Behaviour Change and Transportation Research

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Behaviour Change for Energy Efficiency: Opportunities for International Cooperation in the G20 and Beyond, Paris, 12 September 2018

How have behavioural insights shaped efficiency policy in this sector?

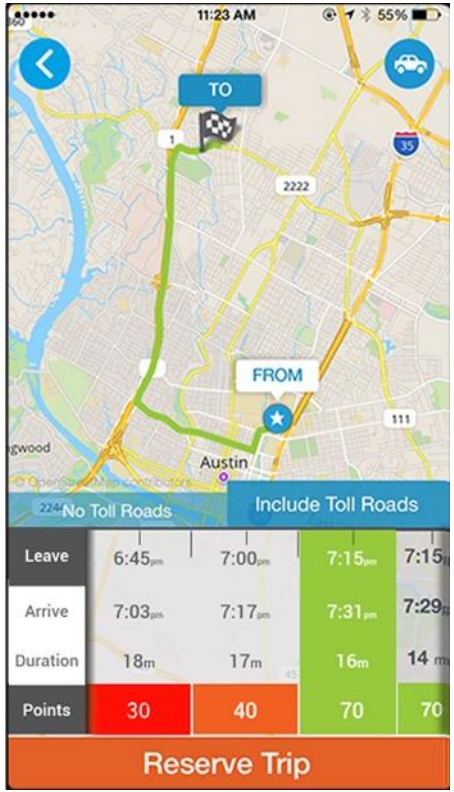
- *U.S. Department of Energy – Advanced Research Projects Agency – Energy (ARPA-E)*
  - *Traveler Response Architecture using Novel Signaling for Network Efficiency in Transportation (TRANSNET)*
    - *Development of smartphone mobility app using incentives/informational levers to nudge travel behaviour*
- *U.S. Department of Energy – Energy Efficient Mobility Systems (EEMS)*
  - *SMART Mobility Consortium: Mobility Decision Science (MDS) research pillar*
    - *WholeTraveler behavioural survey/geolocation data collection*
    - *Integration of behavioural factors into leading research addressing emerging transportation technologies and trends*

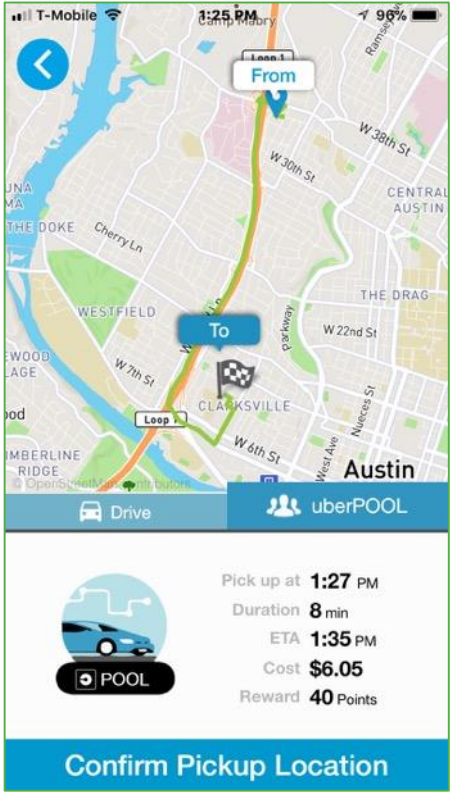
Results of the policy/programme

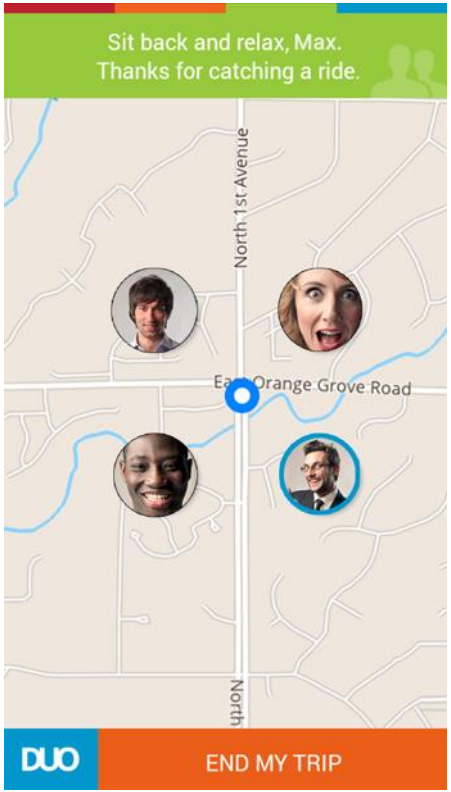
- ***ARPA-E TRANSNET***
  - *Metropia mobility app deployed to thousands of users in Austin and El Paso, Texas & Tucson, Arizona; plans for more cities*
  - *Identified individual and system level energy benefits due to changed behaviours*
    - *Changes to departure time, routes, vehicle passenger load, trips avoided*
  - *NREL developed tools to estimate fuel reduction, economic savings presented to users in real-time*

