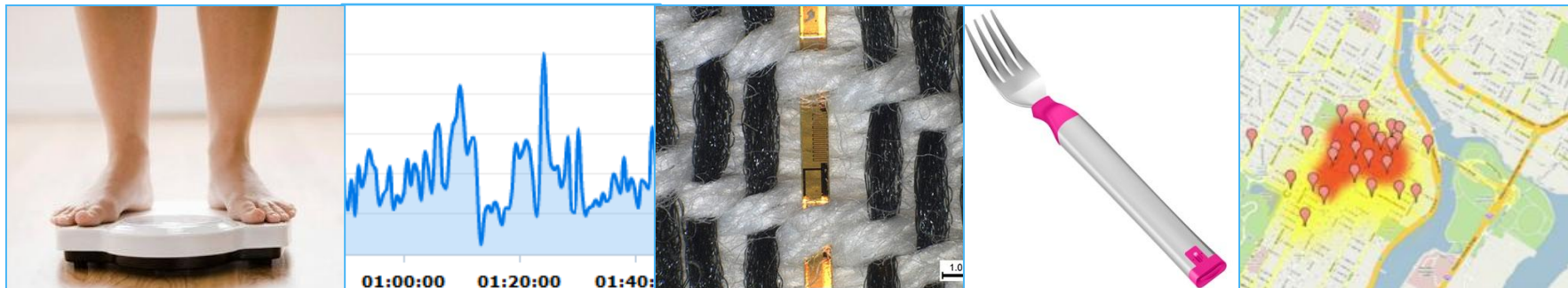


# Track, Share and Compare: Self-Tracking Trends and Opportunities



**Carol E. Torgan, PhD, FACSM**  
**Kinetics :: From lab bench to park bench**

[carol@carotorgan.com](mailto:carol@carotorgan.com)  
[www.caroltorgan.com](http://www.caroltorgan.com)  
Twitter @ctorgan

**SCAN, April 26-28, 2013**

## Disclaimers

**This presentation was developed in my private capacity. The views expressed in this presentation do not represent the views of or endorsement by the United States Government or the National Institutes of Health.**

**The products and tools shown or mentioned are for illustrative purposes only. I do not endorse or recommend any commercial products, processes, or services.**



# Outline

- **What self-tracking is**
- **Who tracks**
- **Why we track**
- **What we track**
- **How we track**
  
- **Sharing and comparing**
- **Issues**
- **Opportunities**
- **The future**



# Self-tracking is ...

## Tracking your life

weight, activity, nutrition, sleep,  
menstrual cycle, heart rate, mood, ....

Also known as:

Life-logging

Data-driven lifestyle

Personal informatics

Personal analytics

Personal monitoring

Living by numbers

Quantified Self (QS)



# “Finally: Self-Tracking is Cool Enough for Viral Advertising”

The image is a screenshot of the Push Snowboarding website. At the top left is the logo for "PUSH SNOWBOARDING" and at the top right is the text "NOKIA x BURTON". Below the logo is a navigation menu with links for "Home", "About", "Riders", "Events", "Tech", and "News". The main content area features a large video player showing a snowboarder in mid-air against a sunset sky. A semi-transparent data overlay is positioned on the left side of the video, displaying the following metrics: SPEED: 26 MPH, HEART RATE: 146 BPM, RUSH: 21+, ORIENTATION: 71°, and PRESSURE: 0MS. The YouTube HD logo is visible in the bottom right corner of the video player.

information aesthetics. *Where form follows data.*

<http://www.pushsnowboarding.com/> <http://www.youtube.com/watch?v=NWAFG4w8-b0>



THE OPRAH  
MAGAZINE

## Great Gizmos

...ne in moderation, self-tracking can be a useful way to  
...ur health. Ask yourself, What do I most want to improve? Then  
...a tool to help you do it. Here are four of Price's favorites:



### FITNESS

The Digifit Connect 2, a transceiver you stick into your Apple device, collects data from a suite of wireless sensors—including ones for your bike and sneakers—so you can adjust your exertion level to reach your fitness goal. (\$50 for the device, \$10 for the app; digifit.com)



