The Transportation Research Program at UTA: New Ideas and New Collaborators

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Transportation Research Center
for Livable Communities

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

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NATIONAL INSTITUTE for
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University Transportation Centers

- Transportation Research Center for Livable Communities
  - Lead - Western Michigan University
  - UTA Contact: Stephen Mattingly
- National Institute for Transportation and Communities
  - Lead – Portland State University
  - UTA Contact: Stephen Mattingly
- Center for Transportation Equity, Decisions, and Dollars
  - Lead – University of Texas at Arlington (CAPPA)
  - Engineering Contact: Anand Puppala
- Transportation Consortium of South-Central States
  - Lead – Louisiana State University
  - UTA Contact: Stefan Romanoschi

CENTER FOR TRANSPORTATION EQUITY, DECISIONS & DOLLARS

Other Project Sponsors and Partners

- Local agencies
- Local cities
  - Arlington
  - Dallas
- Local non-profits
- North Central Texas Council of Governments
- Texas Department of Transportation

Opportunity for Local Agencies and Cities

- NITC supports pooled fund studies and provides a match to the pool raised by supporting agencies
- Theme is mobility:
  - Increase access to opportunities
  - Improve multi-modal planning & shared use of infrastructure
  - Advance innovation & smart cities
  - Develop data, models & tools
- Annual program for cities, counties, MPOs and other regional or local agencies
  - Exploring Data Fusion Techniques to Derive Bicycle Volumes on a Network
  - Equity Implications of Automated Payment Solutions for Public Transportation

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Collaboration with Social Work

- Four different sponsors
- Multiple community partners
- 9 collaborative projects
- Research focus
  - Transportation equity
  - Transportation disadvantage
  - Public health
- Collaboration outcomes
  - Develop human focused solutions
  - Explore the trips not taken
  - Community engagement
  - Data collection

Transportation Mobility Among Low-Income, Transportation Disadvantaged Older Adults Living in a Low Density Urban Environment Using Innovative Data Collection Methods

- Transportation disadvantage
  - Unable to drive due to disability or a medical illness
  - Unable to afford a vehicle
  - Lack access to public transportation
  - Limited access to other transportation options
- Transportation disadvantaged populations
  - Older adults
  - Persons with low income (environmental justice)
  - Individuals with disabilities

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Proposed Solution

- A daily transportation plan, diary, and journal for older adults to capture data related to their planned, desired, and completed transportation experiences;
- Collects qualitative and quantitative data from low-income, transportation disadvantaged older adults. Captures:
  - Lived experience of transportation mobility
  - Desired activities
- Test feasibility of using an app for collecting transportation-related data among older adults
- Enhancements over current practice:
  - Examine the gaps in activity fulfillment due to transport limitations (i.e. latent demand)
  - Transportation mobility experiences and their impact on quality of life

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Conclusions

- Research gaps addressed
  - Record and investigate both the *actual* and *desired* travel experiences of EJ populations.
  - Ascertain the causes of differences between *actual* and *desired* trips and the temporal and spatial scales on which these differences occur
  - Measure the holistic impact of transportation gaps on the lived experiences of EJ populations
  - Data collection method and data focused on transportation equity transportation planning and policies
- Empirical data can be used to inform policy and public planning decisions
  - Local transportation infrastructure and service investments that maximize mobility for this population
  - Public health and quality of life for this highly vulnerable and largely hidden population

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Optimizing Housing and Service Locations to Provide Mobility to Meet the Mandated Obligations for Former Offenders to Improve Community Health and Safety

- Objectives
  - Identify optimal housing locations (existing or proposed) for individuals returning to Dallas, Texas from incarceration.
  - Identify optimal service provider locations (existing or proposed).
  - Identify optimal residential assignments both overall and for individual clients.
- Anticipated outcomes
  - Develop a model to select best housing and services locations for each client reentry plan
  - Reduced recidivism
  - Extend to other EJ populations facing similar constraints
  - Improvements in community and service location planning

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Creating Improved Performance Measures That Evaluate Public Transit as a Ladder to Opportunity

- Research Questions
  - What new performance measures are necessary to better assess transit service based on economic viability, equity, health, and access to opportunity?
  - How to observe and assess the outcomes of these emerging business models with real data using the emerging Mobility-on-Demand (MOD) pilot studies?
  - What emerging business models exist for providing first/last mile service connections to transit?
  - What are the human behavior responses to different messaging and incentive strategies? (U. of Arizona)
  - What human behavior changes can be expected in response to these innovative solutions? (U. of Arizona)
  - Which of these business models offer the best promise for improved performance when evaluated using the new performance measures?
- Anticipated outcomes
  - Transit performance measures for providing equity, improved health, and access to opportunity
  - Analysis and learning from real data collected form the FTA MOD funded AMORE project from the Tucson Arizona area (U. of Arizona)
  - Evidence-based implementation strategy for trials and future research

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Collaboration with Public Affairs

- Three different sponsors
- 5 collaborative projects
- Research focus
  - Active transportation
  - Public health
  - Housing
- Collaboration outcomes
  - Develop human and policy-related solutions
  - Community engagement
  - Safety
  - Public health performance measures
  - Conflict app

