

The NYC Taxi System: Privacy vs. Utility

Presented by Nick Leghorn

18/07/08

The Taxi: An NYC Icon



<http://www.personal.psu.edu/users/m/x/mxk5088/>

In this presentation...

- **All about the NYC taxi system**
- **The T-PEP system**
 - ◇ **Issues with pen and paper reporting (1930s-2006)**
 - ◇ **The solutions and concerns about implementation**
- **What's coming in the future?**

My Qualifications

- **2 month internship with the NYC Taxi and Limousine Commission**
- **Original research in the field**
- **Security and Risk Analysis major**



Nick Leghorn

***A taxi is just a taxi,
right?***

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Taxis in NYC: Yellow Cabs

- Heavily regulated by TLC and NYC
- Cash or credit
- Fleet, DOV, and Independents
- Hail only



abc.net.au

Taxis in NYC: Livery Cabs



<http://www.thedctraveler.com>

- Commonly referred to as “community cars”
- Cash or credit
- Dispatch only

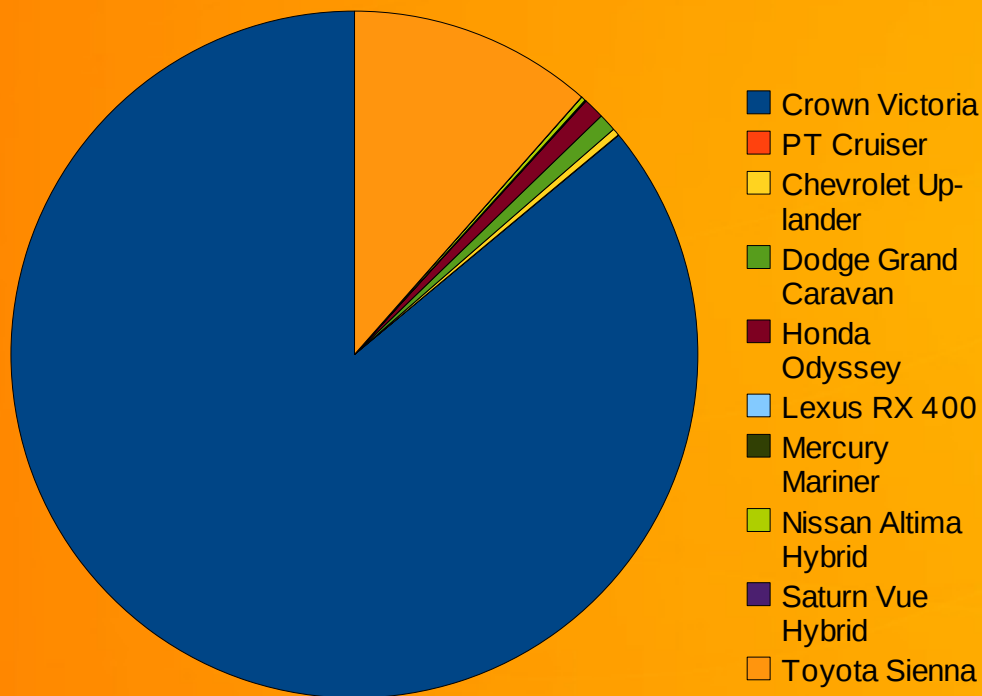
Taxis in NYC: Black Cars

- ❑ **Corporate or private use**
- ❑ **Dispatch only**
- ❑ **Rates set by contract**



