

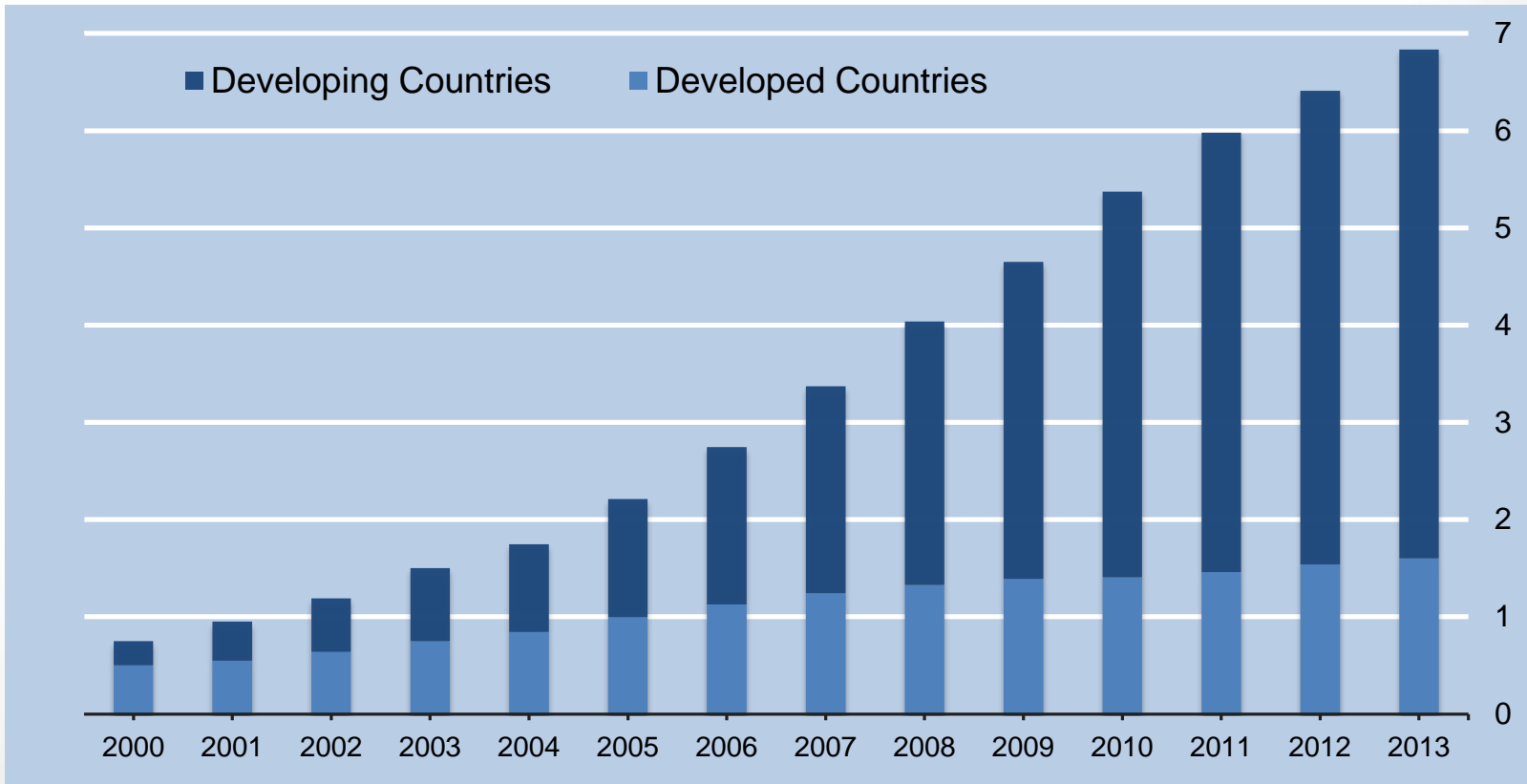
A young woman with dark hair in a bun, wearing a red floral shirt, is smiling and looking at her smartphone. She is in a crowd of people, with a blurred background showing other individuals, including one wearing a red shirt and a black cap with yellow accents. The overall scene is outdoors and brightly lit.

