Short Talks
Big Ideas

Transportation at the Tech Frontier

NYU Wagner
rudin center
for transportation policy & management

http://wagner.nyu.edu/rudincenter/

LIMITS OF THE UNTETHERED CITY

Anthony Townsend

Institute for the Future & Rudin Center

NYU Wagner
rudin center
for transportation policy & management

Limits in the Untethered City

Why Untethered Communications is All That Matters.

And Why We May Never Have Enough Of It.

Dr. Anthony Townsend
Institute for the Future
NYU Rudin Center for Transportation Policy and Management

"When wireless is perfectly applied the whole earth will be converted into a huge brain...

...and the instruments through which we shall be able to do this will be amazingly simple compared with our present telephone."
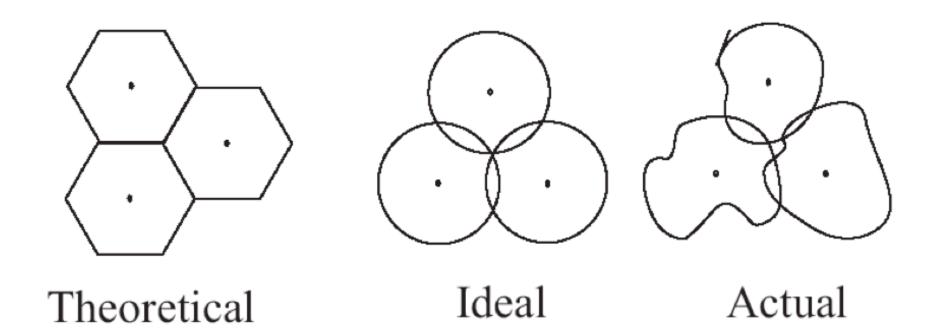
Nicola Tesla in *Collier's* magazine

...in 1926 !

1920s

1946

"2,000 subscribers in New York City shared just 12 channels, and typically waited 30 minutes to place a call."
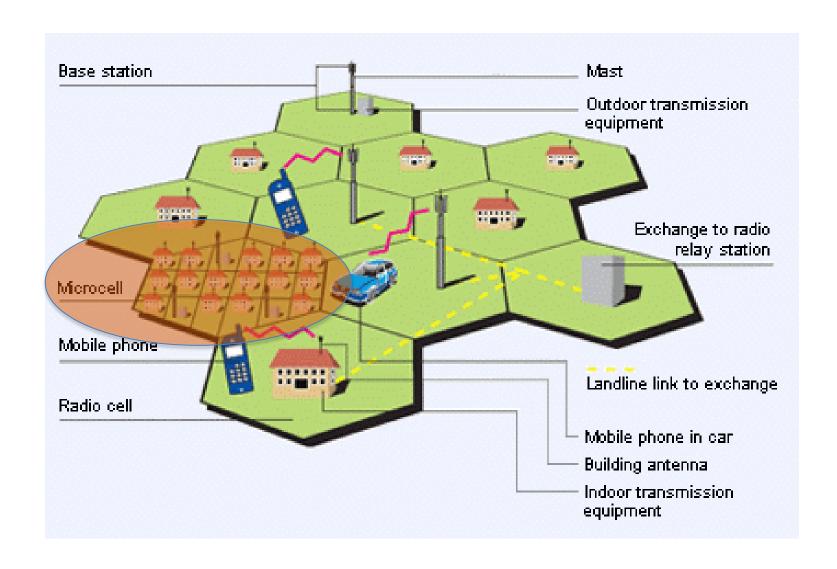-AT&T

Not enough capacity!

Start slicing the city up

slicing space

Theoretical   Ideal   Actual

Digital cellular - slicing time

3G: back to slicing space

Base station

Mast

Outdoor transmission equipment

Microcell

Mobile phone

Exchange to radio relay station

Radio cell

Landline link to exchange

Mobile phone in car

Building antenna

Indoor transmission equipment
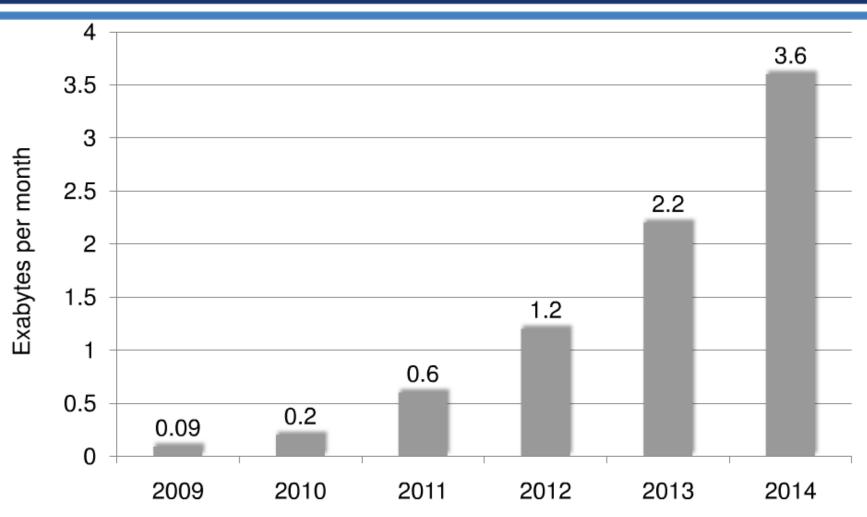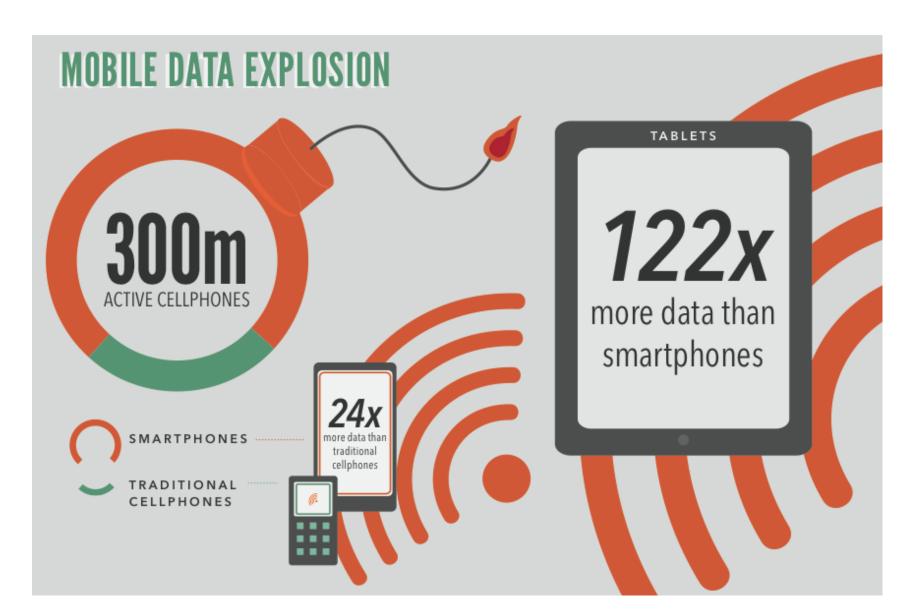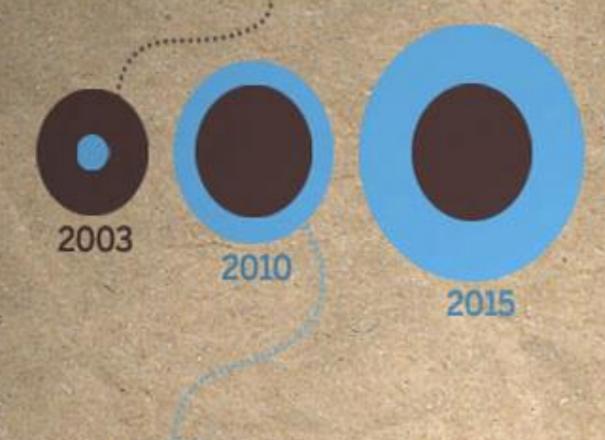
Rapid Growth in Global Mobile Data Traffic

Source: Cisco VNI Global Mobile Data Traffic, 2010

apps need lots of data

During 2008, the number of things connected to the Internet exceeded the number of people on earth.