App-based Crowd Sourcing of Bicycle and Pedestrian Conflict Data

- Conflict Analysis: a surrogate safety measure
- Justification:
  - Crash data may underestimate safety concerns
  - Near misses captured
  - May capture actions taken to avoid a crash
  - May provide evidence on perceived safety concerns
- Challenge: wide-spread data collection
- Solution: an Android app to better understand the continuum of conflicts and acquire difficult to obtain bicycle and pedestrian conflict data using crowd sourcing

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Conflict Severity: Pedestrian-Vehicle No-Overtaking

- Speed categories – 10 mph ranges
- Time – more than enough, sufficient, barely enough
- Separation distance

Time	More					Sufficient					Barely				
Speed	Very Slow	Slow	Moderate	Fast	Very Fast	Very Slow	Slow	Moderate	Fast	Very Fast	Very Slow	Slow	Moderate	Fast	Very Fast
Evasive Action	None	None	None	Light	Light	Medium	Medium	Medium	Heavy	Heavy	Heavy	Heavy	Emergency	Emergency	Emergency
Far (> 20 ft)	D	D	D	D	D	C	C	C	B/C	B/C	B/C	B/C	A/B	A/B	A/B
Medium (10 - 20 ft)	D	D	D	C	C	B	B	B	B	B	B	B	A	A	A
Short (< 10 ft)	B/C	B/C	B/C	A	A	A	A	A	A	A	A	A	A	A	A

Conclusions

- Considering crashes as the sole safety metric appears unsatisfactory, especially for bicyclists and pedestrians where any incident may likely result in an injury or fatality
- Near misses or conflicts need to be included in safety assessments for active modes especially in light of their potential chilling effect on participation in these modes
- *Safe Activity* developed to address this need
- Conflict patterns coupled with crash data and their possible causes help transportation agencies make strategic decisions about active transportation investments
- Conflict measures act as a sketch planning level performance measure to understand potential safety issues related to transportation facilities

Blame-the-Victim Policy Narratives and Local-Level Transportation Policy Decisions

- To identify the factors that influence the characterization within a policy narrative of the vulnerable road user in a crash as a victim or villain
- To assess and classify the policy narratives present in a random sample of 12 states from four regions for the period 2003-2015.
- To assess and classify the policy tools used to improve bicyclist and pedestrian safety in a random sample of 12 states
- To test the statistical association between the policy narratives that emerge and the policy tools and infrastructure improvements used in 12 randomly selected states
- To determine the rate of crash reporting based on a percentage of the total bicyclist and pedestrian fatalities

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Conclusions

- Victim characterization
  - Positive - Pedestrian
  - Negative
    - Age (5-20)
    - Age (21-30)
    - Age (76+)
- NHTSA data fatal bicyclist and pedestrian crashes
  - Bicyclists (9.2%) vs. pedestrians (2%)
  - Highest state level rates
    - Bicyclists <37%
    - Pedestrians <10%
- Infrastructure change
  - Positive – population
- Policy change
  - Positive
    - Crash reporting rate
    - Conservative political culture
    - State media source
    - Age (21-30)
    - Victim characterization
    - Age (76+)

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Collaboration with Planning

- Two (21 partners for one project) different sponsors
- 2 collaborative projects
- Research focus
  - Education
  - Housing
  - Transportation affordability
- Collaboration outcomes
  - Co-chair Ph.D. committee
  - Dallas AFH Assessment
  - Affordability metrics

Affordability of Ridesharing using Autonomous Vehicles

- Would eliminating car ownership and replacing it with autonomous transportation services be more affordable for transportation disadvantaged?
- Would the quality of service provided by autonomous transportation services be better than the current alternatives for transportation disadvantaged?
- What can be done to ensure that the future autonomous transportation system meets the needs of all citizens while achieving its efficiency and safety goals?

Annual Cost of HBW trips – Ride hailing

HH Income	Trip Length	SOV RH Cost	HOV RH Cost	Residual Income
<10k	13.8	$19,665	$5,985	$901
10<15k	9.8	$13,965	$4,560	$10,056
15<25k	11.2	$15,960	$5,059	$17,854
25<35k	10.4	$14,820	$4,774	$25,209
35<50k	11.4	$16,245	$5,130	$33,444
50<75k	12.5	$17,813	$5,522	$49,262
>75k	14.4	$20,520	$6,199	$114,937

Conclusions

- Autonomous ride hailing would force a shift in behavior due to high cost or force households to reexamine household budgets
- Autonomous ride hailing with ride sharing would increase median HH transportation expenses to 24%
- Lowest income households often cannot afford transit after meeting other needs
- Low income households currently have access to automobiles and prefer to use them
- Would the disrupted transportation system allow low income households to seek and maintain employment?

Collaboration with Computer Science

- Three different sponsors
- 3 collaborative projects
- Research focus
  - Develop tools to support data collection
- Collaboration outcomes
  - 2 apps
    - SafeActivity
    - MyAmble

Social Media Analysis for Transit Assessment

- To develop a strategy for extracting and mining transit-relevant information from social network such as Twitter
- To measure and quantify transit performance by individual sentiment and perception on the transit services

Final Thoughts

- Other collaborations include industrial engineering, and within civil structures and water resources
- Other research topics include
  - Decision-making and risk analysis
  - Safety
  - Operations
  - Smart cities (big data, sensors and ITS)
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