<http://www.jaguarlimousineservices.com/>

More about yellow cabs

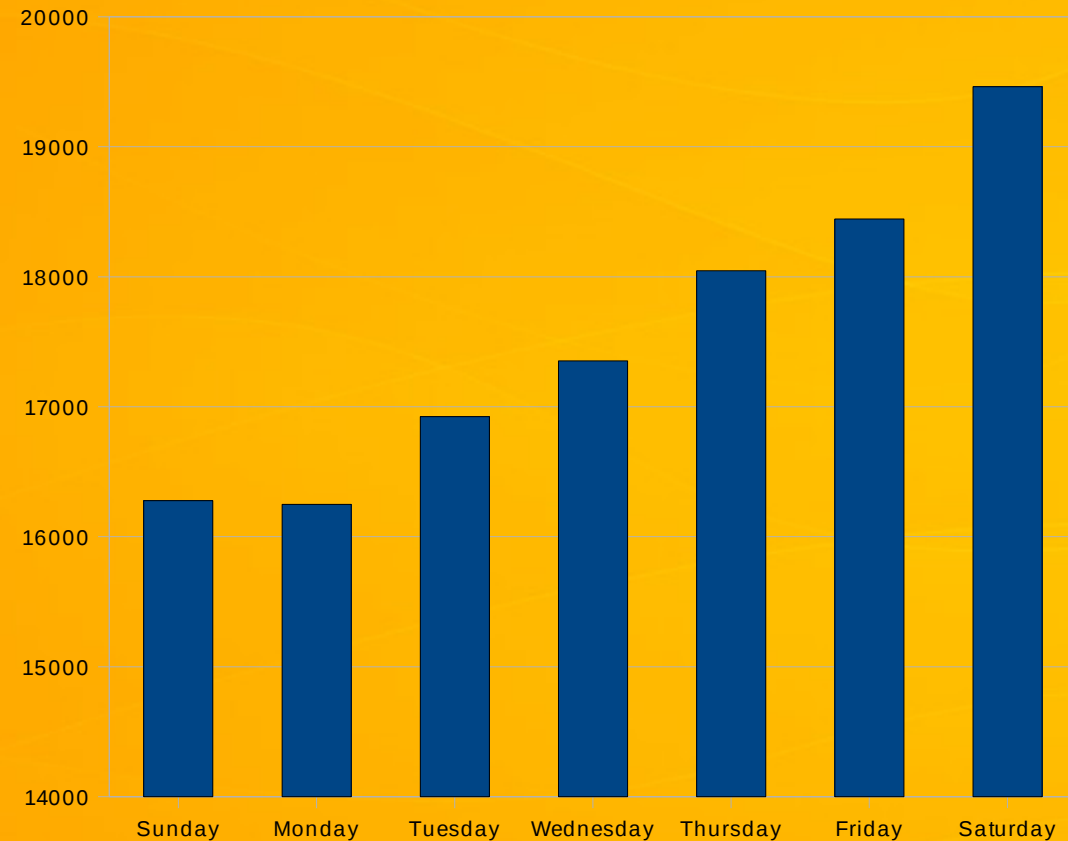


Taxi 07: Roads Forward

- **13,000+ medallions**
- **Maximum lifespan of average taxi: 5 years**
- **200-point inspection 3 times a year**
- **Most taxis operate in 2 shifts, 24/7**

A little about the riders

- **Roughly 17,500 riders every hour**
- **Average distance: 2.88 miles**
- **Average fare: \$11.63**
 - ◇ **Average tip: ~10%**