2003

2010

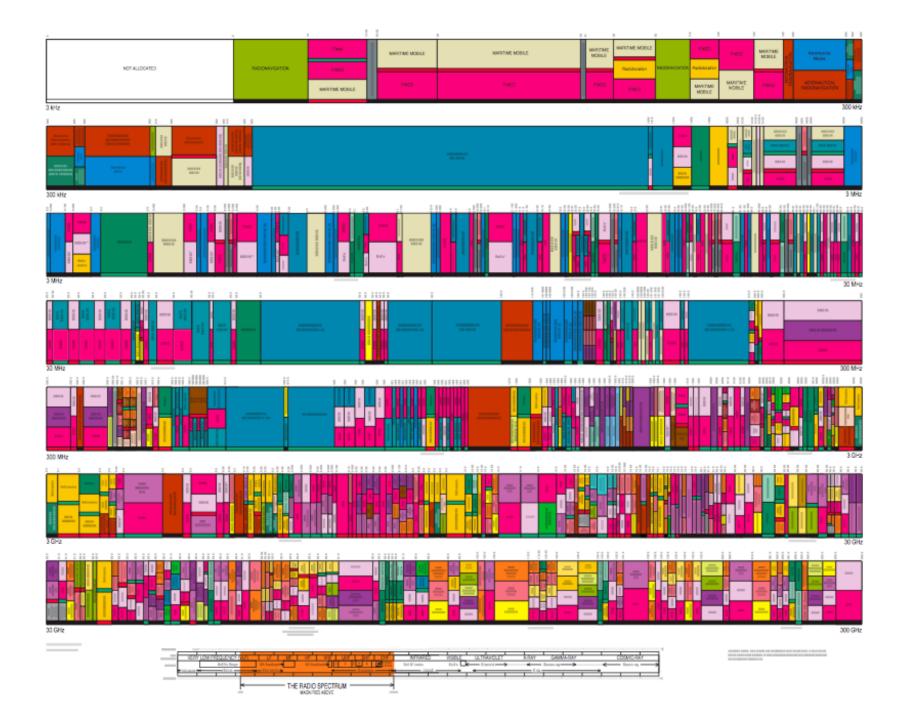2015

By 2020 there will be 50 billion.

These things are not just smartphones and tablets.

"If you had a quarter of the population of Manhattan watching a video over their handset, it would take approximately 100,000 cell sites, or a huge amount of additional spectrum."
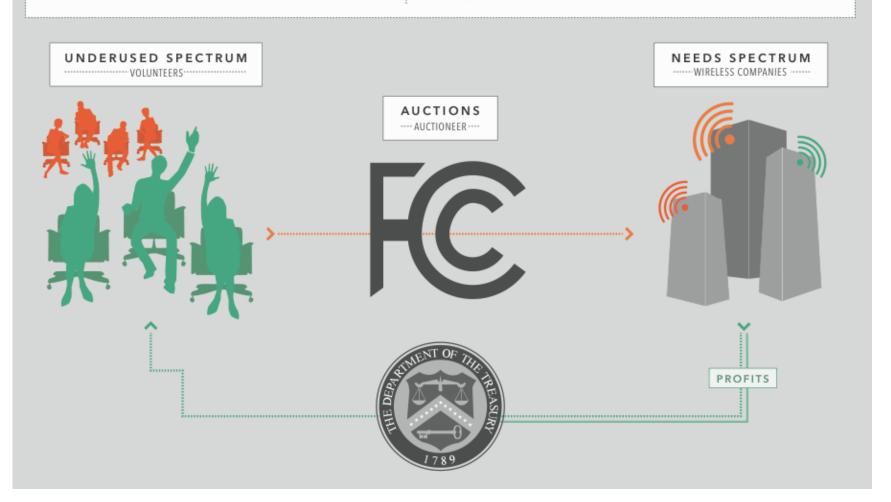
-Eli Noam, Columbia Business School

3 kHz
NOT ALLOCATED
RADIONAVIGATION
Fixed
FIXED
MARITIME MOBILE
MARITIME MOBILE
MARITIME MOBILE
MARITIME MOBILE
MARITIME MOBILE
Radiolocation
RADIONAVIGATION
FIXED
FIXED
MARITIME MOBILE
FIXED
FIXED
FIXED
FIXED
MARITIME MOBILE
MARITIME MOBILE
MARITIME MOBILE
FIXED
Aeronautical Mobile
AERONAUTICAL RADIONAVIGATION
300 kHz

300 kHz
3 MHz

3 MHz
30 MHz

30 MHz
300 MHz

300 MHz
3 GHz

3 GHz
30 GHz

30 GHz
300 GHz

THE RADIO SPECTRUM
MAGNIFIED ABOVE

full steam ahead?

HOW TO SOLVE THE SPECTRUM CRUNCH
VOLUNTARY INCENTIVE AUCTIONS

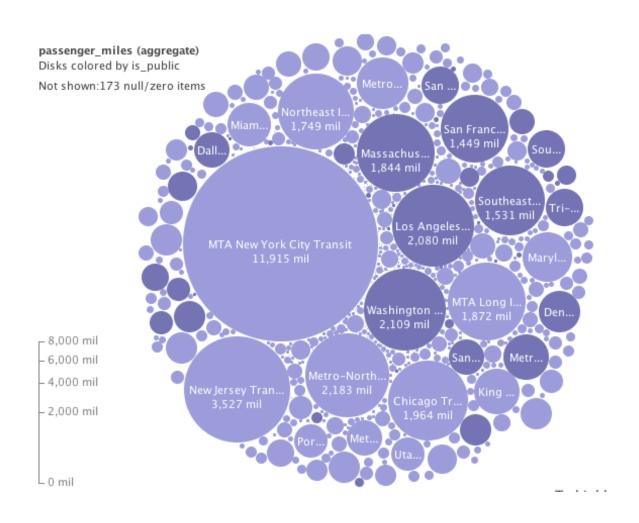Companies can decide to give back underused spectrum. The FCC would auction that spectrum to those that provide wireless broadband services. The volunteers would retain a portion of the auction proceeds, and the rest of the proceeds would go to the U.S. Treasury.

UNDERUSED SPECTRUM
VOLUNTEERS

NEEDS SPECTRUM
WIRELESS COMPANIES

AUCTIONS
AUCTIONEER

THE DEPARTMENT OF THE TREASURY
1789

PROFITS

Why do you care?

untethered devices benefit transit

passenger_miles (aggregate)
Disks colored by is_public

Not shown:173 null/zero items

Metro...

San ...

Northeast I...
1,749 mil

San Franc...
1,449 mil

Miam...

Sou...

Dall...

Massachus...
1,844 mil

Southeast...
1,531 mil

Tri-...

MTA New York City Transit
11,915 mil

Los Angeles...
2,080 mil

Maryl...

Washington ...
2,109 mil

MTA Long I...
1,872 mil

Den...

San...

Metr...

New Jersey Tran...
3,527 mil

Metro-North...
2,183 mil

Chicago Tr...
1,964 mil

King ...

Por...

Met...

Uta...

- 8,000 mil
- 6,000 mil
- 4,000 mil
- 2,000 mil
- 0 mil

And make it easier to use

it's the new infrastructure
of mobility

"the whole earth will be converted into a huge brain...

all things being particles of a real and rhythmic whole..."

