

# Smartphone-Enabled Urban Solutions: Mobility-on-Demand and Mobility-on-Sale

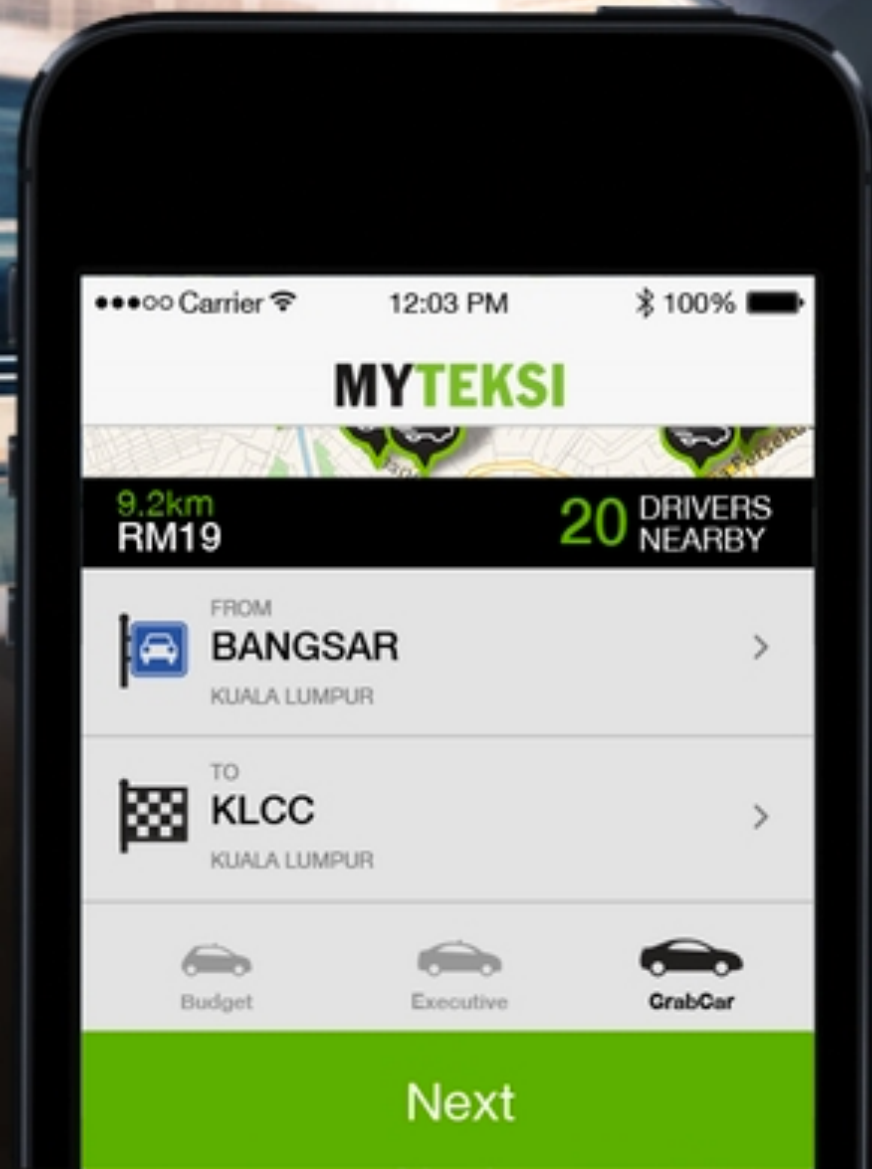
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# Mobility On Demand



Mobility On Sale

U B E R

## GIVE RIDES, GET CASH

Know your way around the city? Make money helping our community of riders travel safely and easily. Pick them up, get going, get paid. It's that simple.

# It's More than Just Ride-Hailing App

Mobility + Crowdsourcing

amazon **mechanical turk**  
beta Artificial Intelligence



amazon **FLEX**

Crowdsourced Logistics

 **DOORDASH**



Household Chores

**FIELD AGENT™**

*Gigwalk*

Mobile Audit/Research



# It All Begins With...

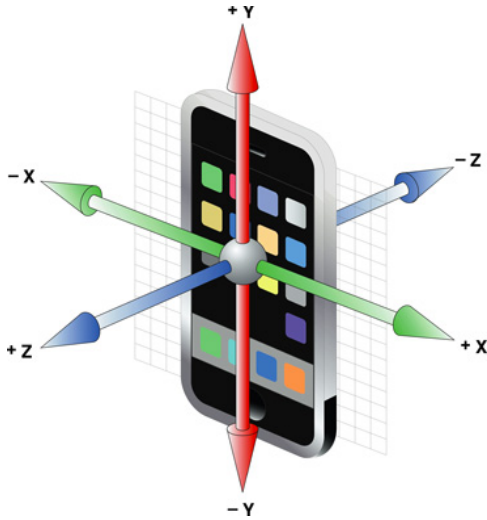
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# The Significance of the iPhone Era

