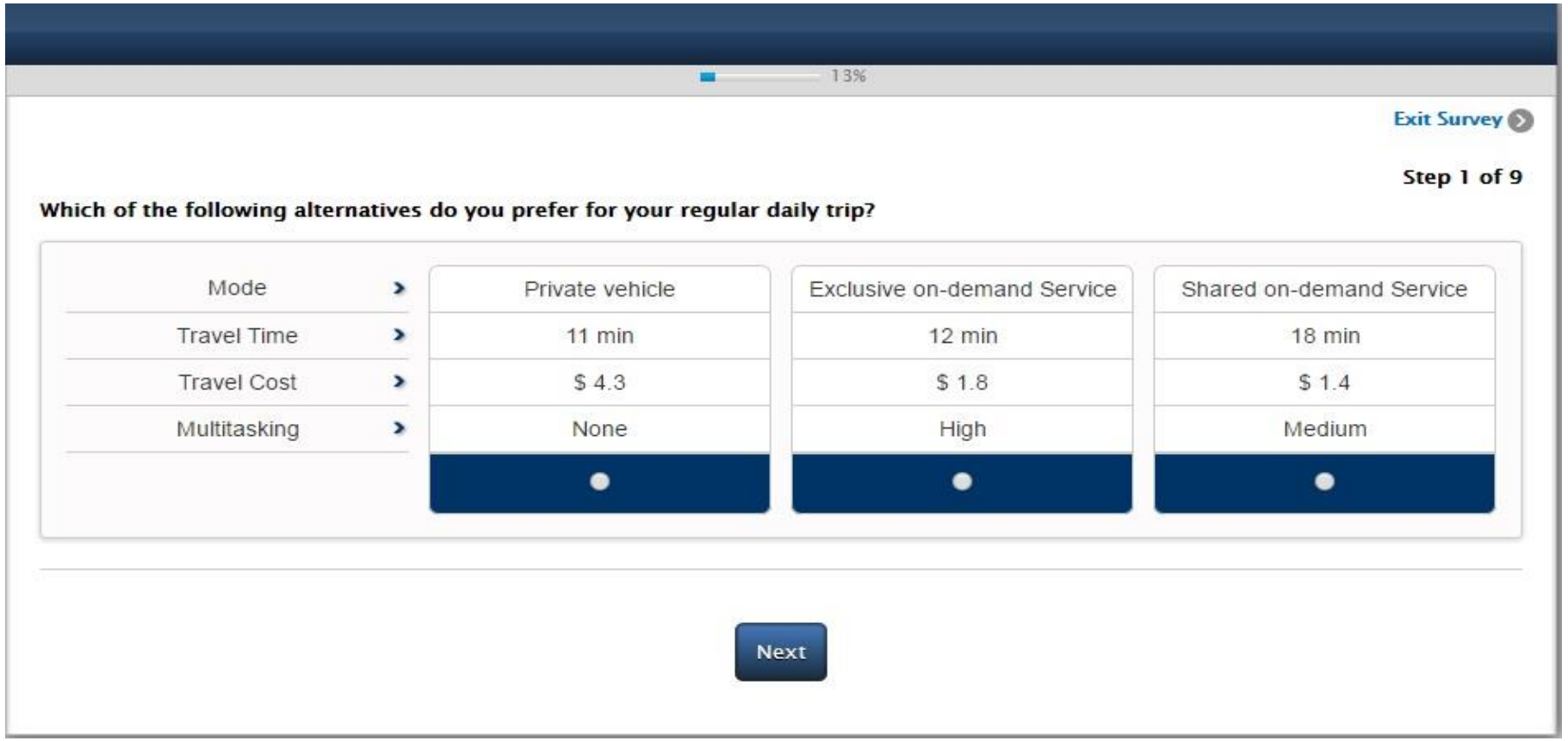
Choice Experiment

S1 – Driving

S2 – Passenger

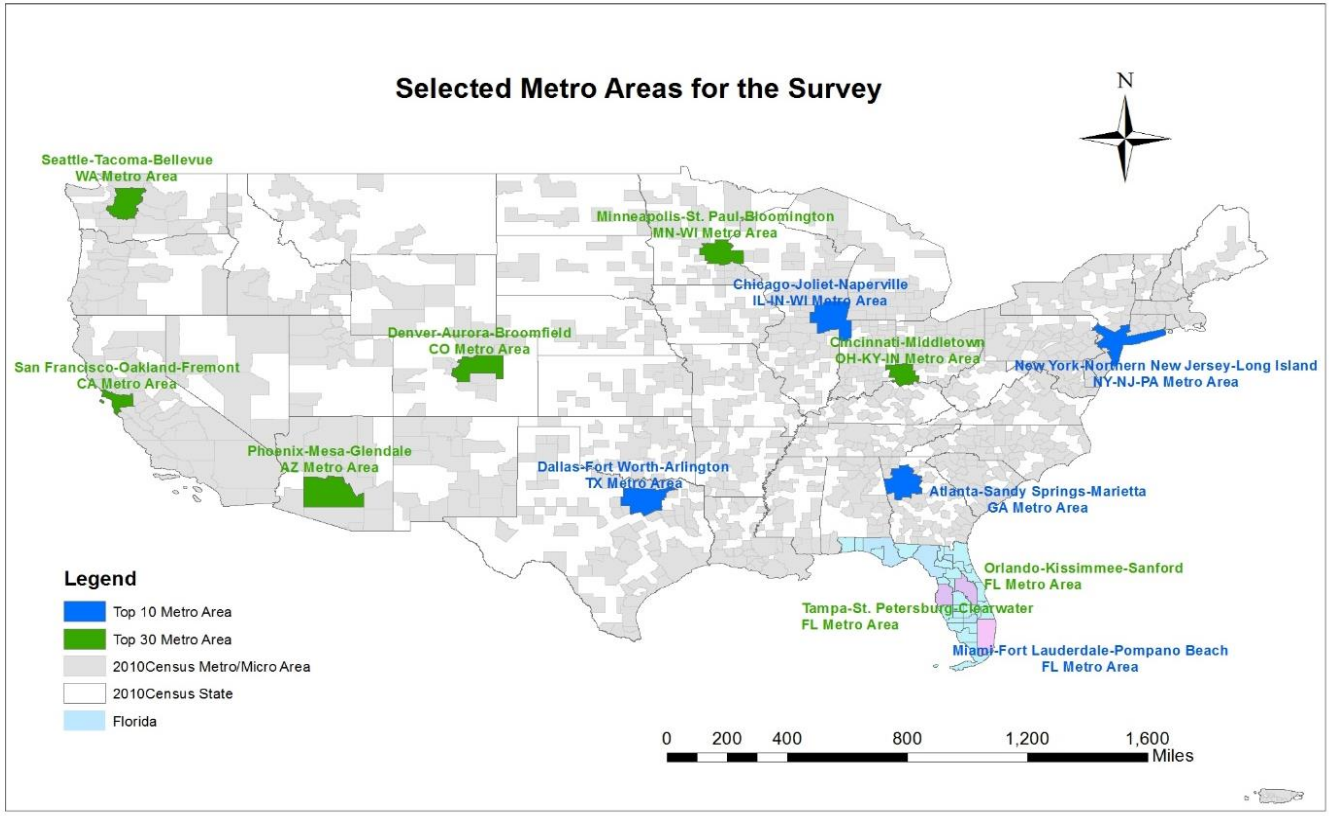
S3 – Transit

S4 – Visitors