DATA FROM THE NEXT BILLION

Nathan Eagle | CEO | Jana Mobile Inc. | jana.com

Big Data in Growth Markets
Small Data in Growth Markets
Data Reciprocity

ACTIVE MOBILE SUBSCRIPTIONS

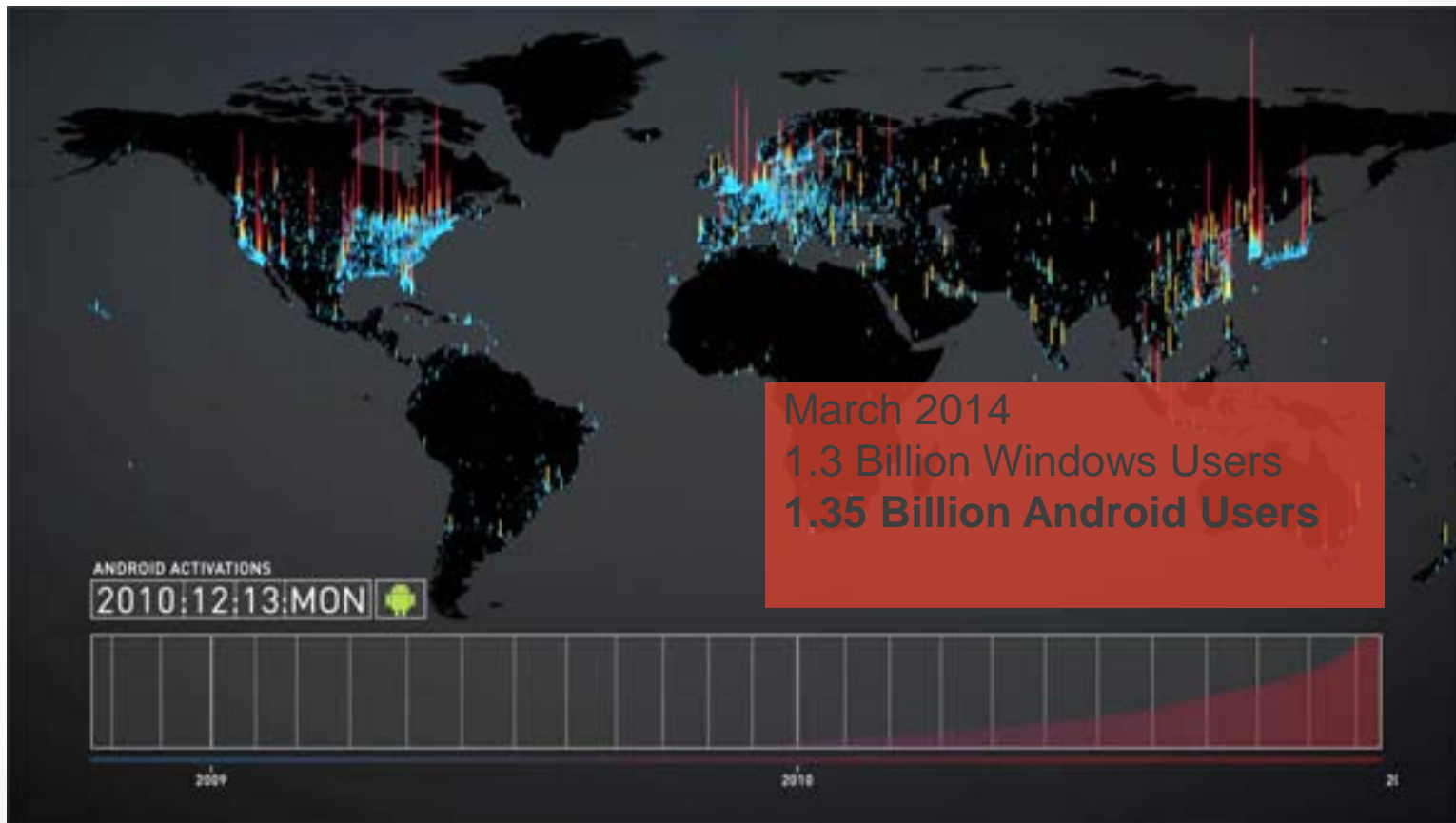


ANDROID PRICE-POINT

+ 3G
+ Wifi
+ GPS
+ Android
+ Touchscreen
=
~~\$175 USD (Jan 2011)~~
~~\$85 USD (Jan 2012)~~
~~\$48 USD (Feb 2013)~~
~~\$32 USD (Oct 2013)]~~
\$22 USD (April 2014)