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- Accelerometer (2007)



\* Sensing linear acceleration

- A-GPS (iPhone 3G, 2008)
- Digital Compass (iPhone 3GS, 2009)
- Gyroscope (iPhone 4, 2010)

# The Significance of the iPhone Era

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- Accelerometer (2007)
- A-GPS (iPhone 3G, 2008)



\* Significantly improve location accuracy

- Digital Compass (iPhone 3GS, 2009)
- Gyroscope (iPhone 4, 2010)

# The Significance of the iPhone Era

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- Accelerometer (2007)
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\* Get true north

- Gyroscope (iPhone 4, 2010)



# The Significance of the iPhone Era

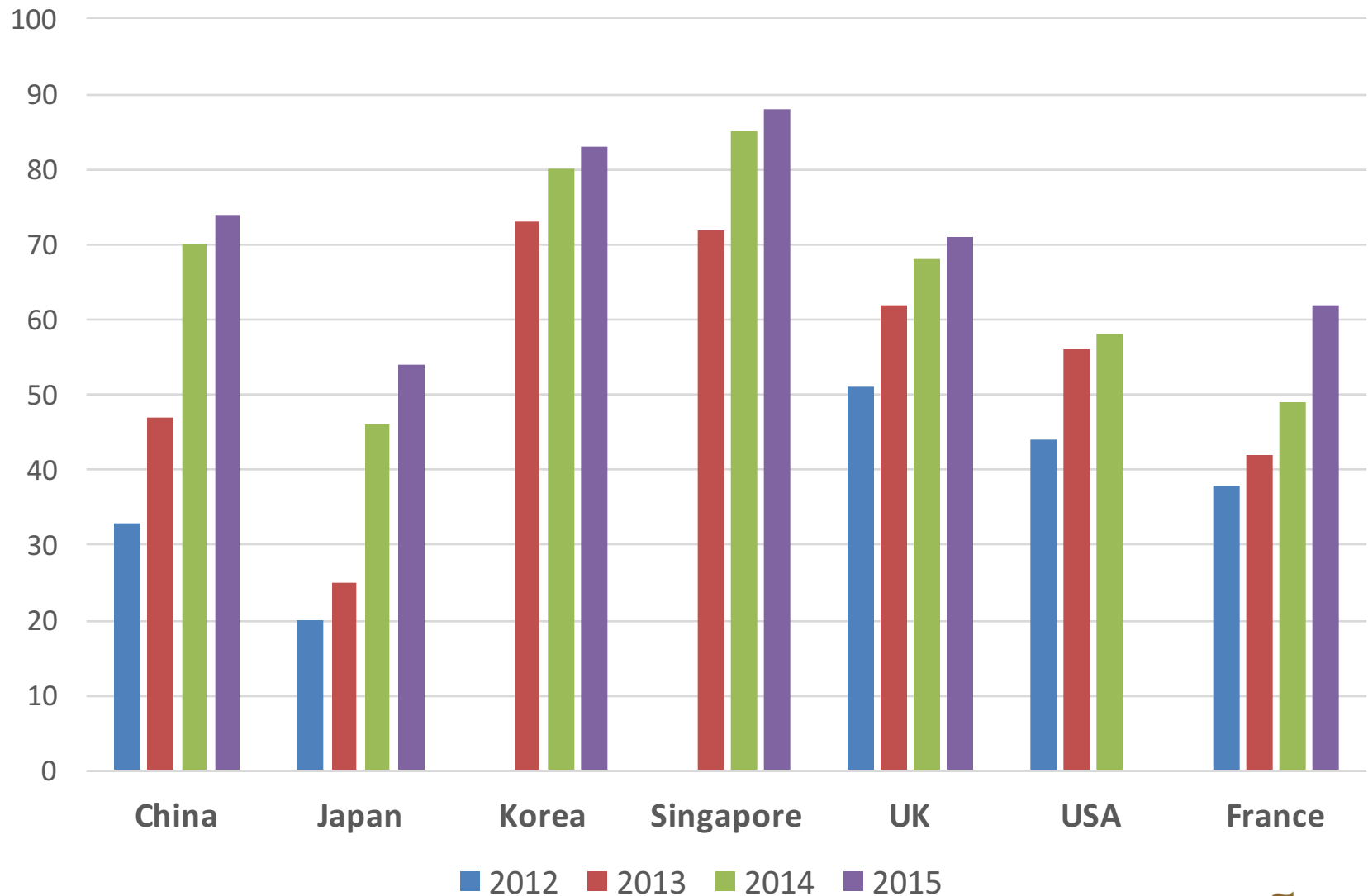
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- Accelerometer (2007)
- A-GPS (iPhone 3G, 2008)
- Digital Compass (iPhone 3GS, 2009)
- Gyroscope (iPhone 4, 2010)



