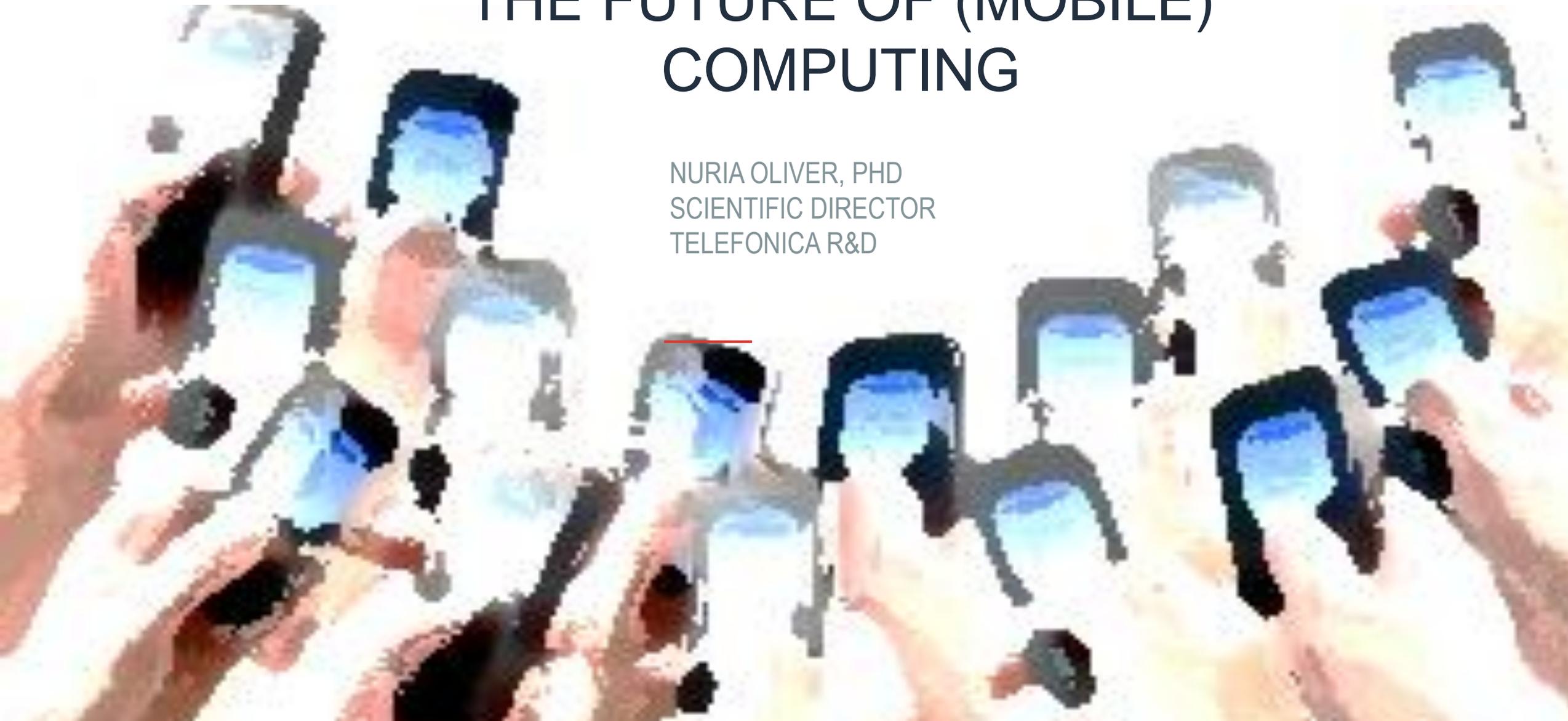


# THE FUTURE OF (MOBILE) COMPUTING

NURIA OLIVER, PHD  
SCIENTIFIC DIRECTOR  
TELEFONICA R&D





# TRENDS AND DREAMS IN MOBILE COMPUTING

NURIA OLIVER, PHD  
SCIENTIFIC DIRECTOR  
TELEFONICA R&D



# OUTLINE

1. My personal evolution within Mobile Computing
2. Where are we now?
3. How did we get here?
4. Where are we going?
  - From looking down to looking up
  - The rise of wearables
  - From living to logging life
  - From quantified self to understanding self
  - Voice is back
  - From visual to multisensorial to neural
  - From dumb smartphones to smart devices
  - Redefinition of who we are as a species, individually and globally
5. Conclusions

**MY PERSONAL  
EVOLUTION WITHIN  
MOBILE COMPUTING**



1996-1998

1<sup>st</sup> Smart Clothes Fashion Show  
Dypers: Dynamic and Personal  
Augmented Reality System



1998-2000

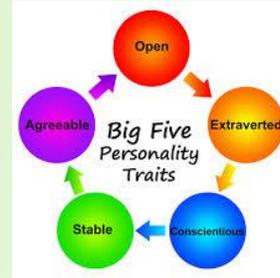
SmartCars and Driving  
Instrumented Cars  
with Sensors

# HealthGear



**2004-now**  
Persuasive Computing  
Wearables with  
Mobile Phones

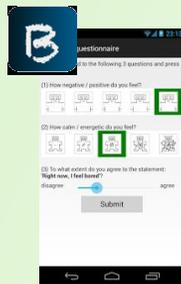
# Personality Inference



# Availability Prediction



# Boredom Prediction

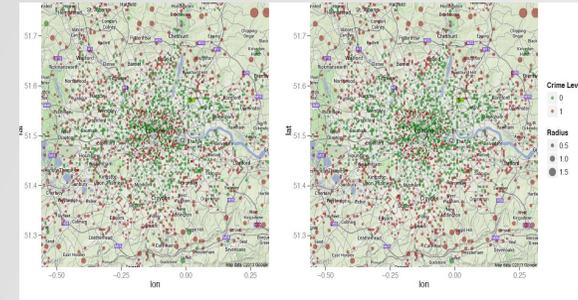


# Financial Risk Inference

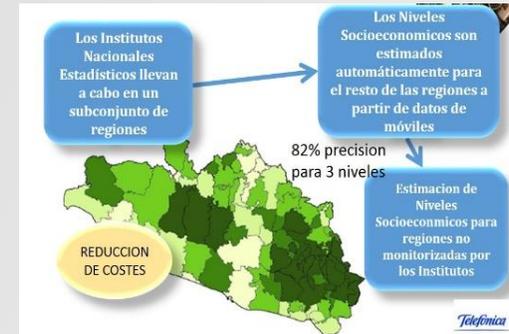


**2004-now**  
User Modeling and  
Human Behavior  
Recognition

# Crime Prediction



# Socioeconomic Status Inference

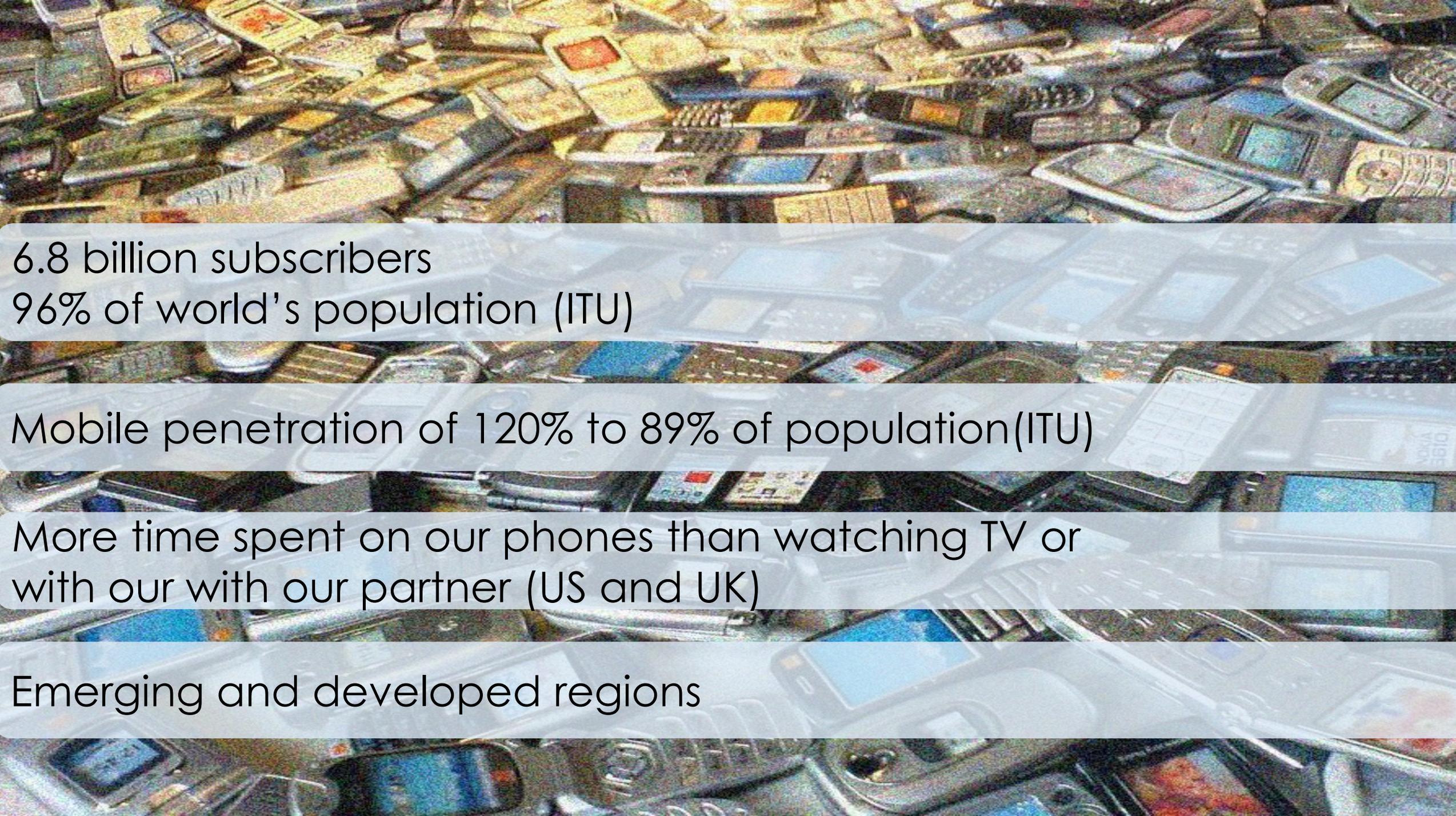


# Pandemic Modeling



**2008-now**  
Large Scale Human  
Behavior Modeling  
Big Data for Social Good

**WHERE ARE WE NOW?**



6.8 billion subscribers  
96% of world's population (ITU)

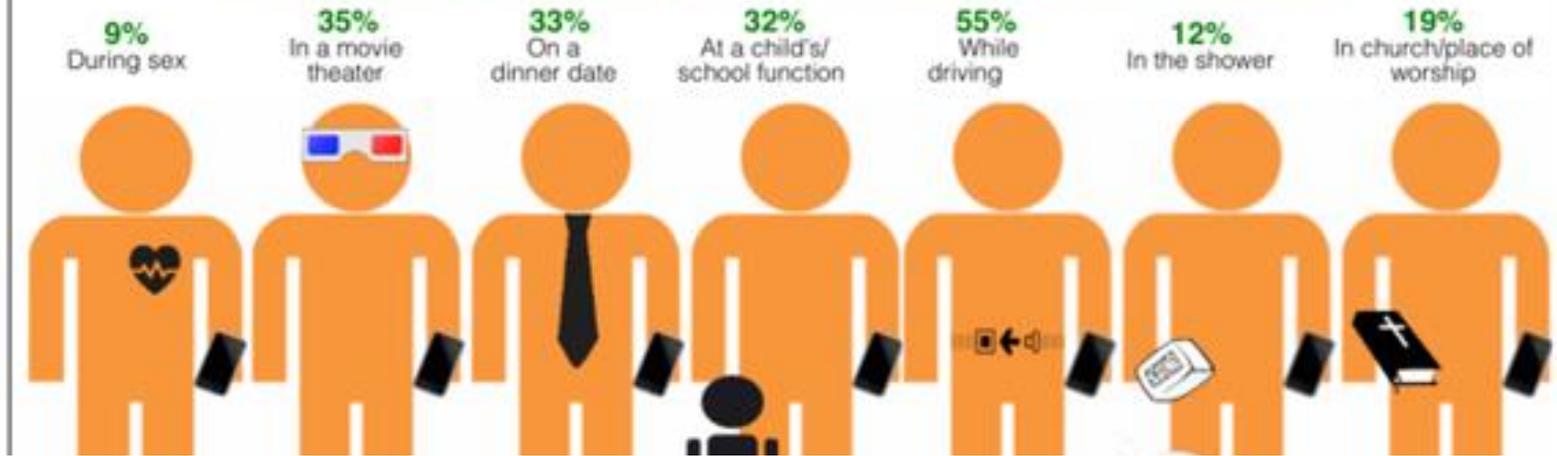
Mobile penetration of 120% to 89% of population (ITU)