Tesla was right!
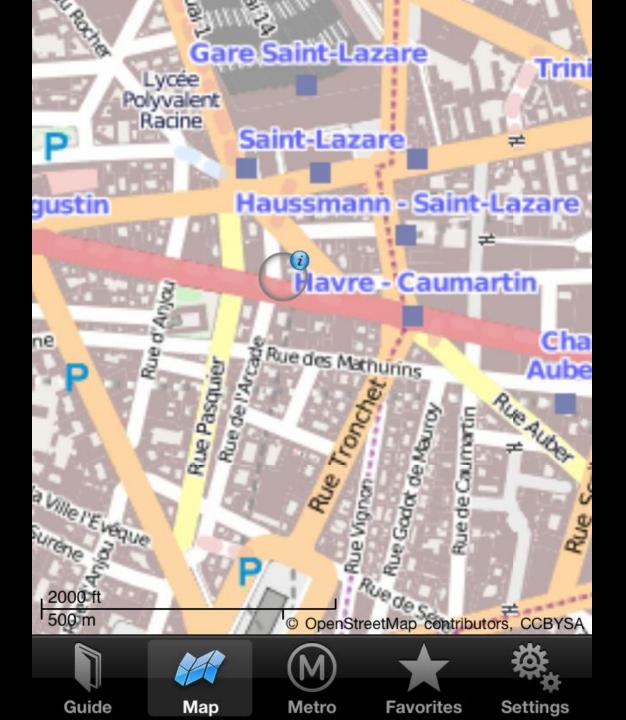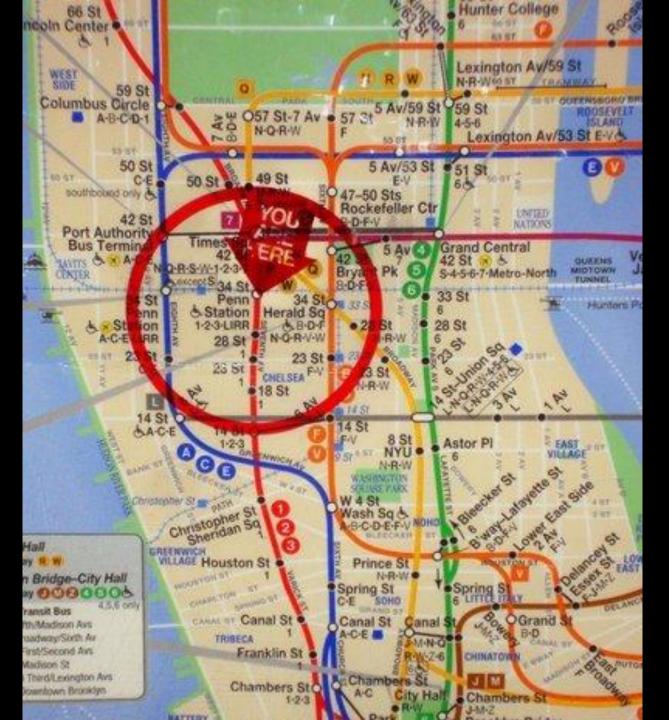
Mobile phone users in Paris

GETTING AROUND CITIES

John Geraci

faberNovel

Gare Saint-Lazare

Trini

Lycée
Polyvalent
Racine

P

Saint-Lazare

gustin

Haussmann - Saint-Lazare

i

Havre - Caumartin

Rue d'Anjou

Rue des Mathurins

Cha
Aube

P

Rue Pasquier

Rue de l'Arcade

Rue Tronchet

Rue Vignon

Rue Godot de Mauroy

Rue de Caumartin

Rue Auber

Rue S

ne

a Ville l'Evêque

surène

Rue d'Anjou

P

Rue de Se

2000 ft
500 m

© OpenStreetMap contributors, CCBYSA

Guide | Map | M Metro | ★ Favorites | ⚙ Settings

faberNovel

ideas with legs

We help
large organizations
think and act like startups

Context

+

Perspective

42th St. Port Authority

(A) 25 mn

34th St. Penn Station

(2) 22 mn

Times Square

(3) 27 mn

Grand Central

(4) 17 mn

14h St. Union Square

(5) 12 mn

Canal St.

(C) 10 mn

You are here

City Hall

(R) 6 mn

Port Authority Bus
Times Sq
except S

47–50
Rockerfeller Center

Long Island Ci
Court Sq

45 Rd

21

Jackson Blvd

Hunters Point Av
LIRR

Greenpoint Av

Nassau A

Penn Station
PATH
AMTRAK
TRANSIT

34–Herald Sq
PATH

33

28

23
PATH

18

8 Av/
14 St

6 Av/
14 St
PATH

8-NYU

Union Sq

14 St

Bedford Av

Metropolitan Av
Lorimer St

Christopher
Sheridan Sq

Christopher

Houston

West 4
Wash Sq

Spring

Prince

Spring

Houston St

Lafayette

2 Av

Delancey St
Essex St

Marcy

3 St lines to
n and Journal Sq

Canal

Canal

Canal

Bowery

Grand

East Broadway

Chambers

Chambers

York

Fulton

H World Trade Center lines to Hoboken and Newark

Cortlandt
closed for
reconstruction

Cortlandt

Fulton
B'way–Nassau

High

Brooklyn Bridge

BART DOWNTOWN IS DELAYED 20 MINUTES

Come get a coffee while you wait!

15th and Mission. Just steps away!

Mention SFMTA and get a free mini scone!

6 ⚠ Subway service suspended.

🚶 🚆

Paris
Fête de la Musique / mouvements des mobiles
15:00   21/06/2008

orange

faberNovel

John Geraci

john.geraci@fabernovel.com

faberNovel

ideas with legs

TAXI GPS DATA & THE BREADCRUMB PROJECT

Sophia Choi

NYC DOT

Photo credit: Murray Mitchell

TAXI GPS DATA

Sophia J. Choi

Transportation Planner, New York City Department of Transportation

April 9th, 2012

NEW YORK CITY DOT

TAXI GPS DATA OVERVIEW

- provided by the Taxi Limousine Commission (TLC)

- track pick-up and drop-off points, trip distance/time and fare information

- post-processed by DOT: filtering, aggregating and assigning trips to zones

- 13,000 taxicabs generate about 13 million citywide taxi trips per month

- Over 800 million taxi trips recorded since 2007

NEW YORK CITY
DOT

TAXI GPS DATA APPLICATIONS

- Applications
  - NYC traffic trends
  - Pre- and post-project evaluations

- Regional transportation planning and modeling (BPM, Origin/Destination, demand estimation)

- Visualizations
  - 2011 Manhattan Speed by Day
  - Daytime Traffic Speeds
  - A New York Minute
  - Pick-up and Drop-off Animation

2011 MANHATTAN SPEEDS BY DAY

2011 Manhattan Traffic Speeds Day By Day

JANUARY

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

FEBRUARY

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

MARCH

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

AUGUST

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

NOVEMBER

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

This calendar shows average daily speeds in the Manhattan CBD, 6 a.m. to 6 p.m.

Key:

- The 25 fastest days (average speed between 16.3 m.p.h. and 12.0 m.p.h.).
- The next 75 fastest days (average daily speed between 11.9 and 10.6 m.p.h.).
- Between the 100 fastest days and 100 slowest days are the 165 days with average daily speeds between 10.5 and 9.2 m.p.h.
- The next 75 slowest days (9.2 to 8.6 m.p.h.).
- The 25 slowest days (8.6 to 6.9 m.p.h.).

2011 Holidays

January	New Year's Day (1)
	Martin Luther King Jr. Day (17)
February	President's Day (21)
April	Easter Sunday (24)
May	Memorial Day (30)
July	Independence Day Observed (4)
September	Labor Day (5)
October	Columbus Day (10)
November	Thanksgiving (24)
December	Christmas Day (25)

Sustainable Streets Index 2011   Sustainable Streets Index 2011
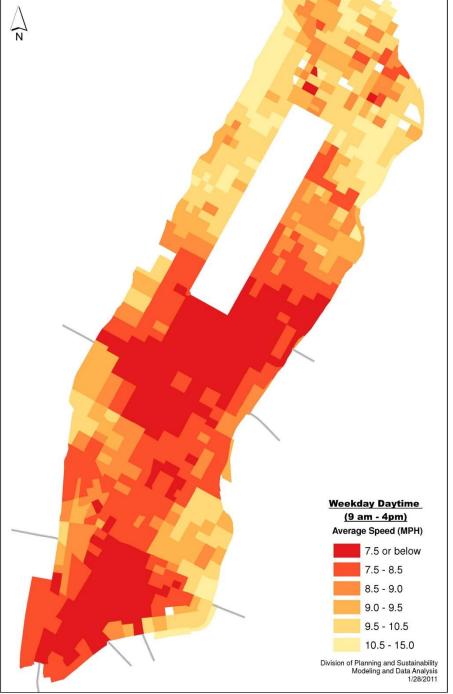
(Source: 2010 Sustainable Streets Index by NYCDOT)

NEW YORK CITY DOT

DAYTIME TRAFFIC SPEEDS WEEKDAYS (9 a.m. – 4 p.m.)