\* Sensing angular acceleration

# Smartphone Penetration



# The Big Promise (and the Big Gap)

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Service made available (now!) as you need it

- If enough willing workers can be found
- If workers know where to situate themselves

# The Big Promise (and the Big Gap)

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Work whenever you are free

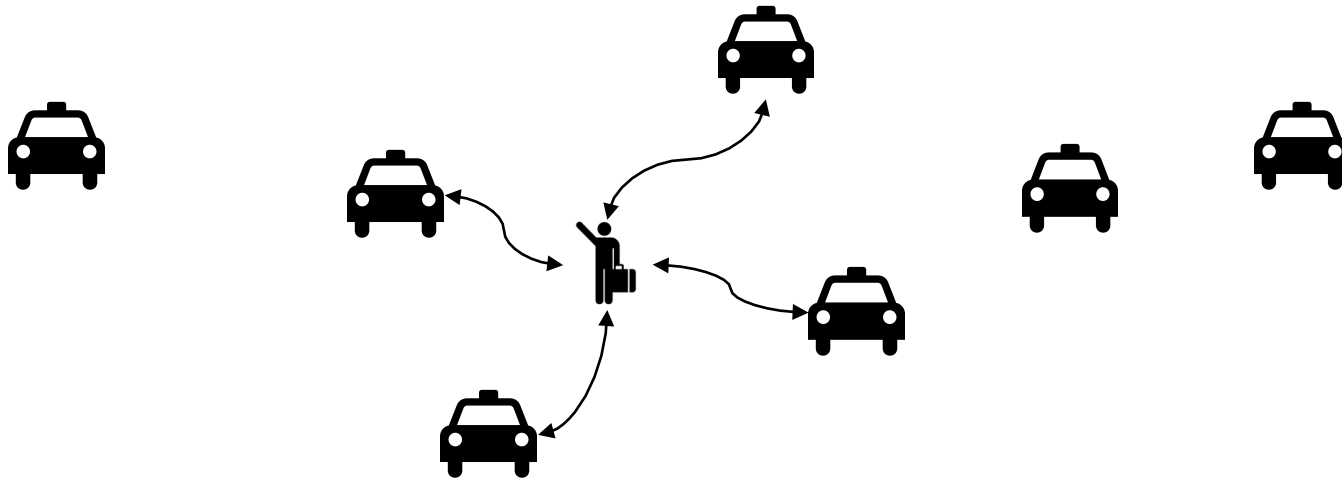
- Yet task planning might consume big chunk of that free time!