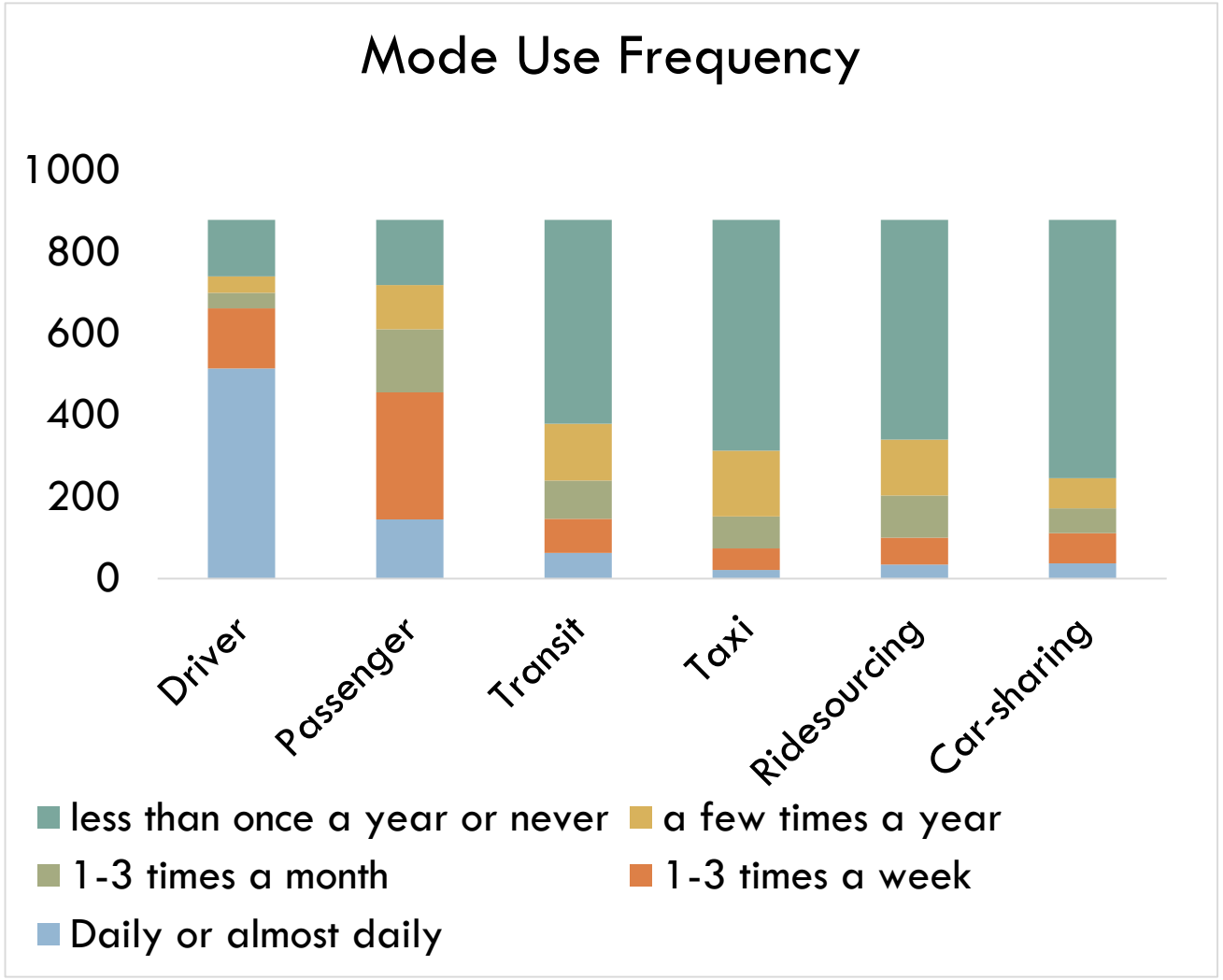


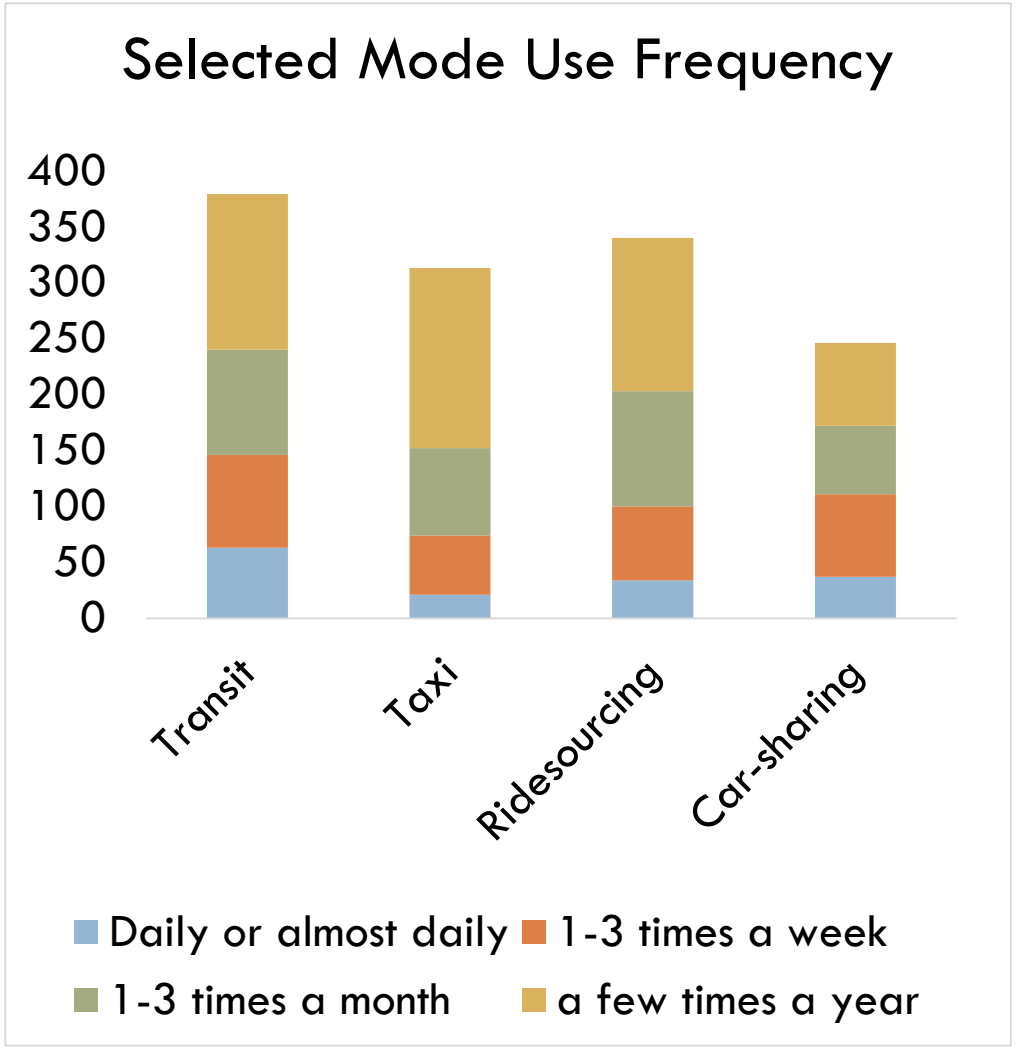
Survey Sampling

- Census representative sample, with oversampling of age group 16-34