- GPS data for short distance trips (<= 0.5 miles) from "typical" weekdays

- Speeds are calculated for small zones using the median speed for taxi trips in each zone.

- Data reflect the median zonal speeds rather than speeds in individual streets.

- Zones with insufficient number of taxi trips are not included.

Weekday Daytime (9 am - 4pm)
Average Speed (MPH)

- 7.5 or below
- 7.5 - 8.5
- 8.5 - 9.0
- 9.0 - 9.5
- 9.5 - 10.5
- 10.5 - 15.0

Division of Planning and Sustainability
Modeling and Data Analysis
1/28/2011

(Source: 2010 Sustainable Streets Index by NYCDOT)
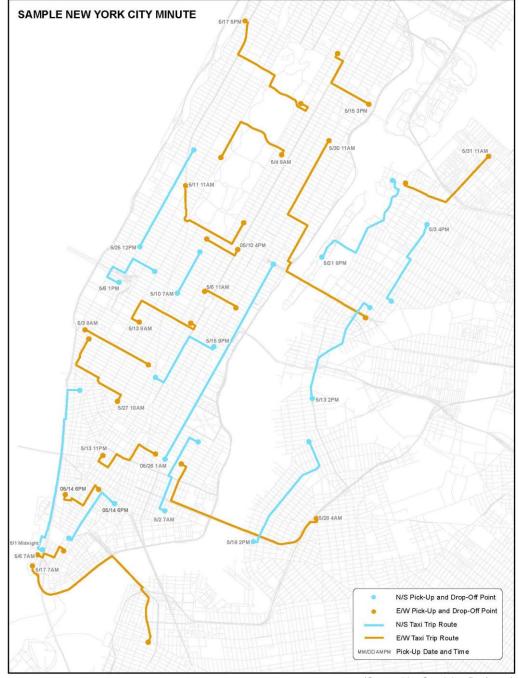
NEW YORK CITY DOT

A NEW YORK MINUTE

- Sample trips to show where you can go in 7-minute taxi ride

- 7 minutes is the most frequent taxi trip duration

- Sample trips from May 2011

SAMPLE NEW YORK CITY MINUTE

Legend:
- N/S Pick-Up and Drop-Off Point
- E/W Pick-Up and Drop-Off Point
- N/S Taxi Trip Route
- E/W Taxi Trip Route
- MM/DD AM PM Pick-Up Date and Time

(Created by Stanislav Parfenov)

NEW YORK CITY DOT
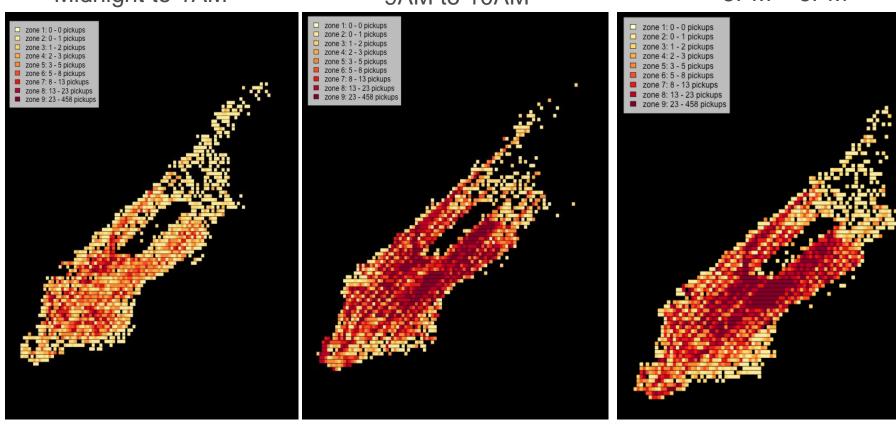
PICK-UP AND DROP-OFF ACTIVITIES

January 13, 2009

Midnight to 1AM

9AM to 10AM

5PM – 6PM

THE FUTURE: THE BREADCRUMB PILOT PROJECT

- Current Taxi GPS data only contain positional information for pick-up and drop-off

- The Breadcrumb project has GPS loggers taking snapshots every second

- Breadcrumb data will reflect the roadway conditions by "time of day"

- The pilot project will determine
  - Minimal # of taxis GPS loggers to generate useful statistics for New York City
  - Whether or not per-second signals is sufficient or excessive

NEW YORK CITY
DOT

SAMPLE TAXI GPS DATA

- Pick-up and Drop-off Time Information

PickupDateTime	PickUp Hour	PickUp Day	PickUp DOW	PickUp Week	PickUp Month	PickUp Year	DropoffDateTime	DropOf Hour	DropOf Day	DropOf DOW	DropOf Week	DropOf Month	DropOf Year
21-May-2011 07:49:41	7	21	7	21	5	2011	21-May-2011 08:01:21	8	21	7	21	5	2011
21-May-2011 07:50:11	7	21	7	21	5	2011	21-May-2011 07:55:57	7	21	7	21	5	2011
21-May-2011 08:58:32	8	21	7	21	5	2011	21-May-2011 09:06:22	9	21	7	21	5	2011
21-May-2011 08:58:09	8	21	7	21	5	2011	21-May-2011 09:06:51	9	21	7	21	5	2011

- Pick-up and Drop-off Location Information

StartLon	StartLat	EndLon	EndLat	PickUp ZoneID	DropOf ZoneID
-73.994140	40.751218	-73.954494	40.765741	4A	6B
-73.983081	40.722783	-73.985433	40.729983	2A	2A
-73.955749	40.780723	-73.970234	40.759689	7B	5C
-73.984751	40.724524	-74.006518	40.721664	2A	1
-73.996960	40.731417	-73.986852	40.725704	2A	2A

- Fare/Trip Information

TollsAmt	FareAmt	TipAmt	Surcharge	TotalAmt	TripTime	TripDistance	Speed	TripNumber	VendorName
.00	10.50	.00	.00	11.00	11.67	3.30	16.97	6135	CMT
.00	5.30	.00	.00	5.80	5.77	.70	7.28	208	CMT
.00	7.30	.00	.00	7.80	7.83	1.70	13.03	5057	CMT
.00	7.30	.00	.00	7.80	8.70	1.70	11.72	5615	CMT