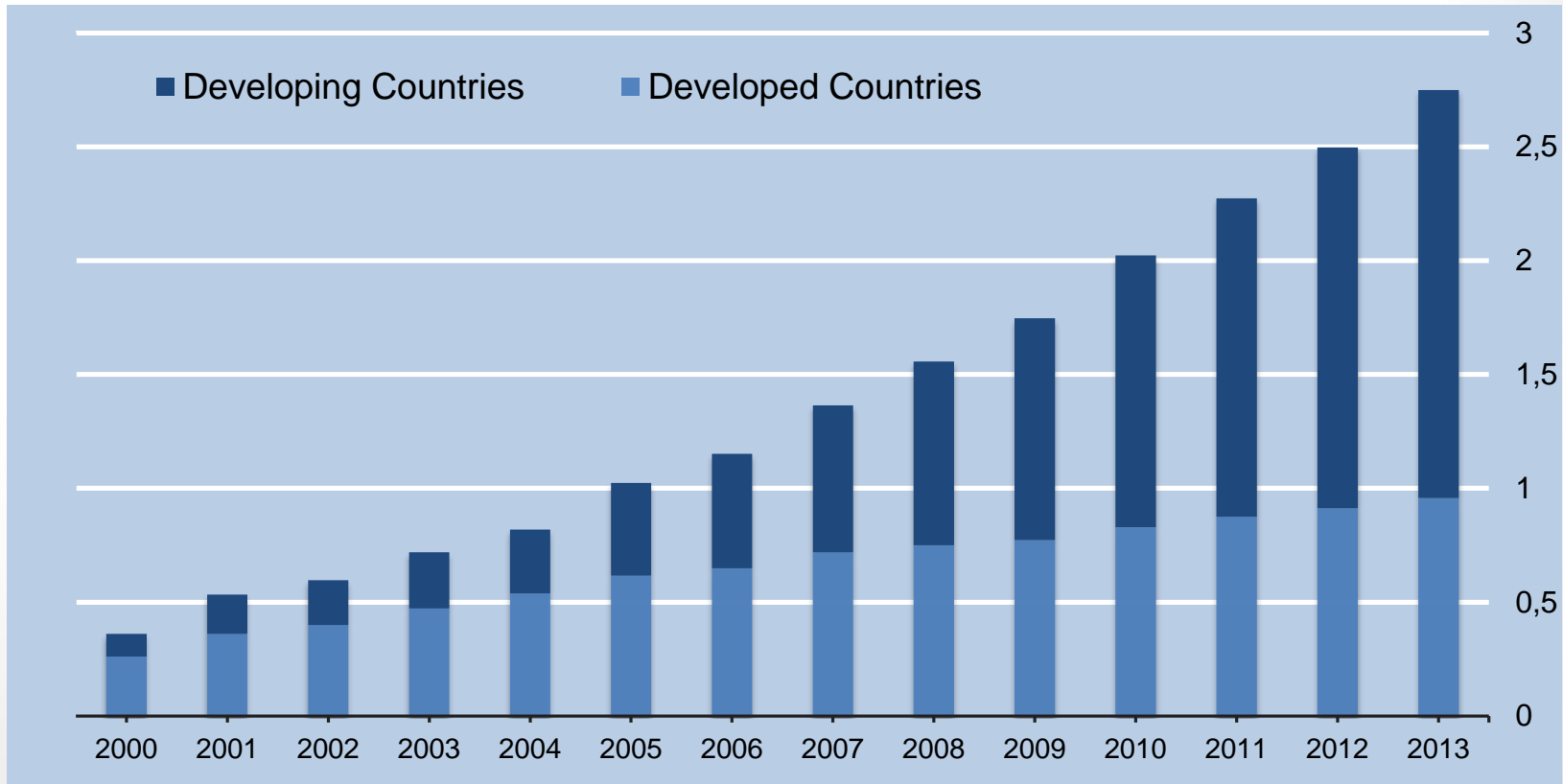


WORLD'S MOST POPULAR OS



PROPRIETARY AND CONFIDENTIAL

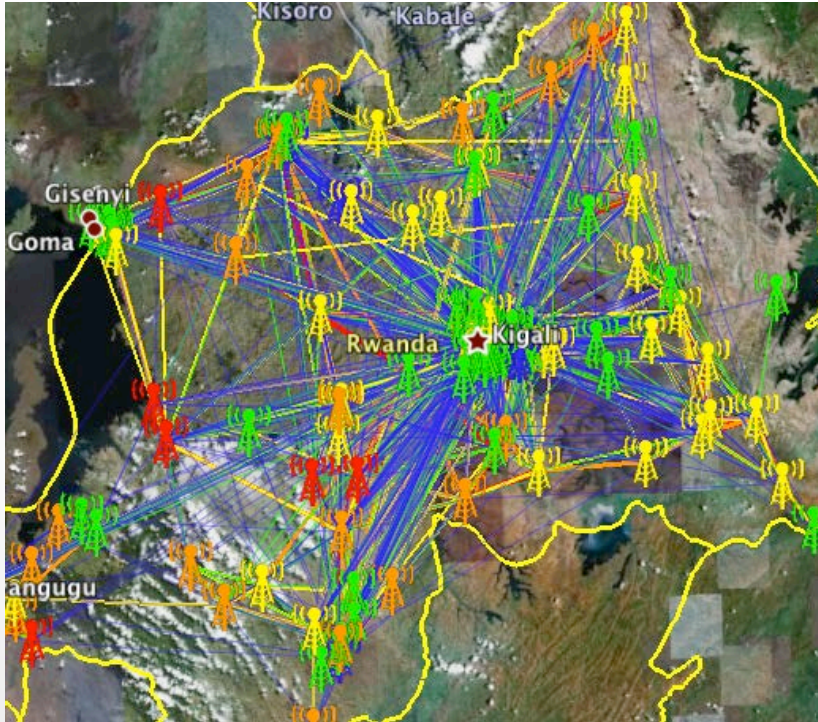
INTERNET USERS



FACEBOOK

#	Country	Users (millions)	YoY Change (millions)	Annual growth	% of Internet users
1	United States	146.8	5.2	3.7%	59.9%
2	India	114.8	36.7	47.0%	71.0%
3	Brazil	69.0	22.5	48.4%	69.6%
4	Indonesia	63.2	14.0	28.5%	86.8%
5	Mexico	35.7	6.5	22.3%	63.2%
6	Turkey	32.3	2.4	8.0%	88.1%
7	Philippines	30.2	5.7	23.3%	88.9%
8	UK	29.9	1.6	5.7%	62.5%
9	Germany	22.1	2.1	10.5%	38.0%
10	France	22.0	1.6	7.8%	53.0%