More time spent on our phones than watching TV or with our partner (US and UK)

Emerging and developed regions



## WHERE ARE U.S. ADULTS USING SMARTPHONES?



# NOMOPHOBIA



73%  
PANICKED



14%  
DESPERATE



7%  
SICK



6%  
RELIEVED

**HOW DID WE GET  
HERE?**

Million mobile subscribers



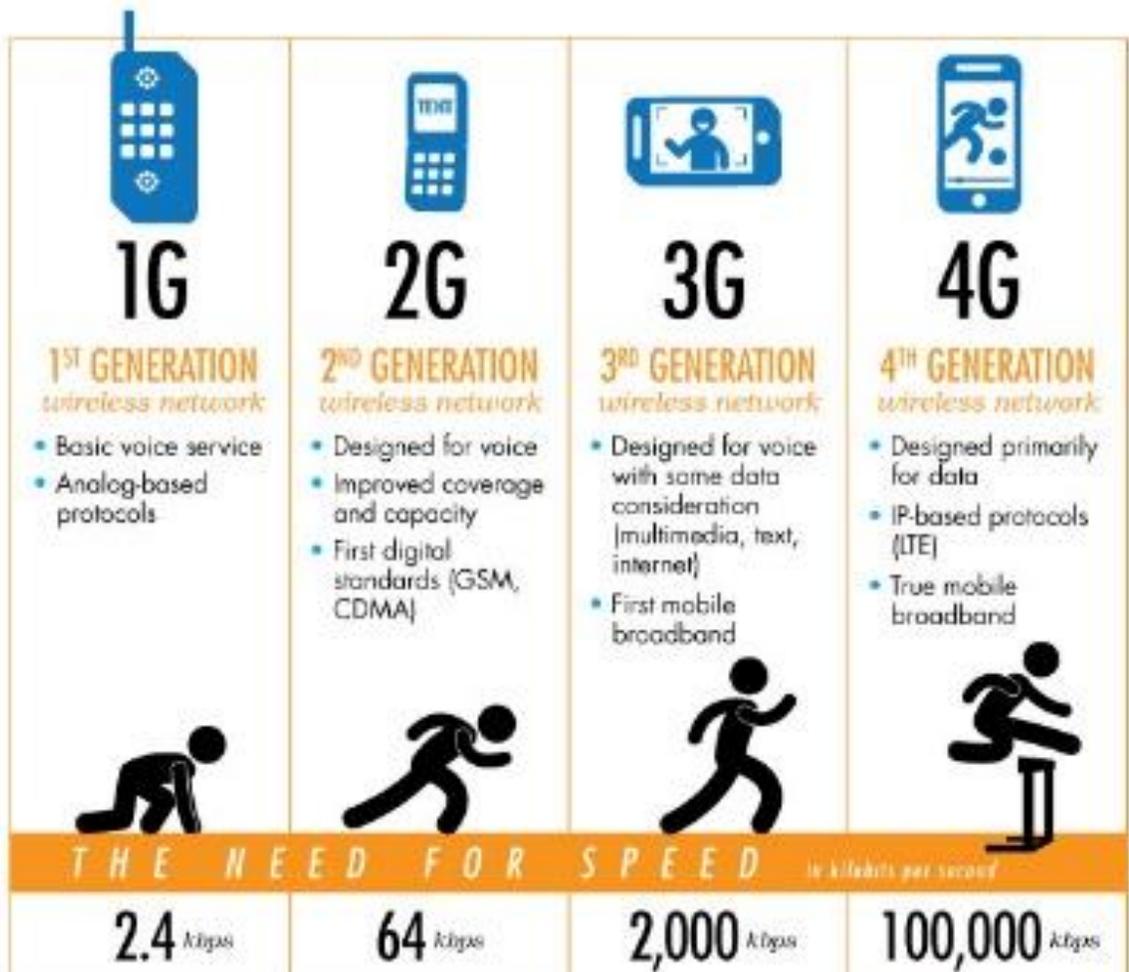
	27.8oz	18oz	3.6oz	5.3oz	4.8oz	3.3oz	4.7oz	4.6oz
Standby Time	8 hrs	6 hrs	8 days	7 days	16 days	9 days	2 days	5 days
	<b>MOTOROLA DYNATAC 8000X</b>	<b>IBM SIMON PERSONAL COMMUNICATOR</b>	<b>MOTOROLA STARTAC</b>	<b>NOKIA 3210</b>	<b>BLACKBERRY RIM 850</b>	<b>MOTOROLA RAZR V3</b>	<b>APPLE IPHONE 1</b>	<b>SAMSUNG GALAXY S4</b>
Release Date	<b>1983</b>	<b>1994</b>	<b>1996</b>	<b>1999</b>	<b>2003</b>	<b>2004</b>	<b>2007</b>	<b>2013</b>
Price New	\$3,995	\$1,100	\$1,000	\$200	\$360	\$449	\$499	\$650
	<ul style="list-style-type: none"> <li>• First commercially available mobile phone</li> <li>• Internal phonebook could only hold 30 numbers</li> </ul>	<ul style="list-style-type: none"> <li>• World's 1<sup>st</sup> Smartphone</li> <li>• B&amp;W touch screen</li> </ul>	<ul style="list-style-type: none"> <li>• Super small</li> <li>• Clam-shell design</li> </ul>	<ul style="list-style-type: none"> <li>• Internal Antenna</li> <li>• T9 text messaging</li> <li>• First phone to come preloaded with Snake</li> </ul>	<ul style="list-style-type: none"> <li>• The business phone</li> <li>• 1<sup>st</sup> PDA</li> </ul>	<ul style="list-style-type: none"> <li>• Sleek, sexy design</li> </ul>	<ul style="list-style-type: none"> <li>• Game changer, with multi-touch screen and apps</li> <li>• Nears 40% share of US market in 2013</li> </ul>	<ul style="list-style-type: none"> <li>• iPhone rival</li> <li>• Whopping 5-inch display</li> </ul>

2014

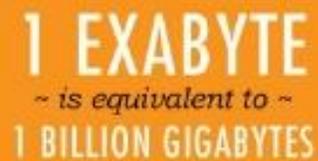
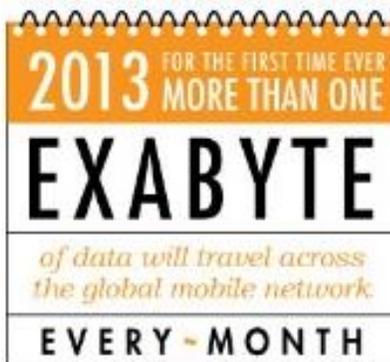
2016

2018

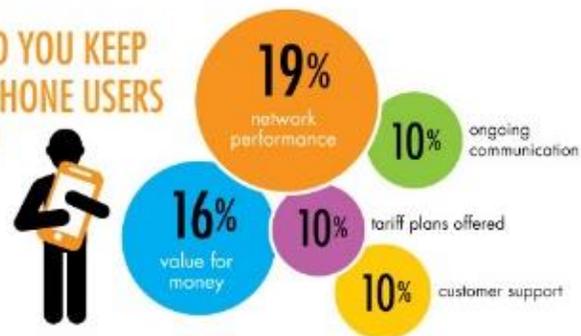
# EVOLUTION OF THE G



## WHERE ARE WE HEADING?



### HOW DO YOU KEEP SMARTPHONE USERS HAPPY?

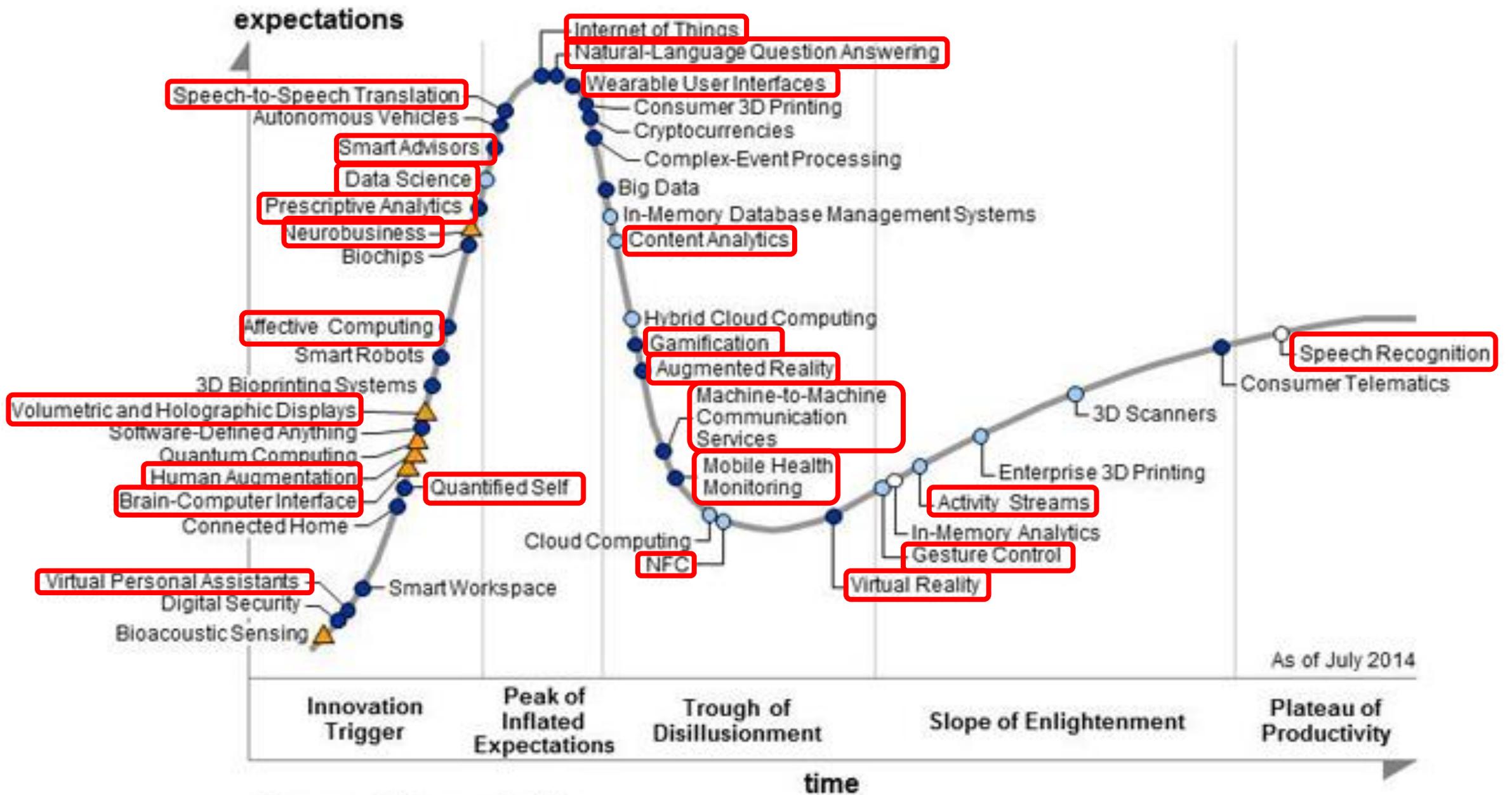


COMMSCOPE®

Sources: Korea, Liu, Sangjoo and Dinya, "Evolution of Mobile Wireless Communication Networks: 1G to 4G," IJCT, December 2010; 4G Americas.org, "Infographic: Mobile Broadband Connected Future," White, "Switch: Keep smartphones in global analysis," Adobe Digital Marketing Blog, March 6, 2013; Weaker and Wu, "Internet Trends 2013," Ipub.com; Etisalat Consumer Insight Summary Report, June 2013.

# WHERE ARE WE GOING?







From looking down to looking up





## TEENS REACT FACT:

*I Forgot My Phone* was written by and stars Charlene deGuzman, and was directed by Miles Crawford.







