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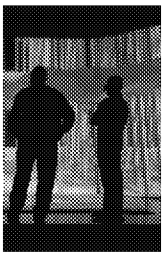
US Mobility:
Changes in American Travel Behavior and the Implications on Fuel Consumption

LANG SUI
ARAMCO RESEARCH CENTER
STRATEGIC TRANSPORTATION ANALYSIS TEAM
TE3 CONFERENCE
OCTOBER 25-26, 2017

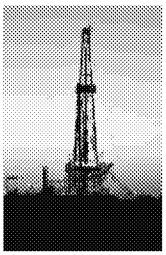
where energy is opportunity

Fully Integrated Energy Enterprise

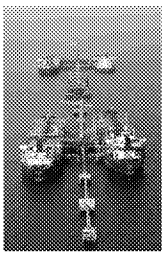
261.1 billion
barrels of oil and condensate reserves



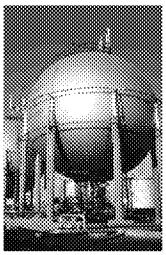
12.0 million
bpd maximum sustainable oil production capacity



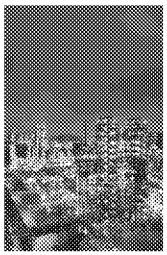
14.6 million
barrels of oil equivalent capacity



297.6 trillion
scf of gas reserves



5.4 million
bpd global refining capacity



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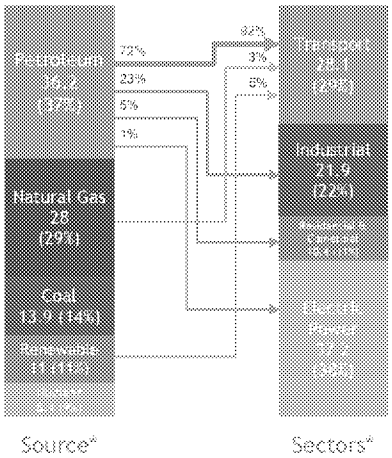
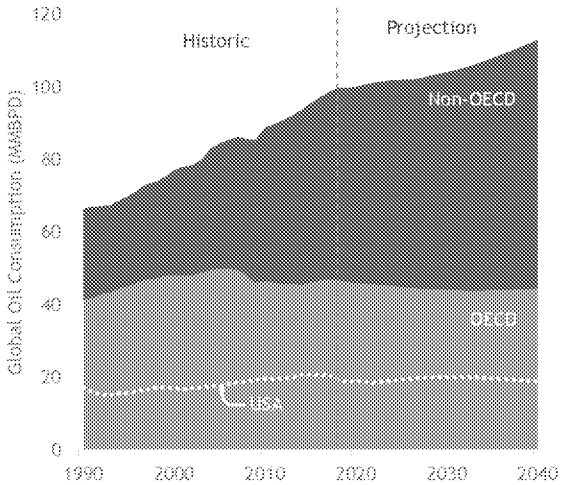
Why Mobility?

2017 US Energy Consumption



Global Petroleum Consumption



→ Transportation accounts for 72% of petroleum use, and the future of petroleum consumption is projected to increase.

*quad BTU

1 Source: U.S. Energy Information Administration, International Energy Outlook 2014 & 2017, AEO 2018 (Reference case scenario)

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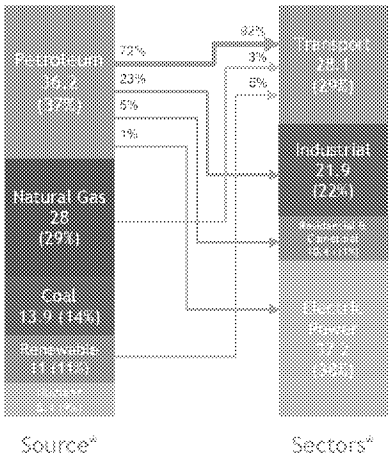
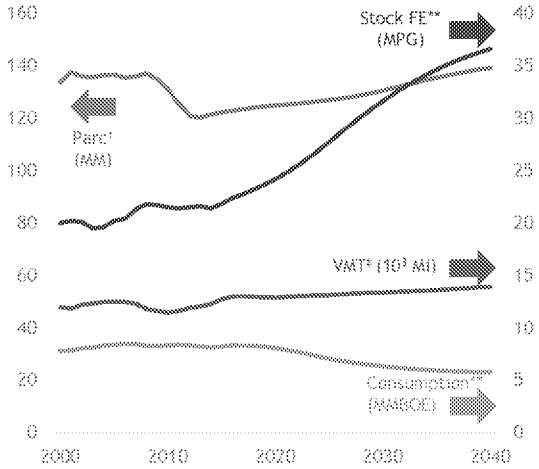
Why Mobility?

