twitter

CROWDSOURCED SENSING & COLLABORATION USING SMARTPHONES & SOCIAL NETWORKING

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Smartphones!

- 3-4B cellphone users worldwide
- 1.13 billion phones sold in 2009 (36 per sec) vs 0.3 billion PCs
- 174M were smart phones
- 15% (up from 12.8% in 2008)

Go smartphones!

* ~Pentium III, +WiFi, GSM, Bluetooth,+camera, mic, GPS, compass, proximity, ambient light, ambient noise, accelerometer, touchscreen, temperature
* Cared for by the user, mobile coverage, human intelligence included
* Combine that with singlehop access to the cloud!

Status quo in smartphones

* Each device connects to Internet to download/upload data and accomplish an individual task that does not require collaboration and coordination

What is missing?

* An infrastructure to task/utilize these devices for collaboration and coordination
* Any node should be able to search & aggregate the data published by other nodes in a region, as well as task nodes in the region to acquire the needed data

DARPA's grand challenge

* Find 10 balloons in US accurately and quickly
* Exploring the roles the Internet and social networking play in the timely communication, wide-area team-building, and urgent mobilization required to solve broad-scope, time-critical problems

Our work

* We provide a crowdsourced sensing and collaboration service using Twitter to enable aggregation and sharing of data as well as tasking of other cellphones

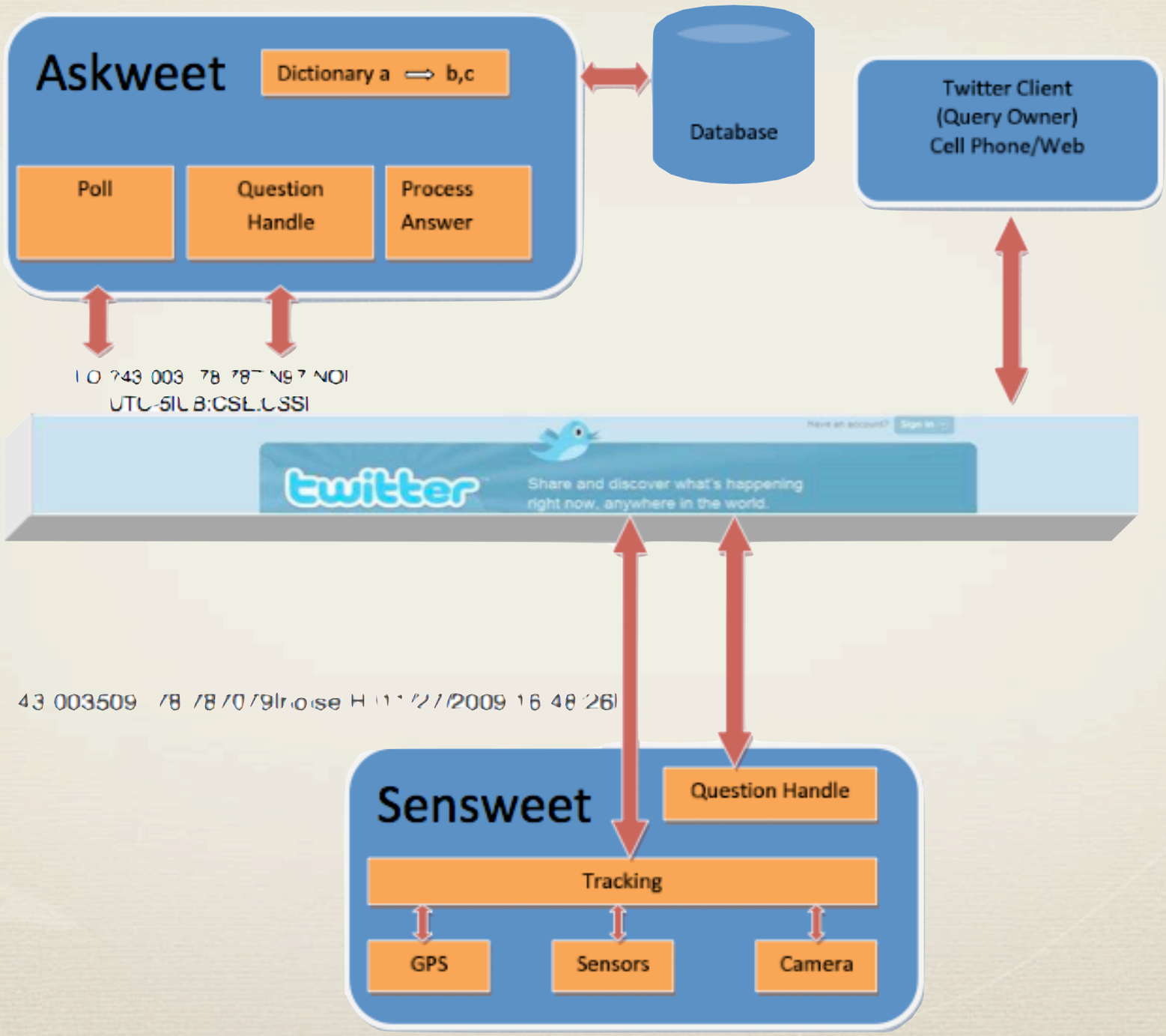
Why Twitter?

* Open publish-subscribe system: Different actors may integrate published data differently, and in unanticipated ways to offer new services
* Social networks aspect is useful for crowdsourced sensing and collaboration applications
* ~200 million users, 200 million tweets & 1.6 billion queries everyday

Outline

* Twitter bot architecture for crowdsourcing
* Crowdsourcing location-based queries
* Other work: Upinion, CityPulse, UBupdates, PhoneLab