MOBILE OPERATOR DATA: CDR



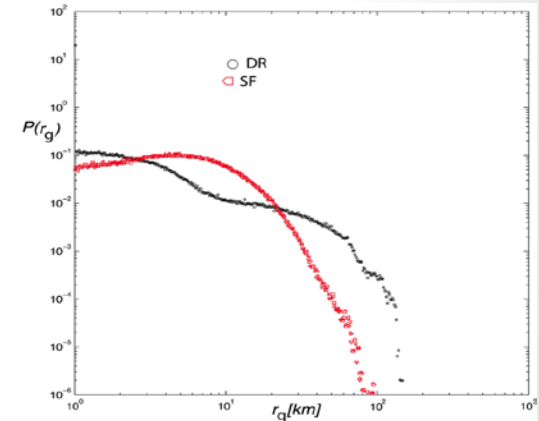
CDR Column Elements

- Caller (Texter) / Receiver
 - **Hashed MSISDN**
 - **Hashed IMEI**
- Time / Duration
- Cellular Towers

TYPICAL DATA

- 1 Month – 5 Years
- 5% – 100% of the population

The Physics of Society: “People are Particles”



$$r_g^a(t) = \sqrt{\frac{1}{n_c^a(t)} \sum_{i=1}^{n_c^a} (\vec{r}_i^a - \vec{r}_{cm}^a)^2}$$

Towards “Universal Laws” of Human Behavior?

ENGAGE THE NEXT BILLION

SOCIOECONOMIC STATUS INFERENCE COUPLING SURVEYS WITH CDR

TABLE V
ACTUAL PHONE USE, COMPUTED FROM TRANSACTION LOGS

	(1) All	(2) Men	(3) Women	(4) "Rich"	(5) "Poor"	(6) MvW	(7) RvP
<i>Panel A: Domestic and International Calls</i>							
Activation date	1/12/08	1/29/08	12/26/07	07/08/06	02/05/08	-	-
Days of activity	770.3	743.4	823.8	994.6	548.1	0.38	0.0001
Avg. call length	31.7	29.7	35.7	39.8	28.4	0.014	0.0001
Calls per day	6.25	6.32	6.09	8.42	6.47	0.82	0.26
Net calls per day (out-in)	0.087	0.31	-0.37	0.76	-0.31	0.02	0.29
Int'l calls per day	0.084	0.071	0.11	0.13	0.066	0.11	0.065
Net int'l calls (out-in)	-0.014	-0.0018	-0.038	-0.031	-0.028	0.031	0.89
<i>Panel B: Social Network Structure</i>							
Degree	734	772.6	657.2	1240.7	498.8	0.56	0.037
In-degree	488.2	488.5	487.6	721.5	369.1	0.99	0.02
Out-degree	433	475.9	347.7	798.1	280.8	0.43	0.1
Daily degree	3.78	3.87	3.61	5.08	3.77	0.63	0.17
Net daily degree (out-in)	0.00027	-0.17	0.34	-0.47	0.41	0.15	0.19
Clustering	0.063	0.065	0.058	0.056	0.057	0.067	0.88
Betweenness	2.72	2.74	2.69	2.61	2.77	0.27	0.0033
<i>Panel C: Other Behaviors</i>							
Credit used per day	163.5	176.2	138.2	246.9	138.9	0.17	0.025
Max. recharge value	2756.3	2775.1	2718.9	3816.1	2228.5	0.89	0.013
Avg. districts per day	1.36	1.37	1.34	1.51	1.47	0.8	0.81
Avg. districts contacted	1.21	1.2	1.22	1.4	1.28	0.81	0.48
Me2U transfers per day	0.044	0.041	0.05	0.037	0.083	0.43	0.012
Net Me2U transfers per day	0.00038	0.0066	-0.012	0.0082	-0.012	0.011	0.14
<i>N</i>	901	645	256	180	180	-	-



J. Blumenstock and N. Eagle (2011). "Mobile divides: gender, socioeconomic status, and mobile phone use in Rwanda", Proceedings of the 4th IEEE/ACM International Conference on Information and Communication Technologies and Development, ACM Press.

