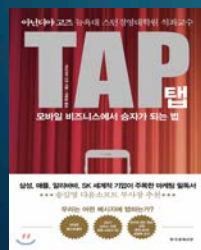
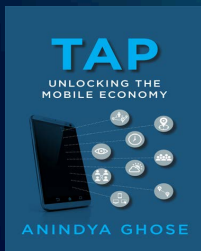


## Using AI and Blockchain To Monetize The Mobile Economy

Anindya Ghose  
Heinz Riehl Chair Professor of Business  
New York University

Twitter @ aghose



## What links them together?

Mobile: Data Source  
+  
AI: Data Mining Tools  
+  
Blockchain: Data Quality

## My work (2000-2019)

- Atomic user-level data from the digital economy
- Digital, Internet, Mobile, Social, Offline-Online
- Global settings (USA, Mexico, U.K., Germany, Italy, China, India, Singapore, S. Korea, Hong Kong, U.A.E. )
- **Data Science, Business Analytics, Machine Learning, Field Experiments**

## Today's Content: My industry experience (2000-2019)

1. **Technology** – Apple, HP, IBM, Samsung.
2. **Platforms** - Facebook, Google, Microsoft, Snap.
3. **Mobile** – Verizon, China Mobile, Korea Telecom, 3TI China, SK Telecom, Telefonica Germany.
4. **Retail + Ecommerce** – Alibaba, Amazon, 1-800-Contacts, DFS Group.
5. **AdTech** – Yahoo, Dataxu, YelloMobile Korea, Verizon-AOL.
6. **CPG** – Marico India.
7. **Media** – CBS, NBC, Showtime, TV Azteca, HR Ratings Mexico.
8. **Travel** – Tripadvisor, Travelocity.
9. **Finance** – AIG, Berkeley Corporation, American Express, Bank of Khartoum, Kookmin Bank Korea, CTBC Taiwan.
10. **Internet Finance** – Indiegogo, Co-Founders Lab.
11. **Ride Sharing** – Via

## Lesson (1): The New Corporate Battles

**Past:** Acting on the known needs of your customers.

**Future:** Identifying and fulfilling the unknown needs of your customers.

## Lesson (2): The New Digital Divide

- Digital divide (internet/computers) was a central issue between 1995-2015.
- The new digital divide (2015 - ) is shaping up to be about **algorithmic + data divide**.
  - People who opt-out of data sharing and algorithmic targeting.
  - GDPR has flaws.
- Are people who opt-out better off?
  - Research suggests otherwise.
  - Data privacy conversation is one-sided
  - Butler vs. Stalker

# Lesson (3): Four Pillars of Business Analytics

## ○ DESCRIPTIVE

What happened?

*exploratory analysis · visualization · BI · dashboards*

## ○ PREDICTIVE

What will happen next?

*data mining · machine learning · model fitting · forecasting*

## ○ CAUSAL

How do inputs impact outcomes?

*a/b testing · econometrics*

## ○ PRESCRIPTIVE

How should we respond?

*optimization · simulation · rules*

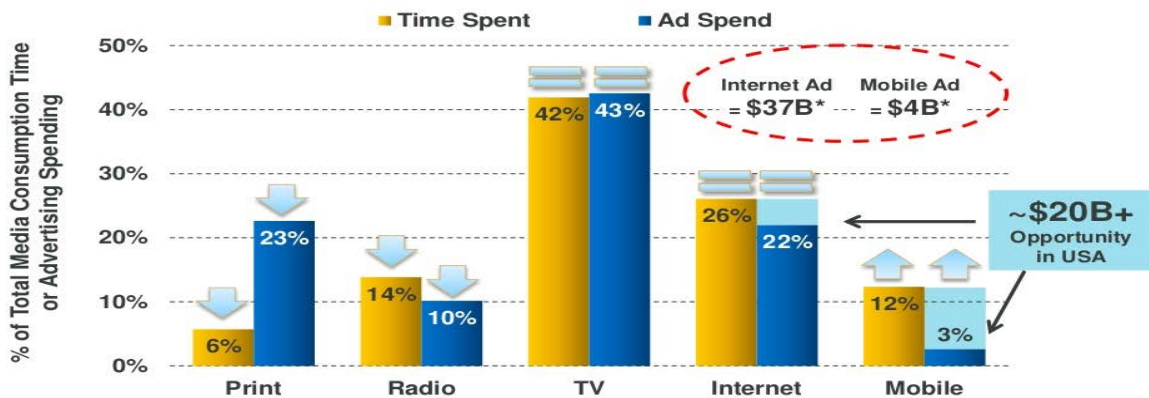
## DATA ENGINEERING

What is the ideal data structure for analysis?