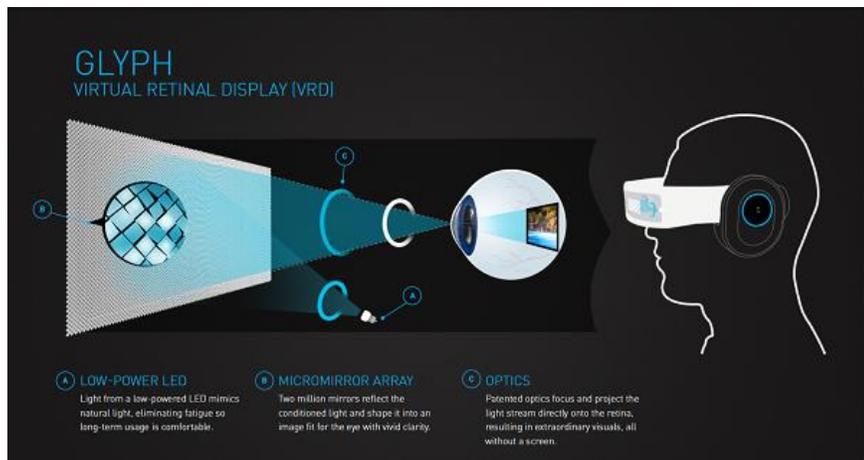
# Augmented Reality



# Immersive Virtual Reality



# AR and VR with Retinal Displays



The global HMD market is expected to reach **\$12.28 billion** by 2020 at an estimated annual growth of 57% from 2014 to 2020, where Americas is projected to be a market leader followed by Europe and then APAC

A Virtual Retinal Display (VRD), also known as a retinal scan display (RSD) or retinal projector (RP), is a display technology that draws a raster display (like a television) directly onto the retina of the eye.



The rise of wearables, the disappearing phone....



# WEARABLE TECHNOLOGY

WHEN IS IT COMING TO THE WORKPLACE?

## What is Wearable Technology?

- MUST BE WORN, NOT CARRIED
- CONTROLLABLE BY THE USER, CONSCIOUSLY OR UNCONSCIOUSLY
- ENHANCES THE USER'S EXPERIENCE

## The Abacus Ring

- The Qing Dynasty miniaturized the abacus and placed it on a ring, a device still used today by some merchants.

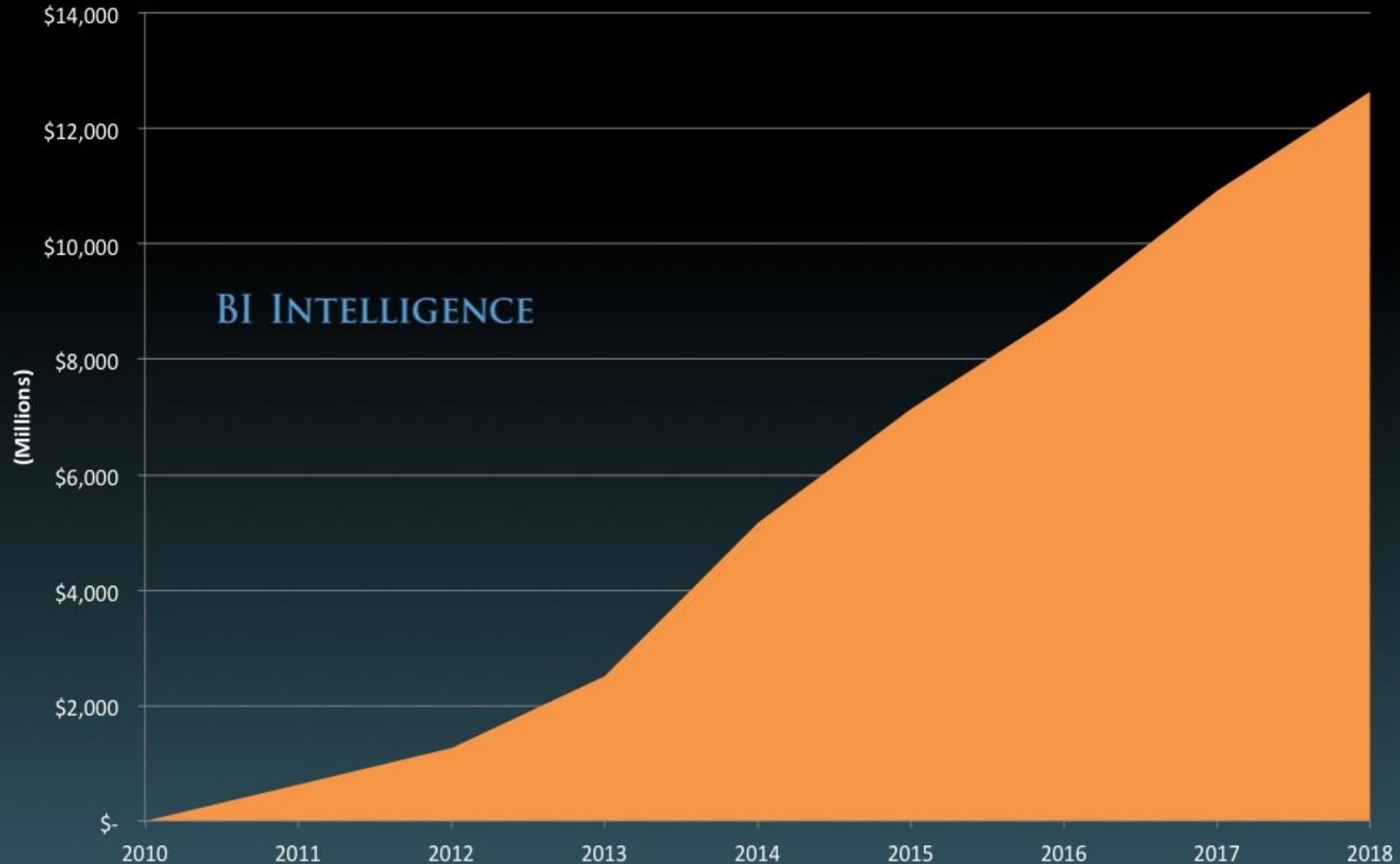
1644

## THE PAST

Wearable technology has a long history dating back as far as the 17th century. Here is a look at the evolution of wearables.

# Wearables are beginning to take off...

## Wearable Device Market Size Forecast



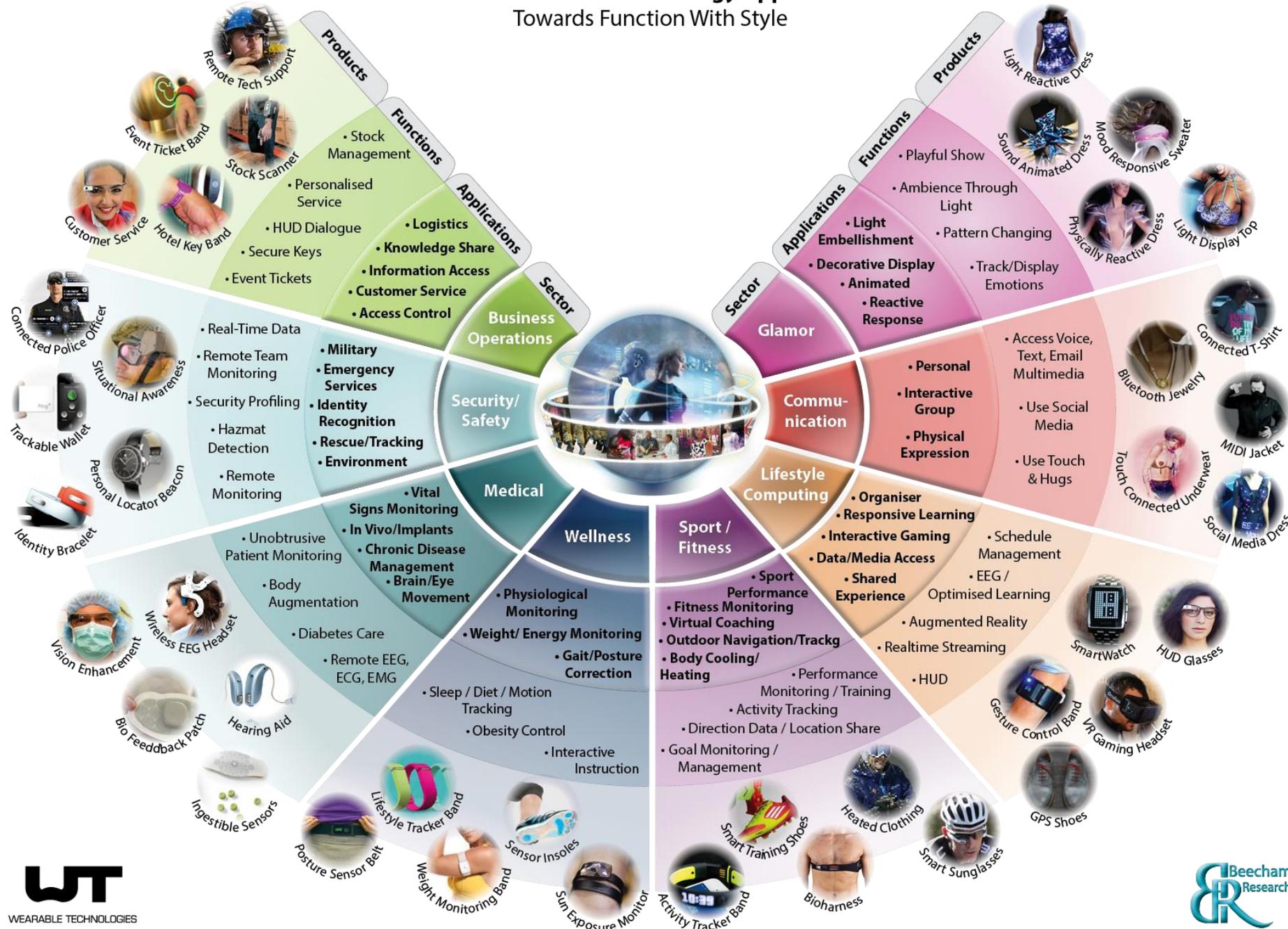
Source: BI Intelligence estimates, ABI Research, IMS, Juniper. \*Assumes \$125 average selling price for wearable devices.

Credit Suisse IT Hardware Analyst Kulbinder Garcha predicts that the market for wearable technology will increase tenfold to as much as **50 billion US dollars** by 2016-18.

Google Glass, Apple smart watch and popular wristbands that track athletic activity show that consumers are already intrigued by wearable devices.

But the technology's true potential lies in its ability to gather streams of currently uncollected data about a subject most of us are happy to explore in great depth: ourselves.

# World of Wearable Technology Applications: Towards Function With Style



## LUMUS



**What:** These see-through glasses can display a '87 inch' screen onto the glass.

**Tech:** Light pumps in the ear piece that refract light down the lens.

**Available:** NOW

## BIONIC CONTACT LENSES



**What:** Information displayed directly on the contact lens. Currently it can only display a single pixel.

**Tech:** Nanometer circuits, micro LEDs, tiny lens arrays.

**Available:** Proof of concept

## FABRICAN SPRAY ON CLOTHES

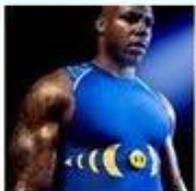


**What:** This aerosol applied fabric can be washed and reworn.

**Tech:** Short fibers and binding polymers in a liquid solvent that evaporates when it dries.

**Available:** NOW

## UNDERARMOUR E3



**What:** This shirt tracks biometrics signals and transmits them to a handheld or PC. Soon will broadcast real time athlete data.