- Ten metro areas nationwide plus three metro areas in Florida



How Americans Travel – mode usage





Potential of MaaS

- *I would use ride-sourcing if it saves me ____ minutes (such as time saved in finding parking or walking from parking/station to your destination)*

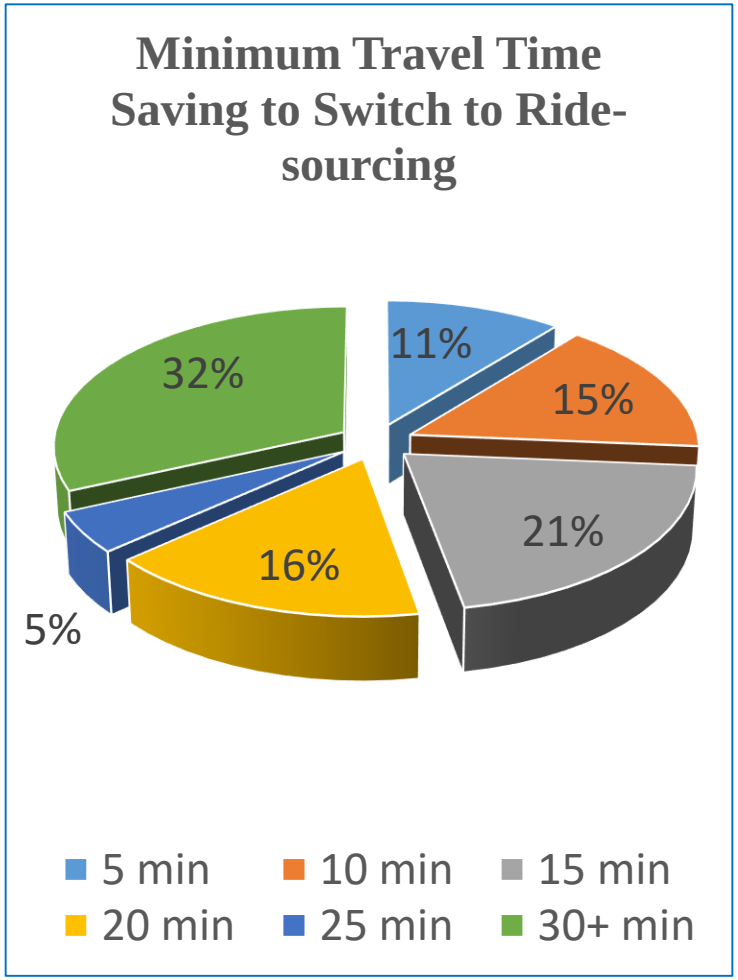
  a) 5 b) 10 c) 15 d) 20 e) 25 f) 30 or more