### CALORIE-BURNING POWER

The Gruve uses your body's vibrations to measure how many calories you're burning during everyday physical activities (like wrestling with laundry). Bonus: If you sit still for too long, it vibrates to remind you to get moving. (\$179 [includes a one-year subscription]; gruve.com)



### BLOOD PRESSURE

With Withings' Smart Blood Pressure Monitor, you can upload your readings to an iPhone, iPad, or iPod touch and graph trends over the course of a day or a month or a year. The device makes it simple to share your data with your doctor via e-mail. (\$129; withings.com)



### MORNING ENERGY

My favorite feature of the Zoq (the sleep-tracking device) was its alarm: Whereas a traditional alarm sometimes jolts you from a deep sleep (which can leave you groggy), the Zoq beeps at a "natural awakening point" when you're transitioning in or out of REM. (\$150; myzoo.com) —C.P.

PHOTOGRAPHY: WITNESS; DIGIFIT: COURTESY OF DIGIFIT; GRUVE: COURTESY OF GRUVE; ROBERT GARNER/LEICA



blend beauty with cutting-edge technology—and make surprising advancements in the way we live



### NEST LEARNING THERMOSTAT

With its sleek exterior, the Nest has as much in common with an ordinary thermostat as an iPhone 5 does with a Volkswagen. It's a classic in its category that the MIT-based device was designed up by Tony Fadell, a former iMac designer for Apple. The Nest is hungry to learn your habits. After only a week of setting it manually, it begins to automatically adjust the temperature to save energy and suit your daily routine. You'll never return from a trip to a cold house again. \$249



### LYTRO CAMERA

The penlight-sized Lytro emits a green laser beam for the only point-and-shoot. While digital cameras focus on only a single plane with each click of the shutter, Lytro's patented technology captures the complete field of light—tracking the effect of many lenses clicking at once. That means you can focus your pictures after you've taken them. With a single button and touch-screen to scroll through photos, the device is elegant and easy to use. The future of photography looks optical now. From \$399



### MAKERBOT REPLICATOR 2

3-D printing, invented more than a quarter century ago, has been used to create everything from Barbie to monkey wrenches. But until now, the technology for fabricating actual parts from digital models has been prohibitively expensive. With the named version of its Replicator, MakerBot has created a relatively affordable, compact printer that produces objects up to 410 cubic inches in just hours from one of thousands of models on file—via from your own design. From your own custom chair, create a new chair, or any table, lamp, or other object. From \$399



### NIKE+ FUEL BAND

Everyone knows that regular exercise is in this era's zeitgeist. But when your clock face tells for the gym, does an alarm go off, or does the gas pump count as a workout? Nike's FuelBand takes the guesswork out of analyzing your active (or inactive) lifestyle. Also discreetly on the wrist, the device tracks your movements 24 hours a day and tallies units of "NikeFuel" whenever you're walking, the dog, or heading to the gym. Use the FuelBand app to set daily goals, score your weekly activities, and motivate yourself to take the stairs instead of the elevator. \$149

### HÖVING HELM

The helmet being shown here is a... and even with the... aspect of... your... Anon... helmet... features... a... when it fits with... controlling and... is to the... helmet... can... helmet...



### TESLA MODEL S

All right, an automobile from the past century can never be... This elegantly designed luxury... miles on a single charge, nearly... any of its rivals, its... power—0 to 60 in 5.6 seconds... 17-inch touch-screen dashboard. All... at least one electric... in the most important car of the century.



O, The Oprah Magazine, December 2011  
WSJ. Magazine, November 2012

# Who is tracking

## Patients

Acute and chronic health conditions

Asthma

Diabetes

Hypertension

Mental health ...