**Tech:** Various sensors.

**Available:** 2012

## ADIDAS MICOACH BRA



**What:** Bra with sensors to monitor heart rate and calories burned. Data then sent to Adidas miCoach app.

**Tech:** Heart rate monitor.

**Available:** NOW \$60

JUST THE BEGINNING

## LOREX VUE

**What:** These sunglasses can record 2GB or 5 hours of high resolution video and stereo sound.

**Tech:** Really small camera.

**Available:** NOW



## VUZIX WRAP 520AR

**What:** These glasses sport dual cameras and a HUD for stereoscopic 3D and augmented reality capabilities.

**Tech:** 'Patented quantum optic see-thru technology'

**Available:** NOW \$1499



## 3RD SPACE FPS GAMING VEST

**What:** Directional force feedback with variable damage, i.e pistol vs rocket.

**Tech:** 8 air actuators, air compressor.

**Available:** NOW \$139



## PPSS CUT RESISTANT FABRIC

**What:** This sweatshirt can withstand slashes from knives, razor blades, and glass without rupture.

**Tech:** Ultra-high molecular weight polyethylene and high density knitting.

**Available:** NOW \$485



## SELF CLEANING FABRICS

**What:** This fabric will clean stains when exposed to sunlight.

**Tech:** Titanium dioxide coating with nanoparticles of silver and iodine.

**Available:** Proof of concept



## PEBBLE E PAPER WATCH



**What:** This smart watch can run apps and sync with your iPhone or Android phone.

**Tech:** 3 axis accelerometer with gesture detection, Bluetooth, SDK for developers.

**Available:** 2012

## NIKE+ FUEL BAND

**What:** This watch will also track your steps and calories burned. Data sent to iPhone app.

**Tech:** Accelerometer.

**Available:** NOW \$149



## JAWBONE UP



**What:** This wrist band tracks activity and sleep and integrates with the iPhone for analysis.

**Tech:** Accelerometer, vibration motor.

**Available:** Clinical trials

## NOKIA VIBRATING TATTOO

**What:** A substance on the skin which can alert users to calls, text messages and receive alerts such as low battery.

**Tech:** Ferromagnetic inks.

**Available:** Patent filed



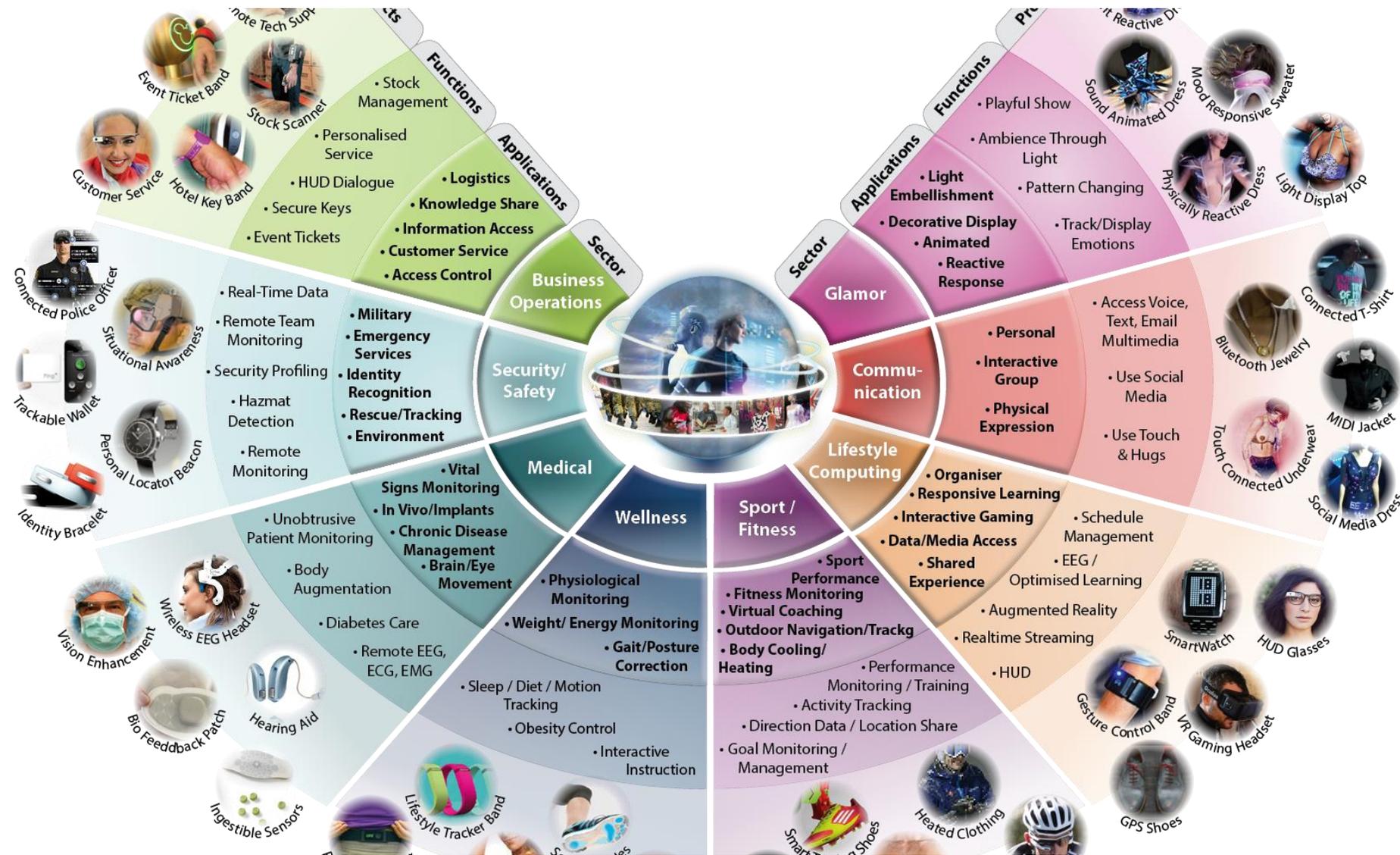
**VoucherCodes.co.uk**

*VoucherCodes.co.uk delivers the very best offers possible, helping shoppers spend their money smarter!*



**visual.ly**

# Wealth of available wearable devices already....



...but they are all isolated, stand-alone apps...

...the real power will come when the sensors talk to each other and are able to understand, predict and adapt to human behavior...



TEDx Barcelona May 2013

<http://www.youtube.com/watch?v=kk-eJoK4fug>

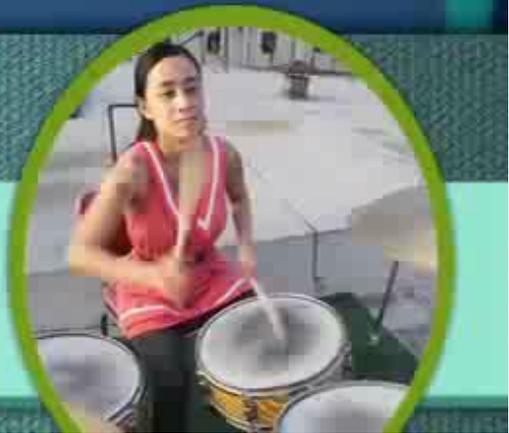
A microscopic view of several cells, likely yeast or similar microorganisms, stained with a blue dye. The cells are roughly spherical and have a distinct, darker central region, possibly representing the nucleus or a similar organelle. The background is a deep blue, and the cells are scattered across the frame. A semi-transparent blue banner is overlaid horizontally across the middle of the image, containing white text.

From living life to logging life to analyzing life...



## TEENS REACT FACT:

Charlene deGuzman, the writer/star of *I Forgot My Phone*, was a background musician on Disney's *Hannah Montana* and Nickelodeon's *Big Time Rush*. She studied theatre at Arizona State University and performed Off-Broadway in New York before moving to LA in 2008.





**1980**

Digital Eye Glass  
By Steve Mann



**2001**

Gordon Bell began  
digitalizing lifelogs



**1992**

MIT Wearable Computing  
Project was founded



**2003**

SenseCam lifeloggng  
released by Microsoft



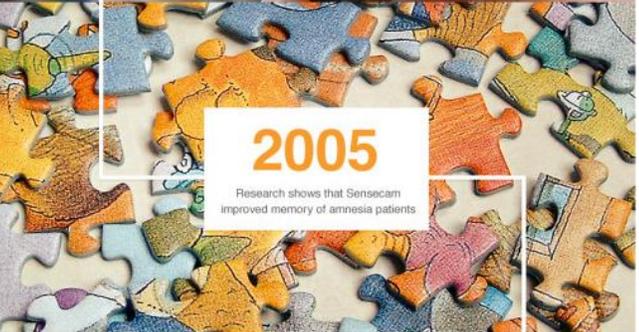
**2010**

Launch of  
Instagram



**1993**

Wearable Wireless Webcam  
by Steve Mann



**2005**

Research shows that Sensecam  
improved memory of amnesia patients



**1998**

Wearable Wireless  
Webcam miniaturized



**2009**

SenseCam becomes  
Vicon Revue



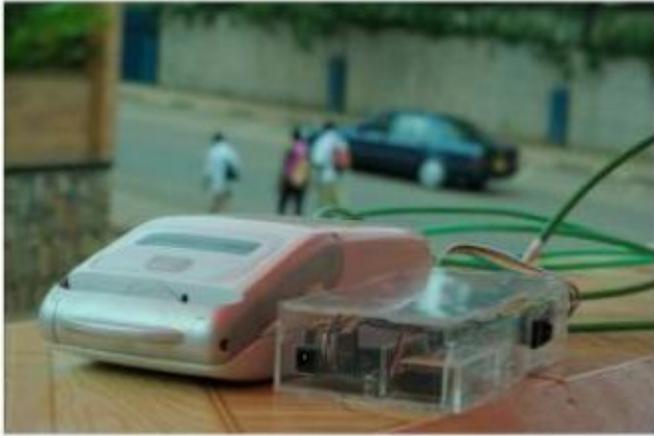
**2012**

Memoto launched  
on Kickstarter

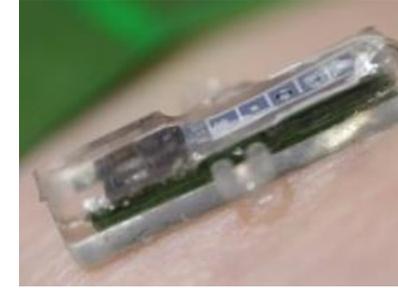
Lifeloggng to the mainstream by capturing  
your life every 30 seconds

Infographic by Memeto

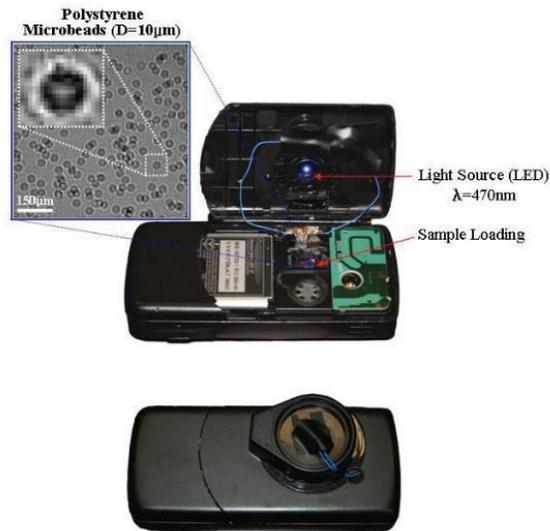
# Analyzing life: Labs-on-a-chip will be common-place