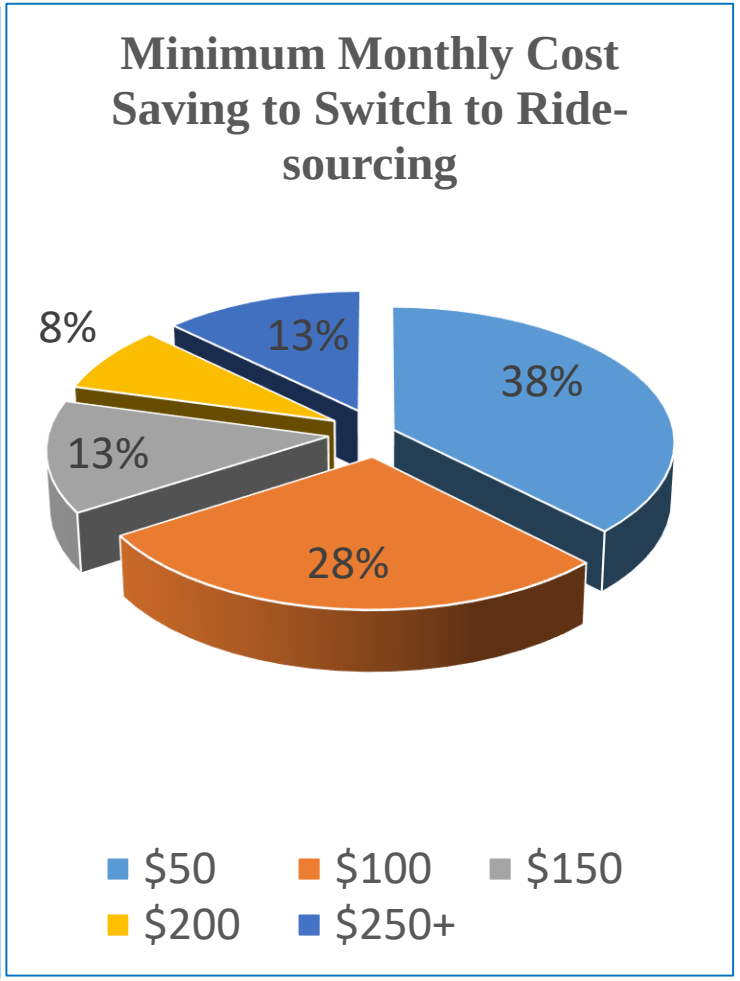
- *I would use ride-sourcing if driving cost increases by ____ dollars per month (e.g. you can think of fuel cost, or parking cost)*

  a) $50 b) $100 c) $150 d) $200 e) $250 or more

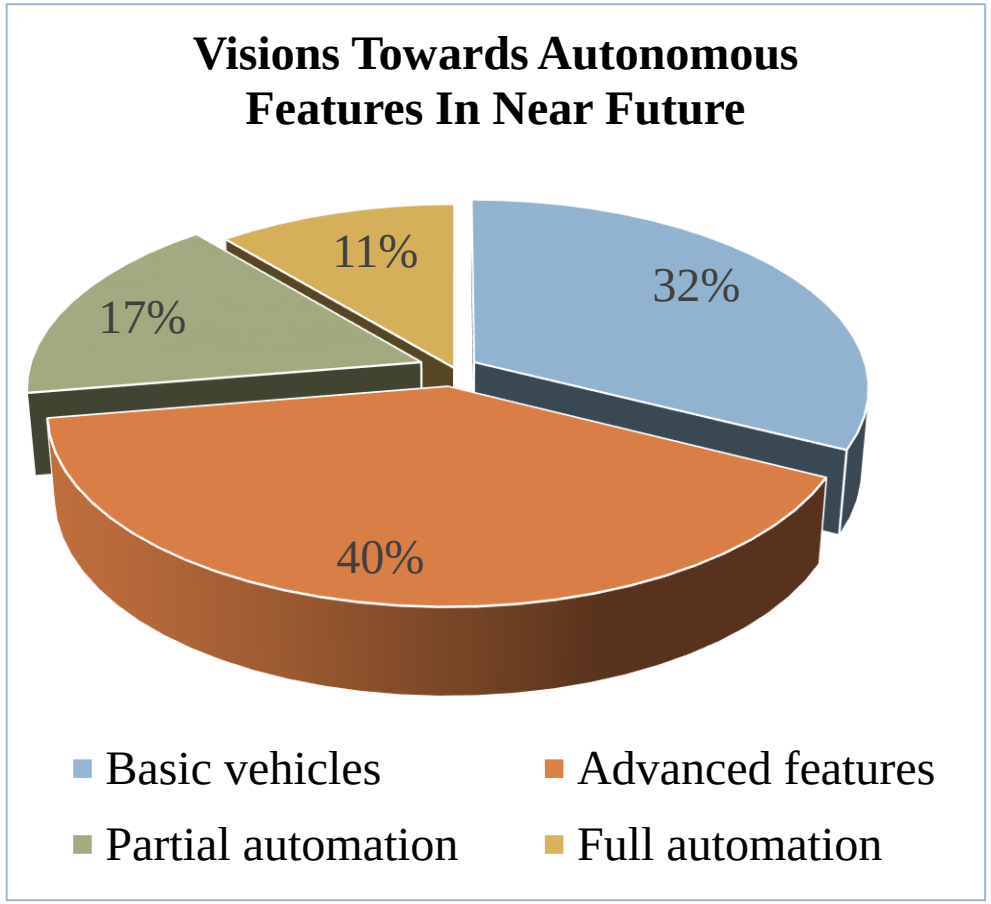
I would switch to ridesourcing if it saves me…