*cleansing · aggregation · integration · transformation*

## Material Upside for Mobile Ad Spend vs. Mobile Usage

% of Time Spent in Media vs. % of Advertising Spending, USA 2012



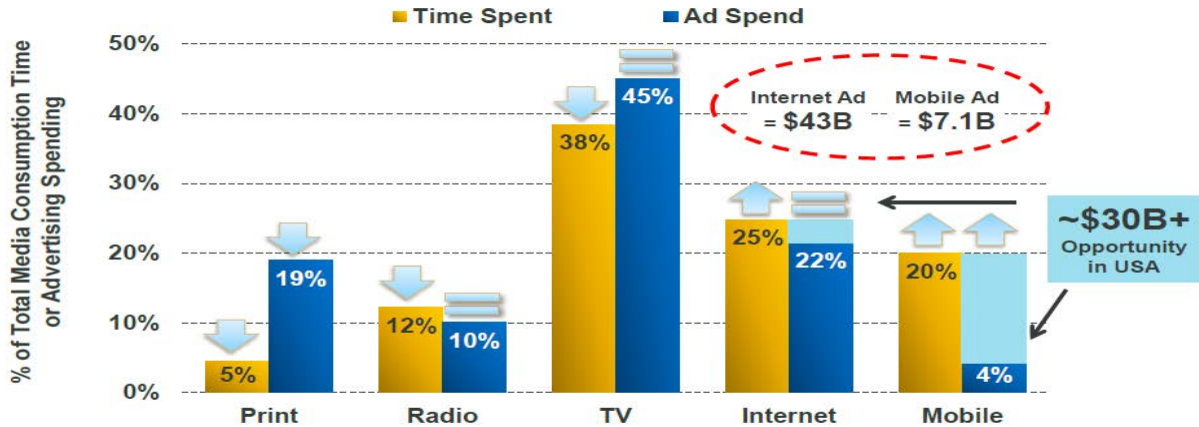
KPCB

Note: \*Internet advertising reached \$37B in USA in 2012 per IAB. Mobile advertising reached \$4B per eMarketer. Print includes newspaper and magazine. \$20B opportunity calculated assuming Internet and Mobile ad spend share equal their respective time spent share. Source: Time spent and ad spend share data based on eMarketer (adjusted to exclude outdoors / classified media spend), 12/12.

5

## Huge Potential in Mobile Advertising

% of Time Spent in Media vs. % of Advertising Spending, USA 2013

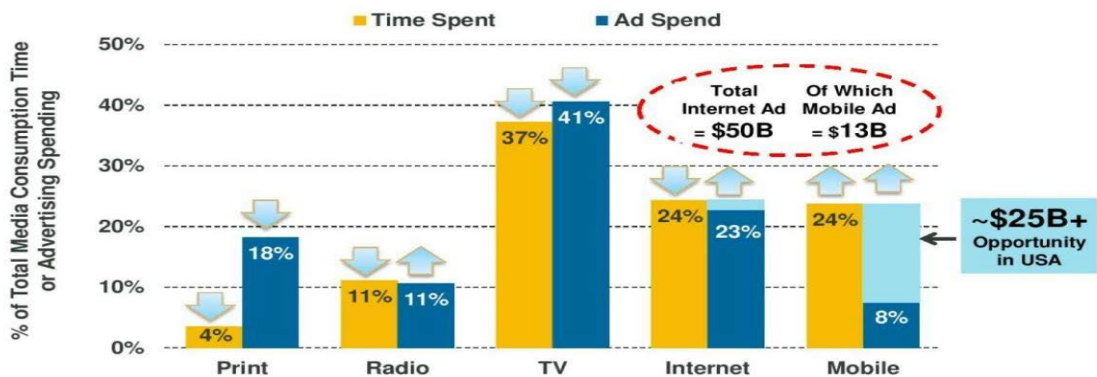


@KPCB

Source: Advertising spend based on IAB data for full year 2013. Print includes newspaper and magazine. \$30B+ opportunity calculated assuming Internet and Mobile ad spend share equal their respective time spent share. Time spent share data based on eMarketer 7/13 (adjusted to exclude outdoors / classified media spend). Arrows denote Y/Y shift in percent share.

## Huge Potential in Mobile Advertising

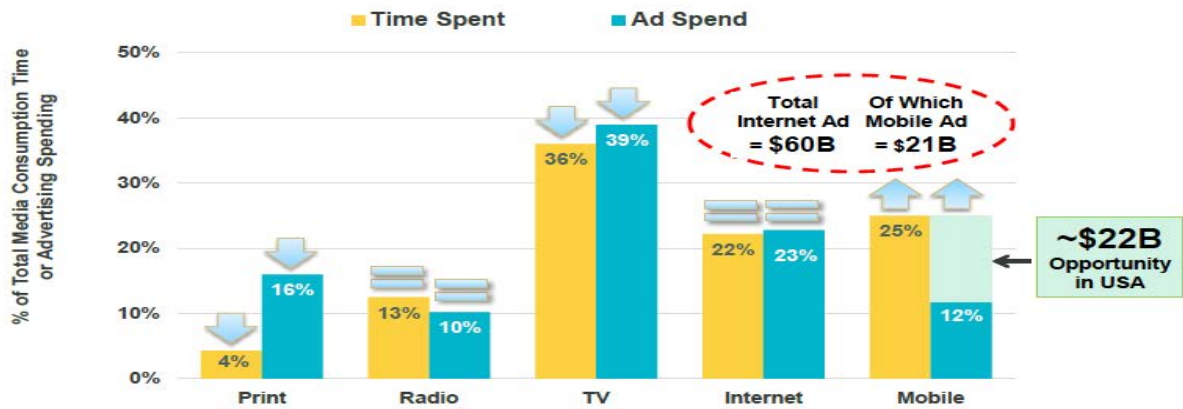
% of Time Spent in Media vs. % of Advertising Spending, USA, 2014