Architecture



Crowdsourced weather app

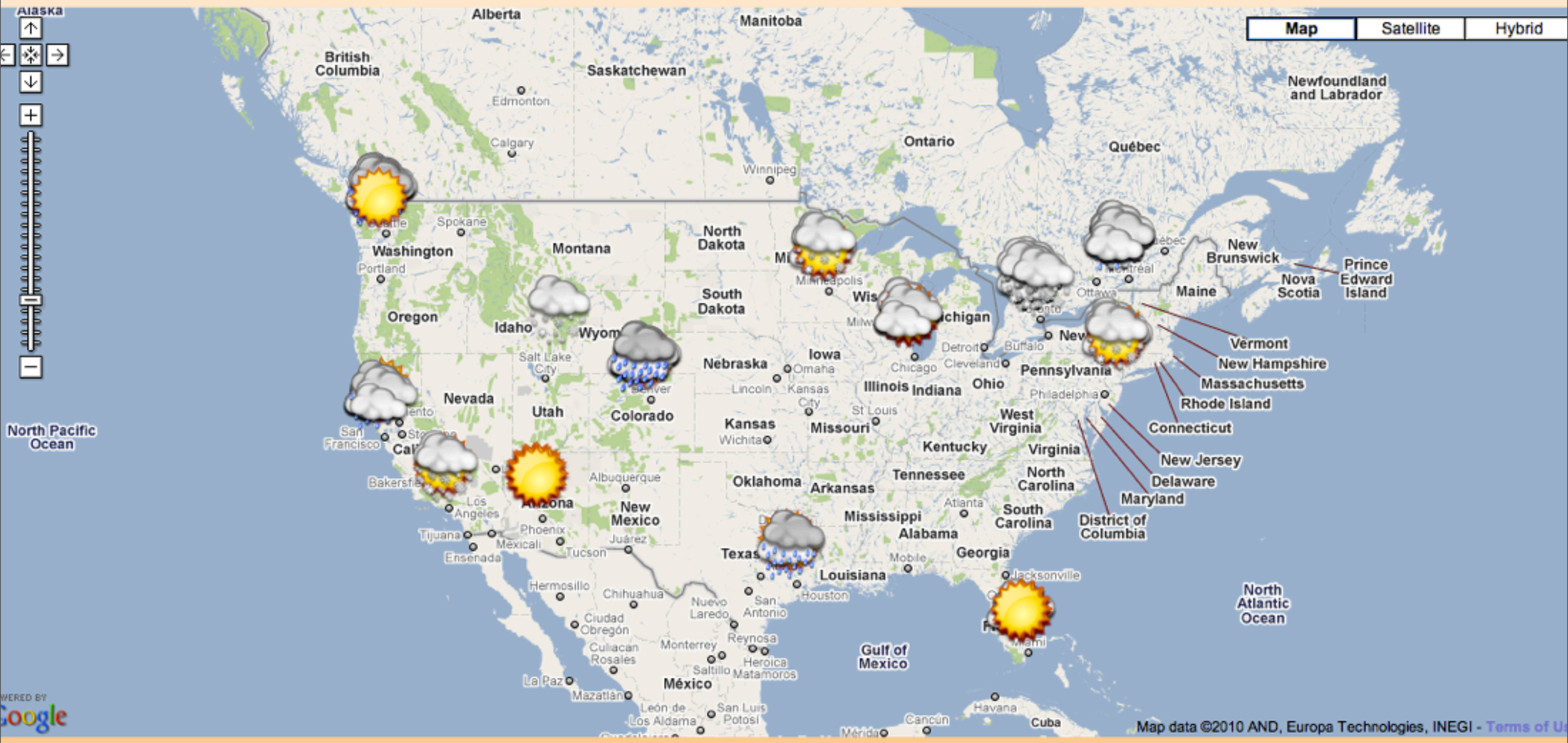
* Current weather, everybody on Twitter can be an expert
* Question to Askweet: “?Weather Loc:Buffalo,NY”
* Forwarded question:“How is the weather there now? reply 0 for sunny, 1 for cloudy, 2 for rainy, and 3 for snowy”