# The Gap: How Tasks Are Assigned

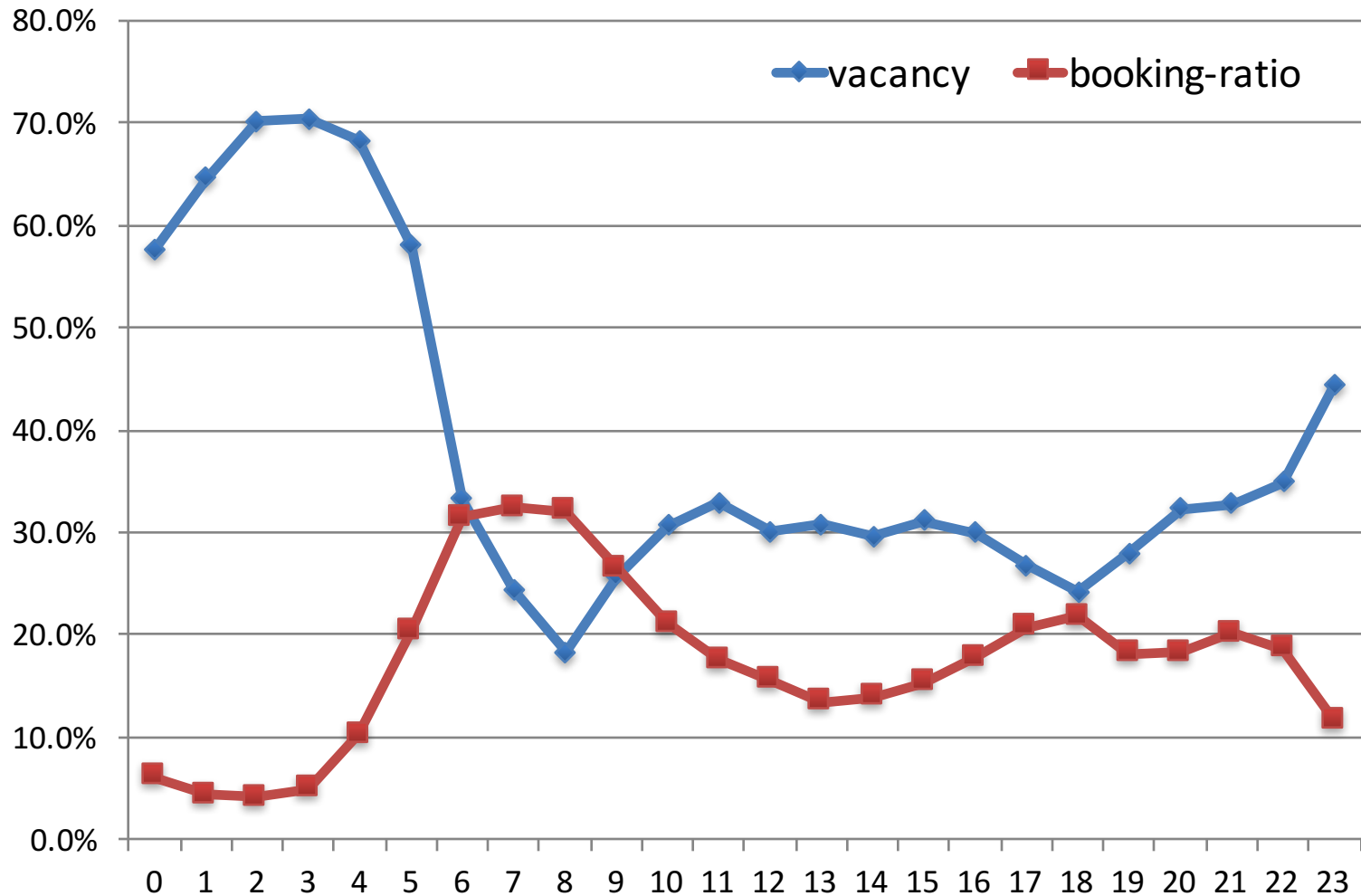
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- (Proximity-based) Push