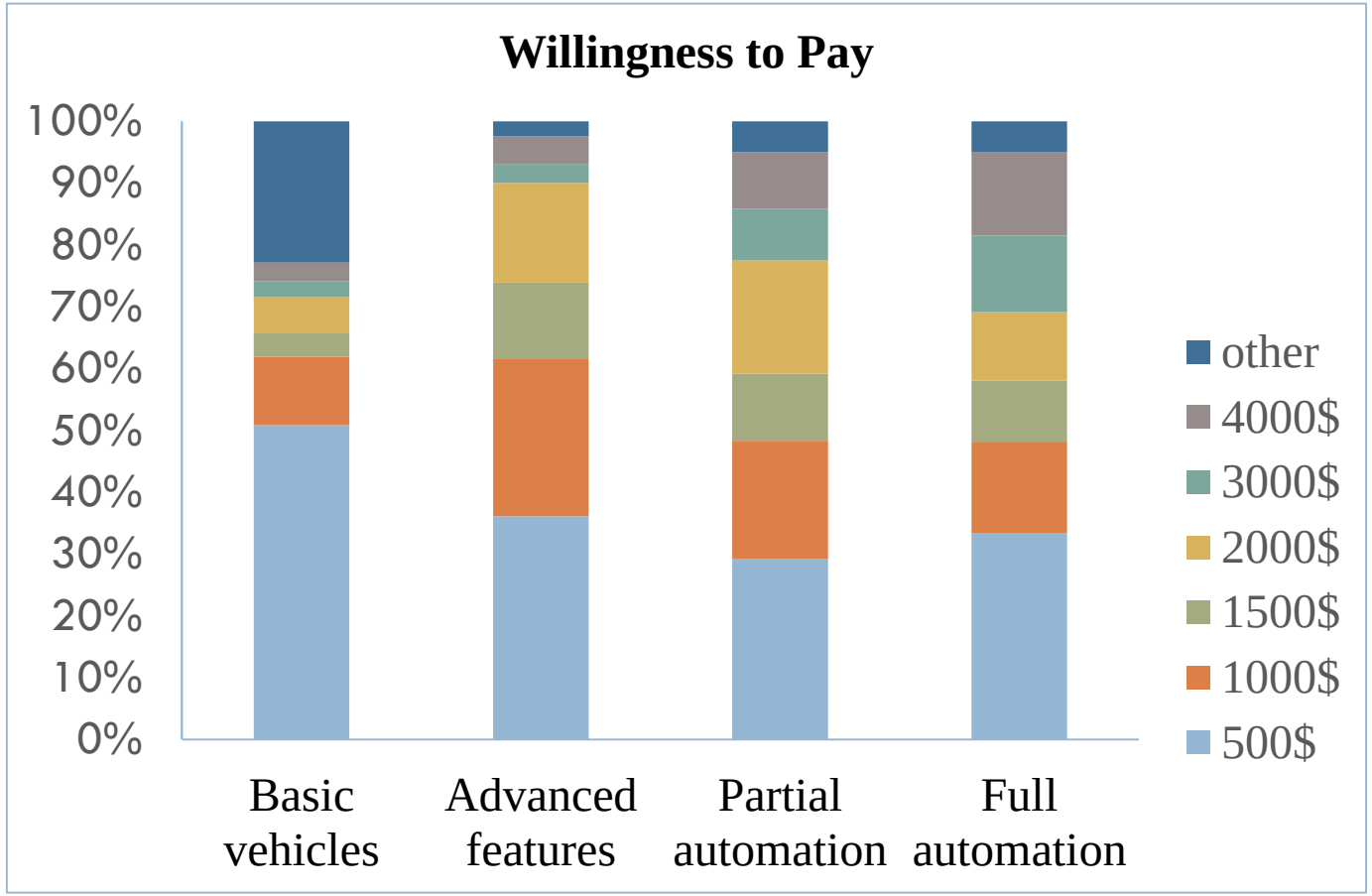
- Median cost saving: $72.4/month
- Median travel time saving: 15.9 min/trip
- A minimum monthly mobility cost saving of $72 or a travel time reduction of 16 minutes per trip will persuade around 50% of the respondents to switch to ride-sourcing.