WOWMOM’10

Funded by Google

MAP WHAT IS RAINRADAR? CROWD-SOURCED SENSING PROJECT TE

http://ubicomp.cse.buffalo.edu/rainradar

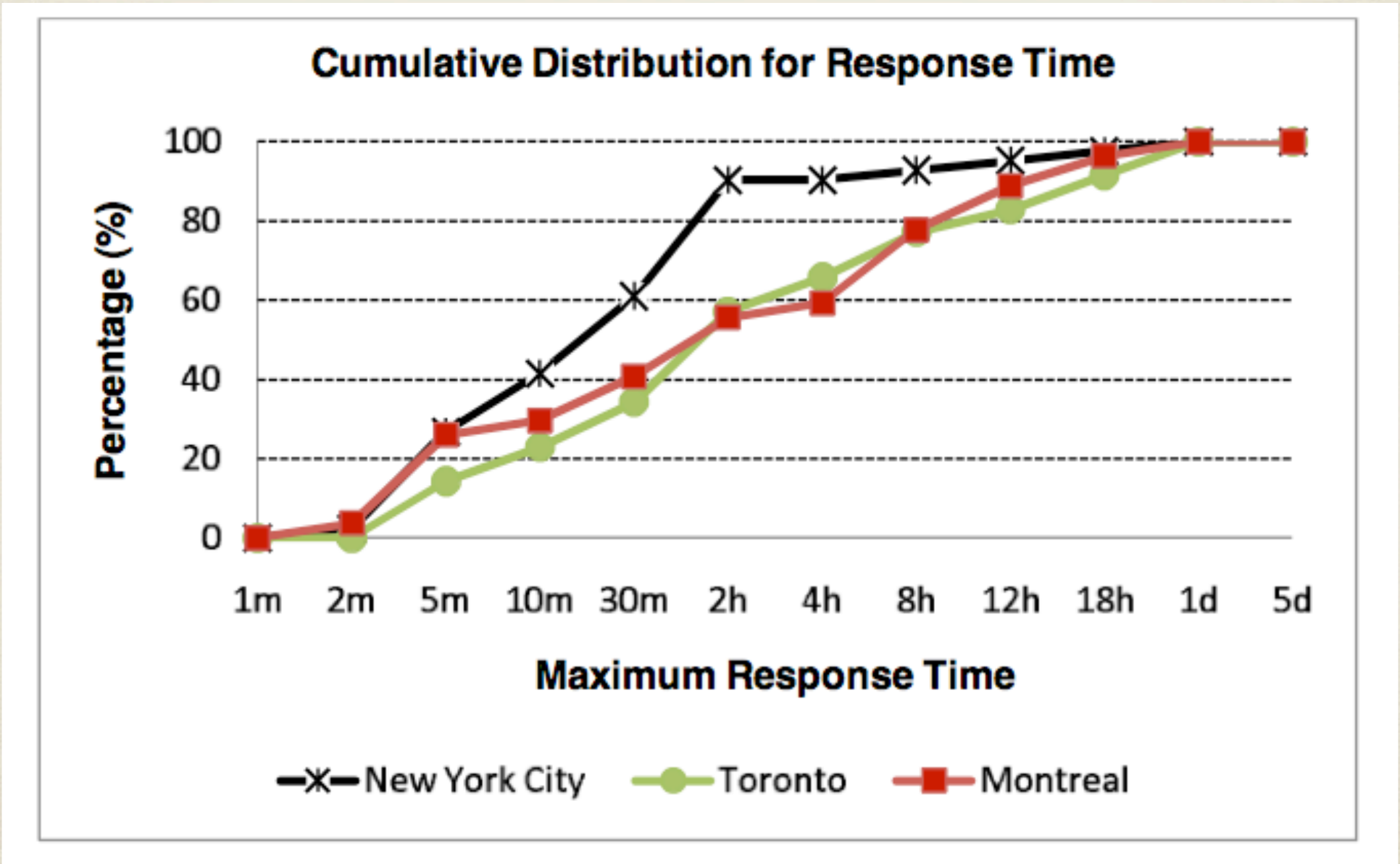


Select Date from here : Selected date is : 2010-01-05

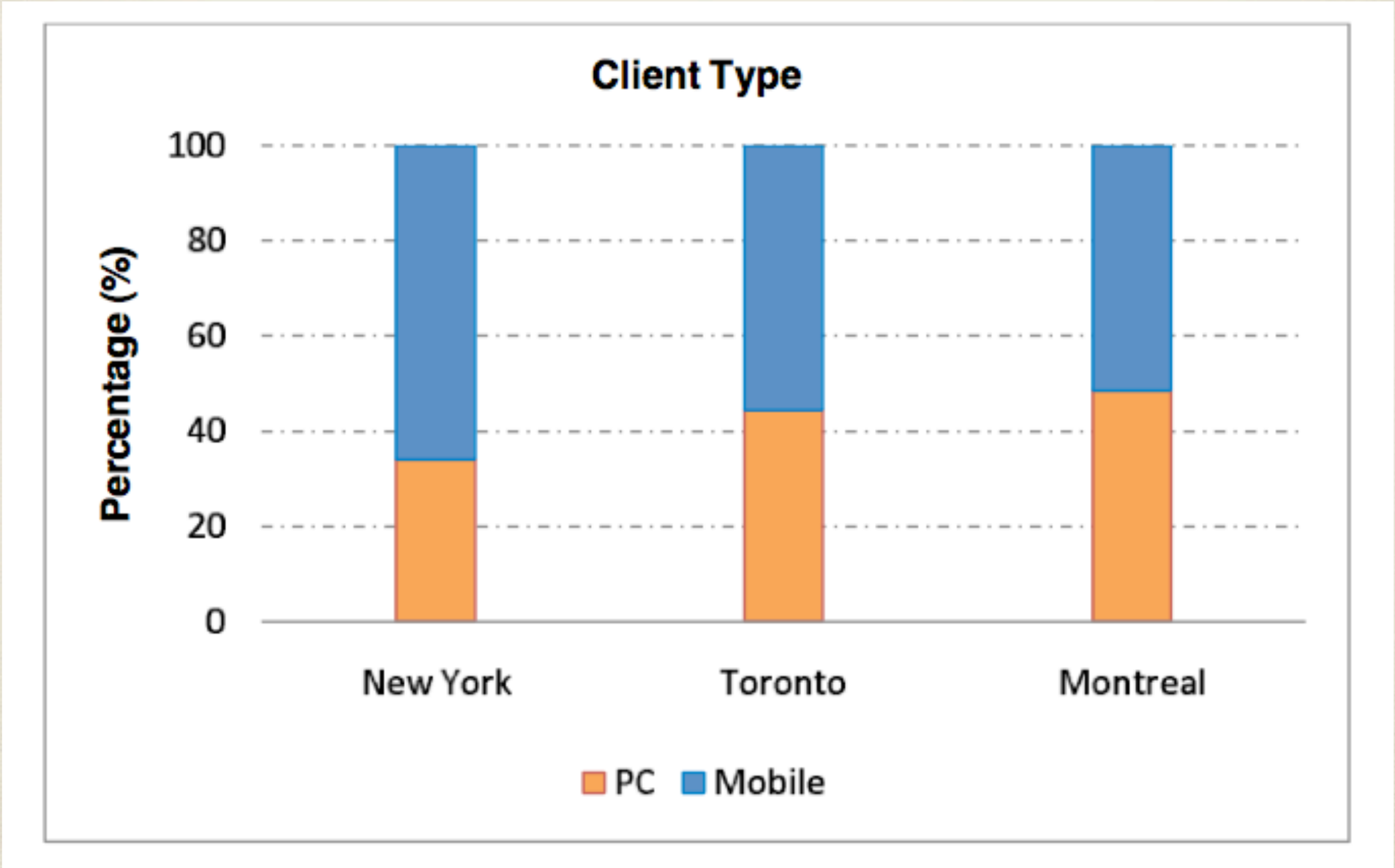
The map is configurable to show results from previous days, and also is zoomable to show fine-grain locations of the replies.

You can select dates between **December, 3 2009** and **January, 6 2010** to see the results!