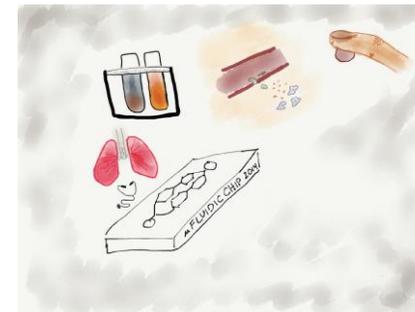
mChip from Columbia Univ for HIV



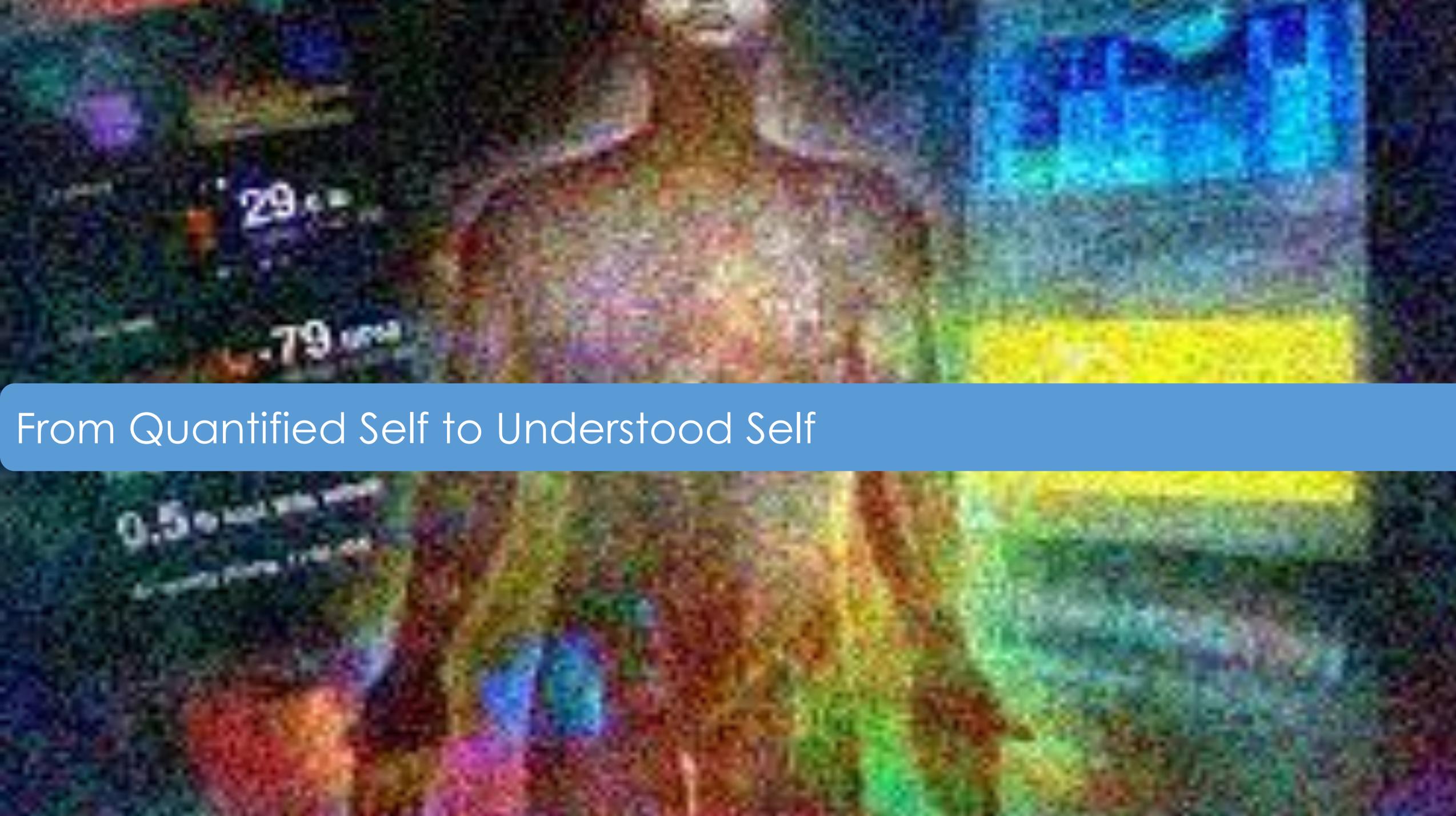
EPFL's implantable blood test device



Mobile phone's refurbished as microcospes (UCLA Prof. Ozcan)



Nature's (March 2014) devoted to the topic



29

.79

From Quantified Self to Understood Self

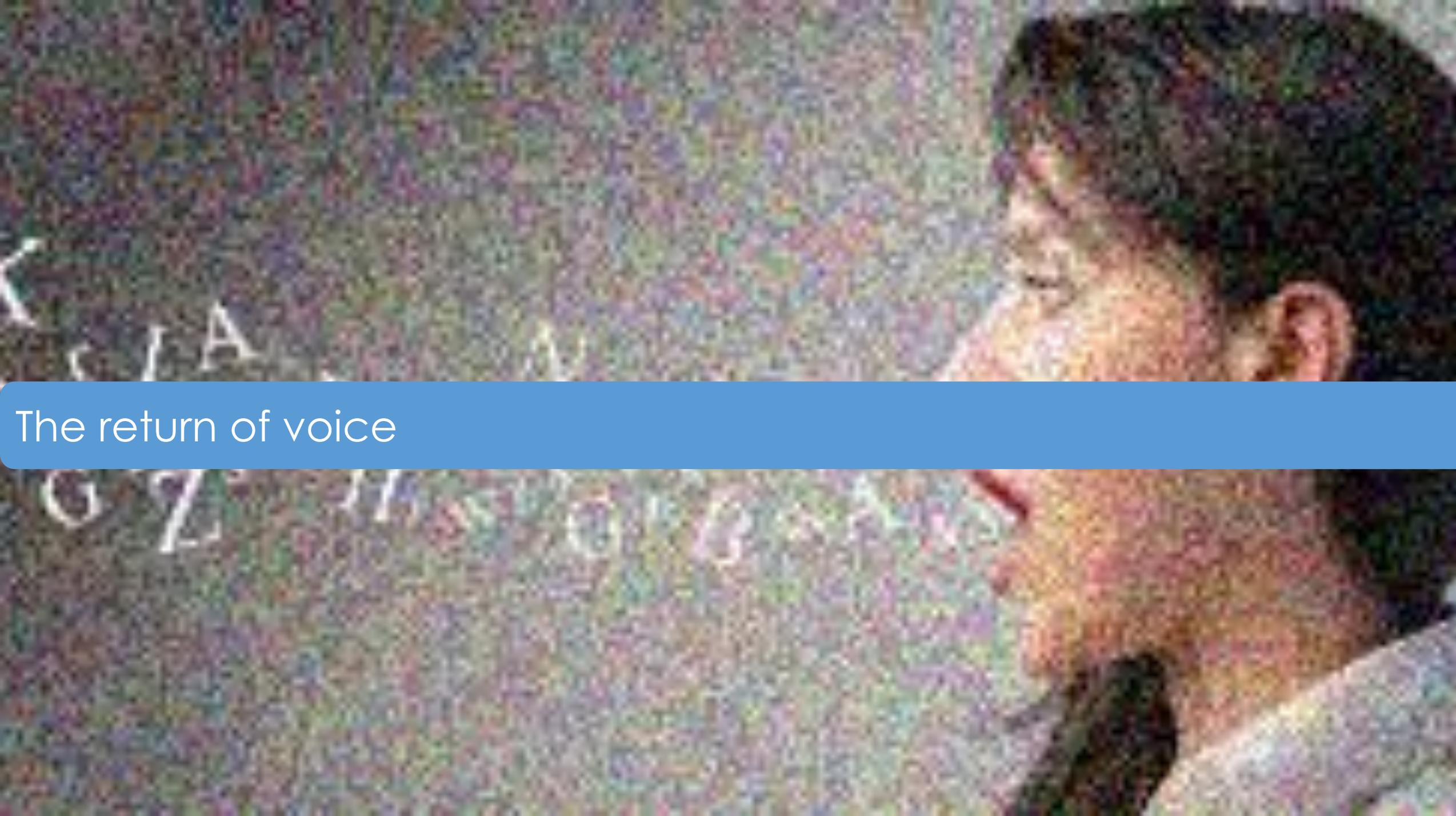
0.5



Quantified Self  
self knowledge through numbers







The return of voice



---

## Cell phone activities

*The % of cell phone owners who use their cell phone to...*

81	send or receive text messages
60	access the internet
52	send or receive email
50	download apps
49	get directions, recommendations, or other location-based information
48	listen to music
21	participate in a video call or video chat
8	"check in" or share your location

Source: Pew Research Center's Internet & American Life Project Spring Tracking Survey, April 17 – May 19, 2013. N=2,076 cell phone owners. Interviews were conducted in English and Spanish and on landline and cell phones. The margin of error for results based on all cell phone owners is +/- 2.4 percentage points.

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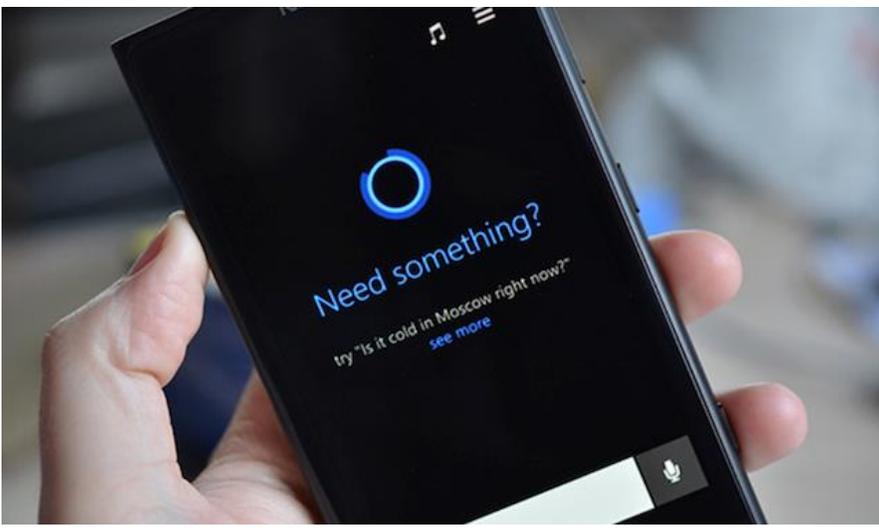
The global voice recognition market is expected to reach **\$113.2 billion** in 2017 after growing at a five-year compound annual growth rate (CAGR) of 16.2 percent

according to projections from U.K. analyst firm [CompaniesandMarkets.com](http://CompaniesandMarkets.com)



### Siri. beta Your wish is its command.

Siri on iPhone 4S lets you use your voice to send messages, schedule meetings, place phone calls, and more. Ask Siri to do things just by talking the way you talk. Siri understands what you say, knows what you mean, and even talks back. Siri is so easy to use and does so much, you'll keep finding more and more ways to use it.



## Voice Biometrics removes authentication hurdles and makes customers happy.



**Voice Biometrics** identifies each individual through their own unique voiceprint, which eliminates the hassle of remember and then typing passwords.



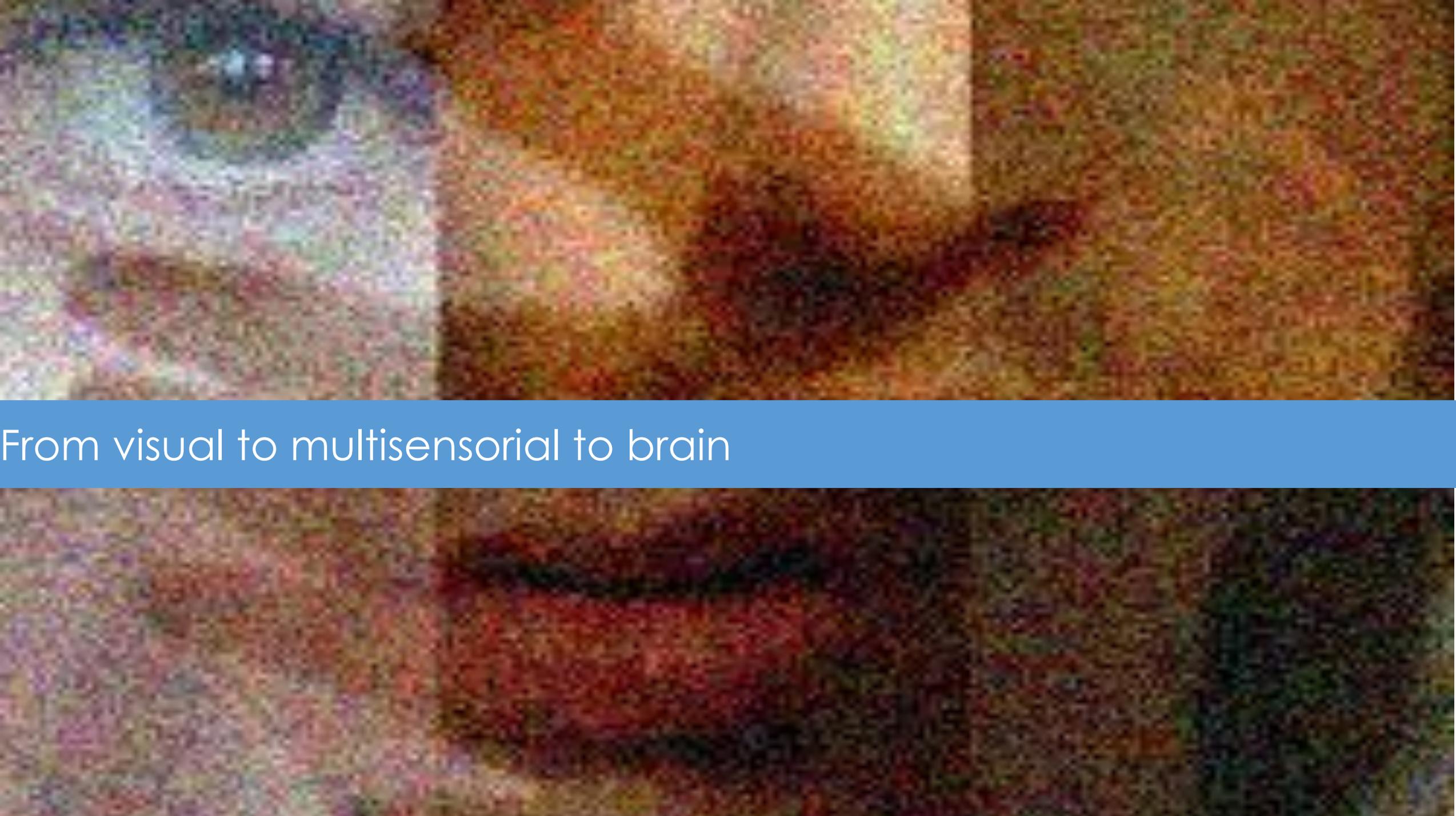
**90%** of users prefer Voice Biometrics over PINs and passwords.