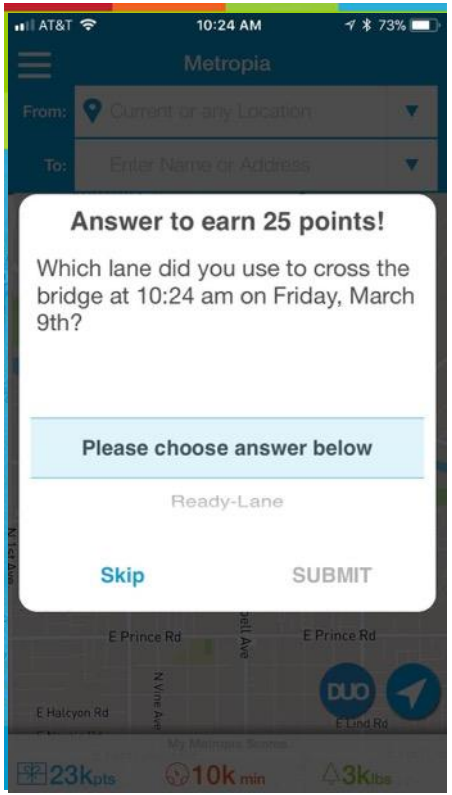
- ***EEMS Mobility Decision Science research***
  - *Intentional effort to integrate behavioural science as part of interdisciplinary research*
  - *WholeTraveler project is currently in progress*
  - *Informing development of current and next generation travel demand models*