2017 US Energy Consumption



US Passenger Vehicle Metrics



→ US passenger car fuel consumption is projected to decrease, mainly as a result of improvements in fuel economy. What about utilization?

*quad BTU
4 **U.S. Energy Information Administration AEO 2018, Reference case scenario
†IHS Markit Rivlary Scenario
‡2017 National Transportation Statistics – US Department of Transportation, Bureau of Transportation Statistics

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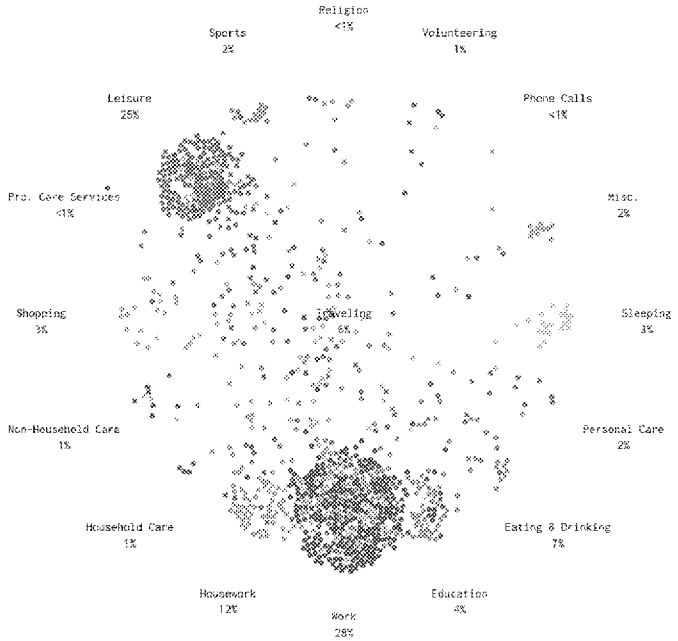
American Time Use Survey

1:25pm



ATUS Highlights	
2003 2017	Survey period by Bureau of Labor Statistics
12,000	Individuals surveyed annually
400	Different types of activities
10	Modes of travel (car, bus, walking, bike…)
70	Categories for travel

Source: http://www.bls.gov/tus
https://flowingdata.com/2015/12/15/a-day-in-the-life-of-americans/

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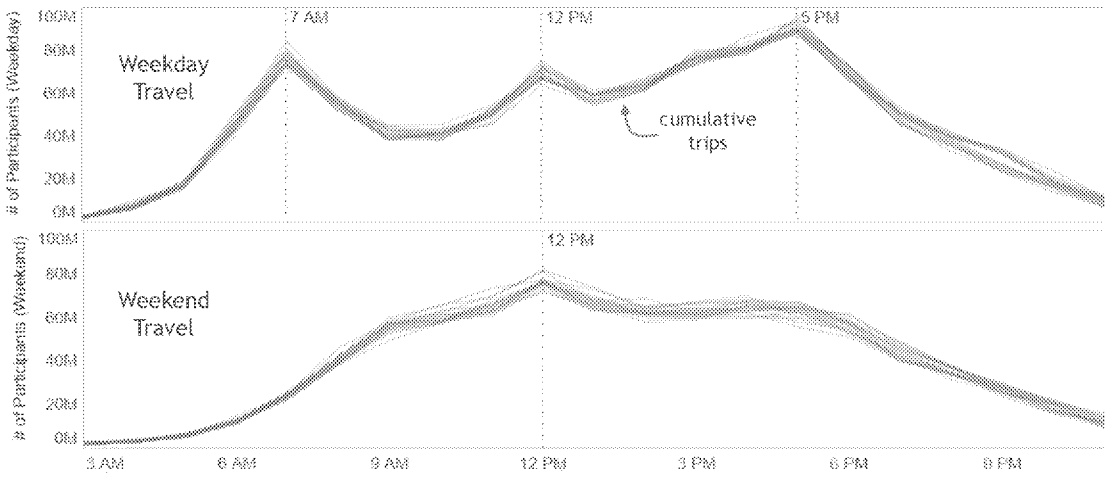
Travel Distribution Over 24 hrs