\* For taxi booking service and most ride-hailing App

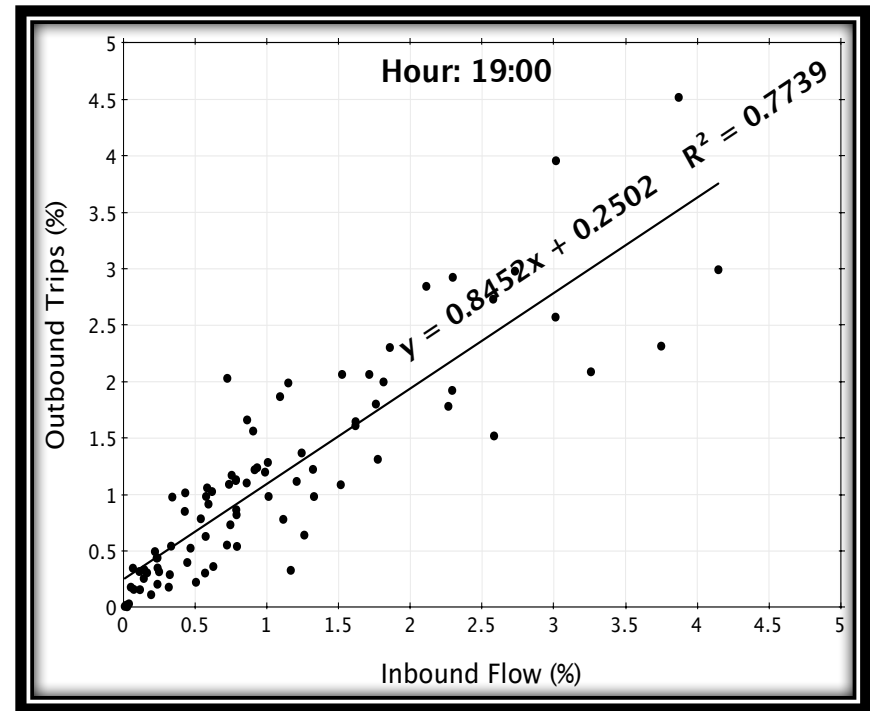
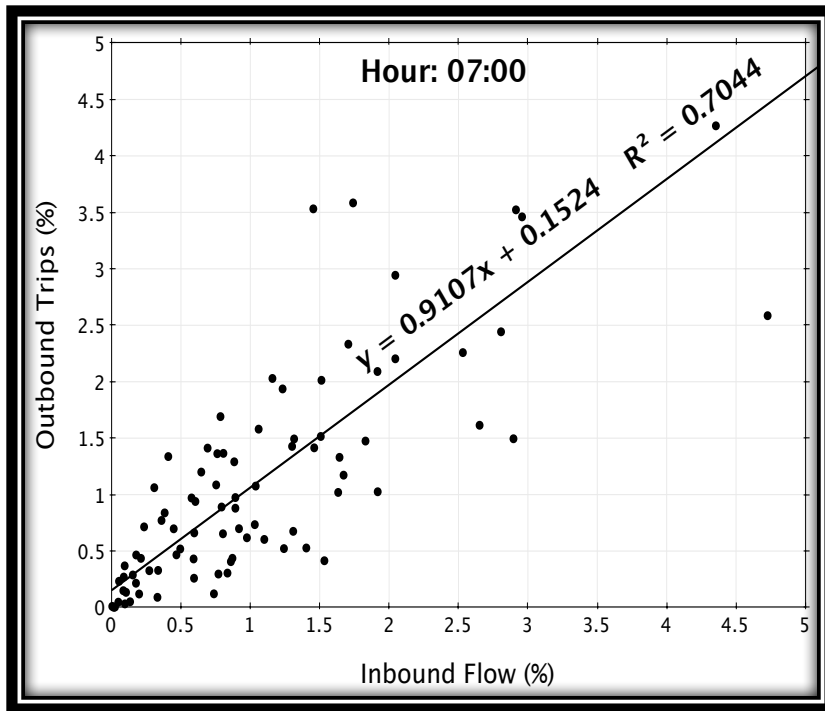
# All These Wasted Minutes



