TNC Infrastructure Implications
09.14.16
The Futures Group

A multidisciplinary group of stakeholders in Greater Philadelphia focused on understanding:

- How long-term change is occurring in the region.
- What its likely implications are.
- Make recommendations to more strategically position ourselves.
Greater Philadelphia Future Forces

- Enduring Urbanism
- The Free Agent Economy
- Severe Climate
- Transportation On Demand
- The U.S. Energy Boom
Transportation Networking Companies

1. Equity issues
2. Cost: TNC vs. vehicle ownership
3. Public revenue impacts
4. Governmental role
   a) Infrastructure implications: parking, curbside, etc.
   b) Regulations
   c) Institutional needs
5. Expand Parking & Amtrak Connection at PHL?
Smartphones, apps, and real-time information help people get around.
A **platform** is a the physical and/or digital infrastructure that serves as a base upon which others can build, play, and/or iterate new applications, processes or technologies.

A **network** is a group of interconnected people and things.

- Source: Oxford Dictionary
Urban Areas are Physical Platforms
“Digitization” of the Physical World

Empowering
+ Smart Cities
+ Platform Cities
+ Digital Cities
+ Connected Cities
+ Intelligent Cities
+ Shared Mobility
“Digitization” of Transportation
Crafting a Vision

Most Common Theme:
Build an Integrated, Multimodal Transportation Network
New Vision is Digital:

Integrated, Multimodal Transportation Network
MOBILE APPLICATIONS IN URBAN SETTINGS: WAZE

Asta Zelenkauskaite, PhD
Drexel University
Challenging the notion of efficiency
Asta Zelenkauskaitė

Assistant Professor, Department of Culture and Communication
College of Arts and Sciences

Expertise:
- Communications
- Culture
- Social Media

Zelenkauskaitė received her doctorate in Mass Communication from Indiana University, Bloomington, with two minor specializations in Information science and linguistics. Her research focuses on the ways in which communication occurs through computer network environments as well as mobile telephony. She is interested in the changes that social media bring to mass media landscape by studying these phenomena from a multi-method approach to analyze changing understanding of content, audiences, and media companies. Most of her work bridges disciplinary boundaries methodologically and conceptually through her collaborative work with computer scientists and Information science scholars.

More information about Zelenkauskaitė

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Big Data Through Cross-Platform Interest-Based Interactivity

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Abstract—Given the ubiquity of social media, we capitalized on interest-based relevance as a key component to enhance user experience. Interest-based relevance modeling was extracted from user interactions in a cross-platform social media Big Data repository. The goal of this study was twofold: first we addressed theoretical dilemmas of a cross-platform user experience; second, we implemented an android-based mobile application and designed a cloud architecture to account for theoretical parameters of Big Data User-centric approach and interactivity. To address cross-platform Big Data challenges, we relied on cloud computing to perform computationally intensive operations such as searching, data mining, and data processing at large scale.

Our use case was based on a cross-platform interest-based navigation and content filtering across multiple radio content streams. The streams consisted of tags from radio stations’ programs and social media content through a discovery process. User interaction was geared to enable preferred topic filtering, flexibly shifting participation roles, notifications, and navigation through underexposed Single-platform SNs, even historical ones, varied technologically and scope-wise, ranging from user demographics, geographical attributes, or mere maintenance of pre-existing relationships. Since 2003 specialized social networking sites became mainstream, focusing on specific interests such as traveling, activism, religion, photosharing, music listening, and video sharing to mention a few [2], evolved and broadened their scope over time. For ex, access to Facebook is open to everyone, even if init. was restricted to college student networks.

Some of these limitations were addressed to overlap limited content access/platform interoperability issues lack of relevant content segmentation across multiple forms. Attempts to facilitate interest-based content access started to be modeled within a single platform. So the technology includes a "like" feature on Facebook, too.

2012 Fourth International Conference on Intelligent Networking and Collaborative Systems

Interconnectedness of Complex Systems of Internet of Things through Social Network Analysis for Disaster Management

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Abstract — This visionary paper presents the Internet of Things paradigm in terms of interdependent dynamic dimensions of objects and their properties. Given that in its current state Internet of Things (IoT) has been viewed as a paradigm based on hierarchical distribution of objects, evaluation of the dynamic nature of the hierarchical structures faces its evaluation and analysis. Within this in mind, our focus is on the area of complex social networks and the dynamic social network construction within the context of IoT. This is by highlighting and addressing the tagging issues of the objects to the real-world domain such as in disaster management; these are in relation to their hierarchies and interrelation within the context of social network analysis.

IoT has also been described as a paradigm that mainly integrates and enables several technologies and communication solutions including but not limited to tracking technologies, wireless, wired sensors, their networks, exchanged network communication which in turn, lead to a next generation Internet (see more in [2]), which is also known as Future Internet. IoT has also been defined as "a worldwide network of interconnected objects..."
WAZE AS A SOCIOTECHNICAL SYSTEM

Convenience, efficiency, saving money

Community-driven
SUCCESS STORIES

The Washington Post

Innovations

Why Waze is so incredibly popular in Costa Rica

By Matt McFarland October 27, 2014

“IT’s a nightmare.”