Response time



Smartphone ratio



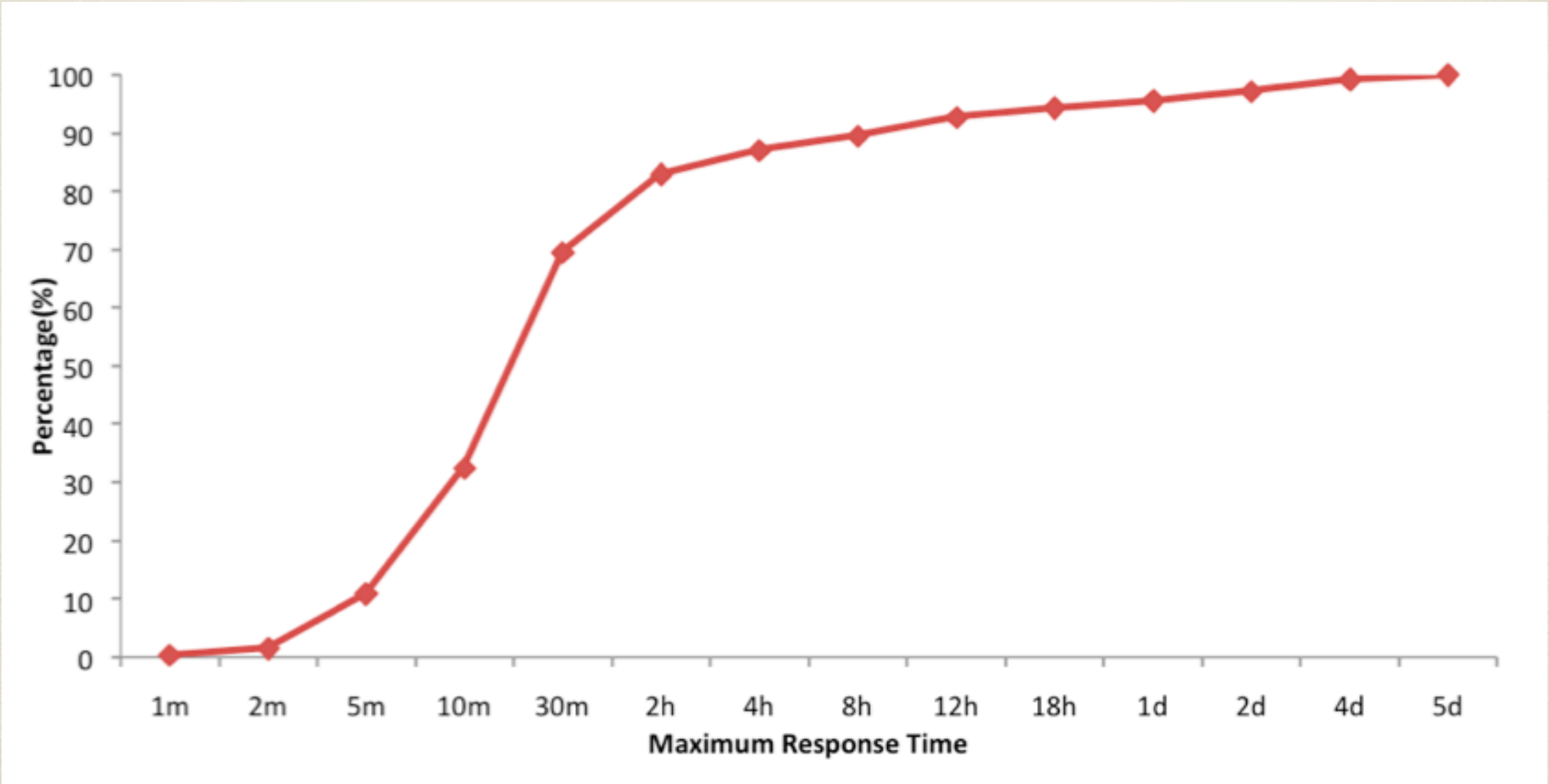
Location-based queries app

- We integrate mobility profiling to our Twitter crowdsourcing architecture to answer location-based queries more effectively
- We use category and location information provided by Foursquare to direct questions to mayors in queried locales
- We get better answers for food, nightlife, colleges

Answer rates

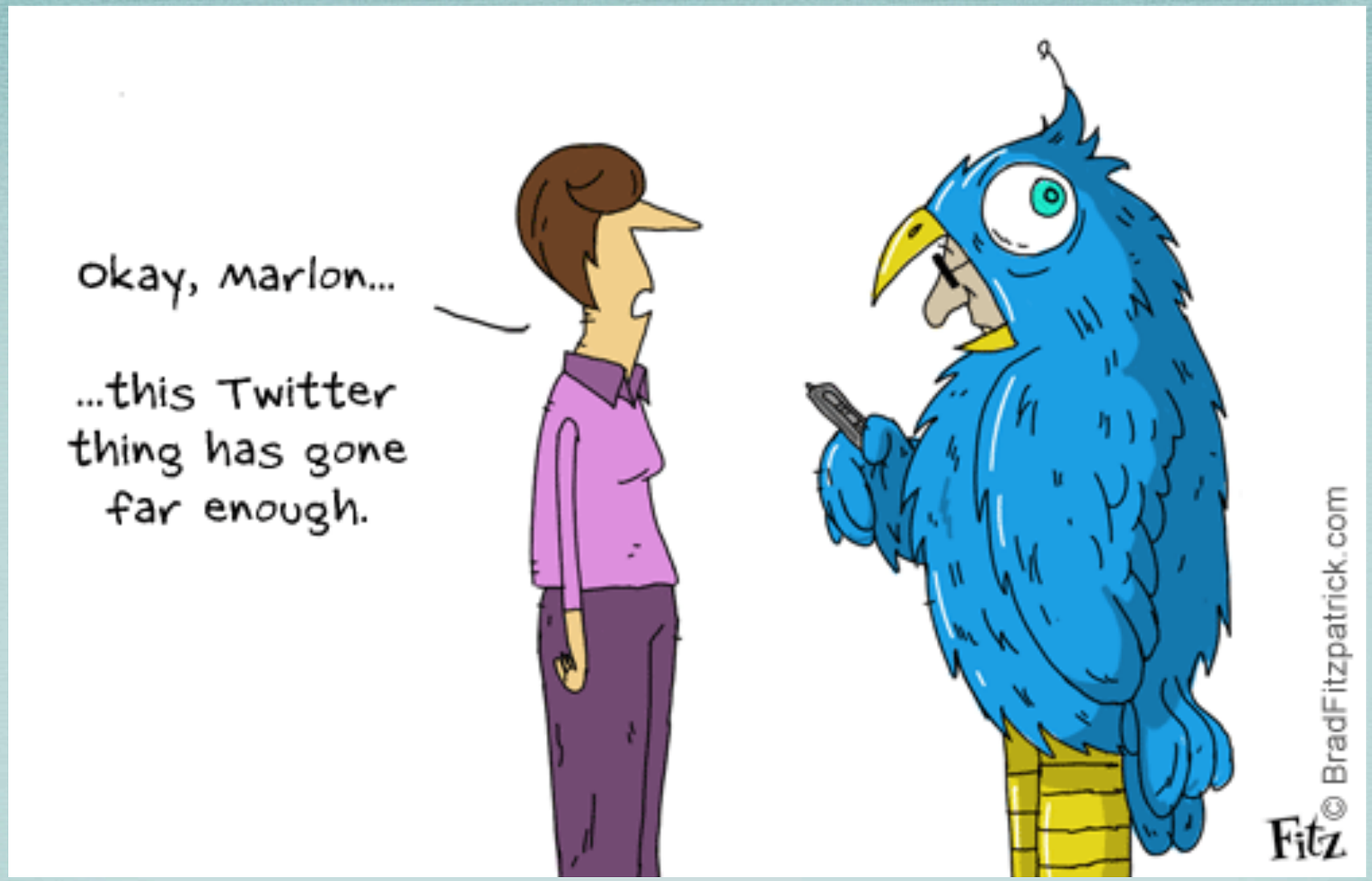
* Our system answered approximately 75% of the questions, compared to Google's 47% answer rate on these questions
* While our system answered 75% of both the factual and the nonfactual questions, Google answered 78% of the factual questions and only 29% of the nonfactual questions.