Metropia Mobility Options and Gamification



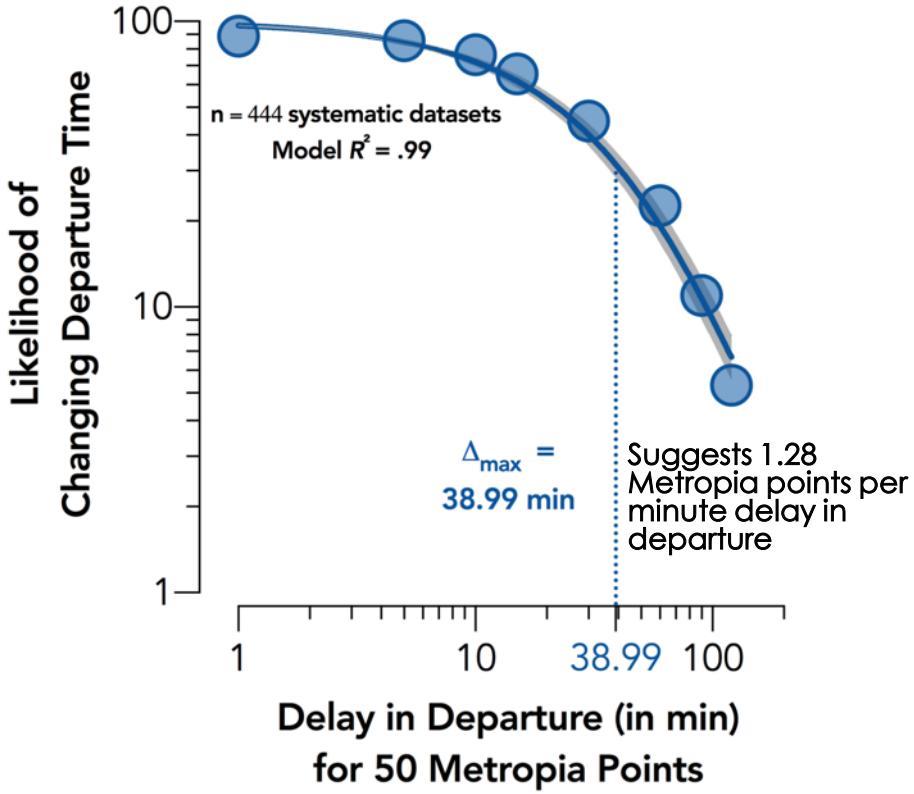


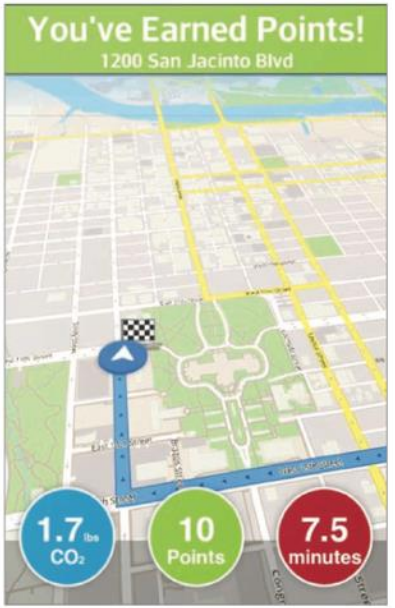




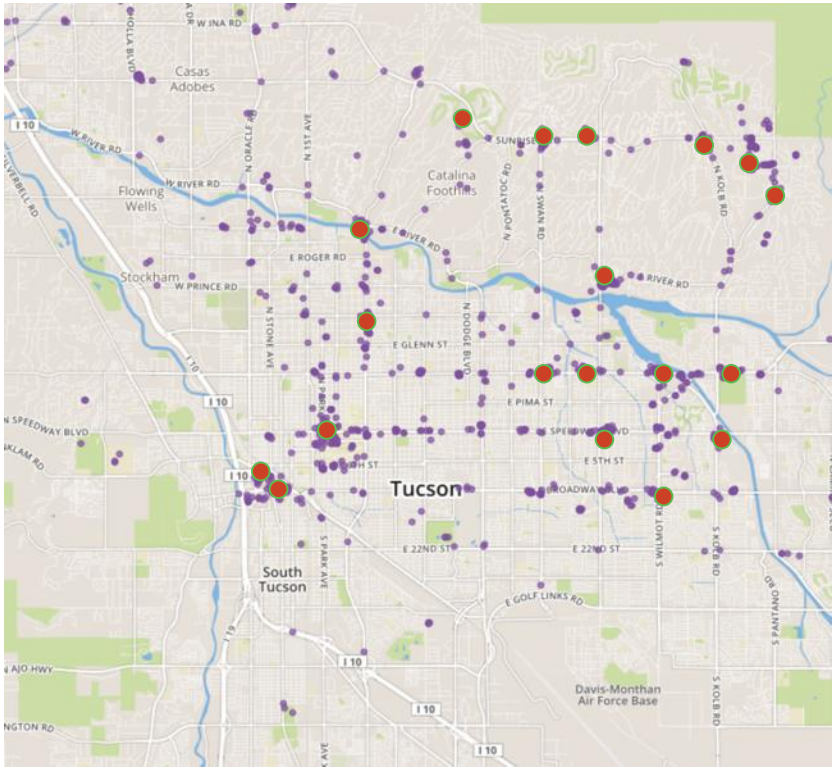
Behavioural Economics: Breakpoint

Population-Level (Aggregate) Analysis





Inferring User Trip Purpose



Activity Type	Number of Trips
Home	230,230
Work	65,065
School	24,956
Shopping	35,629
Maintenance	127,946
Entertainment	142,120
Drop off/pickup	26,112

Annualized Cost Savings

- Annualize costs
  - Determine average $/mile savings for a trip and multiply by average annual VMT for a driver
  - Texas average fuel cost = $2.40/gallon
  - National average annual miles driven = 13,476 miles (averaged over all age groups)

- Aggregate results for annualized fuel cost savings
  - **Mean** = $0.016/mi -> **$215.62/year**
  - **Median** = $0.008/mi -> **$107.8/year**
  - **StDev** = $0.10/mi -> **$134.76/year**

Metropia V2.0: TOTAL MOBILITY

JOURNEY

Multi-modal Trip Planner

Personalized trip planner for all modes. Integration with transportation systems via instant messaging portal: travel alerts, Mobility Option Discovery.

INDUCE

Travel Behavior Shifts

Rich data repository about individual travel behaviors and micro-targeted customer campaigns to alter travel behavior.

TRANSACT

Payment & Ticketing

A bank repository for 'universal' collection
and transfer of points and agency provided rewards, gift cards and CO2 savings.

Lessons learned

- ***ARPA-E TRANSNET***
  - *Users are willing to shift their behaviour as a result of incentives and energy information*
  - *Interventions designed to nudge behaviour can result in substantial energy savings*
  - *Monetary-based incentives can be challenging to scale up*
  - *Challenges: Infrastructural and cultural inertia for automobile dependence*

- ***EEMS Mobility Decision Science***
  - *Strong interest in behavioural science data and approaches among engineers, researchers*
  - *Travel demand models benefit from behavioural data*
  - *Challenges: Vast potential behavioural data from unconventional sources offer insights; improved methods, machine learning/AI analytical tools needed*

Opportunities for international collaboration?

- ***Fundamental disruption is occurring worldwide in transportation***
  - *Opportunity to nudge travel behaviours toward more energy efficient options*
  - *Shared mobility behaviours, coupled with vehicle electrification can enable increased mobility access while reducing energy costs, especially in developing countries*

- ***Knowledge exchange to avoid or mitigate past mistakes***
  - *As behaviours evolve due to Opportunities for countries to exchange knowledge*
  - *"Leapfrog" technologies such as distributed power generation/renewable energy can transform travel behaviour in rural and less developed areas*
  - *Several current behavioural trends in transportation first emerged in developing countries*

- ***Applied behavioural research in transportation is still in early stages***
  - *Much is to be gained through collaborative research efforts*
  - *Strong possibilities to inform "leapfrog" strategies in developing countries*

Further questions

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