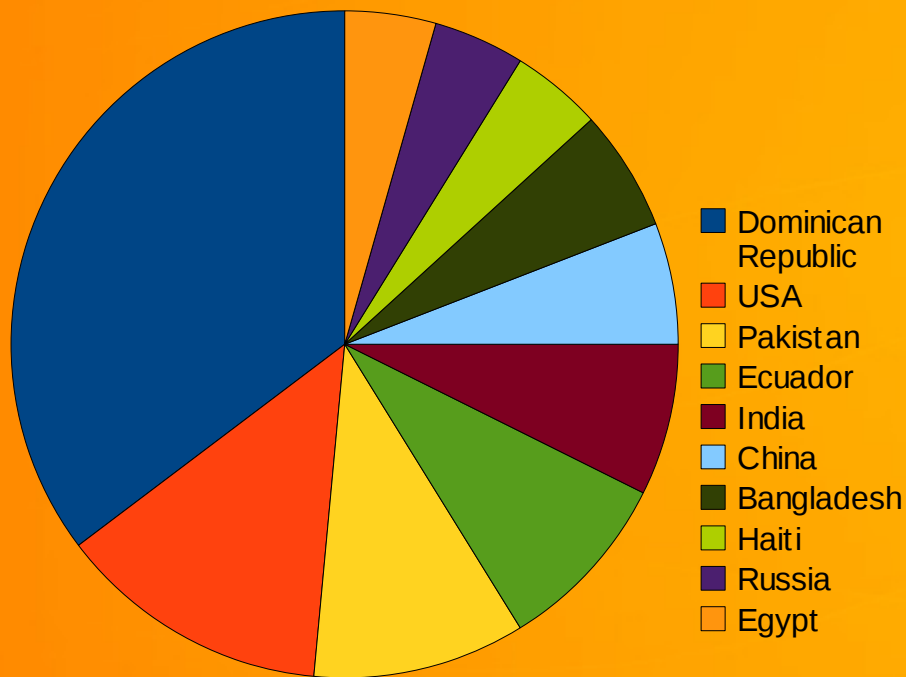


Average riders per hour per day

Sources:
WCBS
TLC

www.schallerconsult.com
TLC Commission Meeting

A little about hacks...



Source: Taxi 07 Roads Forward
Based on sample data

- **97% male**
- **50% have driven 5 or more years**
- **Average age: 45**
- **Work ~9.5 hour shifts, stopping only for food and gas**
- **Majority are immigrants**

And now, the interesting part...

Problems with pen and paper reporting

- ❑ **Lack of useable data for regulatory purposes**
- ❑ **Lack of universal credit card payment system**
- ❑ **Riders wanted to watch their progress**
- ❑ **The backseat ain't too pretty**



IMPERING IS STRICTLY PROHIBITED, ANY VIOLATION OF THIS RULE WILL BE TURNED OVER TO THE TLC FOR PROSECUTION
STRICTLY PROHIBITED AND WILL RESULT IN THE TERMINATION OF YOUR LEASING PRIVILEGES, AS WELL AS POSSIBLE CRIMINAL PROSECUTION.

Refusals of passengers will not be tolerated by this company. it is absolutely against the policy of this company and a violation of law to refuse to pick up an orderly member of the public. Refusals will result in severe discipline up to and including discharge.

- Make all required entries at the start and end of each trip.
- Include 'Relief' and 'Off-Duty' entries as required by TLC Driver's Rules.
- Do not ignore a Parking Ticket. Please notify office.
- All out of town trips must be called into the garage in advance

CHECK READINGS BEFORE GOING OUT MT 4/10

	START OF TRIP	TIME	END OF TRIP	TIME	NO. OF PASS.	TOLL LOCATION	TOLL AMOUNT	TOTAL FARE
1	58 Sulkh	67	Bmb Bump	78	1			16/10
2	almy	78	year walt	78	1			530/140
3	water	78	53 PK	78	1			M10350
4	52	78	49 PK	78	1			870/120
5	57	78	1500 B	89	1			890/180
6	37	89	28 M	89	1			115200
7	37	89	30 R	89	1			140590
8	37	89	48 W	89	1			830/140
9	51	89	29 YB	90	1			1539970
10	37	10/11	41 W	10/11	1			3808350
11	37	10/11	87 B	10/11	1			7709070
12	37	10/11	96 PK	10/11	1			1509200
13	26	10/11	51 PK	10/11	1			8901040
14	57	10/11	122 PK	10/11	1			8301040
15	48	10/11	22 PK	10/11	1			931180
16	72	10/11	37 7	10/11	1			1501360
17	28	10/11	20 7	10/11	1			113014530
18	18	12/1	18 7	12/1	1			16505180
19	humbly	12/1	10/11	12/1	1			1101550
20	Roye	12/1	19 W	12/1	1			5701610
21	12	12	74 PK	12	1			8901150
22	12	12	139 PK	12	1			7701820
23	96	12	80 3	12	1			9901870
24	96	12	82 3	12	1			12302008
25	42	12/3	with 150	34	1			3612360
26	off	12/3	guy to Garage	330pm				
27								

The solution?