Cumulative distribution of response times



One more thing

* 80% of the answers came from smartphones compared to 20% from PC/laptops !



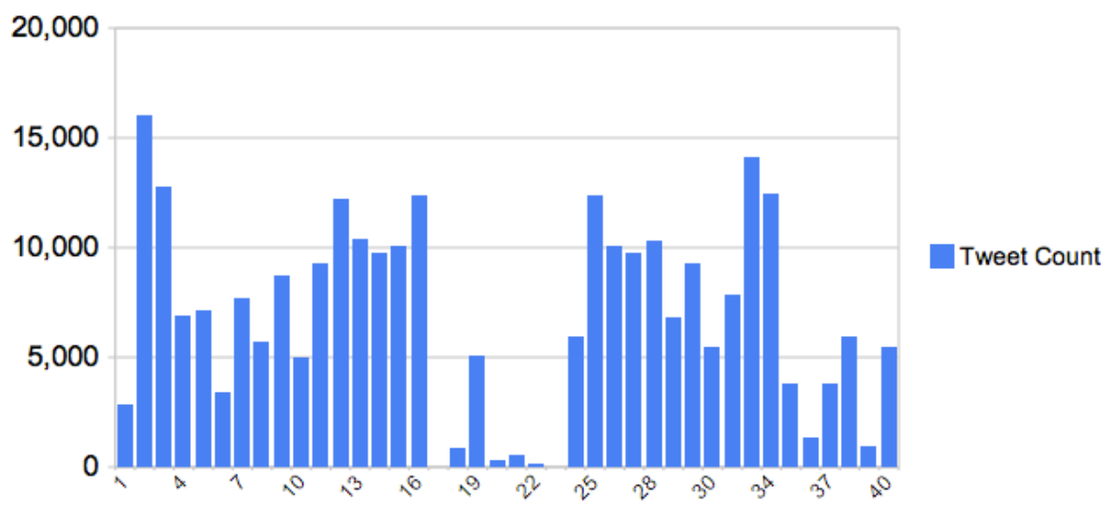
OUR OTHER WORK

Upinion

* Data mining over Twitter for identifying breakpoints in public opinion for a given keyword

Upinion Event Tracker for Tiger Woods Case

http://ubicomp.cse.buffalo.edu/upinion/



Click on periods to see prominent words and related articles

Breakpoints

1st Period | 6th Period | 11th Period | 24th Period

Tiger Woods crash, florida, injur, golf, a Search

powered by Google™

Web

Tiger Woods injured in minor

Nov 27, 2009 ... **Florida** highway patrol troopers plan to talk to pro golfer **Tiger Woods** on Saturday to get ... pro **golfer Tiger Woods** on Saturday to get more information about his car **crash** near his ... Video: **Tiger Woods** in car **accident** ...

www.cnn.com

Tiger Woods Car **Accident** –

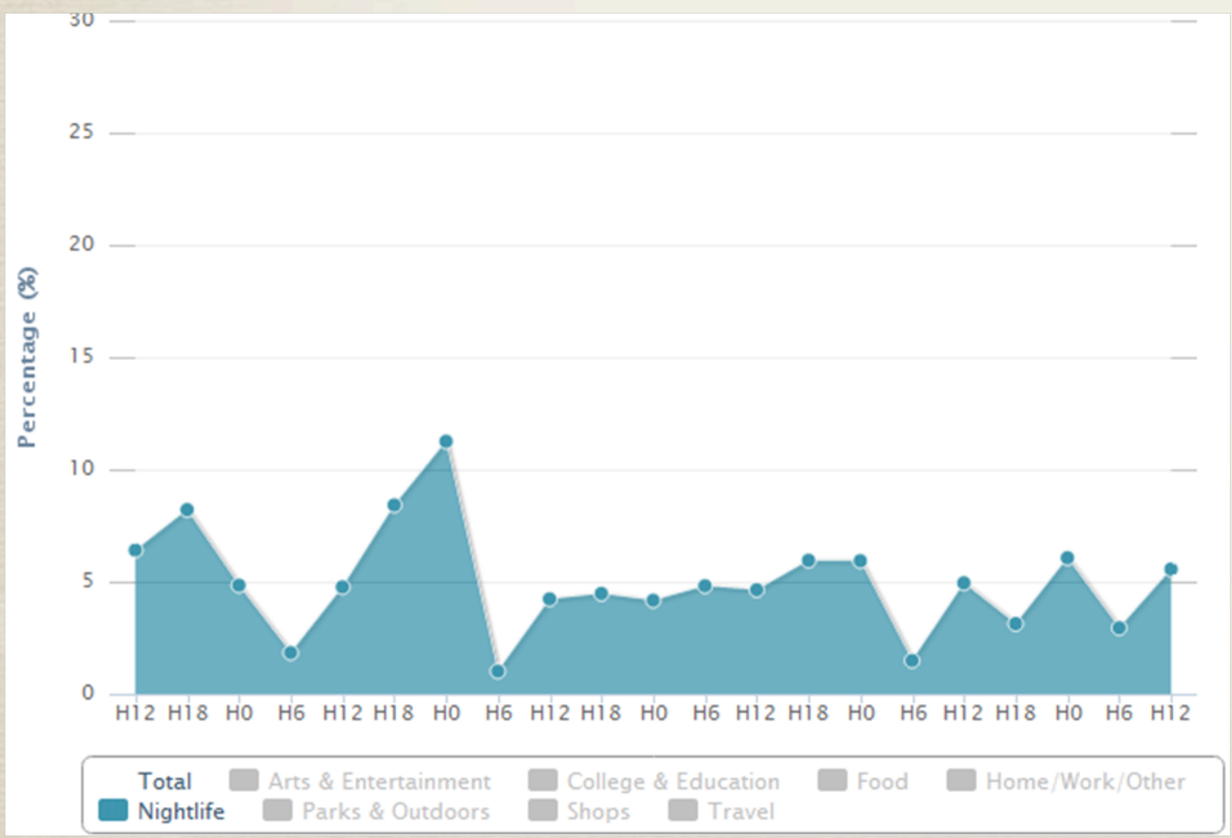
Nov 27, 2009 ... **Tiger Woods**, international **golf** star, **injured** in **Florida** car **crash**. ... **Golf** Superstar **Tiger Woods** in Car **Accident** ...