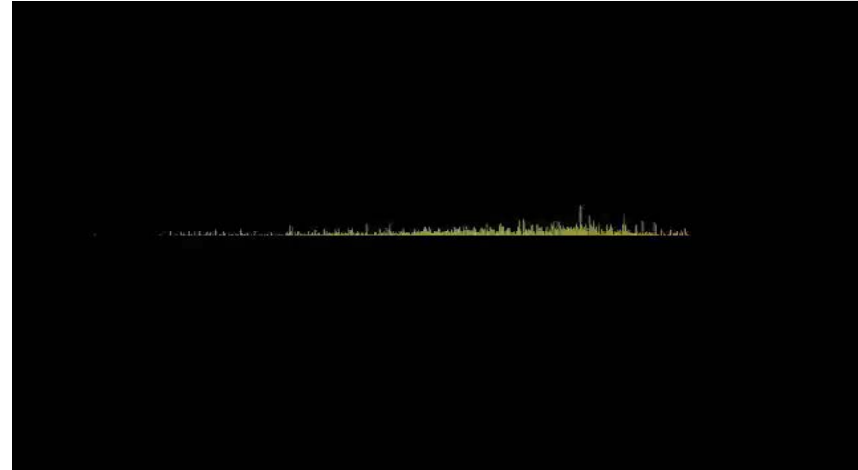
UK CALL GRAPH & NETWORK DIVERSITY

- Social Diversity
 - Edge Entropy

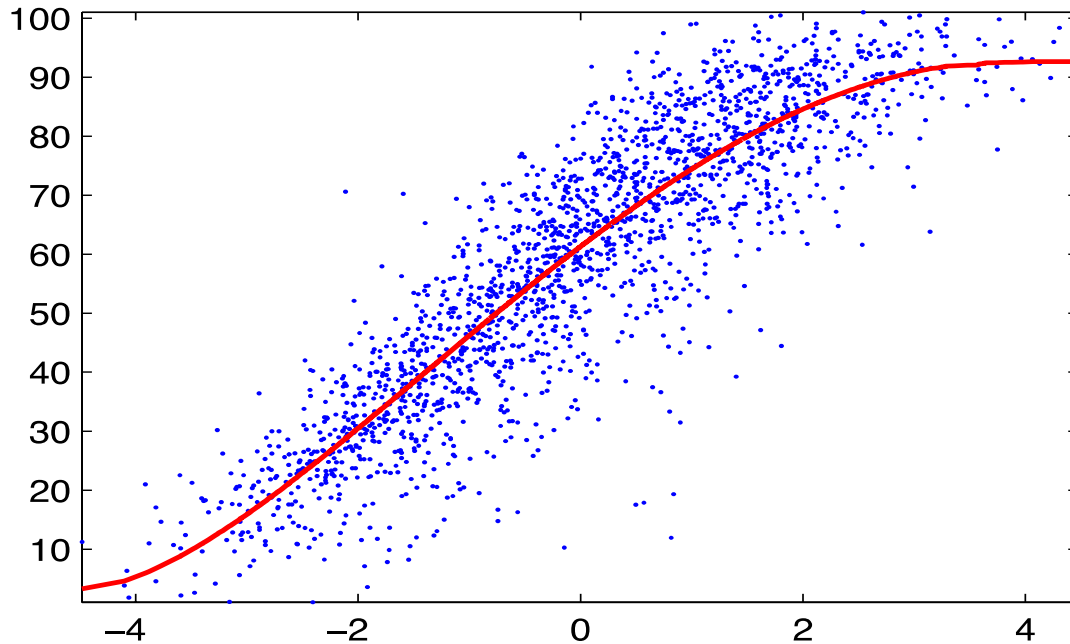
$$D_{social}(i) = \frac{-\sum_{j=1}^k p_{ij} \log(p_{ij})}{\log(k)}$$

- Spatial Diversity
 - Node Entropy

$$D_{spatial}(i) = \frac{-\sum_{a=1}^A p_{ia} \log(p_{ia})}{\log(A)}$$



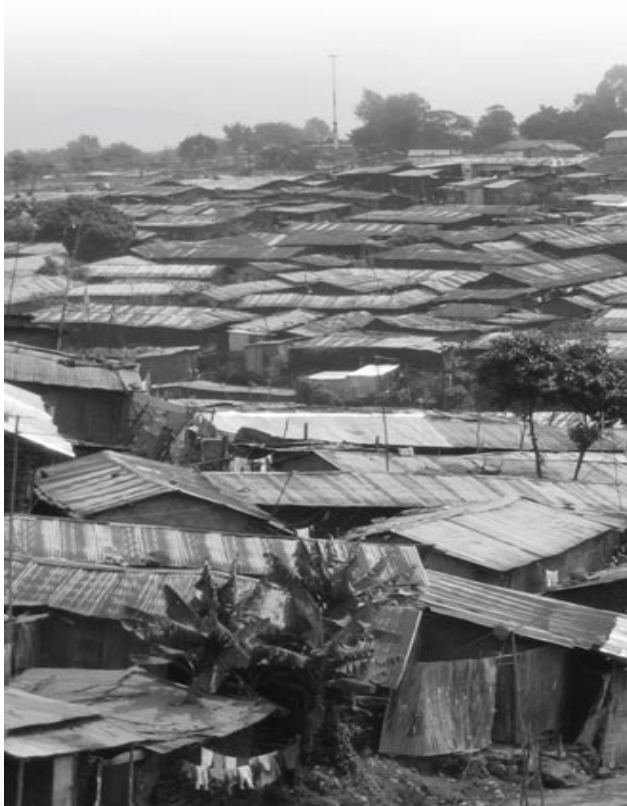
DIVERSITY AND ECONOMIC OPPORTUNITY TOWARDS A SOCIAL STIMULUS PACKAGE?