NEW YORK CITY
DOT

THANK YOU

SOCIAL TRAVEL IN THE ERA OF THE SMARTPHONE

Andrew Mondschein

NYU Rudin Center

Travel is Social
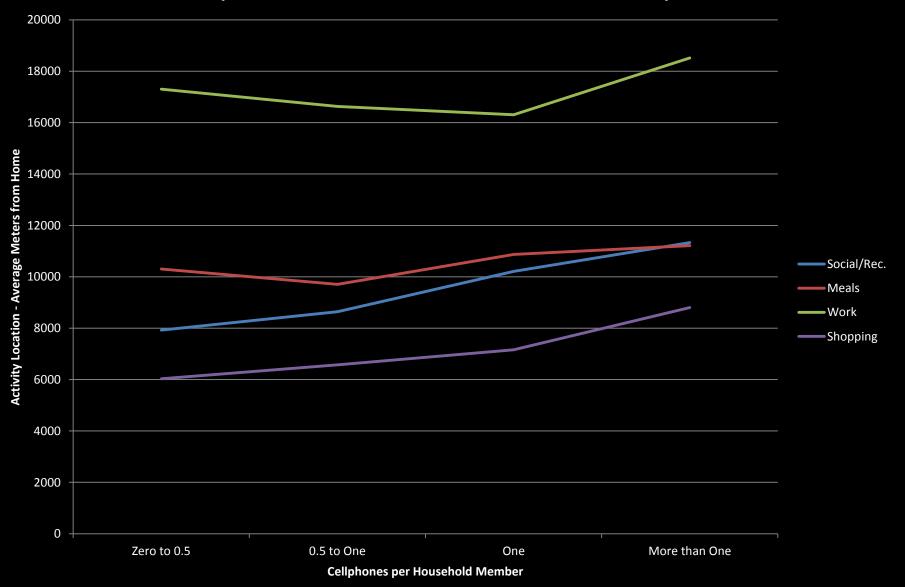
The Italian "Passeggiata"
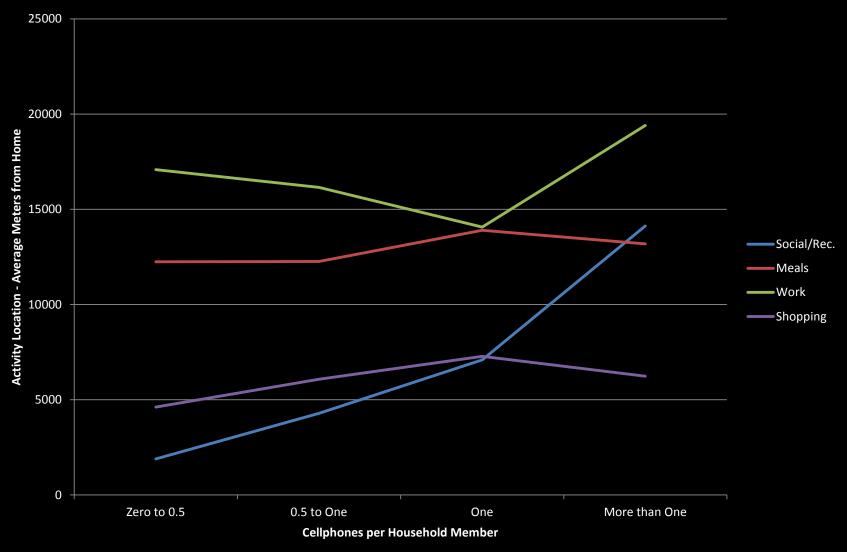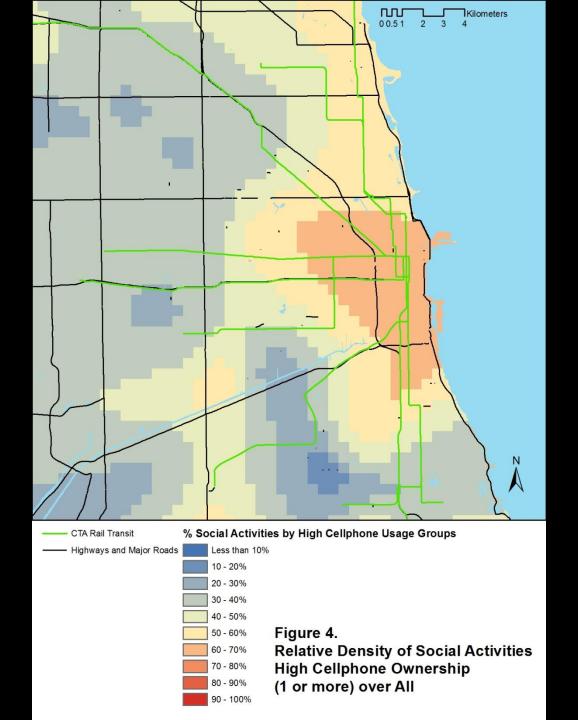
Cruising

**Cell Phone Ownership and Activity Type
(All Modes, Adults > $75k Household Income)**

Activity Location - Average Meters from Home

Cellphones per Household Member

Legend:
- Social/Rec.
- Meals
- Work
- Shopping

X-axis labels: Zero to 0.5, 0.5 to One, One, More than One

Y-axis: 0, 2000, 4000, 6000, 8000, 10000, 12000, 14000, 16000, 18000, 20000
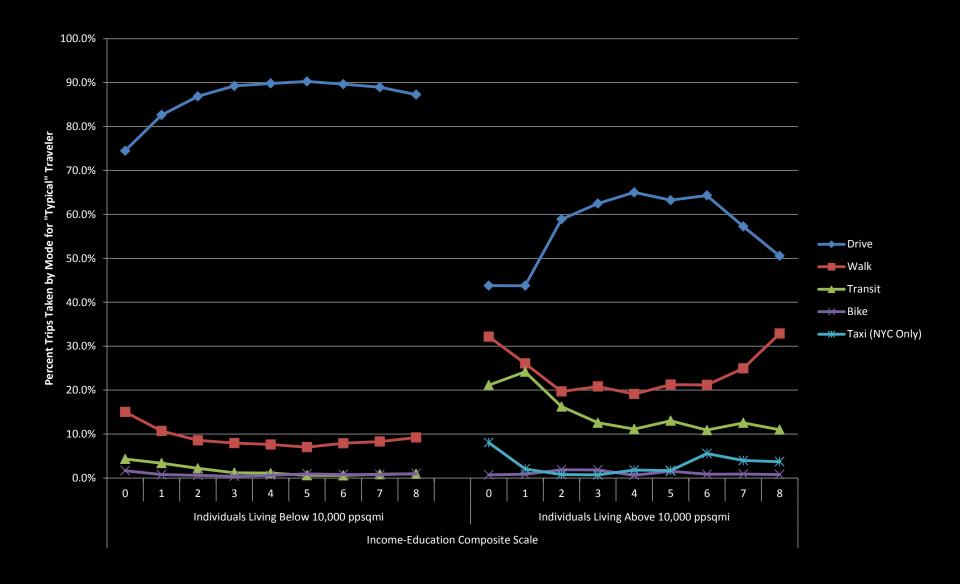
Cell Phone Ownership and Activity Type
(Walking, Adults > $75k Household Income)
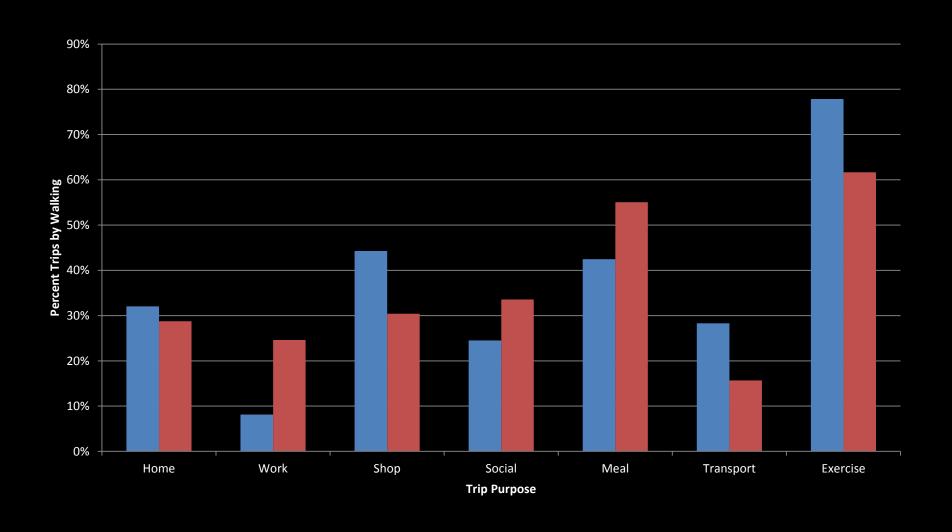
Figure 4.
Relative Density of Social Activities
High Cellphone Ownership
(1 or more) over All

Legend:
- CTA Rail Transit
- Highways and Major Roads

% Social Activities by High Cellphone Usage Groups
- Less than 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%
- 50 - 60%
- 60 - 70%
- 70 - 80%
- 80 - 90%
- 90 - 100%

Kilometers
0 0.5 1 2 3 4

Who Walks?

L TRAIN NOTWORK

Mark Krawczuk

WeMakeCoolSh.it

A Pirate WiFi intranet on the New York Subway

by

WEMAKEcooLSH.IT

Us

We are a creative consultancy that works with start-ups, brands and agencies to produce innovative ideas.