Typical Weekdays

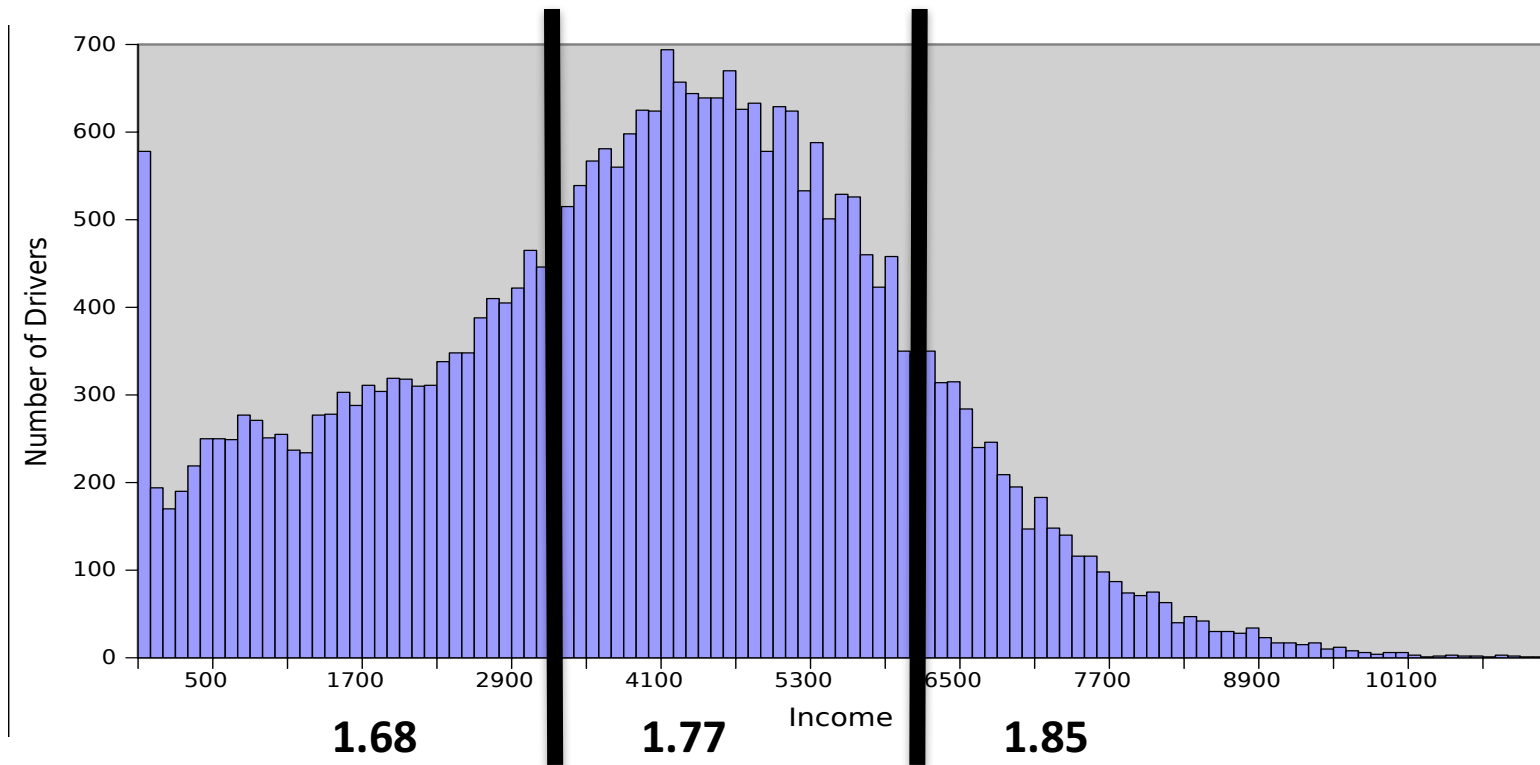
# The Limit of Individuals

- Human drivers generate traces that closely resemble traces expected from a myopic approach (ok, but not great).



# How Can Computation Help?

- From the data: the more you strategize, the better you perform.