Skype Translator seeks to create a world where language brings us closer together



# skype™ Translator



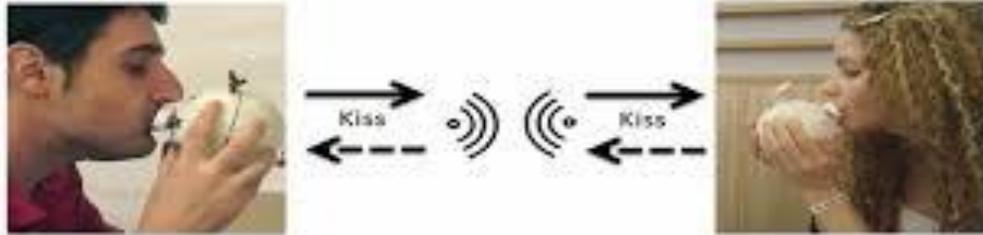
The background of the slide is a blurry, abstract image with a color gradient. It starts with a purple and blue hue on the left side, transitions through a brownish-purple, and ends with a dark brown and black on the right side. The overall appearance is soft and out-of-focus.

From visual to multisensorial to brain

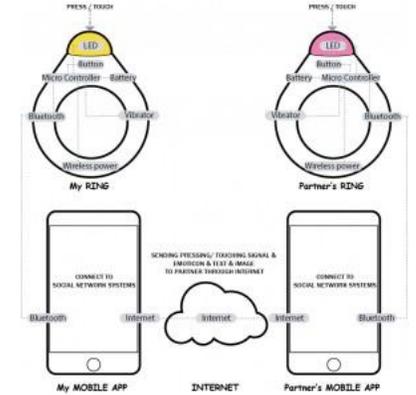
# Touch

Adrian Cheok

## Kissenger



## Kiss Messenger



**25<sup>th</sup> Touch Part 1 of 5**

AS OUR FINGERS **press, probe or pass over** OBJECTS, OUR NERVES GENERATE PATTERNS OF **ELECTRICAL IMPULSES** WHICH OUR BRAINS CAN INTERPRET - CREATING THE SENSATION OF TOUCH.

**5 PREDICTIONS THAT WILL CHANGE OUR LIVES IN 5 YEARS.**

**WHAT** MAKES DIFFERENT SURFACES FEEL DIFFERENT TO THE TOUCH?

THE SURFACES OF EVERYDAY OBJECTS FORM A **microscopic landscape** OF NEARLY ENDLESS **VARIETY**.

**COGNITIVE COMPUTING** SYSTEMS WILL BE ABLE TO UNDERSTAND THE WAY OUR BRAINS EXPERIENCE TOUCH - AND RE-CREATE THAT EXPERIENCE WITH LIFELIKE PRECISION USING VIBRATION, PRESSURE AND MOVEMENT.

**IN THE FUTURE ...**

**ONLINE SHOPPERS** WILL FEEL THE QUALITY AND FLOW OF A GARMENT BY STROKING A PICTURE OF IT ON THE SURFACE OF THEIR PHONE.

**ARTISANS** IN DEVELOPING COUNTRIES WILL ACCESS NEW MARKETS BY INVITING RETAILERS TO EXPERIENCE THEIR LEAPES ONLINE.

**DOCTORS** WILL BE ABLE TO PROVIDE **HANDS-ON** EXAMINATIONS TO PATIENTS IN REMOTE LOCATIONS.

**ADVANCED APPLICATIONS** WILL COMBINE TOUCH WITH OTHER SENSES TO DETERMINE, FOR EXAMPLE, IF A DRIVER IS TOO TIRED TO DRIVE.

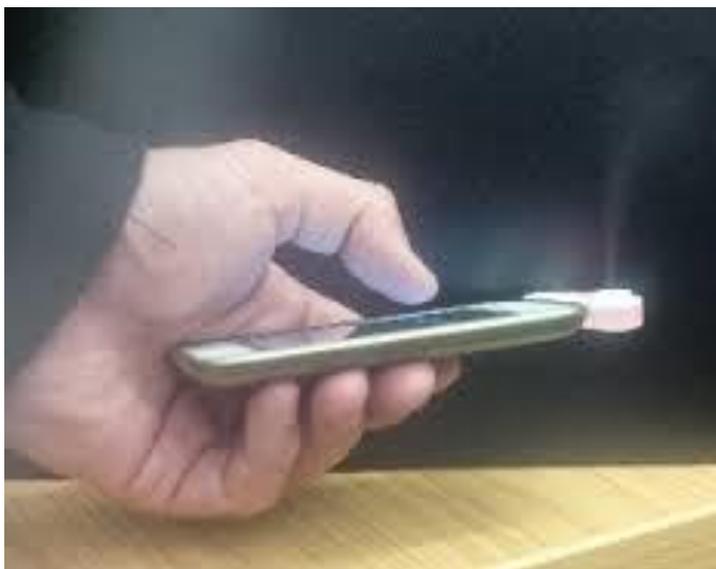
**“ FIVE YEARS FROM NOW, YOU WILL BE ABLE TO TOUCH THROUGH YOUR PHONE. ”**

ROBYN SCHWARTZ  
RETAIL INDUSTRY EXPERT, IBM

# Smell

## Smell Communication

## Smell Recognition



**15** | Smell  
Part 5 of 5

5 PREDICTIONS THAT WILL CHANGE OUR LIVES IN 5 YEARS.

**CONTEXT IS EVERYTHING:**  
OUR BRAINS COMBINE SENSE DATA FROM OUR NOSE WITH INPUT FROM OUR MEMORIES AND OUR OTHER FOUR SENSES TO HELP US MAKE DECISIONS.

HOW DO WE KNOW WHEN SOMETHING DOESN'T SMELL RIGHT?

THE HUMAN NOSE CAN DETECT UP TO A THOUSAND DIFFERENT CHEMICALS.

IN FIVE YEARS, **COGNITIVE COMPUTING** SYSTEMS WILL BE ABLE TO NOT ONLY RECOGNIZE ODORS, BUT PLACE THEM IN CONTEXT TO DRAW CONCLUSIONS AND TAKE ACTION.

FARMERS WILL PLANT SENSORS IN THEIR FIELDS TO SMELL WHEN THE CROPS ARE READY TO BE PICKED.

**"IN FIVE YEARS, COMPUTERS WILL HAVE A SENSE OF SMELL."**  
DR. HENDRIK HAMANN  
RESEARCH MANAGER  
PHYSICAL ANALYTICS, IBM

TINY SMELL SENSORS CAN BE PLACED IN PHONES, BUILDINGS, CARS - ALMOST ANYWHERE.

**ON THE FUTURE ...**

YOUR PHONE WILL BE ABLE TO SMELL WHEN YOU'RE GETTING SICK.

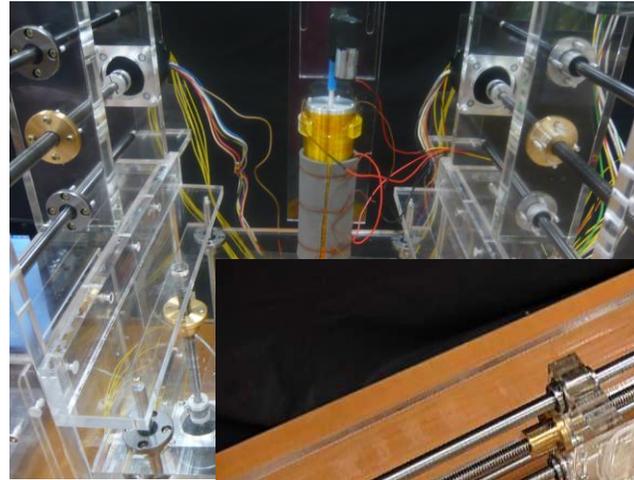
SENSORS WILL SNIFF OUT BACTERIA IN THE FOOD SUPPLY, PREVENTING OUTBREAKS.

HEALTHCARE FACILITIES WILL BE INSTRUMENTED WITH SENSORS TO **DETECT INFECTIONS**.

# Taste

FoodMedia: Communicating through food

Communicating flavors



Adrian Cheok

# Brain Interaction

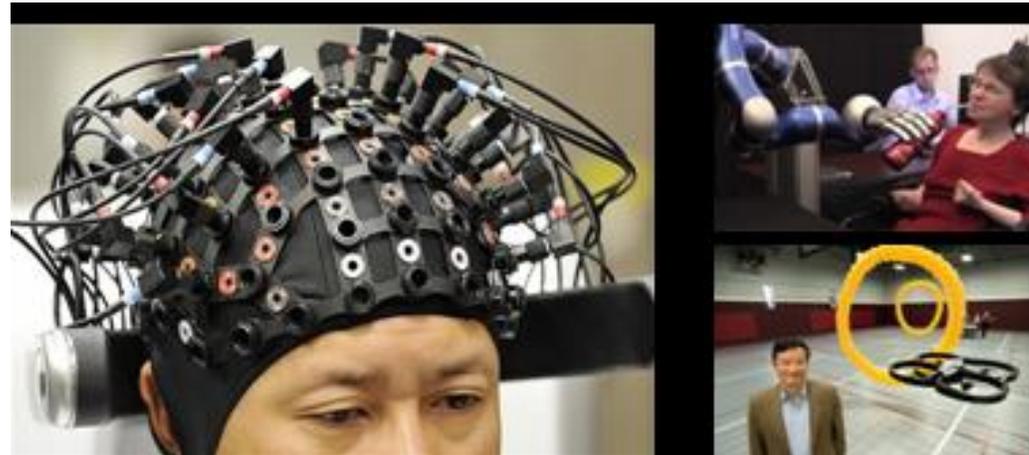
We can command robots, fly helicopters, move prosthetic limbs, play videogames and even send information remotely only using our thoughts



Measures brainwaves via 16 electrodes (push, lifting...can be sensed)



Neurosky detects eye blinking (drowsiness), comfort, meditative states (alpha and beta waves)



The University of Pittsburgh medical school and the University of Pittsburgh Medical Center research team implanted a 6.4cm<sup>2</sup> device into a patient's brain, and succeeded in getting it to control a robot connected to the device.

- Jan Scheuermann, a quadriplegic, was able to control the arm to feed herself chocolates.



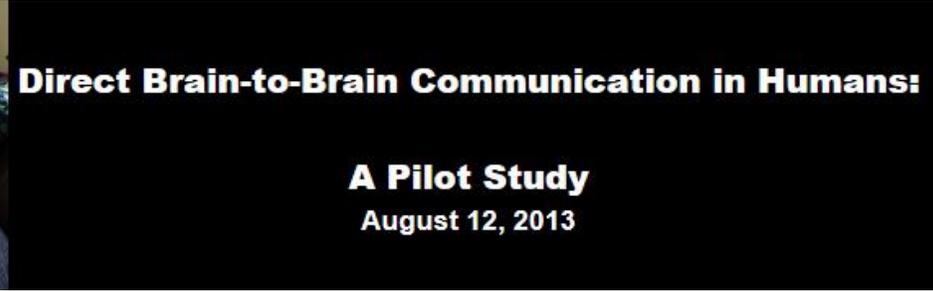
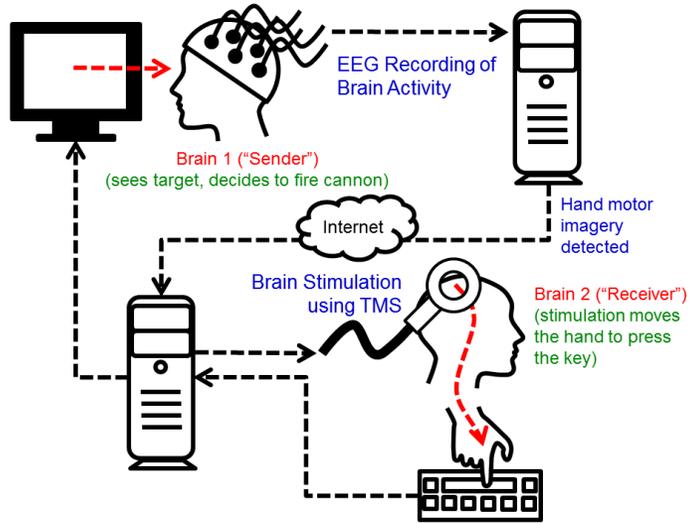
DARPA developed a high-tech system that controls a robot arm attached to the body through brainwaves. Patients can pick up a paper cup or open an aluminum can.