THE L TRAIN NOTWORK

WEMAKEcooLSH.IT

Observations

- People ride the train packed together but rarely interact

- Almost everyone has a mobile device but without an internet connection they are a bit boring

WEMAKECooLSH.IT

Idea

- Create a local WiFi intranet accessible by anyone with a mobile device

- Give passengers a reason and a way to interact with the people around them and artists in their community

What

- Create a LoFi mobile site accessible from any mobile browser
- Feature a chat room for people to chat with people around them
- Feature content from local artists
- Provide newsfeeds from popular sites
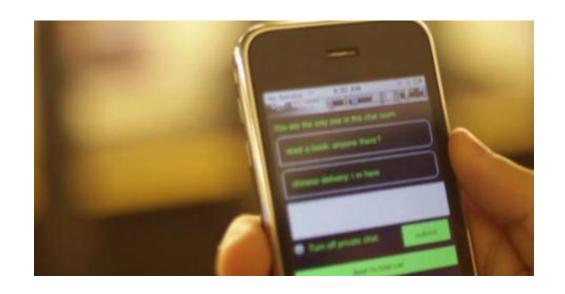
How

- Create tiny battery powered web servers that can be carried on the train in unassuming shopping bags

- Have one person, carrying a server, on every train between the Morgan and 8th Ave stops, on the L train, during rush hour

WEMAKECOOLSH·IT
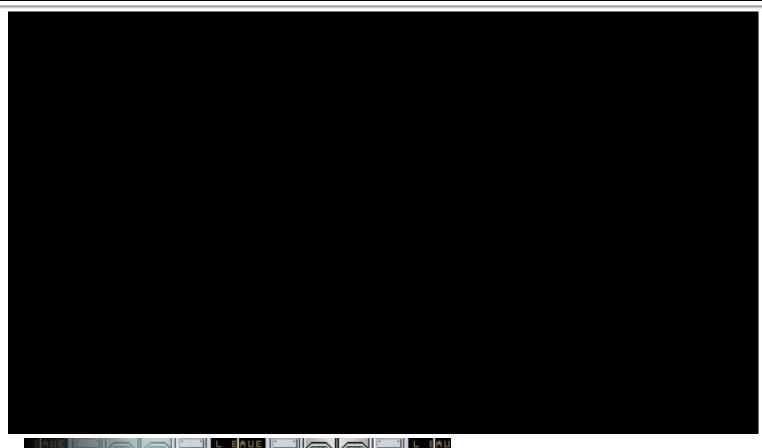
Behind the Scenes

Let's go to the video...

Behind the Scenes

Promotion

Create a clever flyer to pass out to commuters outside the station and at local cafes and places of interest

Spread

- Press
- Blogs
- Tweets
- Cassandra

Open Source

- Symposium

- GitHub

What's Next

- Focus on the idea not the tech

- Applying the same thinking to different situations

Thanks!

http://wemakecoolsh.it/

NEW FARE PAYMENT SYSTEMS

Elizabeth Paul

MTA

MTA Tap & Ride™:
The future of fare collection

Elizabeth Paul, MTA New Fare Payment Systems
April 9, 2012

MetroCard today

A card-based system, all paid-in-advance.

Drawbacks
- Obsolete, nearing end of life
- High fare collection costs
- Inflexible fare policy
- Locked in a proprietary system
- Long bus boarding times
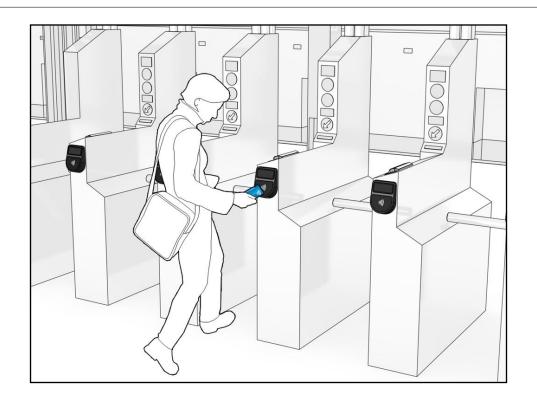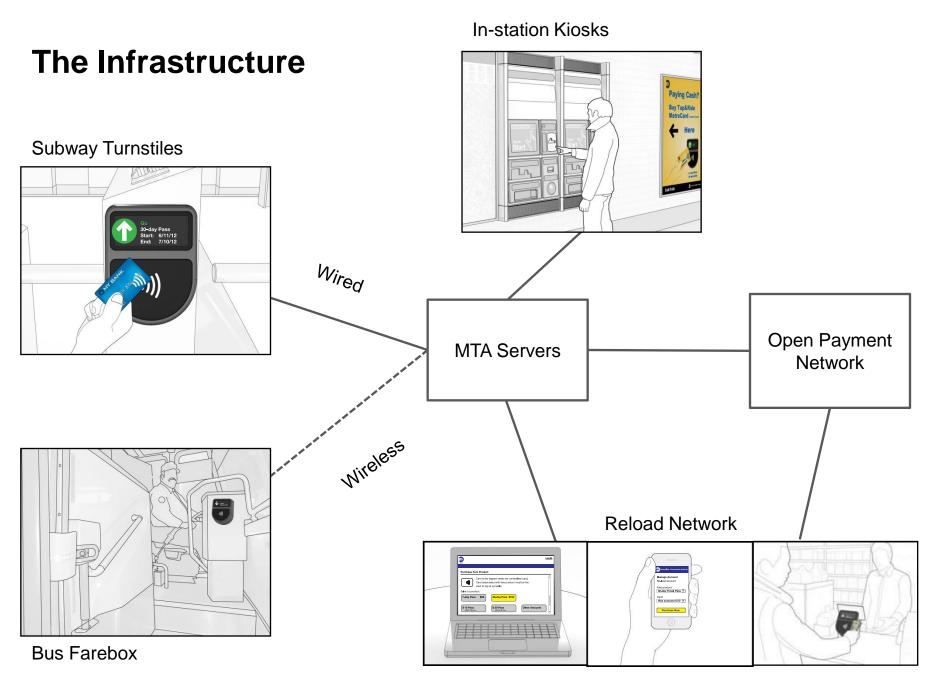
- MTA costs averaged 15¢ per $1 revenue collected.
- MTA issued over 200M MetroCards in 2010.

The future of fare collection is MTA Tap & Ride™

An account-based system using an "open" payment architecture.

The Infrastructure

In-station Kiosks

Subway Turnstiles

Wired

Wireless

MTA Servers

Open Payment Network

Bus Farebox

Reload Network
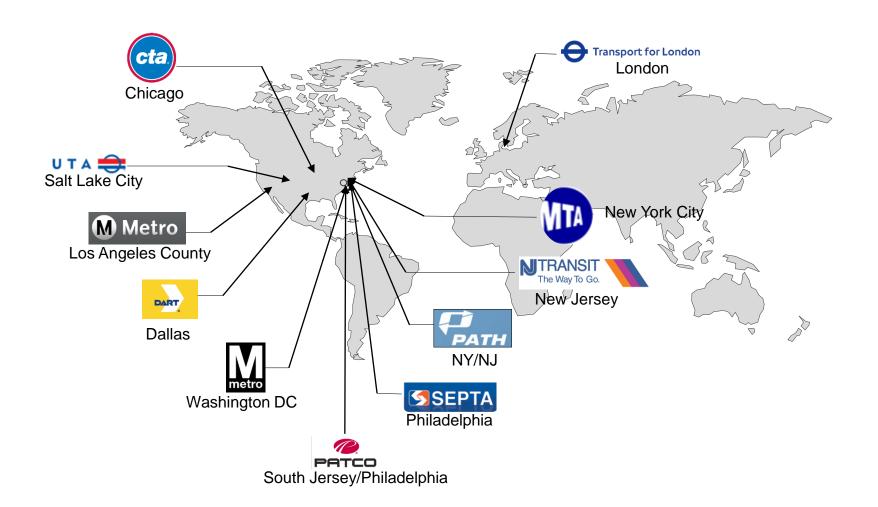
Technology and data

- Using open standards. MTA part of the "open payment network".
- Accept any contactless payment device.
- A ride can be purchased as you enter.
- Reload anywhere (online, app, SMS).