## Professionals

Athletes

Astronauts

Soldiers

Firefighters

Scientists



# Who is self-tracking



**70%** of American adults are self-trackers (track a health indicator)

**60%** of adults track their weight, diet, or exercise routine

**1/3** of adults track health indicators or symptoms  
(like blood pressure, blood sugar, headaches, or sleep patterns)

**1/3** of caregivers track a health indicator for their loved one

**1/2** track on a regular basis, **1/2** track when something changes



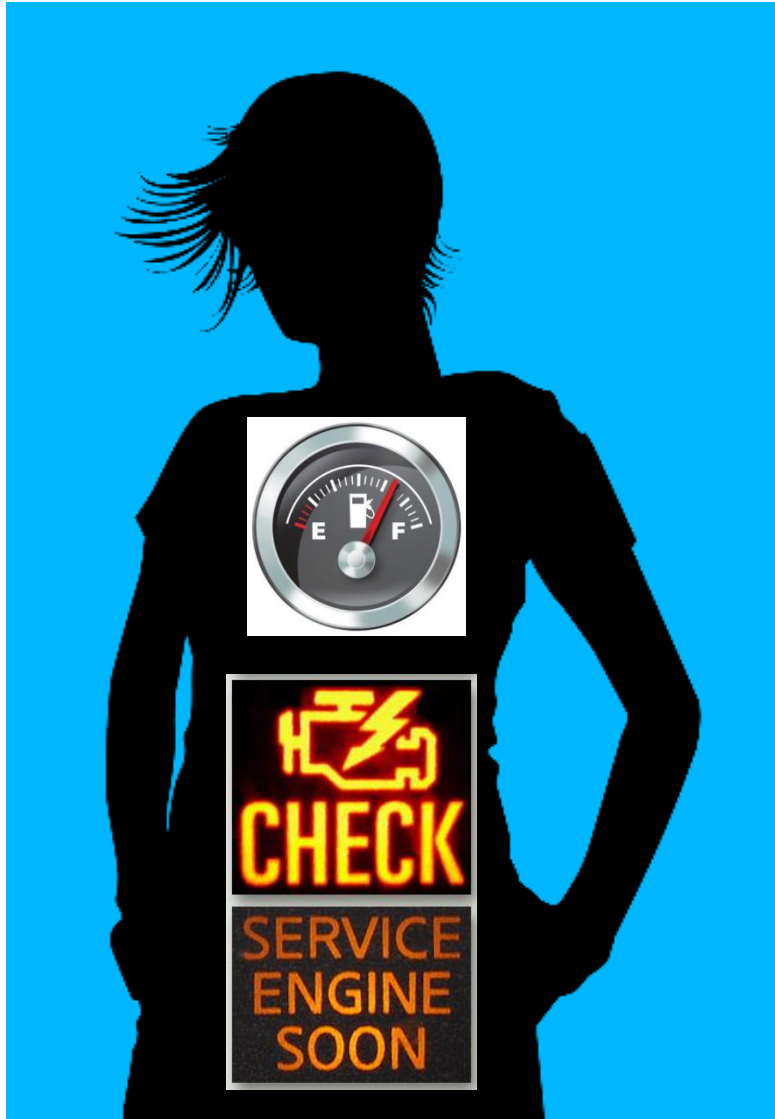
**Patients**

**Professionals**

**Event-driven trackers**



# Why Track?



- **Awareness**
- **Prevention**
- **Management**
- **Specific goal**
- **Behavior change**
- **Motivation**
- **Accountability**
- **Social aspect**
- **Gaming aspect**
- **Because you can**

# Why track?

**“For many self-trackers, the goal is unknown.**

**Although they may take up tracking with a specific question in mind, they continue because they believe their numbers hold secrets that they can’t afford to ignore, including answers to questions they have not yet thought to ask.”**

**– Gary Wolf, *The Data-Driven Life*,  
*The New York Times*, April 26, 2010**

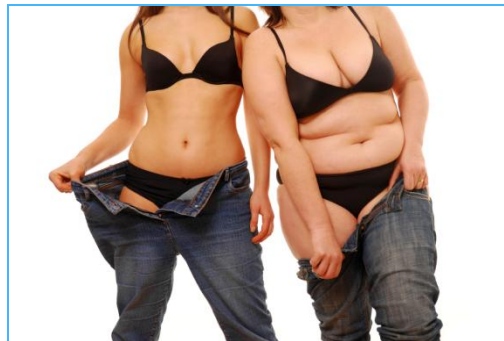
# What do we track?