- Weekday travel exhibit different travel patterns than weekend travel
- Our travel habits have not changed over the course of last 14 years



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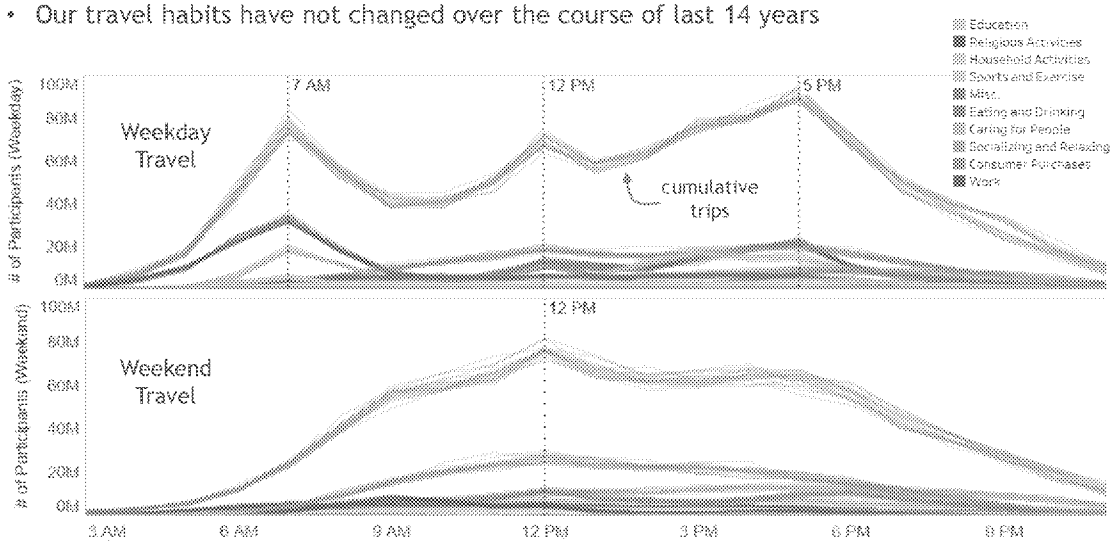

→ Strong travel habits can have beneficial implications for autonomous vehicles, but also presents a challenge to for autonomous vehicles to alternate those habits.

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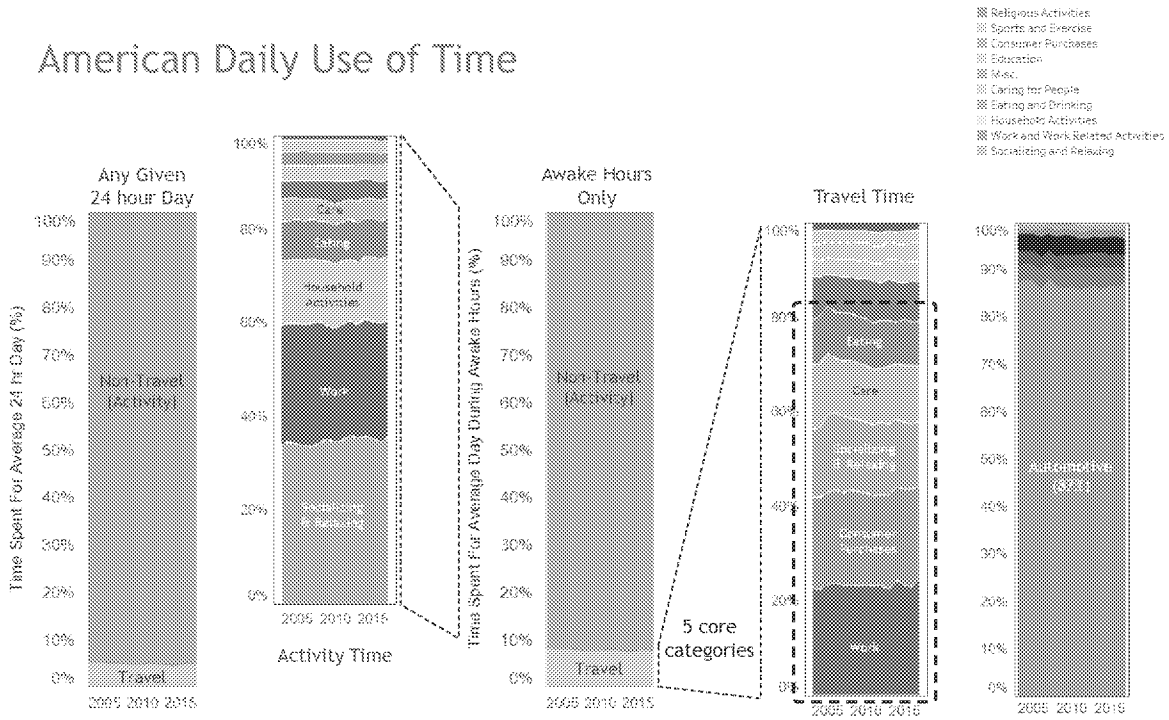
American Daily Use of Time