Willingness to Pay for Automated Features

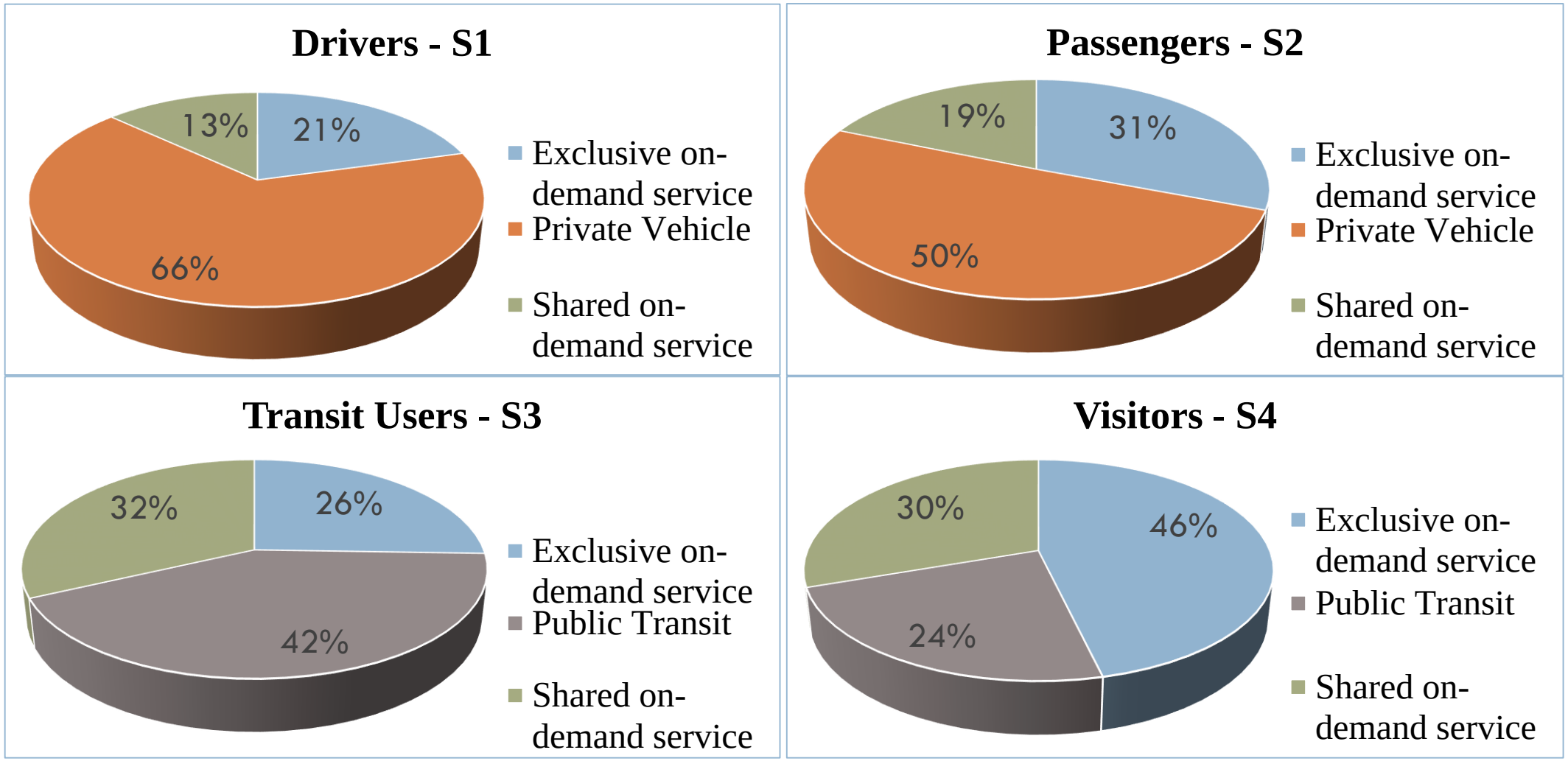




Expected WTP Value:

Basic vehicles: $734; Advanced Features: $1052; Partial Automation: $1483; Full automation: $1639