T-PEP

**Technology
Passenger
Enhancements
Project
(GPS)**



The PIM

- Updated daily with important information
- Real-time GPS position
- Currently 3 different companies



<http://cityroom.blogs.nytimes.com/>

SMS messages to the cab



Digital Dispatch

- Short messages can be sent to specific cabs
- Traffic alerts, fare opportunities, emergency information
 - ◇ Not everyone listens to 1010 WINS

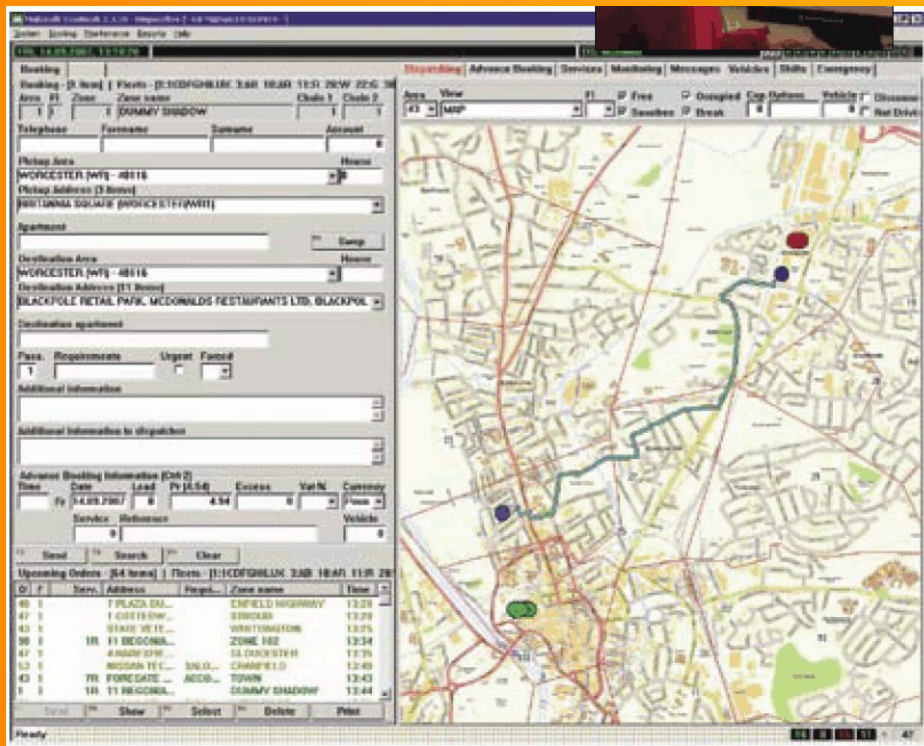
Credit card payment systems

- ❑ **Cabs no longer predominantly cash only**
- ❑ **Wireless credit card authorization**
- ❑ **All major credit cards accepted**
- ❑ **Payments under \$25 do not require a signature**



http://lh5.ggpht.com/_D1pjmtQP73A/Ro186buyQfI/AAAAAAAAABpk/-tzjdzC_Bfk/IMG_8816.JPG