ENGAGE THE NEXT BILLION

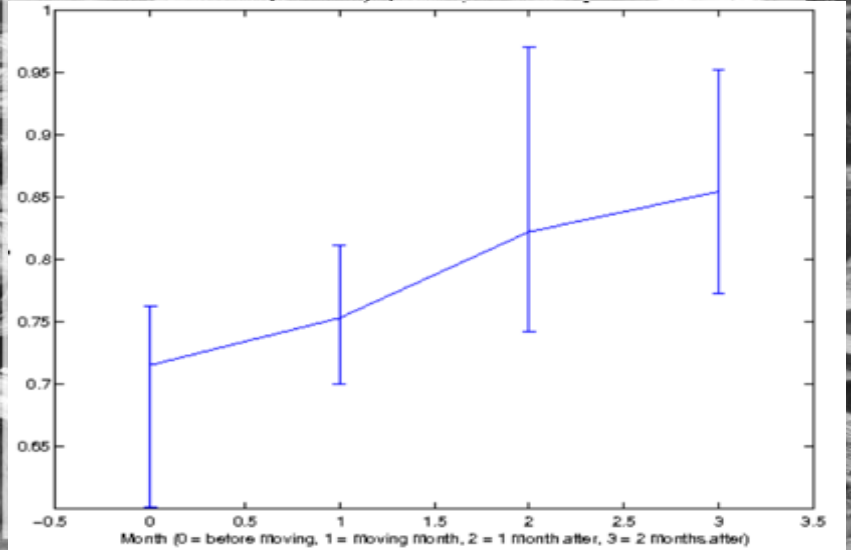
Are Slums Good?

Economic Springboards and Resource Allocation



AI-D ARTIFICIAL INTELLIGENCE FOR DEVELOPMENT

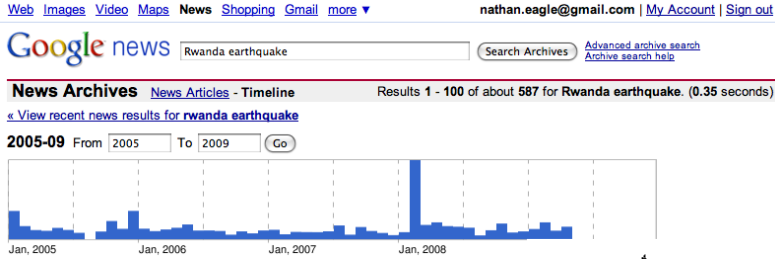
Over one billion people - or nearly one in every three urban residents - live in informal settlements and slums. Coupling mobile phone data with mathematical models and statistical inference, we hope to better understand the dynamics of these establishments and ultimately develop predictive models to better serve



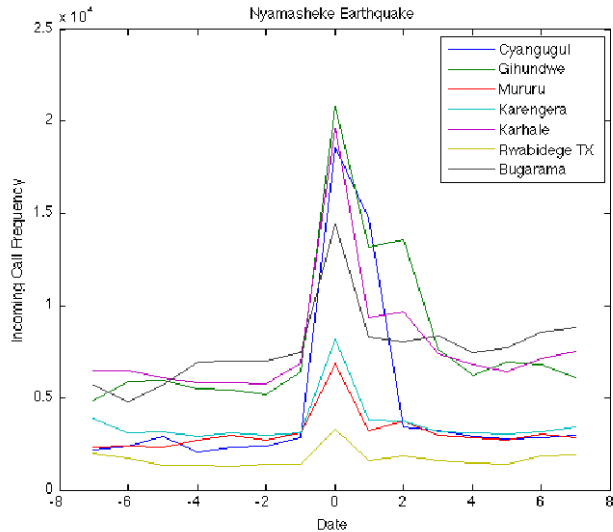
PROPRIETARY AND CONFIDENTIAL

ENGAGE THE NEXT BILLION

REACTIONS TO REGIONAL SHOCKS



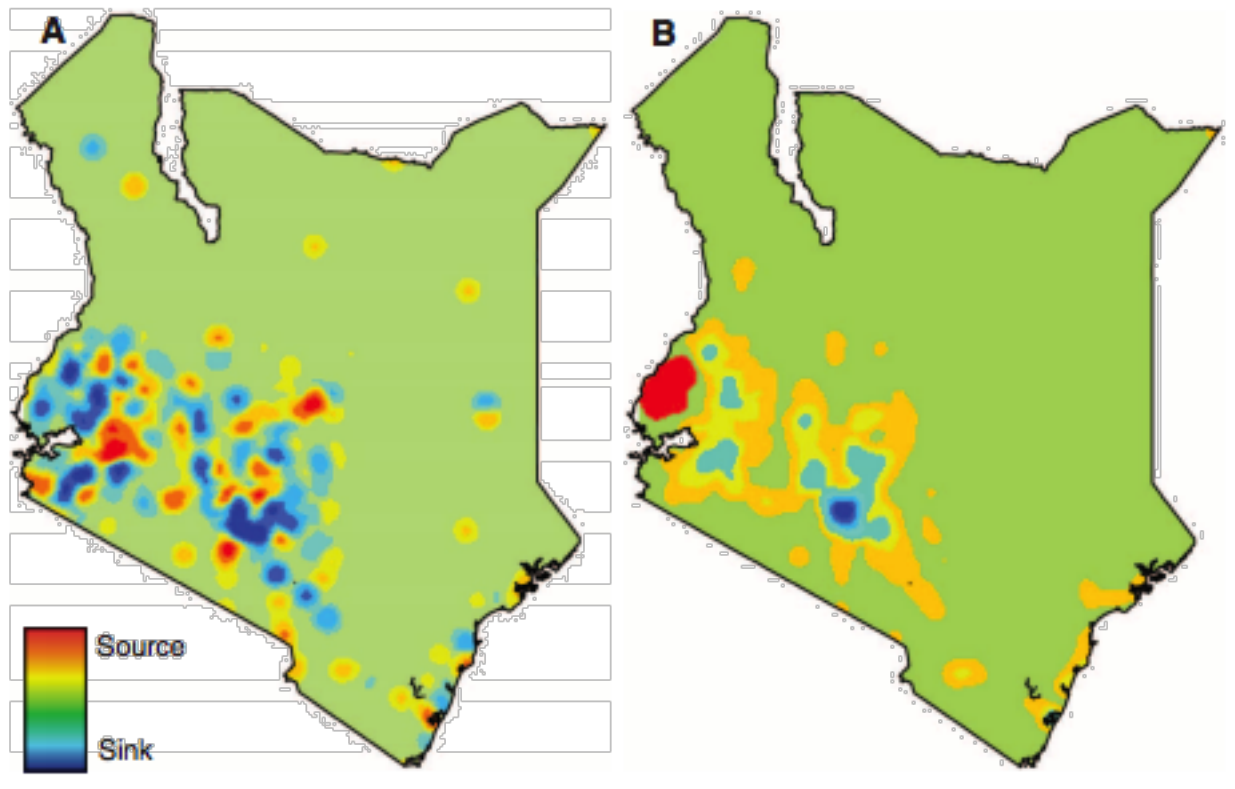
- Spatial Dynamic Bayesian Anomaly Detection
 - Quantify tower-level behavioral