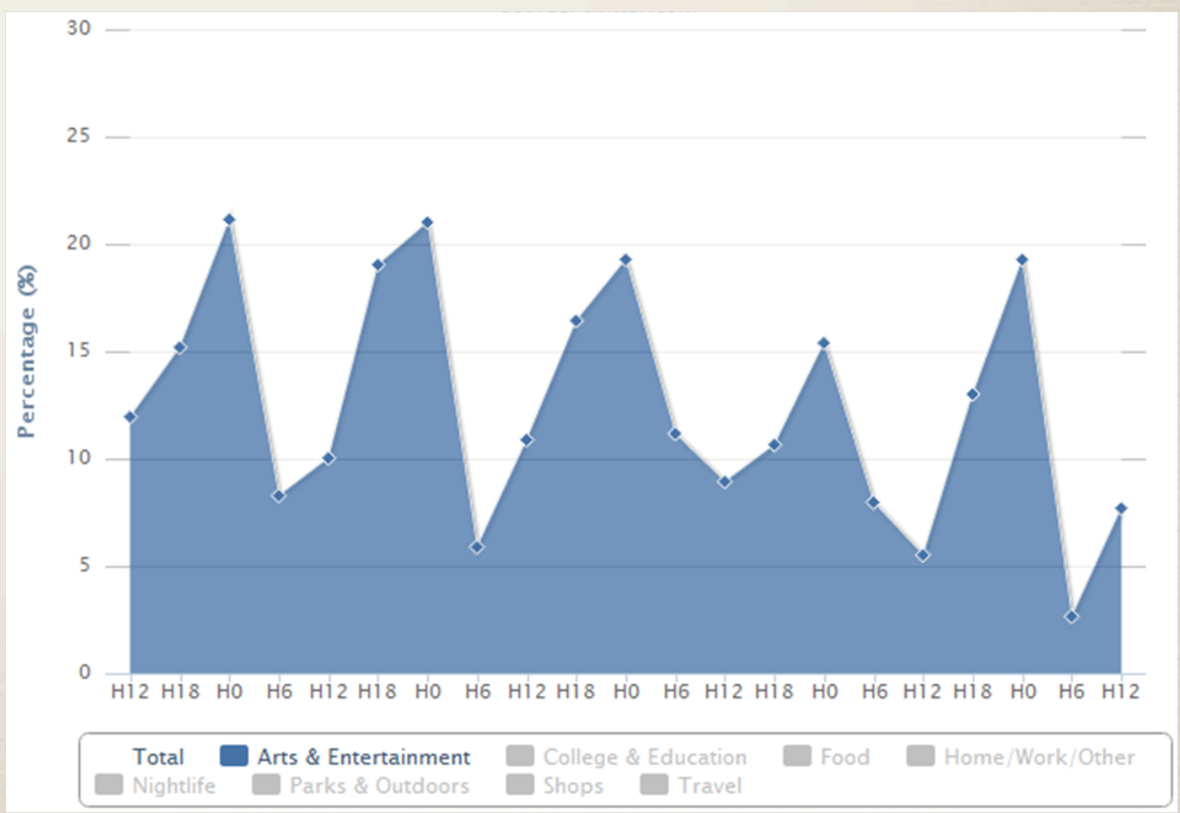
abcnews.go.com

Tiger Woods To Skip Chevron

CityPulse

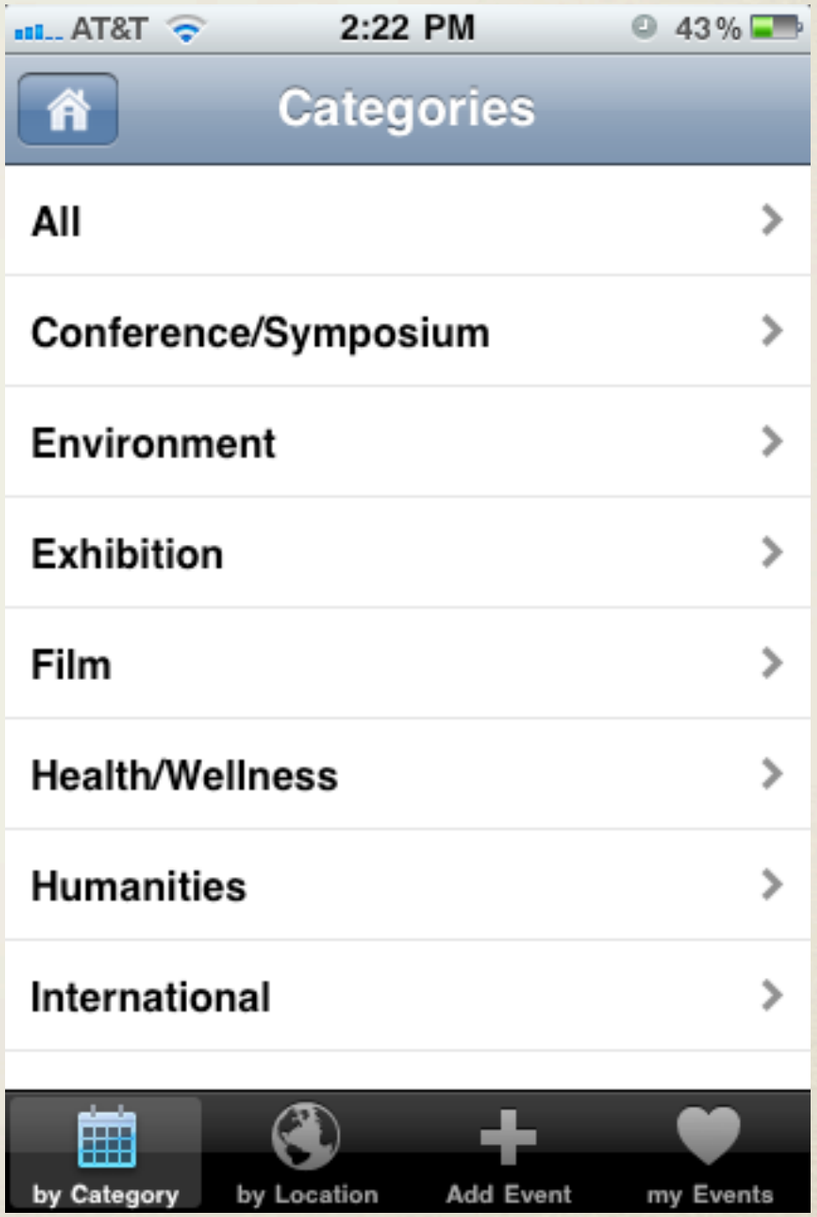
* We adopted the upinion framework to monitor changes in location related tweets in cities.