That’s how Eduardo Carvajal describes the Costa Rican way to give an address.

“If I want to give the address of my office I say ‘Okay, go to the ice cream cone shop in Curridabat then drive...”
3 RECONFIGURED CONTEXTS

Point 1:

Alternative routes shift traffic from the main roads to the neighborhood roads.

Point 2:

“When everyone is special, nobody is special” principle [If everyone is diverted, then new traffic zones get created]

However, what are contexts that are relevant for the futures group?

Point 3:

Emergency situations and special events
DISCUSSION: UNPREDICTABILITY OF THE PLANNING

a. Mobile apps reconfigure density of the traffic use of what was initially planned:
   i. To what extent?
   ii. Which neighborhoods and how much and why?
   iii. Which other Geospatial apps are the ones that may be part of the discussion?

b. Mobile apps like Waze may influence the future of the planning:
   i. ‘Dialog’ with planning institutions?
   ii. Emergency planning together
   iii. Algorithmic power and data exchange
THANK YOU

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Asta Zelenkauskaite
Pop-up Urban Mass Transit

- Direct, comfortable, right when you need it
- Track your vehicle’s progress
- Data-driven, flexible service to meet dynamic demands of a city
Why?

- Massive growth of cities around the world
- Imperative that we get good at moving groups of people around in fewer vehicles
- People are becoming more discerning when they choose transportation modes due to the growing number of options
- Need to make mass transit efficient and comfortable
Urban Logistics Learner

- Understand how to move large groups of people and things around rapidly growing cities
- Iteratively learn movement patterns and transit needs of a city
- Explore different partnership models to make platform that can work in any situation
Infrastructure Needs

- Physical / Technical infrastructure that facilitates on-demand mobility
  - Now
    - Safe curb space for pick ups / drop offs
    - Free wifi
    - Kiosks for those without smartphones
  - Future – autonomous technology
    - Curb-car communication
    - Location for vehicles not in use
  - Lots of possibility for new forms of Public-Private Partnerships
BUILDING THE FUTURE

DVRPC FUTURES FORCES

SEPTEMBER 14, 2016
1. Enduring Urbanism

2. Transportation on Demand
From Binary transportation modes (car or transit) OR Multi-modal (transit and rideshare and bike and car share and...)

Private Car | Public Transit

Frequent ride-hailing users less likely to own or drive a car, more likely to use a range of other transit options.

Source: Survey conducted Nov. 24-Dec. 21, 2015. “Shared, Collaborative and On Demand: The New Digital Economy” PEW RESEARCH CENTER
FUTURE FORCES OF THE REGION

1. ENDURING URBANISM

2. TRANSPORTATION ON DEMAND
IN CENTER CITY BETWEEN 2010 & 2015:

- New Development **Eliminated 2,426** Public Parking Spaces
- Employment in Core Center City Grew from 231,873 to 243,450 (**+5.0**)%
- Population in Core Center City Grew from 58,882 to 63,521 (**+7.9**)%
- Public Parking Occupancy Rates Actually **Declined** from 75.6% to 73.9% (**-1.7**)%
- Not Possible Without Transit

**COMCAST INNOVATION & TECHNOLOGY CENTER**

- Replaced **360-SPACE PUBLIC** PARKING LOT with **70-SPACE PRIVATE** GARAGE
- **DIRECT-CONNECT TO SUBURBAN STATION**
- 1,121-FT SKYSCRAPER (9TH TALLEST IN U.S.)
- $1.2 BILLION COMMERCIAL INVESTMENT
WITH SEPTA:

2ND DENSEST DOWNTOWN IN UNITED STATES

62% OF ALL CENTER CITY/UNIVERSITY CITY WORK TRIPS

ENDURING URBANISM
WITHOUT SEPTA, 923 ACRES OF ADDITIONAL PARKING NEEDED –
28 COMCAST CENTERS OF SQUARE FOOTAGE JUST FOR CARS
FUTURE FORCES OF THE REGION

1. ENDURING URBANISM

2. TRANSPORTATION ON DEMAND
SEPTA KEY
EARLY ADOPTERS – JUNE 13, 2016

REAL TIME INFORMATION
MODEM INSTALL UNDERWAY
TRANSPORTATION ON DEMAND

INFORMATION-DRIVEN TRANSIT EXPERIENCE

Pricing

- Enhanced transit passes
  - Integration with TNCs and other travel providers
- Different passes for different commutes
  - A selection of pass-types to suit different travel frequencies and habits