→ Overall travel time is less than 5% of a 24-hr day and the top 5 core categories remain the same

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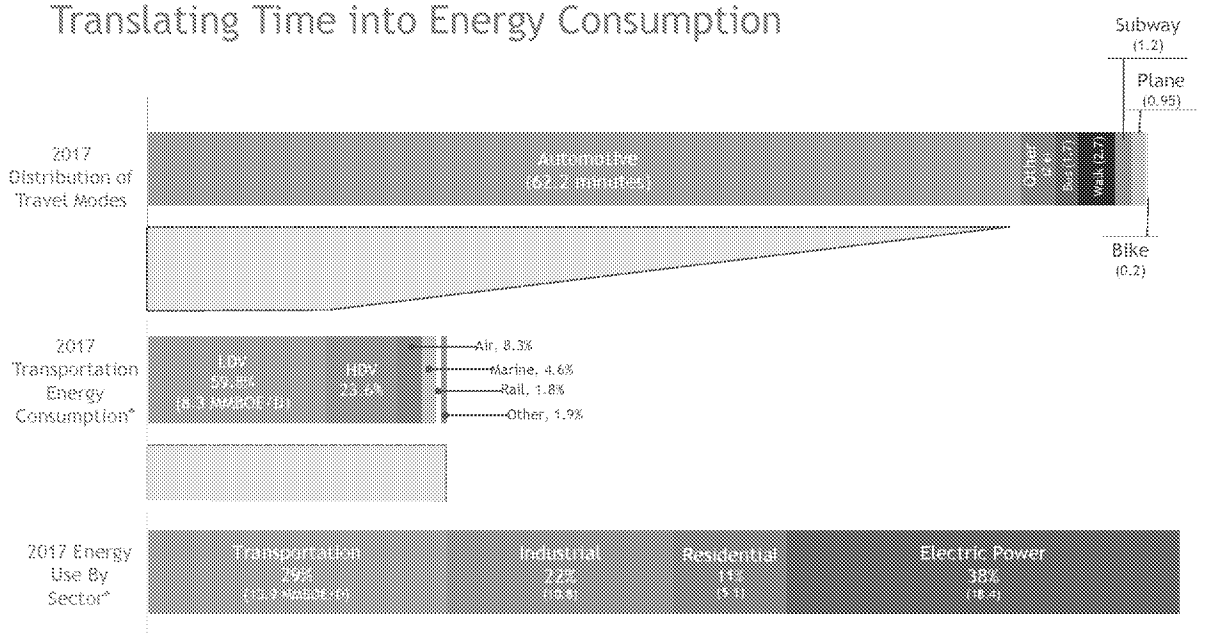
Translating Time into Energy Consumption



→ In 2017, 62.2 min/day of automotive travel consumed 8.3 MMBOE/D or ~17.2% of total energy consumption.

*EIA 2018 Annual Energy Outlook, reference scenario.