@MaryMeeker 2014

## @ Margin... Advertisers Remain Over-Indexed to Legacy Media

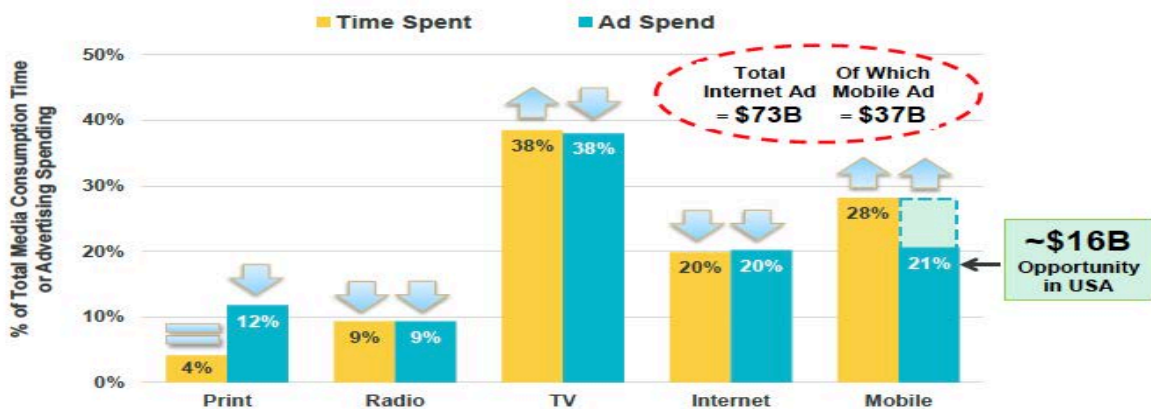
% of Time Spent in Media vs. % of Advertising Spending, USA, 2015



@KPCB and @Mary Meeker 2016

## Advertising \$ = Shift to Usage (Mobile) Continues

% of Time Spent in Media vs. % of Advertising Spending, USA, 2016



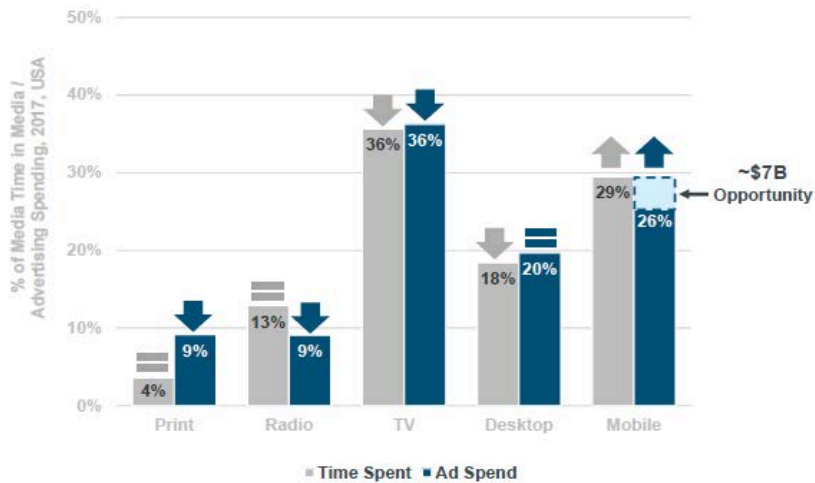
**KLEINER PERKINS**

Source: Internet and Mobile advertising spend based on IAB and PwC data for full year 2016. Print, Radio, and TV advertising spend based on Magna Global estimates for full year 2016. Print includes newspaper and magazine. Internet (IAB) includes desktop + laptop + other connected devices. ~\$16B opportunity calculated assuming Mobile (IAB) ad spend share equal its respective time spent share. Time spent share data based on eMarketer (4/17). Arrows denote Y/Y shift in percent share. Excludes out-of-home, video game, and cinema advertising.

KP INTERNET TRENDS 2017 | PAGE 13

## Advertising \$ = Shift to Usage (Mobile) Continues

% of Time Spent in Media vs. % of Advertising Spending



## The World Today

### • Companies

- 3 triggers to increasing mobile investments.
  - Better understanding about consumer behavior regarding data privacy.
  - Increased precision in quantifying ROI of mobile.
  - Blockchain can alleviate fraud in digital advertising.

### • Consumers

- Everyone is doing everything, everywhere.
  - Location data is only a foundation for user insights.

## This talk

- **Takeaways**

- What forces influence consumers' mobile behavior?
- How can we create value from applying AI tools on mobile data?
- Can blockchain address pain points in the digital economy?

## What's different about mobile?

- **Portable and Personal (precise and unique data)**

1. Location is core but you can do more!
2. Location -> Time
3. Location -> Context
4. Location -> Omni-Channel
5. Location -> Crowdedness
6. Location -> Weather
7. Location -> Trajectory
8. Location -> Social dynamics
9. Location -> Saliency

**9 Forces Shaping The \$3 Trillion Mobile Economy**

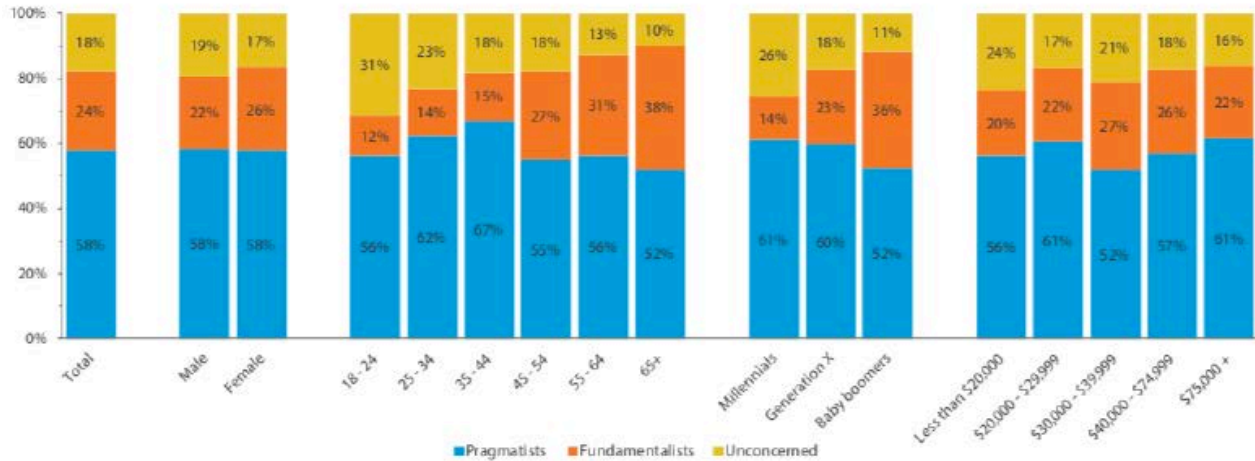
## Surprising consumer behavioral contradictions