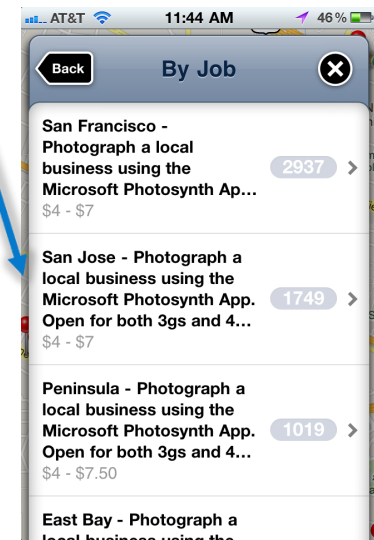
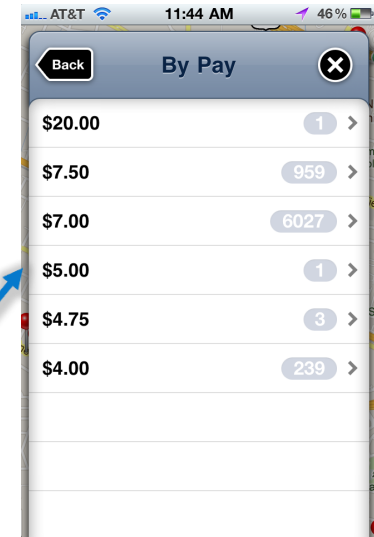
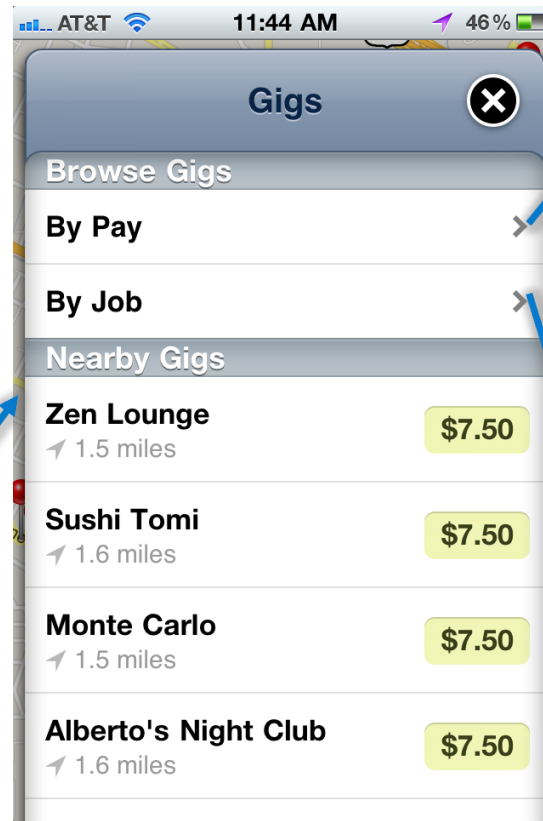
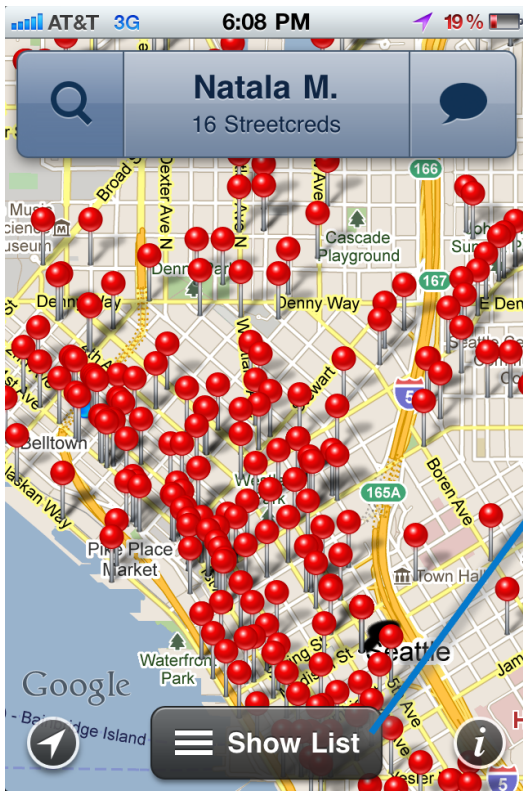


- With sufficient computation efforts, our algorithm can do reasoning with infinite depth.
- And extra thinking pays off!



# The Gap: How Tasks Are Assigned

- Pull



# All These Wasted Minutes

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For “Pull-based” paradigm, workers suffer from:

- Having to browse through long list of tasks.



# All These Wasted Minutes

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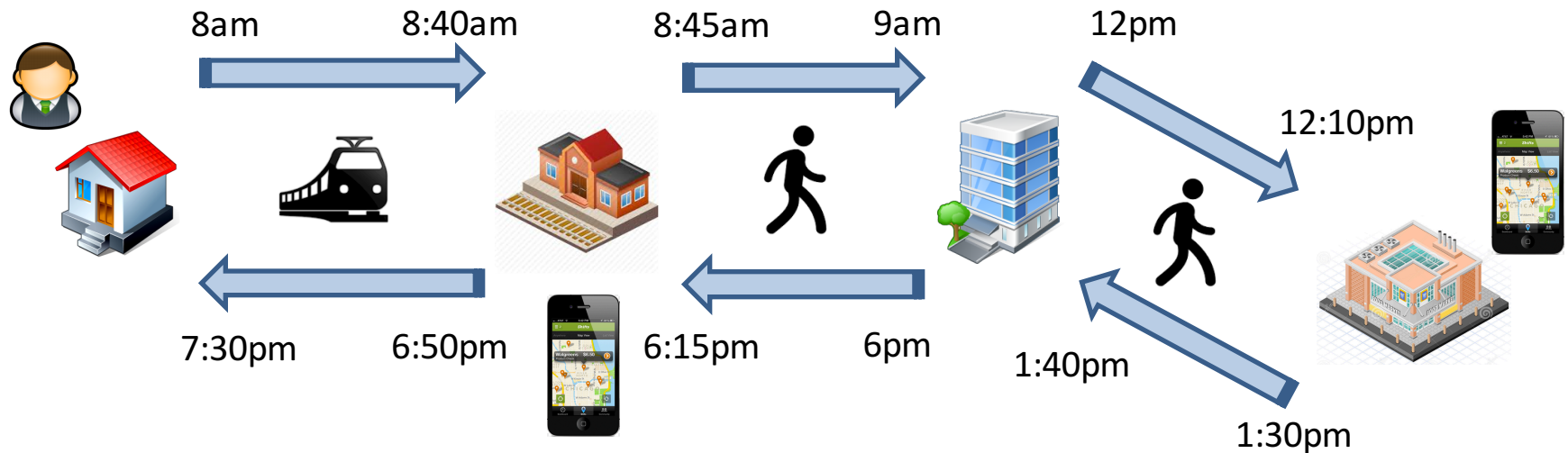
- Having to browse through hundreds of tasks.
- Having to manually construct work plans.