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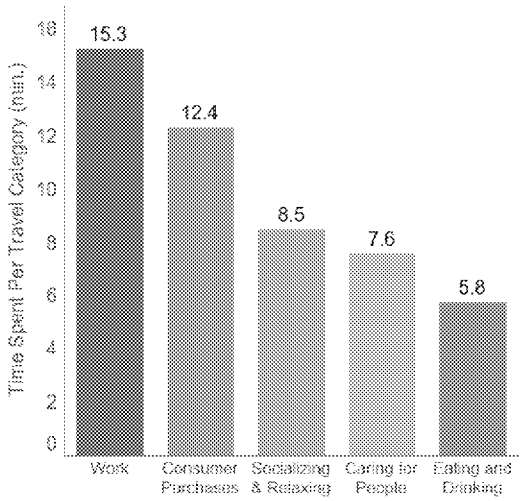
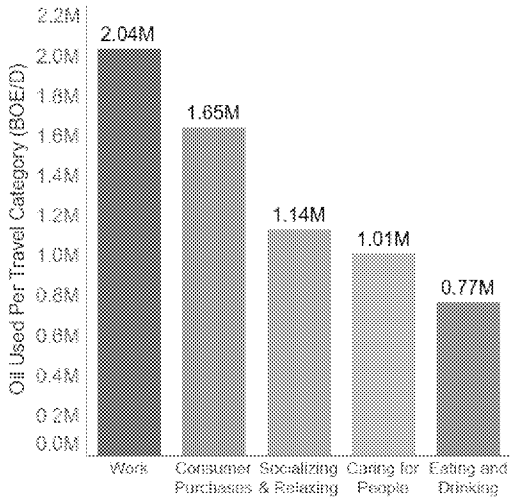
Translating Travel into Barrels of Oil





→ Oil consumption can be allocated to each travel category based on their respective fraction time spent per day.

*Assuming ~8.3 MMBOE/D usage for LDV in 2017

16 EIA Annual Energy Outlook 2018 for fuel consumption.

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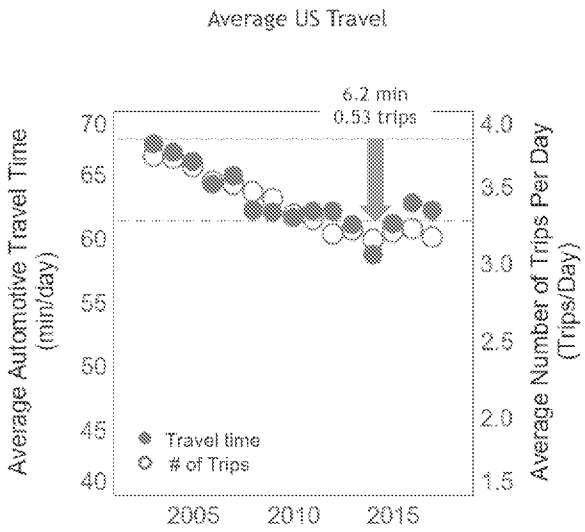
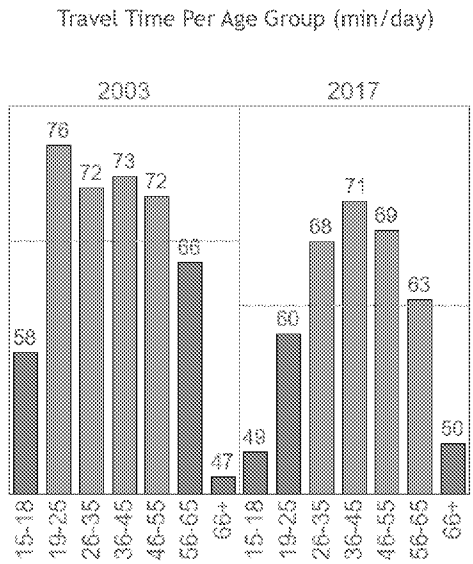
Average Daily Automotive Travel





→ Average travel time and number of trips have fallen by 6.2 min and 0.53 trips, respectively

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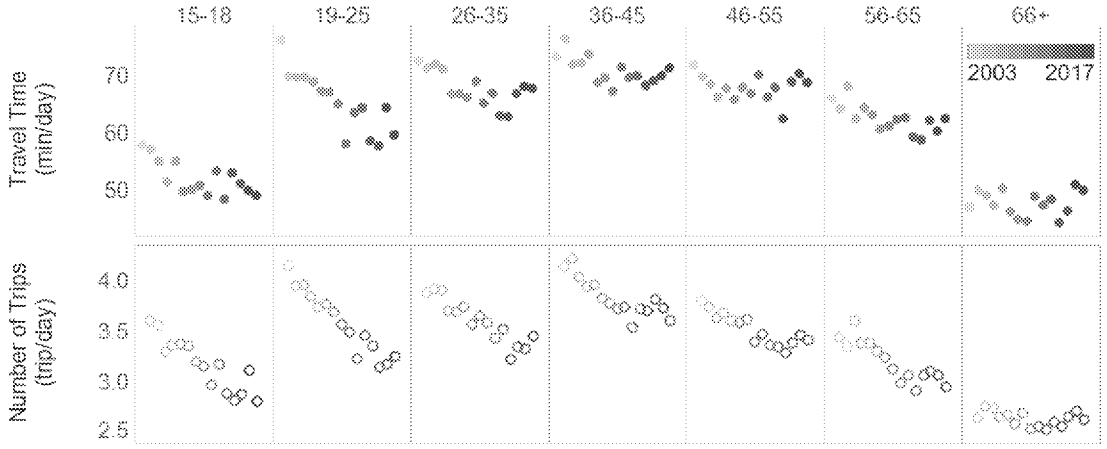
Decreasing Travel Time by Age Groups