1. We claim to be spontaneous but actually value certainty
2. We claim ads are annoying but also fear missing out (FOMO)
3. We crave choices but also get overwhelmed with choices
4. We care about our data but will exchange it for benefits

**Would you give up your friend's  
privacy for pizza?**



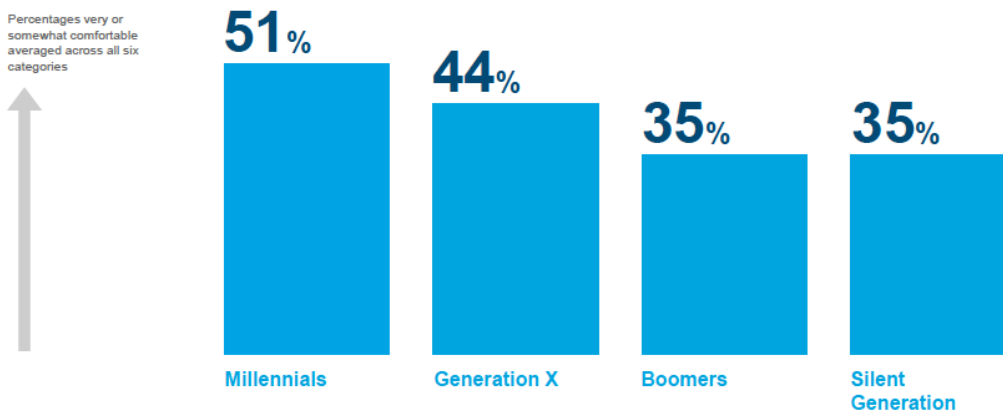
### A segmentation of attitudes towards privacy and data exchange in the USA



### Younger generations show greater comfort with how companies handle their data...

Q: For each of the following categories, how comfortable do you feel about a company in that category handling your personal data?

Percentages very or somewhat comfortable averaged across all six categories



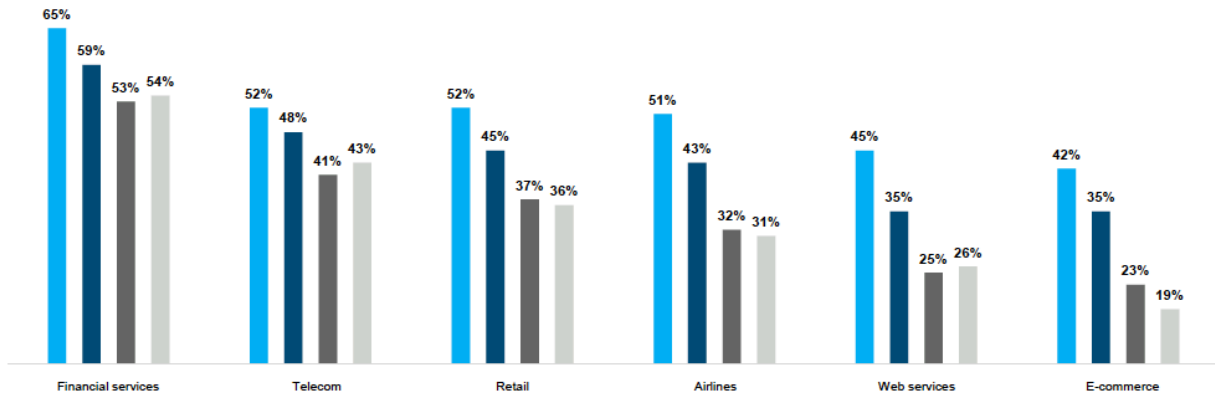
David Rogers @Columbia Business School

## ...and these generational differences in comfort are consistent across industries

Q. For each of the following categories, how comfortable do you feel about a company in that category handling your personal data?

Percentages represent respondents that are very or somewhat comfortable

■ Millennials ■ Generation X ■ Boomers ■ Silent Generation

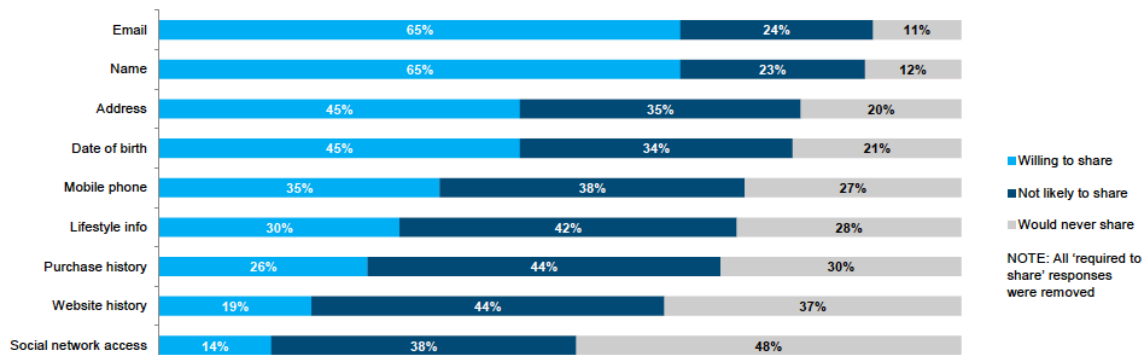


David Rogers @Columbia Business School

## ... and yet personal identifying data is also what people are most willing to share

Q. Please indicate how you would plan or expect to share the following types of your personal data in order to purchase products/services?