PROPRIETARY AND CONFIDENTIAL

N. Eagle and E. Horvitz. (2009). 'Spatial Dynamic Bayesian Anomaly Detection for Real-Time Disease Detection', AAI.

MOBILITY & MALARIA: SOURCES AND SINKS



A. Wesolowski, N. Eagle, A. Tatem, D. Smith, A. Noor, R. Snow, and C. Buckee (2012). "Quantifying the impact of human mobility on malaria", *Science*, 338(6104), pp. 267-270.

H1N1, MEXICO, 2009

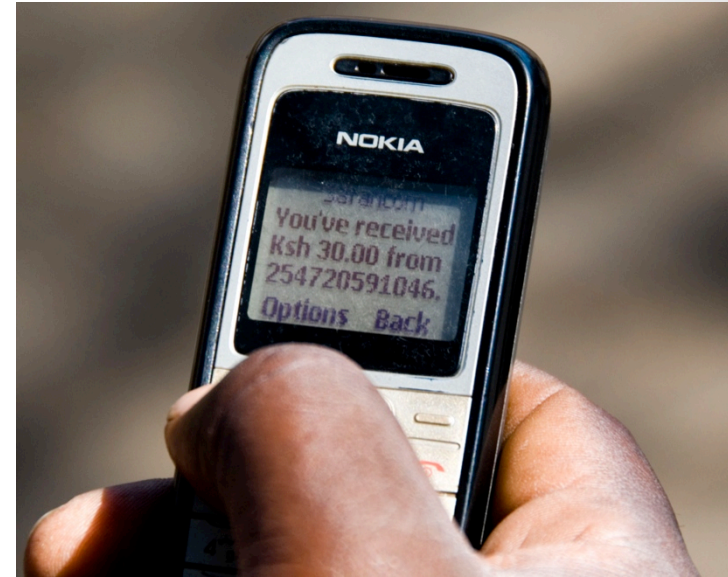


Big Data in Growth Markets
Small Data in Growth Markets
Data Reciprocity

PREDICTING CHOLERA IN RWANDA?



MOBILE PAYMENTS: SMS BLOODBANK



J A N A

PREPAID AIRTIME IS VIEWED AS EQUIVALENT TO C



10% of daily wages spent airtime

A woman with dark hair tied back, wearing a pink and blue patterned shirt and a tan shoulder bag, is talking on a black mobile phone. She is standing in a busy street with yellow taxis and other people in the background. The scene is brightly lit, suggesting daytime.

Meet Gowri from Bangalore.

Mom, Sister, \$50 Android, \$3/day on

Jana Drives Consumer Action With Mobile Airtime.