- Devices were connected via a wired connection at first but are now controlled wirelessly.

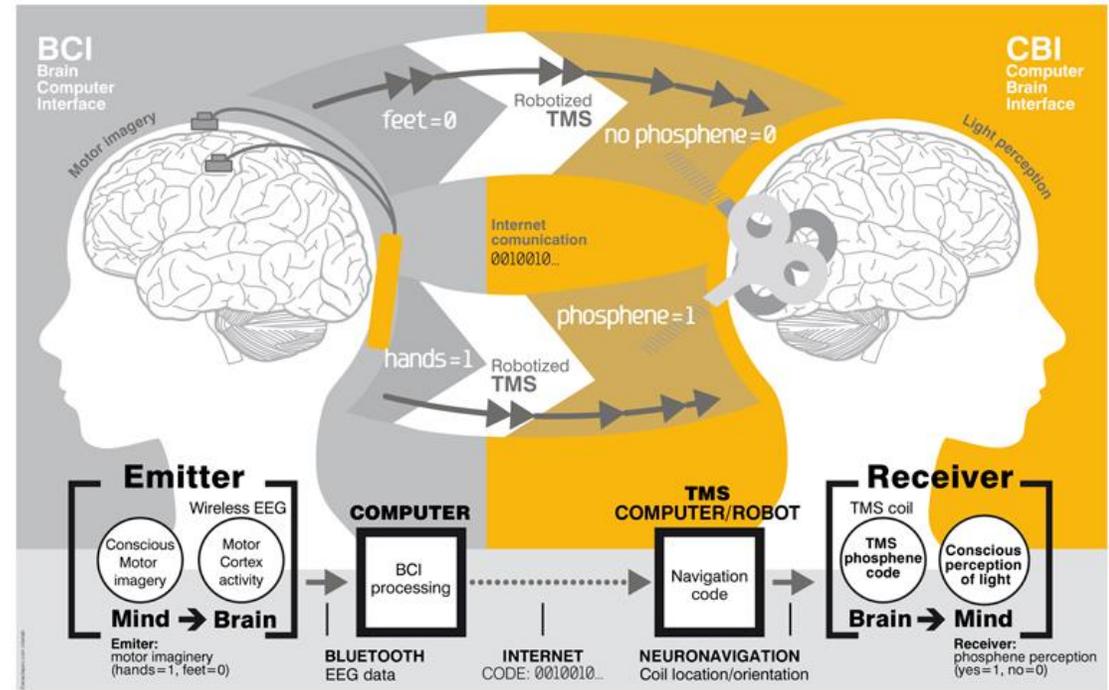


1. Woman with quadriplegia eats chocolates using a mind-controlled robot arm. (December 17, 2012). Science Daily  
2. DARPA closer to brain-controlled prosthesis. (March 20, 2013). Marine Times.

# Brain to Brain Communication



The team, comprising researchers from Harvard Medical School teaching affiliate Beth Israel Deaconess Medical Center, Starlab Barcelona in Spain, and Axilum Robotics in Strasbourg, France, used a number of technologies that enabled them to send messages from India to France -- a distance of 5,000 miles (8046.72km) -- without performing invasive surgery on the test subjects



Grau et al, PLOS One



From dumb smartphones to smart smartphones

Smartphones today are not smart. They have limited intelligence, and a poor ability to understand the user's context (activity, emotional state, tastes, needs...) and adapt to it.

Thanks to significant progress in AI, smart smartphones with increased **context-awareness** will become a reality

## MOBILE, SMART & CONTEXT-AWARE



“ Computing  
is not about  
computers anymore,  
it's about living. ”

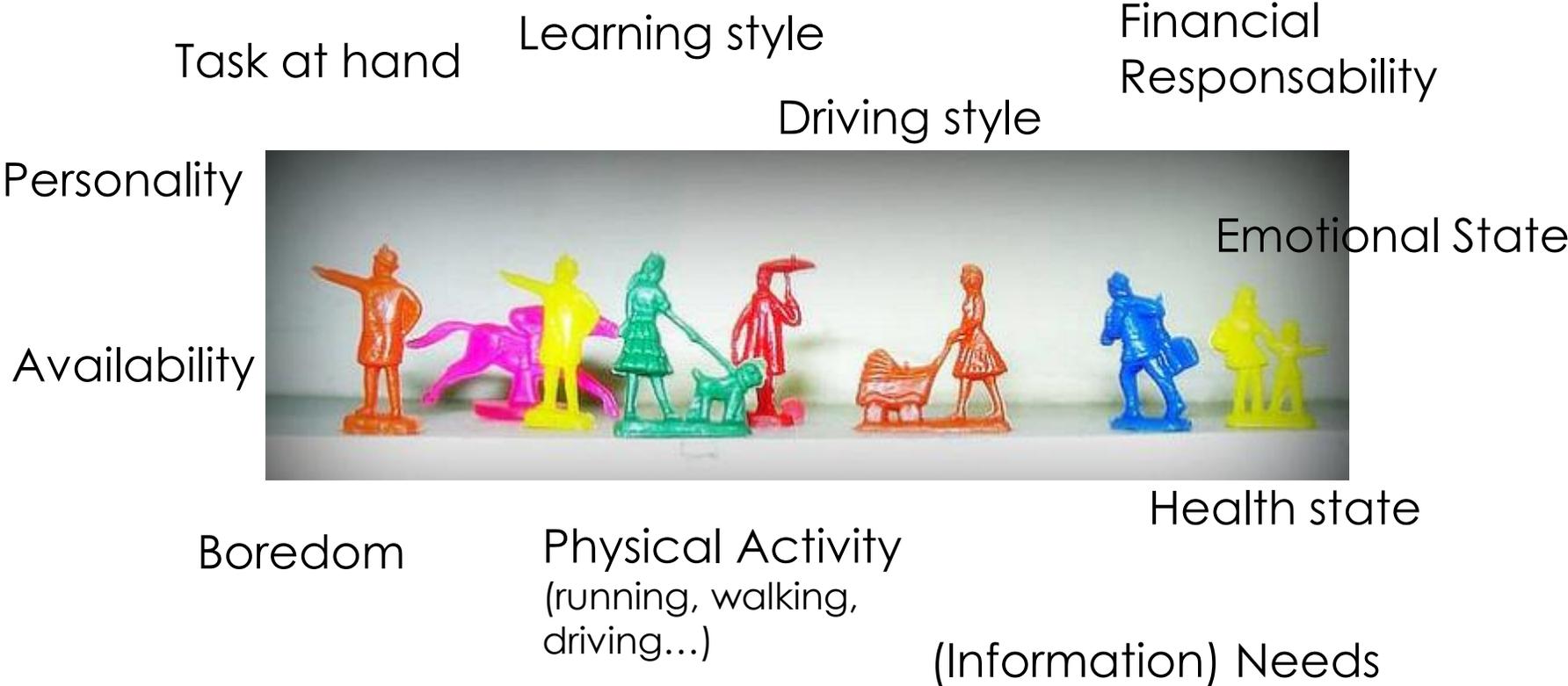
Nicholas Negroponte

### Four Phases of Cognizant Computing (Gartner 2013)

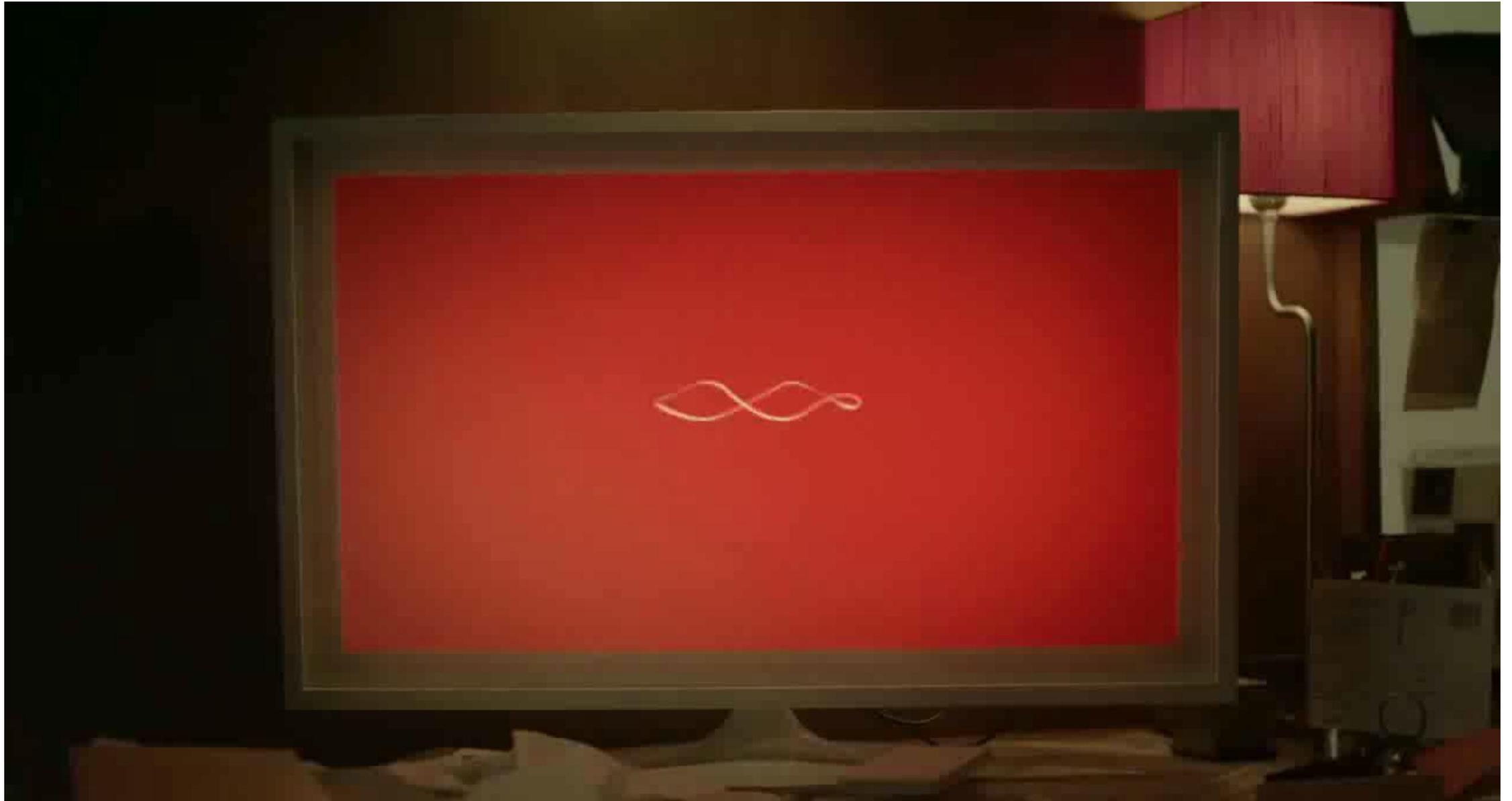
NOW	<b>1 Sync Me</b> Store copies of my digital assets and keep it in sync across all end points and contexts.
	<b>2 See Me</b> Know where I am (and have been) on the Internet and in the real world. Understand my mood and context to better align services.
FUTURE	<b>3 Know Me</b> Understand what I want and need and proactively present it to me.
	<b>4 Be Me</b> Act on my behalf based on learned or explicit rules.