# All These Wasted Minutes

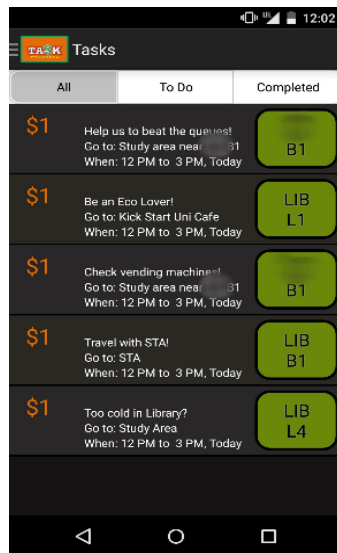
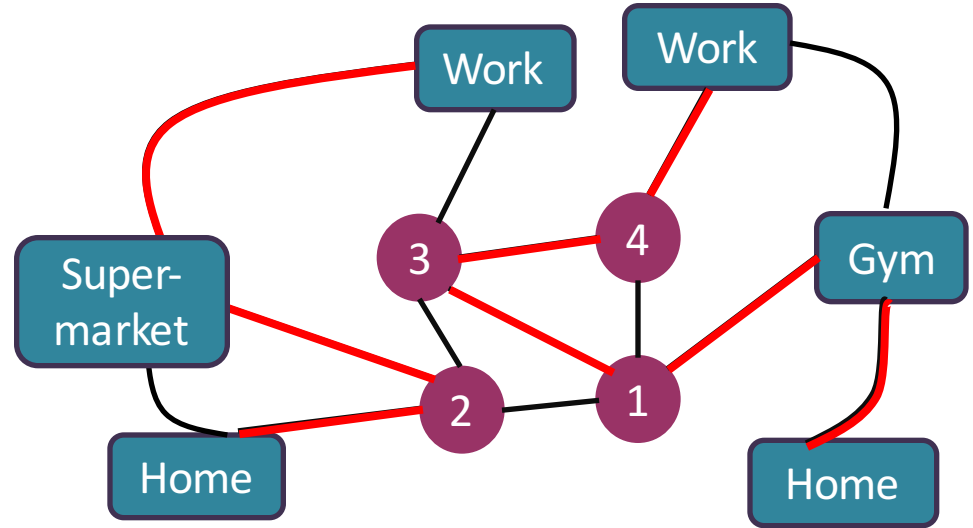
For “Pull-based” paradigm, workers suffer from:

- Having to browse through hundreds of tasks.
- Having to manually construct work plans.
- Not able to plan for the future.



# TA\$Ker: A Predictive “Push” Platform

Historical (mostly indoor) mobility traces



Task Recommendation Engine

# The TA\$Ker Experiment

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- More than 1,000 SMU students participated
- More than 30,000 tasks completed within 2 months
- Super-user phenomena:
  - 20% users performed more than 80% of tasks
  - Achieved by devoting more time
  - Efficiencies are lower than normal user, especially when in “Pull” class (25% lower)
- When compared against “Pull”, “Predictive Push” users:
  - Finish more tasks (56% vs 44%)
  - Incur less detour time (50% less)

# Some Testimonies (after our experiment ended)

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You deprived me of my livelihood!!

I will have to eat instant noodles everyday until TA\$Ker opens again!

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# Takeaways

- Mobility + Crowd => Mobile Crowdsourcing
- Workers, part-time or full-time, can benefit greatly by having customized recommendations.
  - By incorporating spatiotemporal patterns of workers and tasks.
- Reducing wasted time/efforts, not exploiting participating workers.



Follow the example of reCAPTCHA!