Percentages averaged across all six industries



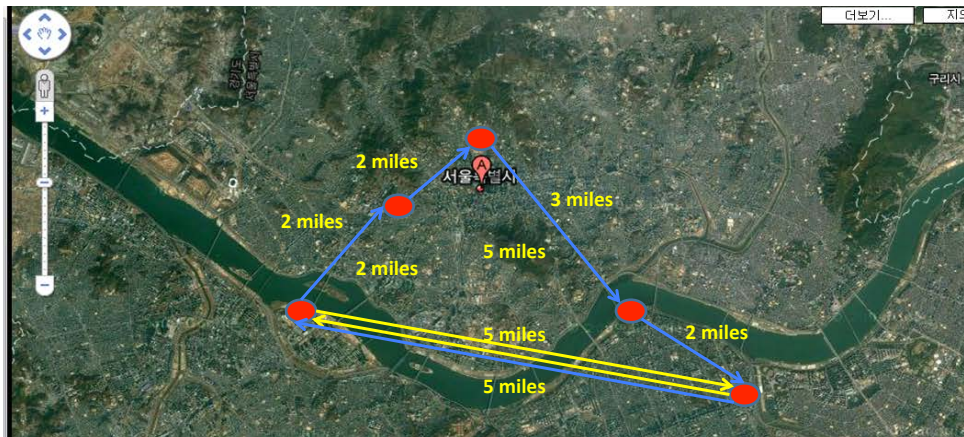
David Rogers @Columbia Business School

# Monetizing Mobile Data

- Video



## How Commuting Patterns Influence Our Mobile Redemptions (S. Korea)

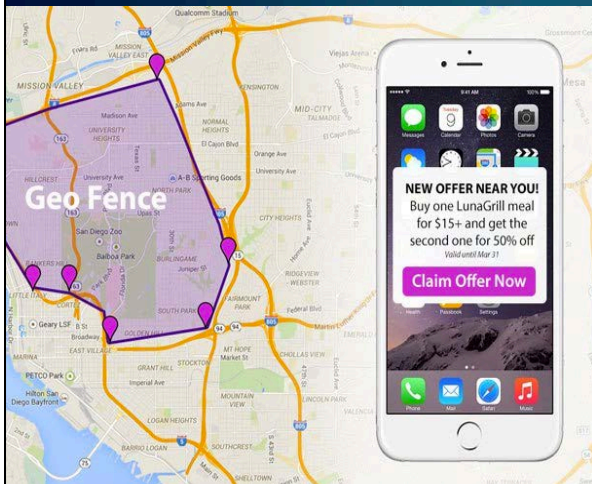


**Contextual Targeting**

## Personalized billboard ads (Coke, Samsung, Hyundai, L'Oréal Paris, eBay)



## Billboard advertising + mobile targeting : O2O synergies?

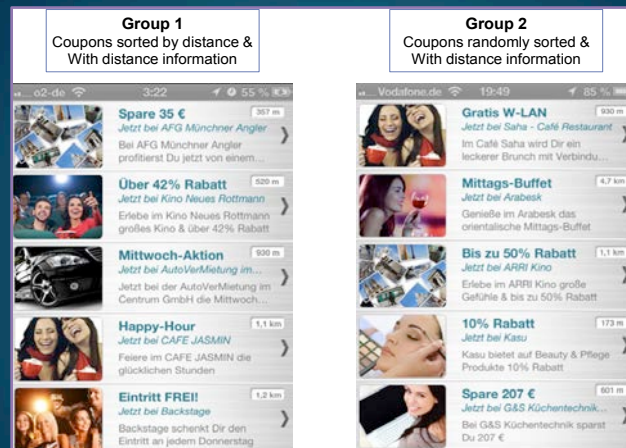


Online-Offline synergies lead to increase in redemptions

## Geo-targeting & Geo-fencing

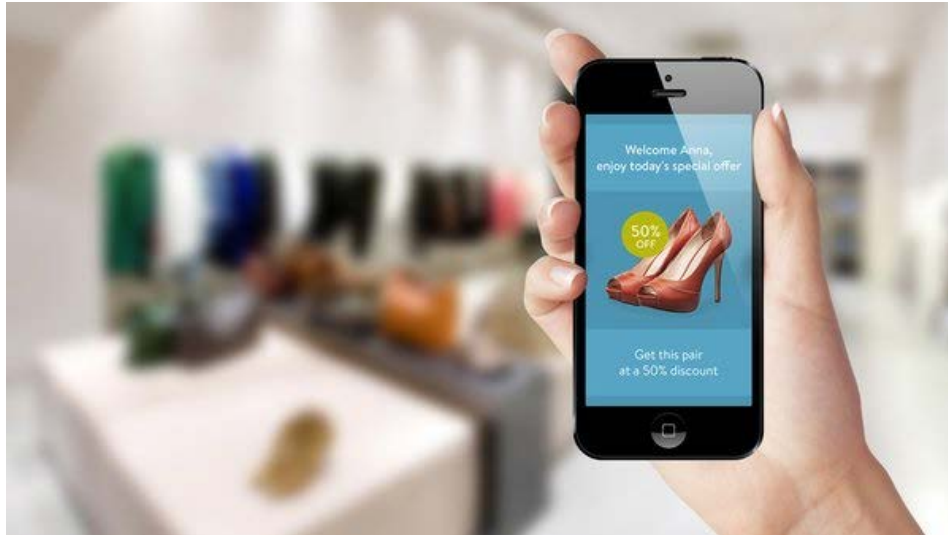
- The interplay between **distance** and **discount**
  - **Prior findings:** Distance and response rates are inversely correlated
  - **Our findings:** Use discounts to change this relationship!