- **Physiological: chemical, electrical, mechanical, thermal**
- **Behavioral**
- **Environmental**
- **Social**
- **Geographical**
- **Temporal**

# How we track



- Paper and pencil
- “How clothes fit”
- Apps
- Gadgets & sensors
- Images

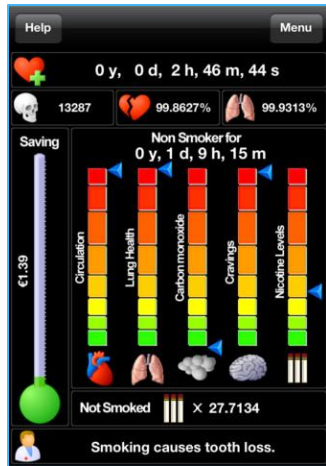


Mon, Oct 19				
Budget	Food	Exercise	Net	Under
2,094	865	-242	623	1,471
<b>Breakfast: 425</b>				
	<b>Cereal, hot</b>		205	>
	¾ Cup			
	<b>Milk, 1%</b>		110	>
	1 Cup			
	<b>Juice, orange</b>		110	>
	8 Fluid ounces			
<b>Lunch: 440</b>				
	<b>Apples, fresh</b>		95	>
	1 Each			
	<b>Sandwich, turkey</b>		346	>
	1 Each			
<b>Exercise: 242</b>				
	<b>Basketball</b>		242	>
	General — 45 Min			

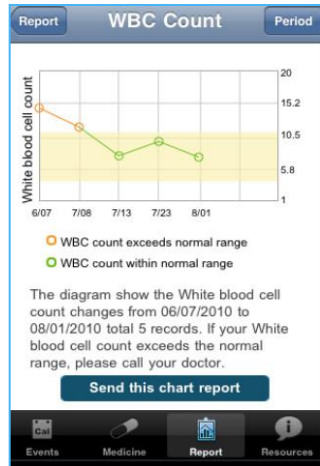
# How we track

- 1/5** technology: device, app, spreadsheet, or website
- 1/3** paper (notebook or journal)
- 1/2** keep track of progress “in their head”  
[skinny jeans trackers]

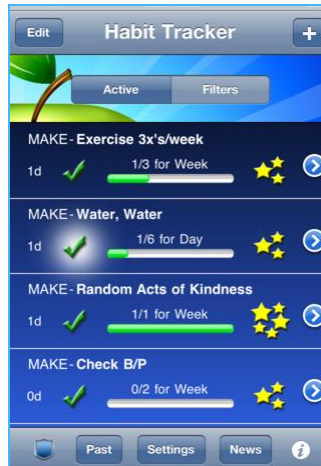
# There's an app for that!