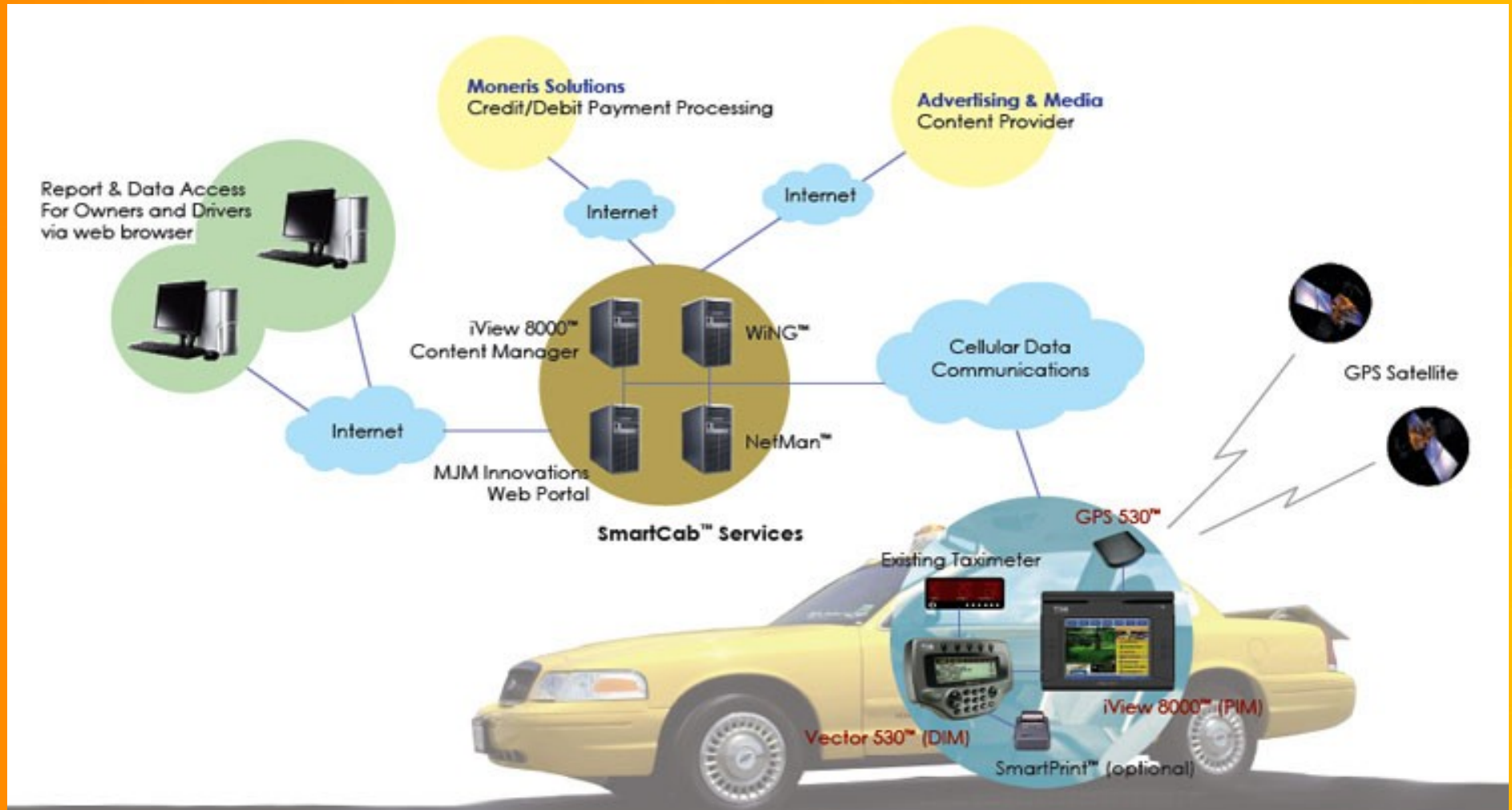
In-Cab GPS



Digital-Dispatch.com

- Constantly updated position
- Automatic tripsheet generation
- Easy fleet management
- Seen by fleet or owner only