# The dream of an intelligent personal assistant who quietly observes us, understands us and predicts our behavior and needs will be reality



Her



A horizontal sequence of six figures illustrating human evolution. From left to right: a dark-furred monkey-like creature in a crouching, quadrupedal stance; a slightly more upright, dark-furred hominid; a brown-furred hominid with a more pronounced brow ridge and a slightly more upright posture; a brown-furred hominid with a more pronounced brow ridge and a more upright posture; a brown-furred hominid with a more pronounced brow ridge and a more upright posture; and a modern human with a very small brow ridge and a fully upright posture. The figures are set against a plain white background.

Redefinition of WHO we are as a species

# Symbiotic Relationship

- Brain plasticity combined with a strong co-dependency with our devices is leading to brain changes, which is affecting our memory, ability to concentrate/distractability, needs, satisfaction, emotional state and interpersonal relationships
- Without our devices we already feel *naked, unprotected, anxious and paralyzed.*



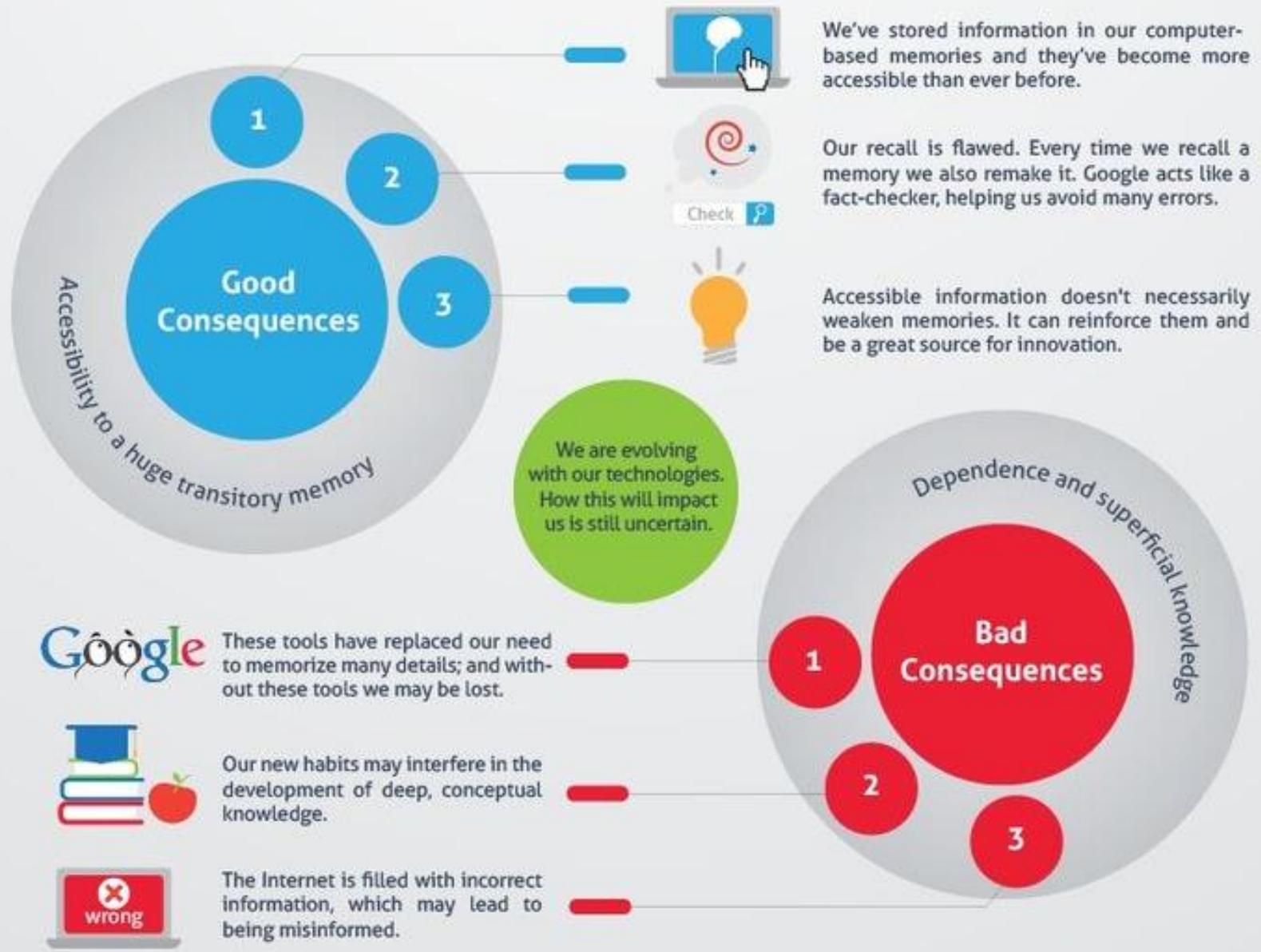
## TEENS REACT FACT:

*I Forgot My Phone* was written by and stars Charlene deGuzman, and was directed by Miles Crawford.



### 3 The consequences

We are becoming symbiotic with our computer tools. We relate to them like they're close friends in whom we can rely. But is that a good or a bad thing?





Children are 50% more likely to experience pain in their fingers and wrists for every hour per day they play video games.



Children who spend more time in front of screens and less time outside have narrower blood vessels in their eyes – an issue that's been linked to cardiovascular disease in adults.



Researchers have described the phenomenon that results when teens spend too much time on social networking sites as "Facebook Depression."



In one study, students couldn't concentrate on their homework for more than TWO minutes without distracting themselves with screens.



61% of obese boys, and 63% of obese girls, reported watching television for two or more hours each day.



An estimated 12.5% of children and adolescents ages 6–19 have suffered permanent damage to their hearing from excessive exposure to noise.



84% of 18- to 24-year-olds admitted to having back pain from being slumped over their phones, known as "iPosture."



Only 20% of adolescents get the recommended nine hours of sleep on school nights, and 45% sleep fewer than 8 hours, in part due to attention-stealing devices.

Sources: Simplyhealth, Journal Pediatrics, American College of Rheumatology, Journal Arteriosclerosis, Thrombosis and Vascular Biology, National Sleep Foundation, Journal of the American Medical Association, Computers in Human Behavior, AAP

THE HUFFINGTON POST

A large crowd of people at night, many holding up their mobile phones, creating a sea of small, glowing screens. The scene is captured from an elevated perspective, showing a dense gathering of individuals. The primary light source is the numerous mobile phones held aloft, which appear as a multitude of small, bright, multi-colored rectangles (blue, white, yellow, red) against the dark background of the crowd and the night sky. The overall effect is a shimmering, pixelated texture of light points.

The mobile phone as a sensor of humanity...

The ubiquity of mobile phones enables us to collect and analyze, for the first time in human history, large-scale aggregated and anonymized human behavioral data of entire cities, countries or even continents

The opportunity is HUGE to help decision making units (governments, UN, Red Cross...) make more informed decisions thanks to the existence of quantitative real-time information about populations

## Big Data from Cheap Phones

Collecting and analyzing information from simple cell phones can provide surprising insights into how

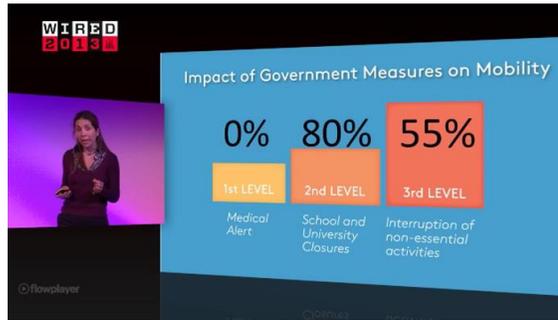


# Big Data for Social Good

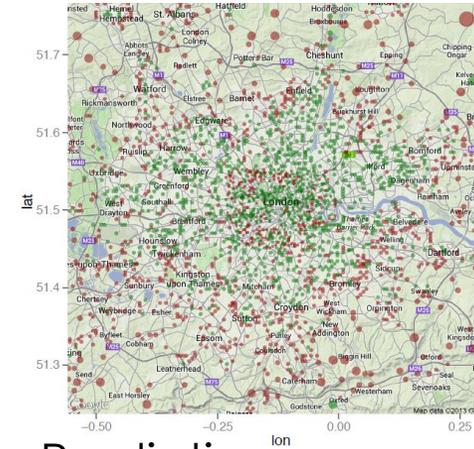
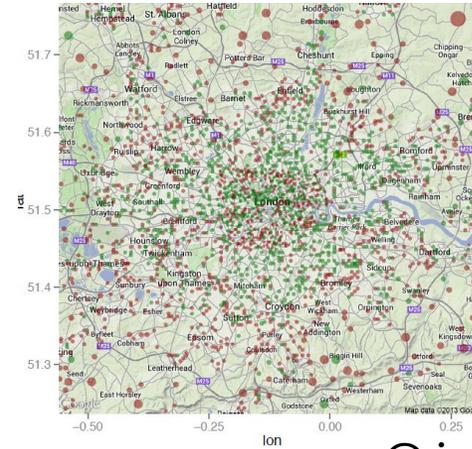
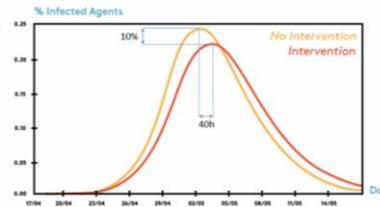
## Nuria Oliver: what big data and the Mexican pandemic taught us | Wired 2013 video

TECHNOLOGY / 17 OCTOBER 13 / by LIAT CLARK

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Wired 2013 Video: Nuria Oliver

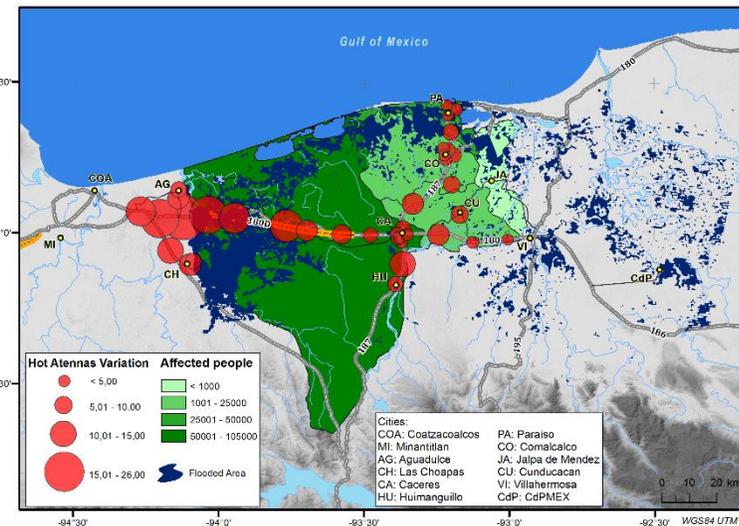
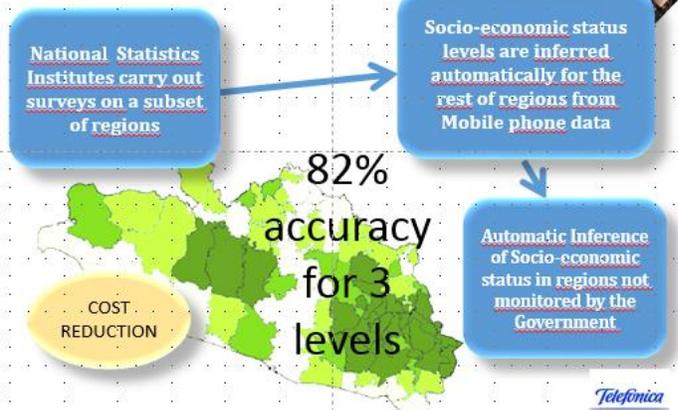


Crime Prediction



<http://www.wired.co.uk/news/archive/2013-10/17/nuria-oliver>

## Socio-economic Level Inference



Analysis of impact of floods



**CONCLUSION**

- The future of mobile computing is the future of computing and will be intimately related to the future of us as a species
- Technology has and will continue to have a tremendous positive impact in our lives, both at the individual and aggregate levels but...
- We need to be aware of the **re-definition of humankind** as we continue to nurture this unprecedented intimate relationship with extremely capable (more capable than ourselves), always on, fully interconnected devices that we carry with us all the time and are embedded everywhere
- As this re-definition happens we can draw on what this symbiotic relationship is going to provide us for social good

# Thanks!

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*Telefonica*

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