## Location Based In-App Offers (Europe 2014-2018)



374 cities and towns and 3500+ participating firms  
Distance-discount trade-off affects redemptions.

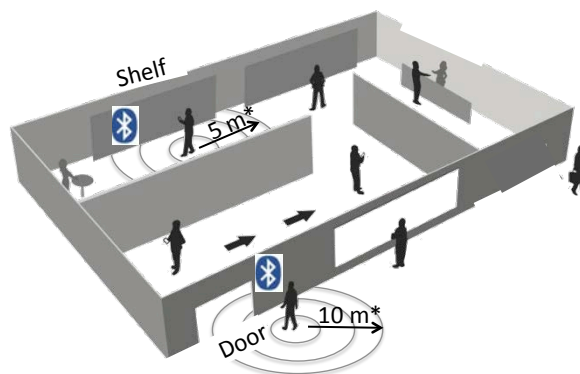
## Apple's Bluetooth iBeacon: In-Store Marketing (Ghose et al. 2018)



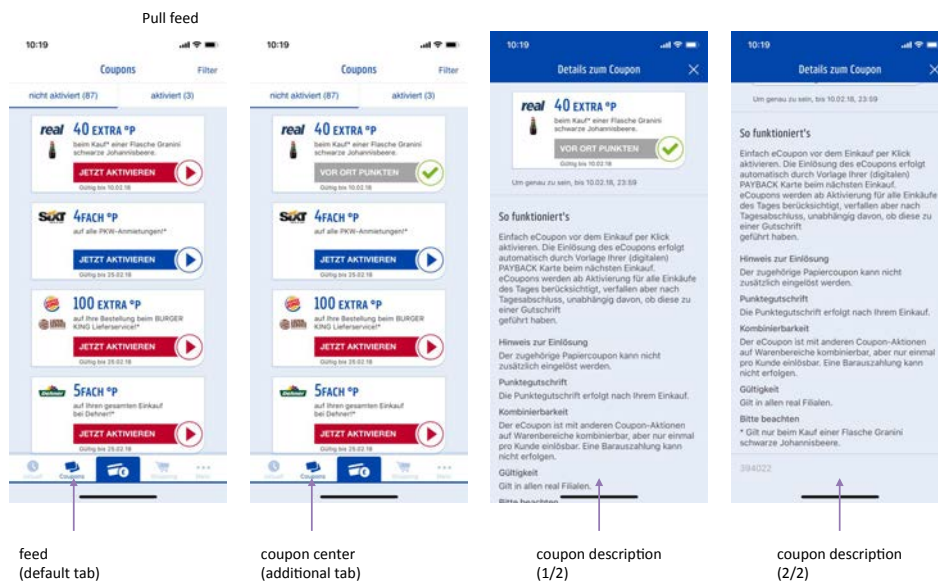
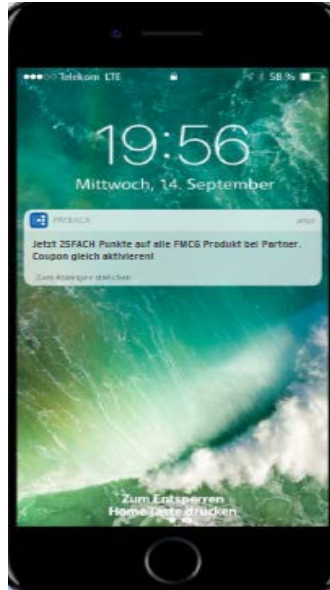
### How Beacons can increase store traffic and trigger unplanned purchases

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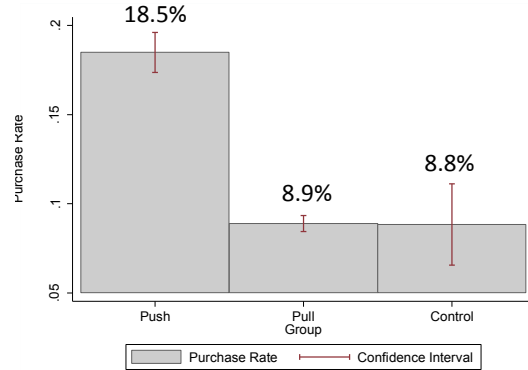
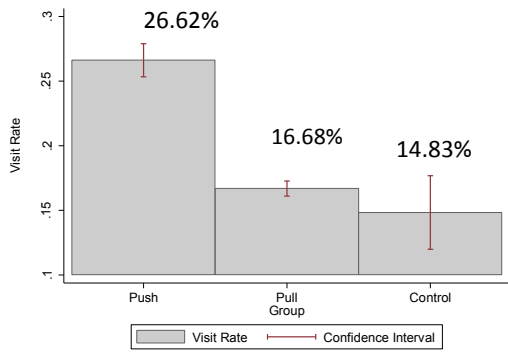
Store Setting



# Screenshots



## Results – Visit and Purchase Rate



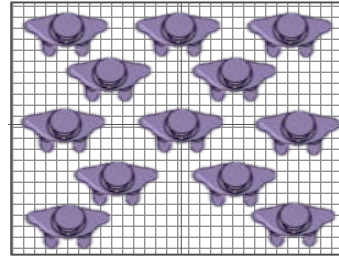
## Monetizing Crowdedness!