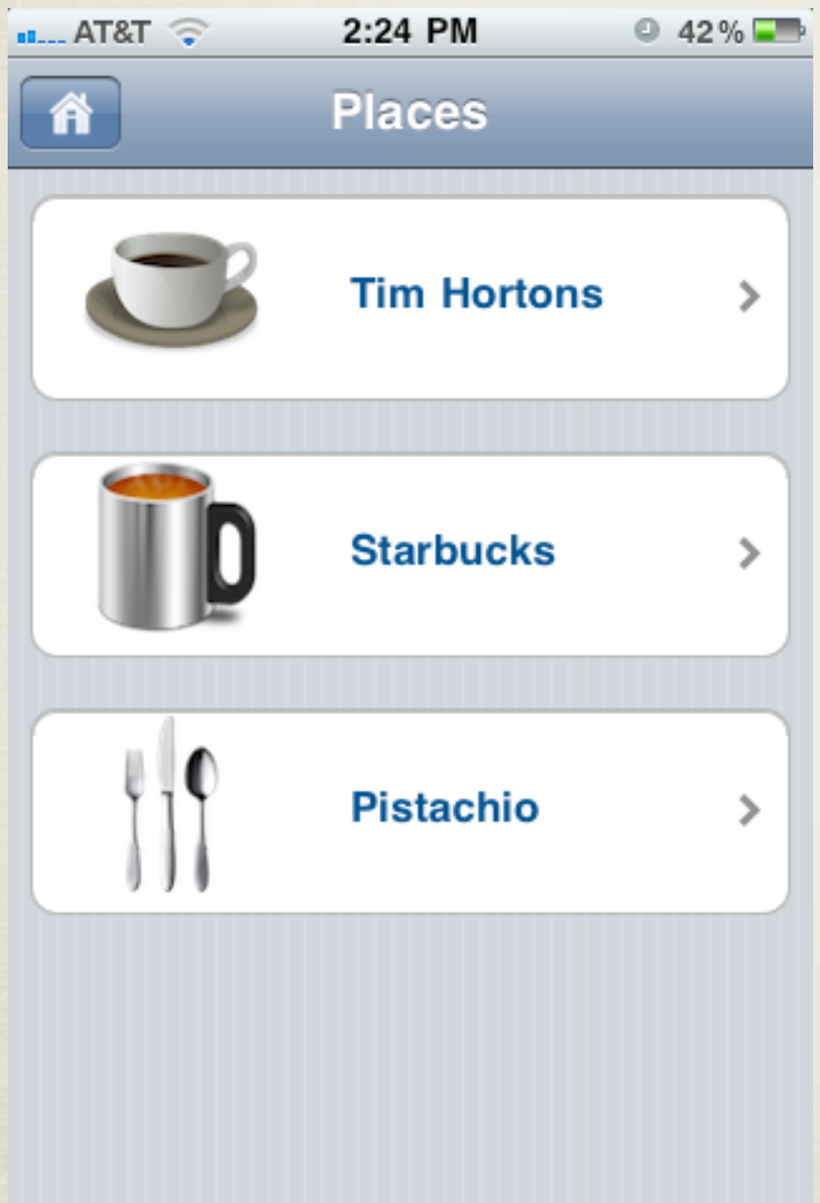


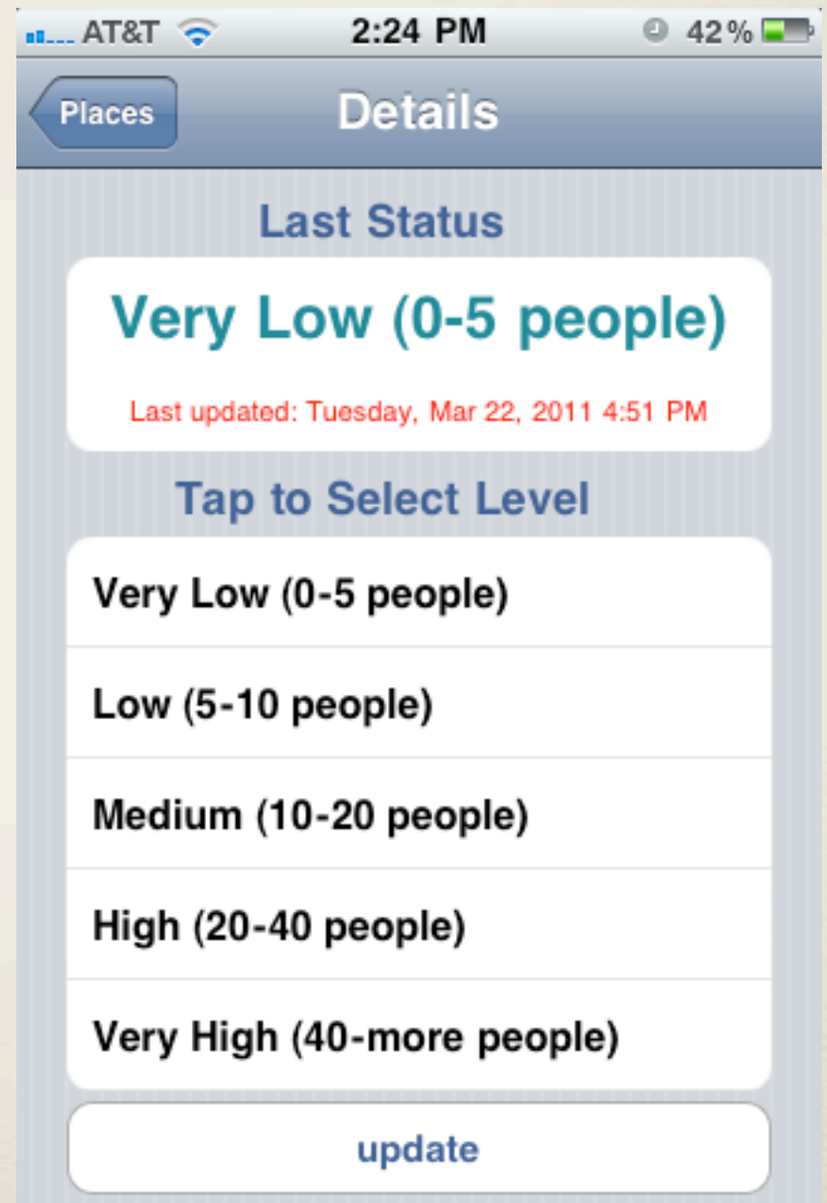
UBupdates


AT&T
2:22 PM
43%
ub updates
Events
Map
Queues
UB News
UB Alert
Schedule
myUB


AT&T
2:22 PM
43%
Categories
All
Conference/Symposium
Environment
Exhibition
Film
Health/Wellness
Humanities
International
by Category
by Location
Add Event
my Events

UBupdates

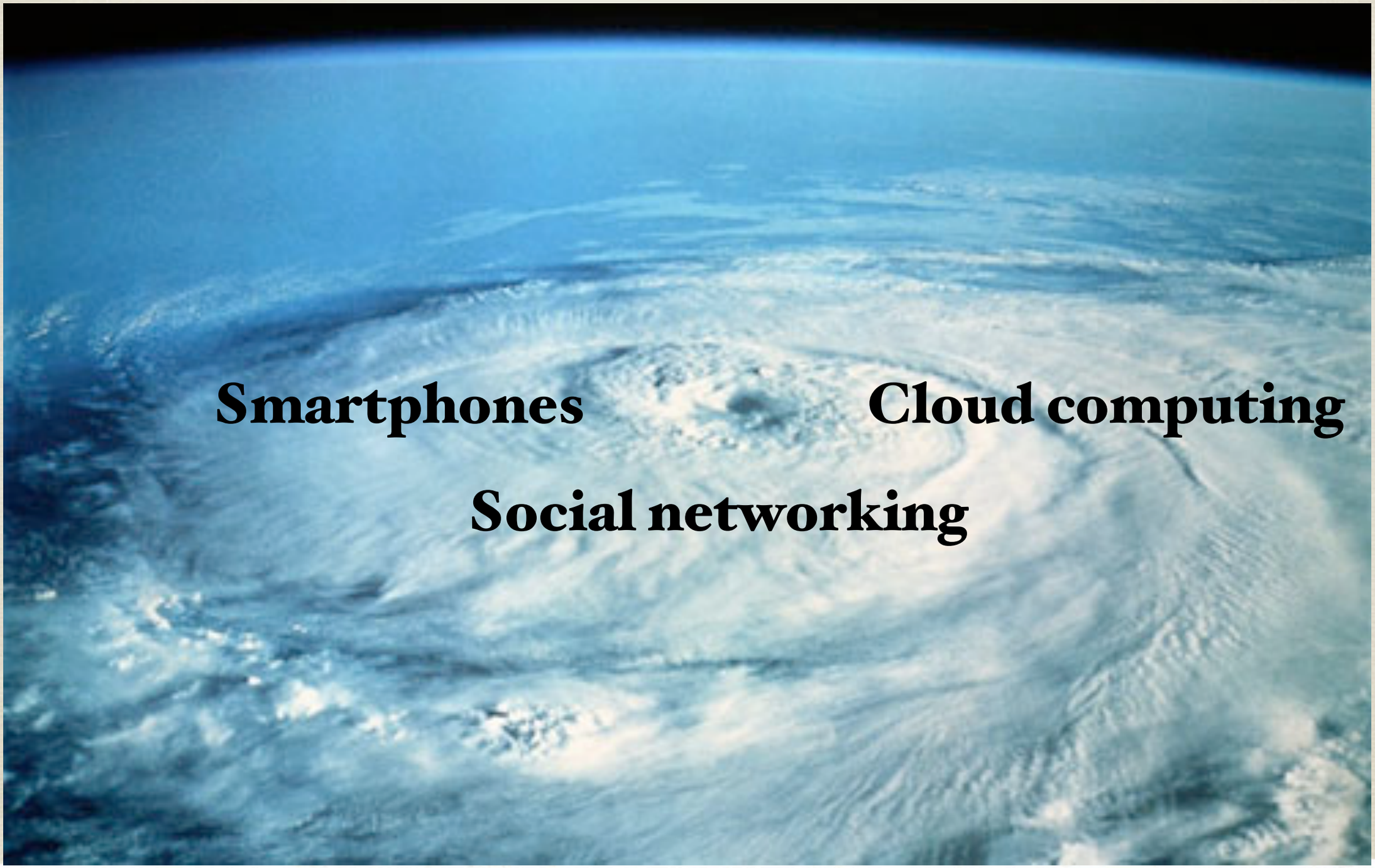

AT&T
2:24 PM
42%
Places
Tim Hortons
Starbucks
Pistachio


AT&T
2:24 PM
42%
Places
Details
Last Status
Very Low (0-5 people)
Last updated: Tuesday, Mar 22, 2011 4:51 PM
Tap to Select Level
Very Low (0-5 people)
Low (5-10 people)
Medium (10-20 people)
High (20-40 people)
Very High (40-more people)
update

Jeopardy grand challenge

* Build an expert-sourced system to beat Watson in Jeopardy!

Perfect Storm



PhoneLab

* We are building a 1000 phone reprogrammable testbed
* Geoffrey Challen, Murat Demirbas, Steve Ko, Tevfik Kosar, Chunming Qiao **@ Univ at Buffalo**
* Dense, controlled, yet realistic environment for testing and developing next generation collaborative smartphone apps and operating systems
* Will be open to public