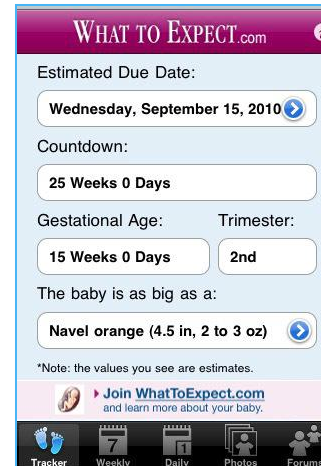
My Last Cigarette



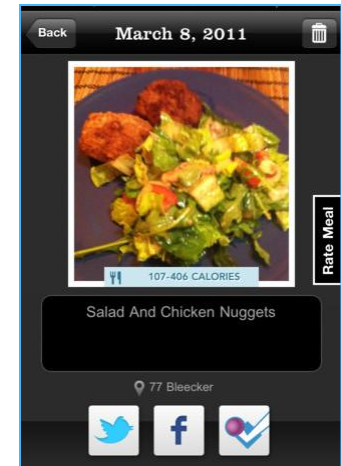
Chemo Calendar



Healthy Habits



Pregnancy Tracker



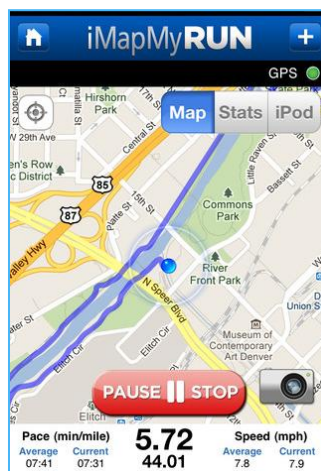
Meal Snap



Period Tracker



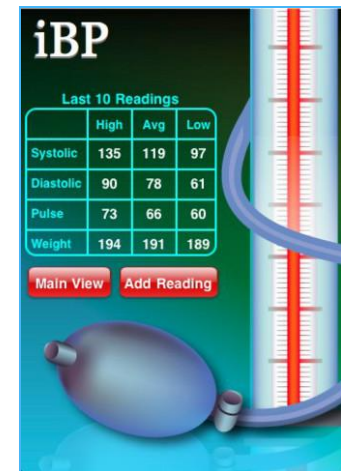
Mole Measure



iMapMyRUN



Glucose Buddy



iBP Blood Pressure

# U. S. Surgeon General's Healthy Apps Challenge Winners

**First Place - Fitness/Physical Activity**  
**Lose It!**



**First Place - Nutrition/Healthy Eating**  
**Fooducate - eat a bit better**  
**GoodGuide Mobile Application**



**First Place - Integrative Health**  
**Healthy Habits (A health & happiness app)**





# Should there be an app for that?

- **Do your clients use apps to track?**
- **Which ones? For how long?**
- **What apps would you like to see?**
- **What features should an app have (or not have)?**
- **Should there be a 'Good Housekeeping' seal of approval for fitness and nutrition apps?**

**Happtique**

**FDA (medical)**

# Sensor technology moves from edges inward

## Patients



## Professionals



# Lactate analyzers: Available from laboratory catalogs AND Amazon



**YSI Life Sciences**  
a xylem brand

Home Products Applications Support Contact About Shop

Home > Products > YSI 2300 STAT Plus Glucose & Lactate Analyzer

### Product Detail



**YSI 2300 STAT Plus™ Glucose & Lactate Analyzer**  
Proven technology for fast, accurate glucose & lactate results in whole blood or plasma

YSI glucose and lactate analyzers have been recognized standards for the measurement of blood glucose and lactate for more than a quarter century. The YSI 2300 STAT Plus is known for its exceptional speed, performance and ease of use. It is a laboratory glucose and lactate analyzer designed for flexibility. Measure glucose and lactate simultaneously in whole blood or plasma. Alternatively, configure the analyzer to measure glucose only or measure lactate only. Requires only the sensor and reagents for the chemistry you need.

enlarged view



**amazon** Today's Deals | Gift Cards

Shop by Department Sports & Outdoors Athletic & Outdoor Clothing

Search Sports & O



Lactate Pro

# Sensors that connect to the body



## Pedometers

spring-lever movement  
steps, calories burned



## Actigraph

triaxial (3D) accelerometer  
inclinometer  
steps, energy expenditure  
intensity, body position, METs



# Examples of companies that cater to wellness programs

## Body Media

skin temp, galvanic skin response,  
heat flux, 3-axis accelerometer  
(calories burned, steps taken,  
activity levels, sleep efficiency)



## Fitbit

accelerometer, altimeter  
steps, distance, calories burned  
(Zip shown)



# You are ~~what~~ how much you eat

## Bite Counter

tracks wrist motion to count bites  
estimates calories



## HAPIfork

measures "fork servings"/minute  
intervals between fork servings  
how long it takes to eat a meal



# Tracker Ecosystems

## Nike+ Fuelband (wrist)

3D accelerometer  
light sensor, LED lights  
steps, calories, 'NikeFuel'



## Zeo (headband) \*

electrical signals  
sleep patterns, sleep quality score 'ZQ'