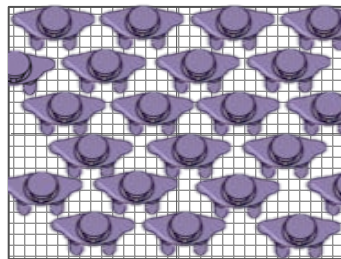
## Visualizing Crowdedness



1 person/m<sup>2</sup>



3 people/m<sup>2</sup>

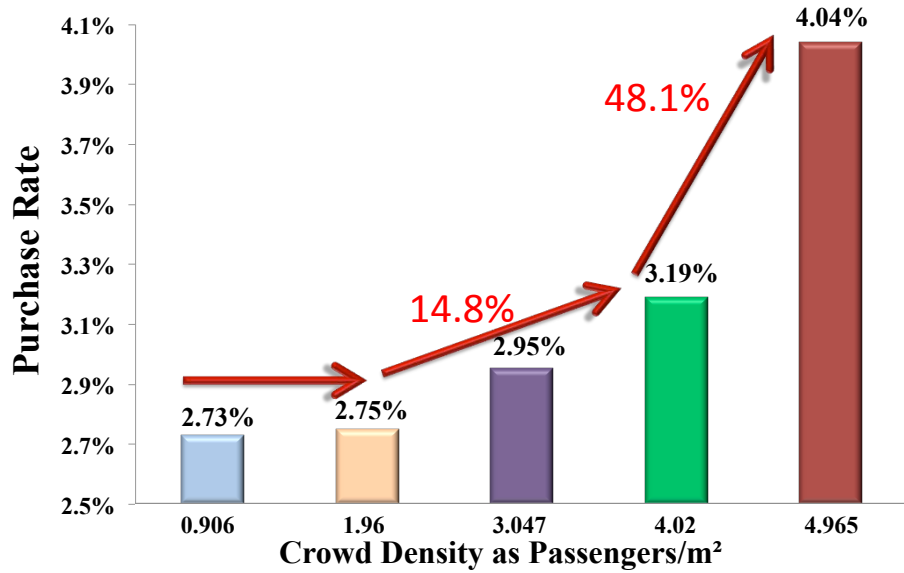


5 people/m<sup>2</sup>

1

**Should we send you this mobile offer when your context is more crowded or less crowded?**

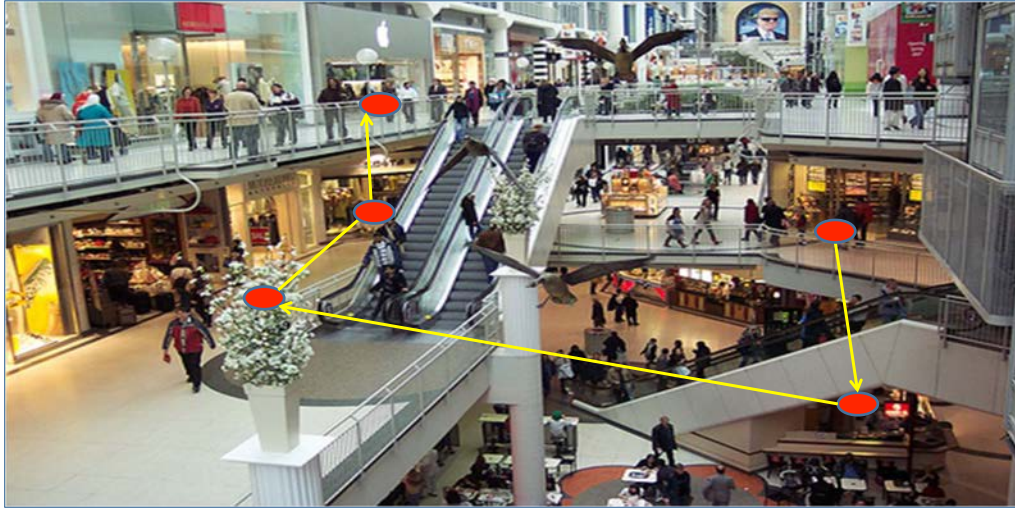
## Crowdedness Increases Purchase Rates



## Trajectory

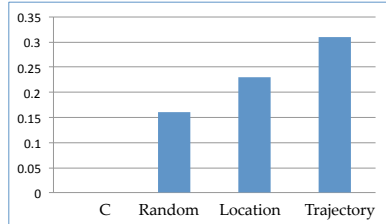


## Trajectory

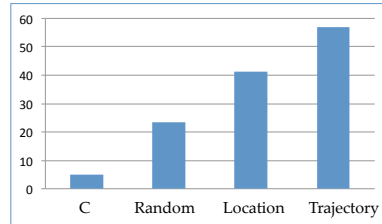


## Results

- **Large shopping malls (department stores, airports, etc.)**
  - 1.3 million square feet
  - 300+ stores, Centralized Wi-Fi system
  - 100,000 visitors weekday; 200,000 visitors weekends
  - **Trajectory** is the most effective targeting strategy.



Highest Redemption Rate



Highest Spending in Store

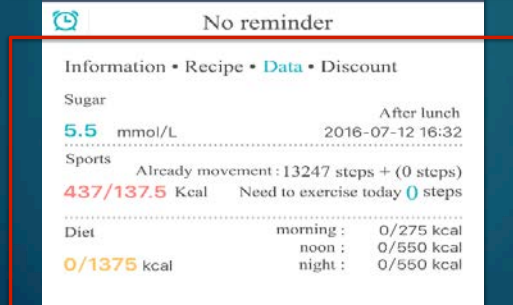
Also replicating in department stores & airports

## Wearable Tech Adoption and Patient Behavior

Overview of User Homepage



Dashboard of User Daily Activities



Detailed Information

## Key Findings

- mHealth has a significant impact on individual patients.
  - 21x reduction in glucose levels.
  - 3x reduction in hospital visits.
  - 8x reduction in medical expenses.
- Implications for healthcare and insurance providers.