Constantly updated



digital-dispatch.com

Concerns

□ Wireless payment problems

◇ Dead spots

◇ Authorizations time out in 25 seconds

- Most payments are 2-3 seconds
- Maximum time when in range: 7 seconds

◇ Queue for auto-authorize

◇ Card number storage / transmission

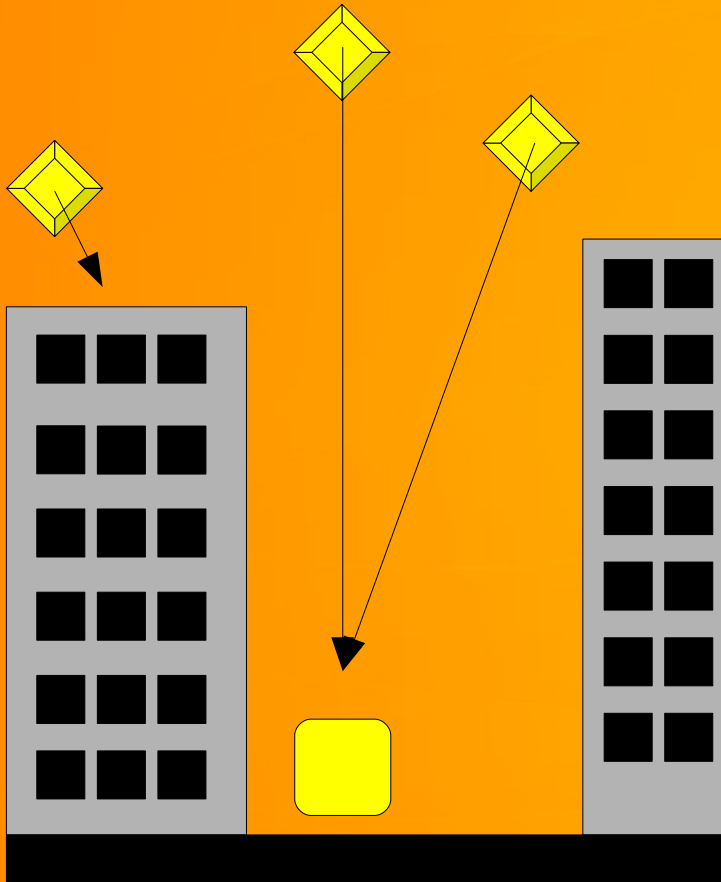
◇ Card numbers stored by 3rd party companies