Ease of Use

- Real-time information to consumers
  - Vehicle location and arrival time
  - Multi-modal information for trip planning
- Payment options
  - Integrated SEPTA Key and mobile payments
- Integrated transportation services
  - First and last mile
  - Mixed mode daily commutes

Leveraging Data

- Optimize SEPTA service through analysis of trips searched and taken
- Customized information, communication, and pricing models to consumers
- Data sharing?
SEPTA & TNCs

- **First mile, last mile**
  - Supplement transit
  - Improve transit’s efficiency or extend reach

- **Integrated services and payments**
  - Dallas integrates Uber into its transit app

- **Mixed mode route trips**
  - Payment integration for new types of commutes

- **Loyalty program integration**
  - Rewarding customers for using transit and TNCs in tandem
SEPTA/UBER PILOT PARTNERSHIP

- 40% discount for rides to and from 11 Regional Rail Stations
- Summer 2016 (Memorial Day - Labor Day)

How did it do?

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Framework for Pilots

- Proof of Concept
- Scalability
- Data-sharing for tracking/evaluation
SEPTA & TNCs

- **Integrated real-time info**
  - Plan trips based on vehicles, not schedules
  - See transportation choices as a continuum

- **Integrated mobile payment**
  - Your device as your transportation hub

- **Data-driven transit experience**
  - Service improvements and optimization
  - Customized information and suggestions to save customers time and money

- **Data-sharing improves transit and TNCs**
Information-driven integration
- Payment methods and pricing models
- Real-time service information
- Leveraging resulting data

Data as infrastructure
- Multimodality will increasingly rely on
  - Information availability to customers
  - Information integration with providers
- Privacy concerns
- Travel data will help optimize
  - Transportation and city planning
  - Investments in physical infrastructure
“Competing” Transportation Theories

<table>
<thead>
<tr>
<th>Overall Goal</th>
<th>Auto-Oriented</th>
<th>Active Transportation</th>
<th>Digital Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase mobility</td>
<td>Increase accessibility</td>
<td></td>
<td>Increase information</td>
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</tbody>
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<thead>
<tr>
<th>Land Use</th>
<th>Separation of uses</th>
<th>Mixed use, high density</th>
<th>Live / work where you want with recognition that density is more efficient</th>
</tr>
</thead>
</table>

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<thead>
<tr>
<th>Trip priorities</th>
<th>High speed</th>
<th>Shorten trips, get exercise</th>
<th>Customization, cost, reliability, use time other than for driving</th>
</tr>
</thead>
</table>

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<tr>
<th>Safety</th>
<th>Safe mobility</th>
<th>Vision Zero</th>
<th>Connected technologies, warning systems, feedback loops, and data enhance safety</th>
</tr>
</thead>
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<tr>
<th>Key Metrics</th>
<th>Level-of-service, vehicle hours of delay, travel time index / savings</th>
<th>Bike/Ped level of service, trip length, total travel time, vehicle miles traveled, greenhouse gas emissions, transit trips</th>
<th>Real-time data, person throughput, wait time, personal ratings, Big Data and analytics</th>
</tr>
</thead>
</table>

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<tr>
<th>Investment Priorities</th>
<th>New and wider roads</th>
<th>Connections between modes; Walking, biking, and transit facilities</th>
<th>Multimodal Smart Roads that increase safety and efficiency</th>
</tr>
</thead>
</table>

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<tr>
<th>Rationale for Investment</th>
<th>Fight congestion; reduce delay</th>
<th>Build livable communities; sustainability; improve health</th>
<th>Create an integrated, multimodal network, profit (private market)</th>
</tr>
</thead>
</table>

TNC Future Scenarios

Cooperative, Partnerships

A Tale of Two Regions

Transportation Reinvented

Slower Growth

Filling a Niche

The TNC Takeover

Faster Growth

Individualistic, Fragmented
Filling a Niche

Despite bursting onto the scene, TNC operators never manage to grow beyond specialized trips. Transit service is little affected by TNCs, with no substantial change in ridership.
A Tale of Two Regions

TNCs and transit agencies build partnerships in the region’s denser developed areas, building an integrated, multimodal transportation network. Outside these areas the traditional auto-oriented transportation system remains in place.
The TNC Takeover

TNCs operate independently and are better able to quickly respond to changing market conditions. This has led to a significant scaling down of transit operations, which now consist primarily of rail operations and limited bus service.
Transportation Reinvented

Transit redefines its operations, creates cooperative partnerships with new private market TNC services, and becomes the backbone of an integrated transportation network. Aggressive service expansion and big venture capital investments fuel long-term, rapid TNC growth.
TNC Survey Results

Relative Percent Probability of Occurring:

- Filling a Niche: 33%
- A Tale of Two Regions: 32%
- The TNC Takeover: 16%
- Transportation Reinvented: 16%
- Other: 3%

#MakingConnections | @dvrpc
The Scenario We Aren’t Getting Into... Yet

Disruption
Thank You!

www.dvrpc.org/connections2045