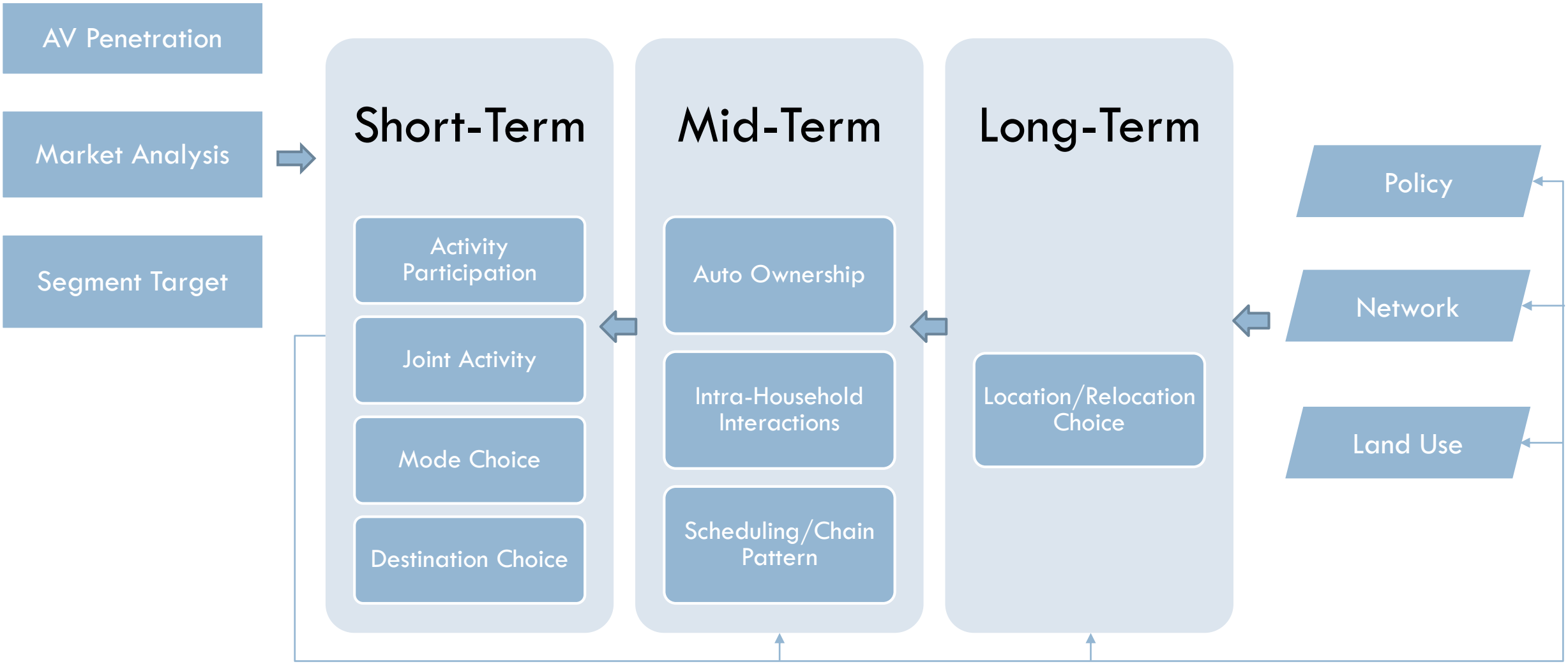
SP Choices


Drivers - S1
13%
21%
66%
Exclusive on-demand service
Private Vehicle
Shared on-demand service
Passengers - S2
19%
31%
50%
Exclusive on-demand service
Private Vehicle
Shared on-demand service
Transit Users - S3
32%
26%
42%
Exclusive on-demand service
Public Transit
Shared on-demand service
Visitors - S4
30%
46%
24%
Exclusive on-demand service
Public Transit
Shared on-demand service

Summary Findings

- For everyday use, transit is still more popular than ridesourcing at its current state. If the cost of ridesourcing comes down significantly it may become more competitive.
- Multitasking may have been overrated as an advantage of mobility-as-a-service or AVs.
- In general, user adoption of advanced vehicle technologies and their willingness to pay is in the lower range as seen in the literature.
- People prefer single ride twice as much as shared ride, except for transit users, which may indicate that cost is a primary consideration.
- Mode choice is still highly influential by the core utility (travel time and cost).
- Habit plays a significant role in mode choice, parking cost and time may act as habit breakers.

Policy Implications



Thank you

Xia Jin, Ph.D., AICP

Associate Professor

https://behaviorlab.eng.fiu.edu

Florida International University

Tel: (305)348-2825

E-mail: xjin1@fiu.edu