**We Connect Global Companies to
3.48 Billion Emerging Market
Consumers in 102 Countries.**

JANA: OUR GLOBAL NETWORK

3.48 BILLION
MOBILE SUBSCRIBERS

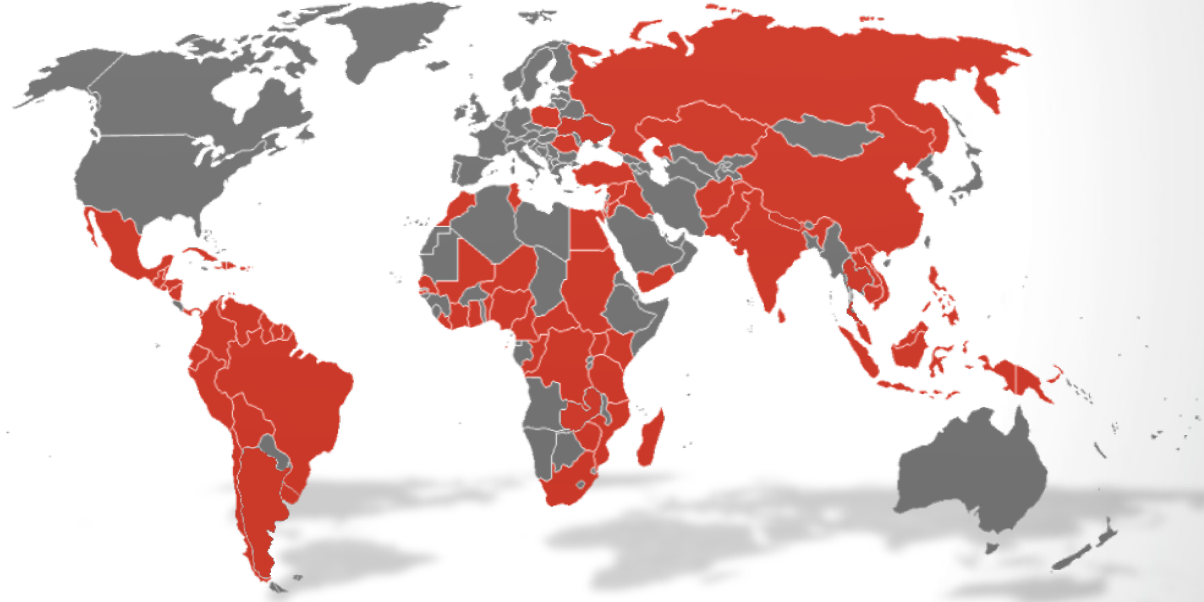
Partnerships with 237 mobile phone carriers in 101 countries

MOBILE ENGAGEMENT

*Mobile interaction with the consumer – in **any country, on any handset** – using a range of engagement channels*

MOBILE
REWARDS PLATFORM

Mobile Airtime Rewards in over 70 currencies world-wide



Global Footprint in 101 Emerging Markets Across Asia, the Americas, Sub-Saharan Africa, Middle East, and Eastern Europe

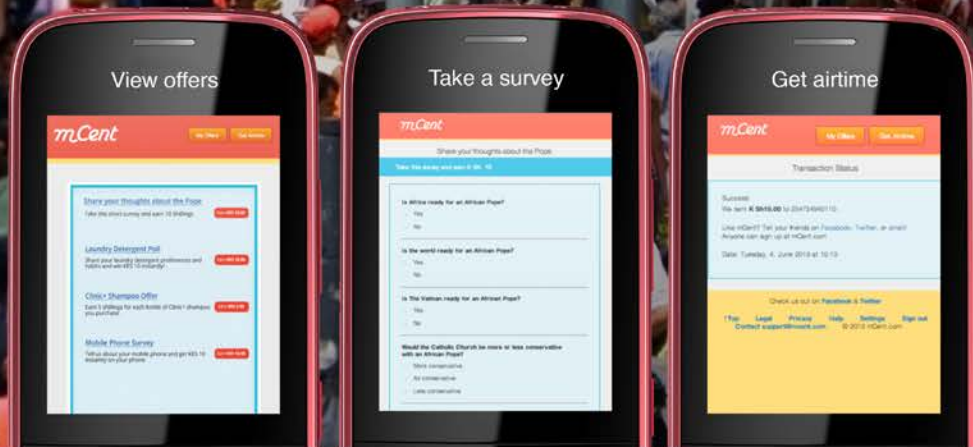
PARTNERSHIPS WITH 237 MOBILE OPERATORS...



JANA

Global Research

Take the pulse of
over 5 million
consumers
across the world



Gather insights from millions of emerging market consumers in over 100 countries

Learn more at jana.com/products/global-research

Rapid, accurate, and cost-efficient

Our mobile platform is optimized for all types of web-enabled phones, making it simple for our panelists to complete a survey quickly. Ask panelists a question and begin receiving results within minutes. Our panelists are actual people who are eager to share their insights. Receive robust, valid results at scale from individuals across the world. Minimum panel sizes or survey questions are not required. Survey Jana panelists starting at \$0.10 per question.

ALL THIS DATA, AND DIGITAL ADVERTISING STILL SUCKS.



Sheela

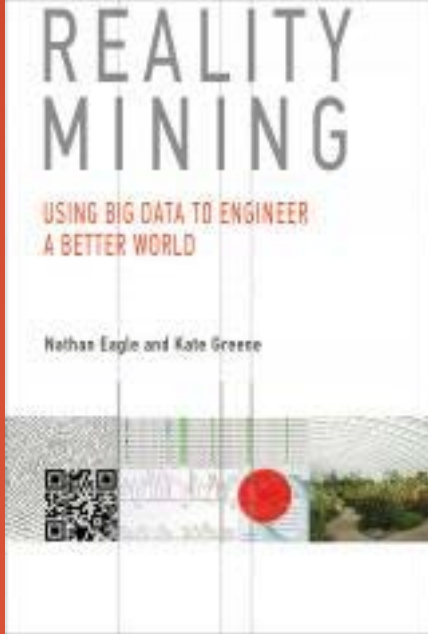


Google's Estimate of Sheela

RECIPROCITY IN ADVERTISING



If we can redirect half of the \$200 billion spent on emerging market advertising, Jana will be able to **provide one billion people with the equivalent of a 5% raise.**



Reality Mining: Using Big Data to Engineer a Better World, MIT Press, 2014.

Thank You!

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