- Compliance with PCI industry standards

◇ Transmission over cell network

- Illegal in US to listen to cell phone frequencies

Concerns

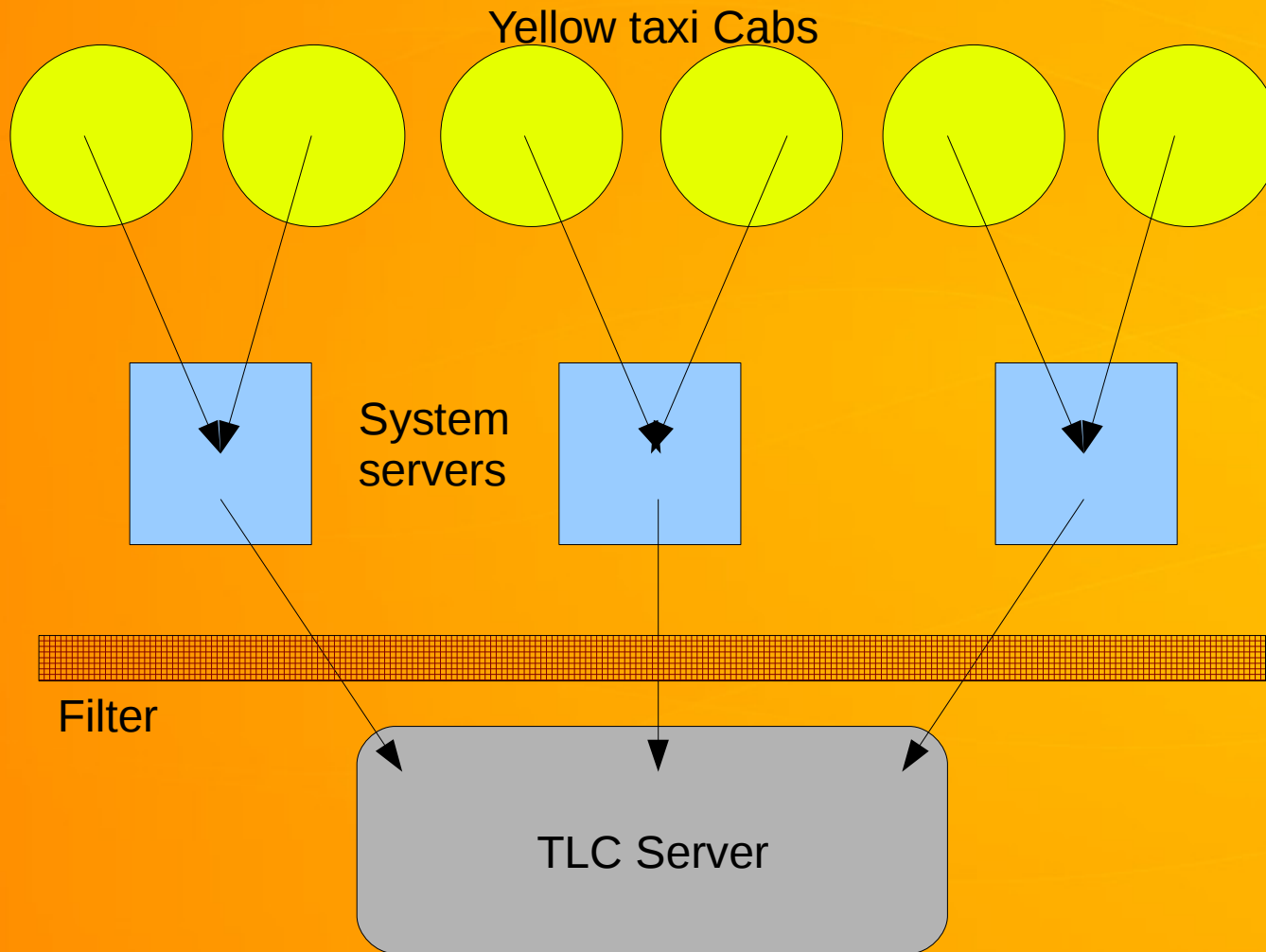


- **Canyon effect**
 - ◇ TLC requires 95% minimum accuracy
 - ◇ The middle of New York harbor is not usually a good drop-off point

Concerns

- **Tracking drivers everywhere they go?**
 - ◇ **By contract, GPS data only collected at pickup and drop-off**
 - ◇ **“Breadcrumbs” every few seconds, stored by companies, never received by TLC**
- **GPS + Credit card = tracking citizens?**
 - ◇ **Initial data collection and storage handled by 3rd party**
 - ◇ **Only last 4 digits received by TLC**
 - ◇ **3 separate companies**

Slightly helpful network diagram



Taxi strike



<http://www.daylife.com/photo/0d7p4oHaB4bi1>

***Benefits to the customer,
the driver, and the industry:***

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Lost items not lost for long

- **All T-PEP trips logged**
 - ◇ **Location data, fare amount, medallion number, last 4 digits of credit card, time the trip occurred**
- **TLC operators can locate taxi within minutes with proper information**
 - ◇ **TLC reached by calling 311**

Statistics

- **Data available helps set cab fare**
 - ◇ **Better targeted fares**
 - ◇ **Better targeted lease rates**
- **Evaluating implementation of projects**
 - ◇ **Hybrids**
 - ◇ **Accessible dispatch**
 - ◇ **Effects of incentives**

Other projects

- **Mandatory 25 MPG (City) by October for new yellow taxis**
 - ◇ **30 MPG by the following year**
 - ◇ **Black cars: same requirements starting January 2009**
- **Accessible dispatch program**
- **Taxi of Tomorrow**

What's coming in the future?



Lictaxi.com

What's coming in the future?



What's coming in the future?



jalopnick.com

What's coming in the future?



What's coming in the future?



What's coming in the future?



StandardTaxi.com

What's coming in the future?



Special thanks

- **The New York City Taxi and Limousine Commission**
- **Bear Stearns Co.**
- **JP Morgan Chase**
- **2600 and The Last HOPE**
- **Dr. Skippy T.W.D.**
- **Cathrine Muller**
- **NYC DMV**



Questions?

***Presentation, bibliography, and more information at:
Blog.NickLeghorn.com***

Tips for taxis

- **Use the avenues**
- **Look around the cab**
- **Always get a receipt**

How to get a hack license

- **Class A, B, C, or E license**
- **Be eligible**
 - ◇ **No outstanding fines/balance with NYC**
 - ◇ **Child support supplement**
 - ◇ **US citizen**
 - ◇ **No arrests / convictions**
- **Fingerprints taken and drug test**
- **24/80 hour Taxi School (~\$100-\$500)**
- **6 hour defensive driving course**