- Aggregate statistics on ridership and fare media sales and use.
- Potential web service for fare table queries.
- Travel and purchase history data available to account holders.
  - Potential for personalized stats, visualization.

Other transit agencies exploring open payments

cta
Chicago

Transport for London
London

UTA
Salt Lake City

M Metro
Los Angeles County

DART
Dallas

M metro
Washington DC

MTA
New York City

NJ TRANSIT
The Way To Go.
New Jersey

PATH
NY/NJ

SEPTA
Philadelphia

PATCO
South Jersey/Philadelphia

I HEART M15

Lizzy Showman & Kathleen Fitzgerald

School of Visual Arts
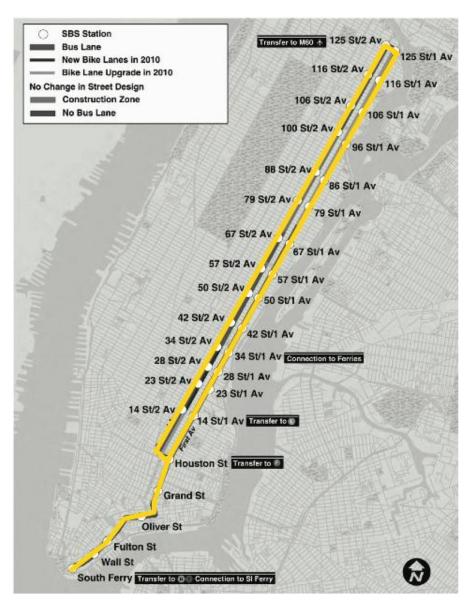
ROUTE M15

QUICK FACTS:

THE SECOND-BUSIEST BUS ROUTE IN THE U.S.

ANNUAL RIDERSHIP JUST SHY OF 16.5 MILLION

ORIGINALLY THE SECOND AVE STREET CAR

CREATED IN 1853

1853

SECOND AVENUE LINE

15

I ❤ M15

IHEARTM15.COM

I ❤ M15 BUS DRIVERS

M15 BUS DRIVERS
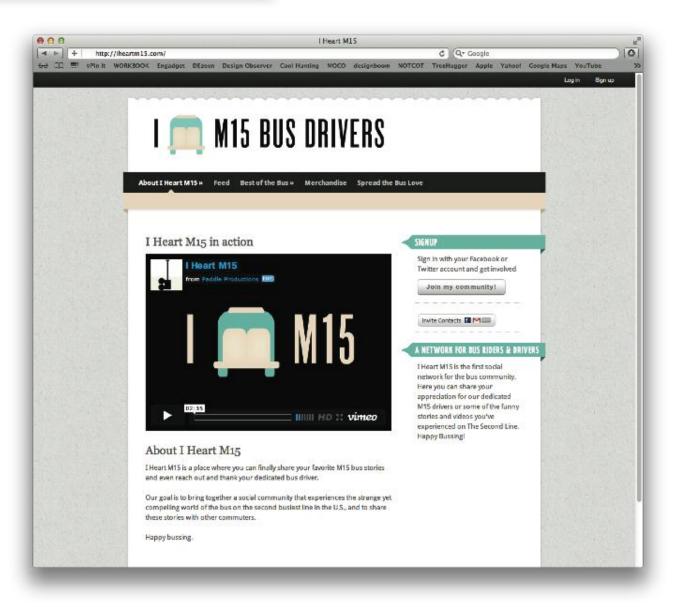
CUSTOM SEAT CUSHION
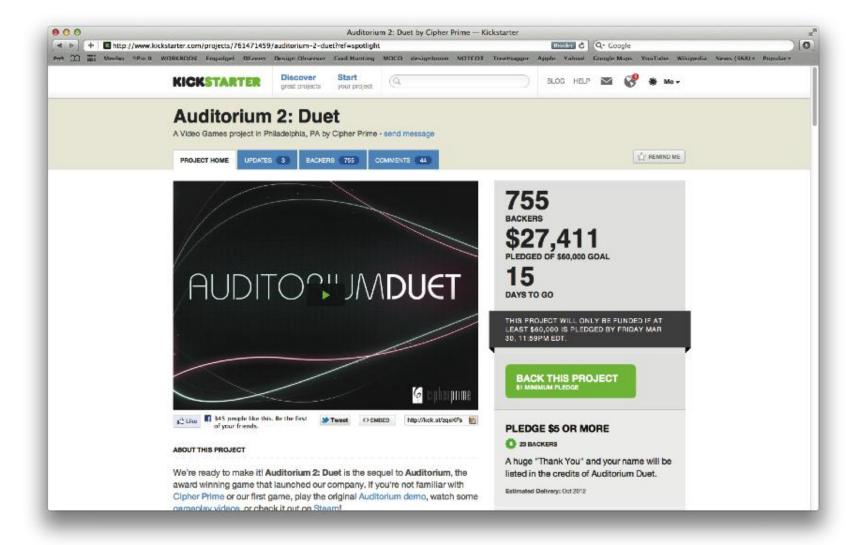
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NEXT STEPS

KICKSTARTER

Auditorium 2: Duet by Cipher Prime — Kickstarter

http://www.kickstarter.com/projects/761471459/auditorium-2-duet?ref=spotlight

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Auditorium 2: Duet
A Video Games project in Philadelphia, PA by Cipher Prime · send message

PROJECT HOME | UPDATES 3 | BACKERS 755 | COMMENTS 44 | ☆ REMIND ME

755 BACKERS
$27,411 PLEDGED OF $60,000 GOAL
15 DAYS TO GO

THIS PROJECT WILL ONLY BE FUNDED IF AT LEAST $60,000 IS PLEDGED BY FRIDAY MAR 30, 11:59PM EDT.

BACK THIS PROJECT
$1 MINIMUM PLEDGE

👍 Like | 345 people like this. Be the first of your friends. | Tweet | <> EMBED | http://kck.st/zqeKFa

PLEDGE $5 OR MORE
23 BACKERS
A huge "Thank You" and your name will be listed in the credits of Auditorium Duet.
Estimated Delivery: Oct 2012

ABOUT THIS PROJECT

We're ready to make it! **Auditorium 2: Duet** is the sequel to **Auditorium**, the award winning game that launched our company. If you're not familiar with Cipher Prime or our first game, play the original Auditorium demo, watch some gameplay videos, or check it out on Steam!

THANK YOU & REMEMBER TO JOIN
iheartm15.com

KATHLEEN FITZGERALD: kathleenmariefitzgerald.com
LIZZY SHOWMAN: lizzyshow@gmail.com

THE COLLABORATIVE CITY PLAN

Frank Hebbert

OpenPlans
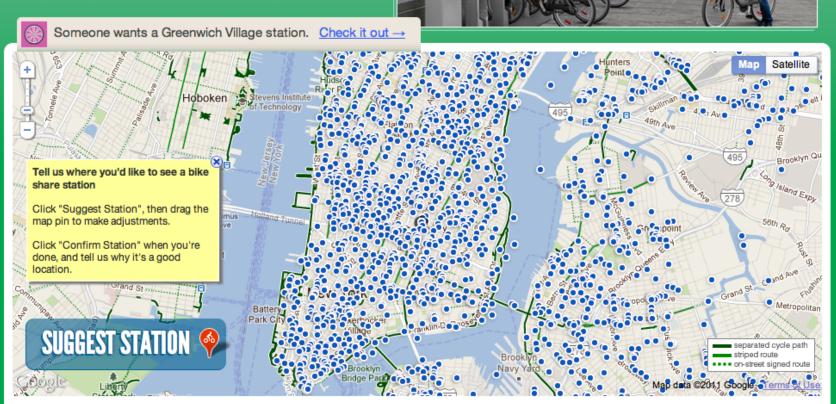
Short Talks, Big Ideas:
Transportation at the Tech Frontier

The Collaborative City Plan April 9, 2013.

Frank Hebbert, OpenPlans
@fkh

New York City Bike Share

Help shape NYC's new transit option

Someone wants a Greenwich Village station. **Check it out →**

Map | **Satellite**

Tell us where you'd like to see a bike share station

Click "Suggest Station", then drag the map pin to make adjustments.