## Current Challenges in Digital Advertising



### DATA DISCREPANCIES

Data discrepancies between ad tech supply chain partners are commonplace



### LACK OF PAYMENT TRANSPARENCY

Advertisers don't know what their advertising budget is actually buying, causing slow payments and waste

<http://XXXXXXXXXXXX> <http://usatoday.com>

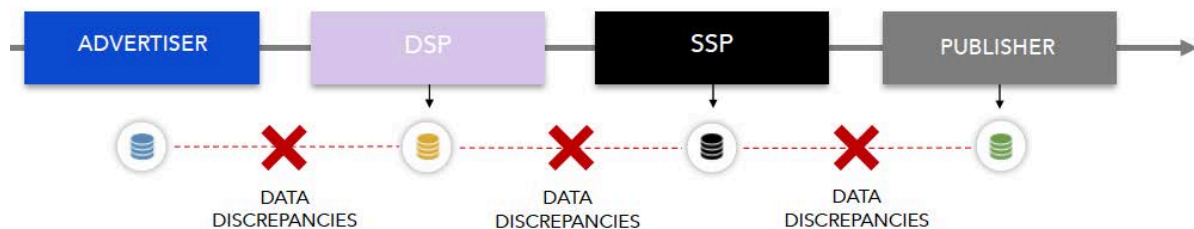


### FRAUD

Ad fraud cost marketers \$16.4 billion globally in 2017, and is expected to triple over the next 10 years\*

Copyright@Lucidity

## The Ad Supply Chain is Full of Inefficiencies

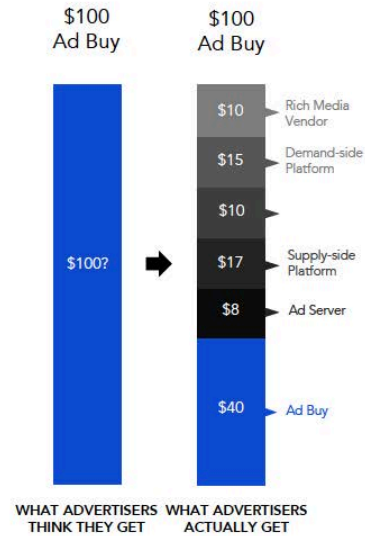




## Where Do The Ad Dollars Go?

Advertisers achieve complete transparency into the cost of every technology partner. Know exactly what your budget is buying.

- Optimize ad spend
- Expose hidden fees and overcharging
- See exactly how much of budget goes towards middleman services



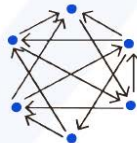
Copyright@Lucidity

## Why Blockchain?



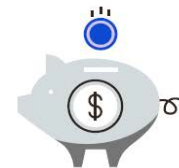
### CONSENSUS + TRANSPARENCY

Create consensus among parties that don't trust each other via a smart contract



### NO MANUPULATION

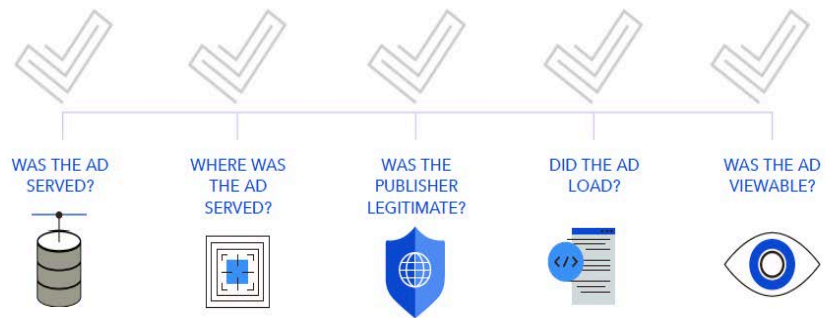
Avoid having bad actors or centralized parties manipulate rules



### AUTOMATIC PAYMENTS

Long-term it enables decentralized automatic payments

## Access key insights for each and every impression

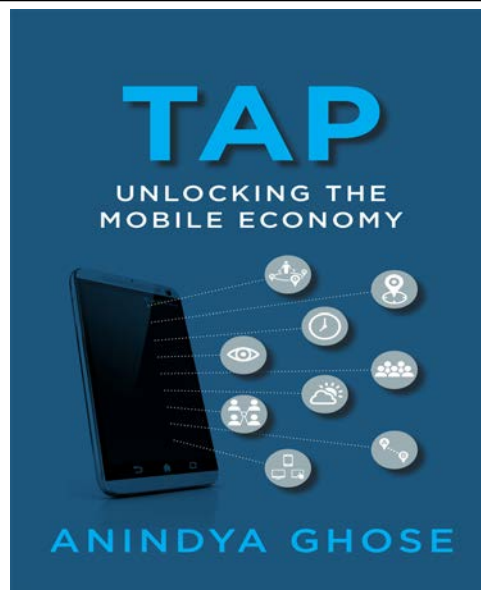


## Recent case study (Toyota + Lucidity + AT&T)

- 3 week campaign with 10 million Toyota ad impressions.
- 21 % lift in visits to Toyota's website when compared to without Blockchain.
- Blockchain helped identify ad fraud and bot fraud.

## AI + BC To Monetize The Mobile Economy

1. Shifting consumer mindset about data exchange with firms.
  - Trust: **Butler** not a **Stalker**
2. Using AI to mine **9 Forces**: Context, Location, Crowdedness, Trajectory, Omni-Channel, and 4 more.
  - Watch out for the algorithmic + data divide
  - Data Analytics vs. Data Engineering
3. Use **Blockchain** to address fraud in digital advertising



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Twitter@ aghose

<https://www.linkedin.com/in/anindya-ghose/>