- Automotive travel time is decreasing for all age groups.
- 19-25 age group experienced the most significant decrease in travel time.



→ Individual travel has all fallen for almost every age group since 2003; however, the decrease is not evenly apply across all age groups.

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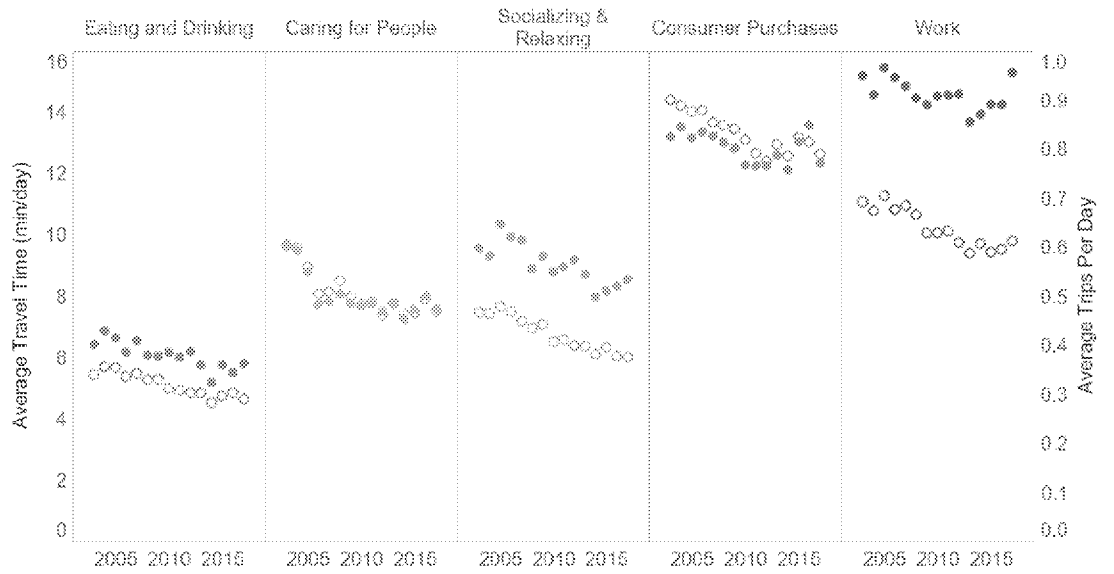
Travel distribution by activity



→ Five core categories all exhibit decline in the past 14 years, but to varying degrees.

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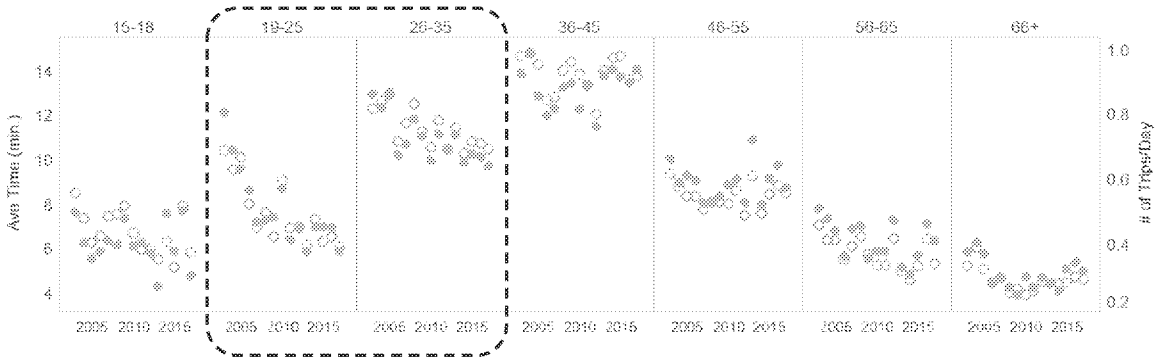
Travel distribution for Caring for People



→ People who are 19-35 spent less time traveling for caring for people.