Click "Confirm Station" when you're done, and tell us why it's a good location.

SUGGEST STATION

— separated cycle path
-- striped route
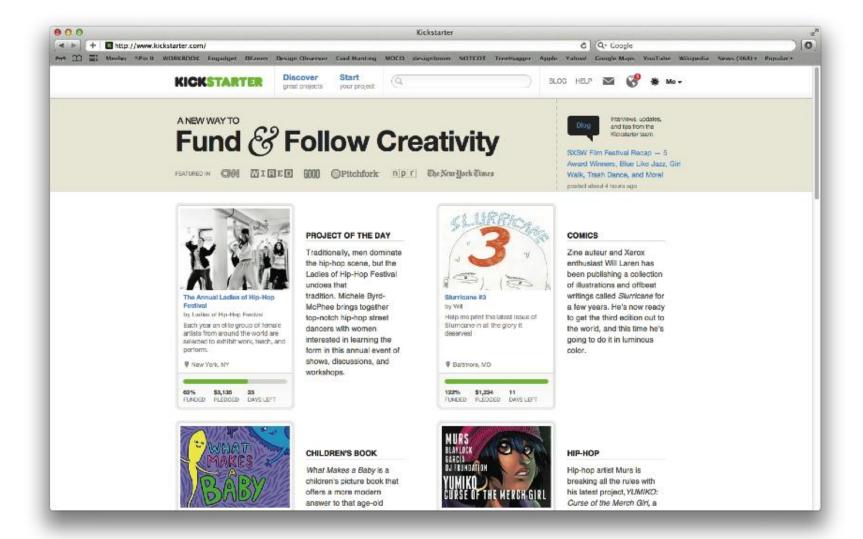··· on-street signed route

Map data ©2011 Google · Terms of Use

What Is Bike Share?

Bike share is a network of thousands of bicycles available at self-service docking stations around the city.

NYC Bike Share Quick Li
How Does it Work?
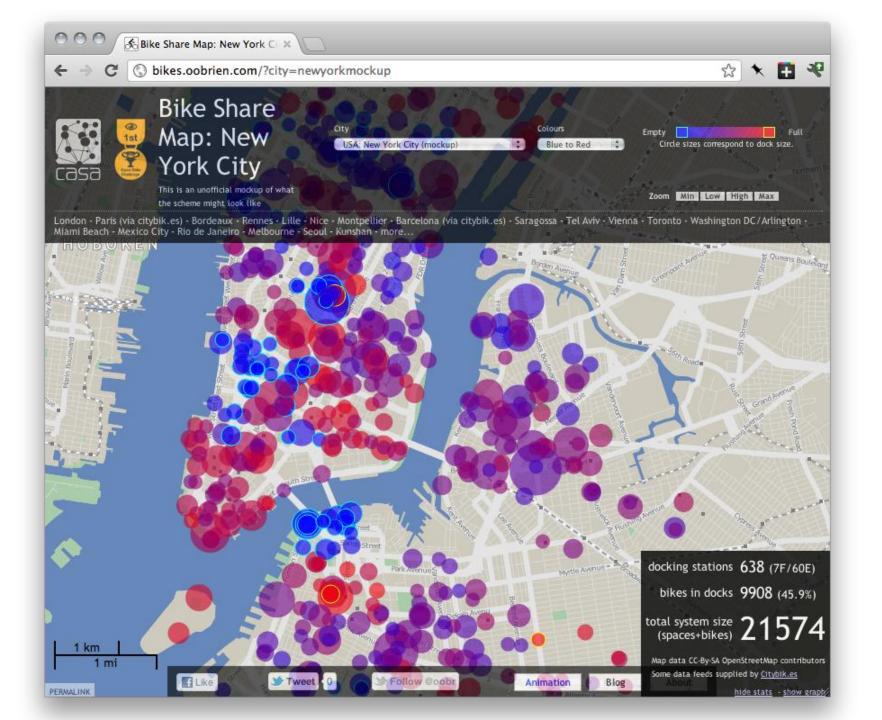
Bike Share in NYC
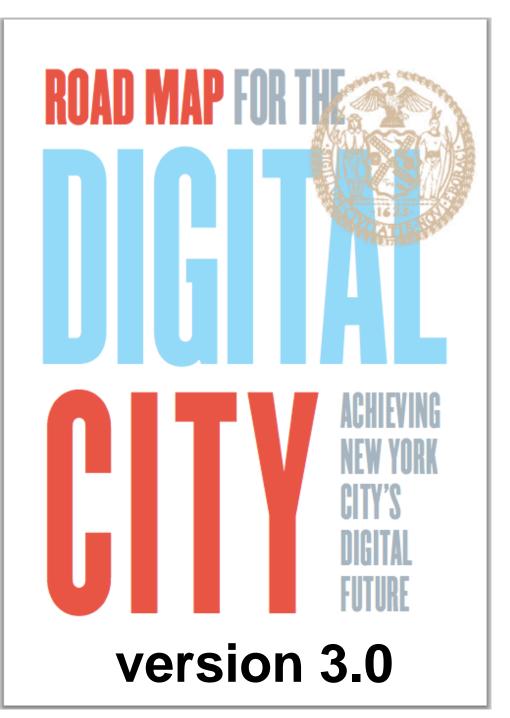
Bike Share in NYC will be run by Alta Bicycle Share, and funded by private sponsorship and user fees, not taxpayer dollars. Bike Share membership will be inexpensive (less than one monthly MetroCard), and bikes will be available 24/7, every day.

Get Involved

NYC DOT and Alta Bicycle Share invite you to help craft a system that's designed for New York City. We invite you to attend special events, open houses and workshops throughout the city, try out the bikes and give your feedback. Get started now by dropping

bikes.oobrien.com/?city=newyorkmockup

Bike Share Map: New York City

1st

casa

This is an unofficial mockup of what
the scheme might look like

City
USA: New York City (mockup)

Colours
Blue to Red

Empty ▮▮▮▮▮ Full
Circle sizes correspond to dock size.

Zoom Min Low High Max

London - Paris (via citybik.es) - Bordeaux - Rennes - Lille - Nice - Montpellier - Barcelona (via citybik.es) - Saragossa - Tel Aviv - Vienna - Toronto - Washington DC / Arlington - Miami Beach - Mexico City - Rio de Janeiro - Melbourne - Seoul - Kunshan - more...

HOBOKEN

1 km
1 mi

docking stations **638** (7F/60E)

bikes in docks **9908** (45.9%)

total system size
(spaces+bikes) **21574**

Map data CC-By-SA OpenStreetMap contributors
Some data feeds supplied by Citybik.es

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About

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ROAD MAP FOR THE DIGITAL CITY

ACHIEVING NEW YORK CITY'S DIGITAL FUTURE

version 3.0

condition at Franklin St. Visit www.mta.info for details

s/b 4 & 5 trains are running local 42nd St to 14th St due a sick customer at 42nd St. Visit www.mta.info for details.

Apr 9, 2012 15:02

2 & 3 train service has resumed with residual delays.

4 & 5 train service has resumed with residual delays.

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— DID U COMMENT ON PLAZA PROPOSAL? PUBLIC MEETING TMRO. REPLY WITH UR IDEAS. XOXO DOT.

Q blockchalk

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   Social Networking
3. **Justin.tv**
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4. **Status Shuffle**
   Social Networking
5. **Facely HD for Facebook**
   Social Networking
6. **3D Animations + Emoji ...**
   Social Networking
7. **Tapatalk Forum App**
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8. **iSocialize for Facebook,...**
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9. **Grindr Xtra**
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10. **Chat for Google Talk**
    Social Networking

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$0.99 BUY

1. Facebook

Google fusion tables **Cities with open planning** Mashable   Discussions (0) Saved links (1)   Get link   Permissions

File   View   Edit   Visualize   Merge

Current view: **All** - Show options

Location   City ▼   ☐ Display as heat map   Export to KML   Get KML network link   Get embeddable link

POWERED BY

See you in 2014.

Frank Hebbert, OpenPlans
@fkh

Big Ideas

Transportation at the Tech Frontier

Q & A

http://wagner.nyu.edu/rudincenter/