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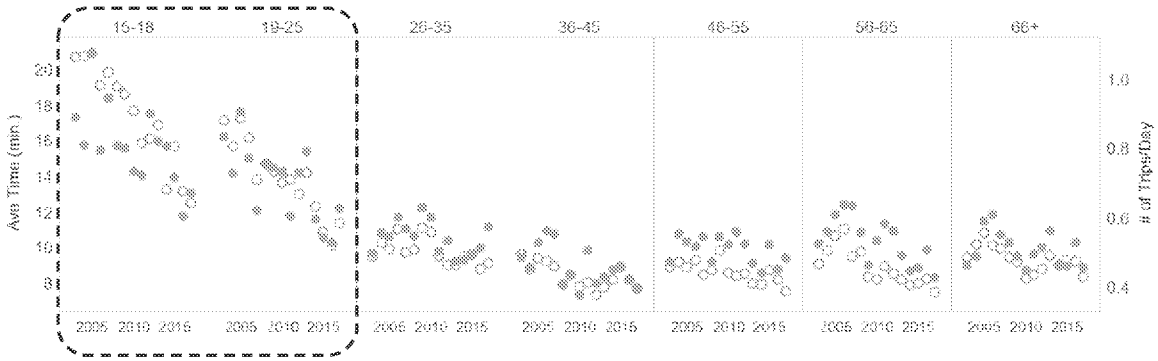
Travel distribution for Socializing and Relaxing



→ Travel time for those who are 25 and younger have dropped significantly and approaching those who are 26 and older.

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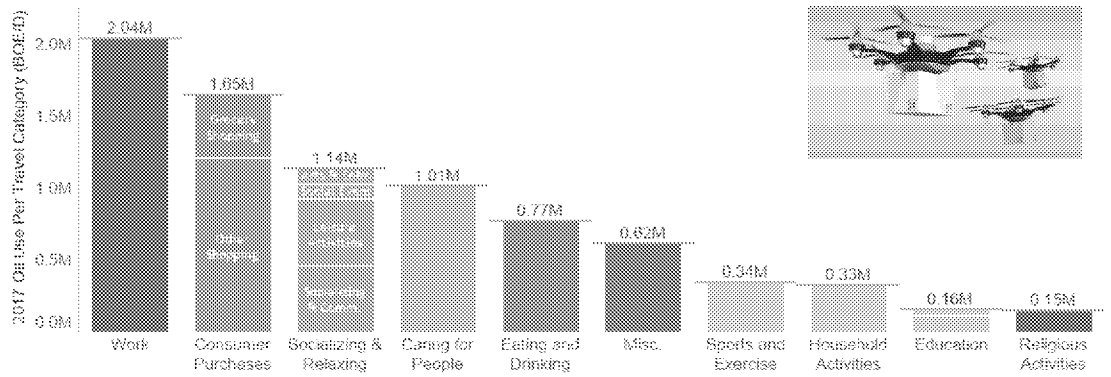
What Does This Mean?

- Today, some trips can be *displaced* or *transformed*
  - Displaced trips include ability to socialize or view content through Facebook or YouTube.
  - Transformed trips such as e-commerce where passenger trips to the store is shifted into deliveries mean there could be a transfer from gasoline to diesel.
- These changes will have impact on future oil demand, alternatively, technological and social changes may be limited to each travel category.



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Travel Summary

- Americans participate in 5 core travel categories including:
  - Work
  - Consumer purchases
  - Socializing
  - Care
  - Eating out

  } 80% of all reasons for travel

- In 2003, Americans on average make 3.7 trips per day and spend 67 min on the road.
- Compared to 2017, Americans make 3.2 trips per day and spend 62.3 min on the road.

- The rate of change is more significant for people who are 25 or younger, but less so for older people
  - Deeper dive is necessary for complete travel picture.

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Thank you for your attention

For further information, please contact:

Lang Sui, Ph.D.
Strategic Transport Analysis
Aramco Research Center - Detroit
46535 Peary Court
Novi, MI 48377 - USA
Tel: +1 248 896-3945
Email: lang.sui@aramcoservices.com

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