# Wearable sensors

Attach to clothing or integrate into fabric

e-fibers

smart clothing

interactive clothing

e-textiles

smart textiles

interactive textiles

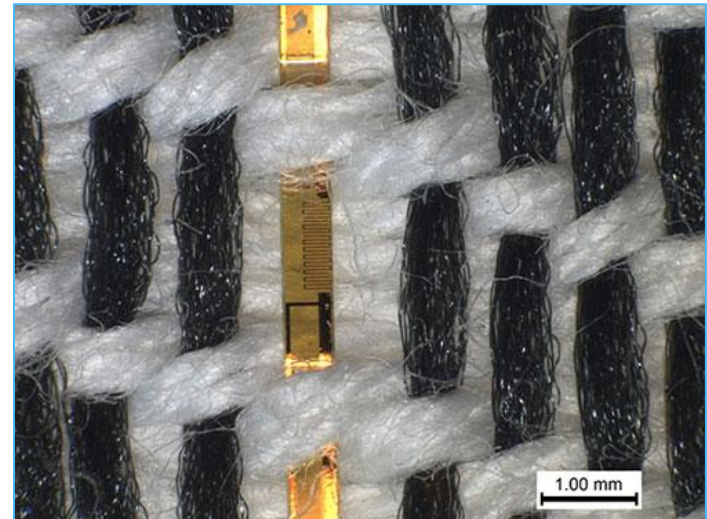
e-fabrics

smart fabrics

Unobtrusive, direct skin contact

Need to bend, stretch, drape

Be washable, light weight



Smart textiles: the woven plastic fibers with integrated temperature sensors  
Photo: K. Cherenack / ETH Zurich

# MagIC (Maglietta Interattiva Computerizzata) Vest

Embedded sensors made of  
conductive fibers  
Heart rate, breathing rate  
3D accelerometer  
Washable, front or side opening

**Mount Everest climbers**  
polypropylene / telemonitoring



**Congestive heart failure patients discharged from hospital**  
wore in homes few minutes each day for a month  
data viewed remotely by a cardiologist  
**Patients felt “safely supervised” and requested to continue monitoring!**

# Screen-print sensor onto fabric: Smarty pants

Carbon sensor arrays on elastic band of underwear

Tight contact, direct skin exposure  
Sensors survive large deformations

Electrochemical detection of sweat  
(hydrogen peroxide, ethanol, lactate)



# Textiles

## TeKila Dress

Tequila viewed under the microscope inspired geometric patterning & colors

100 LEDs

100 Laser cut, etched acrylic pieces

An accelerometer on the dress detects the movement of the wearer, which changes the color, pace and pattern of the lights



# Sensors on your skin

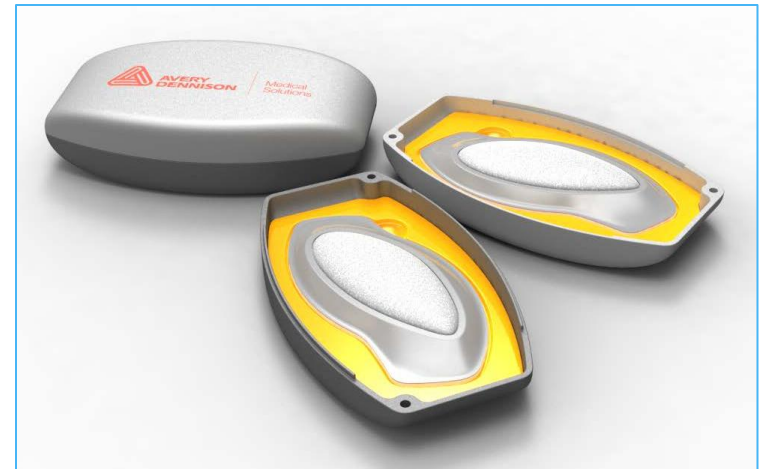
## Zio Patch

Continuous cardiac monitoring  
(up to 14 days)  
Detect arrhythmias

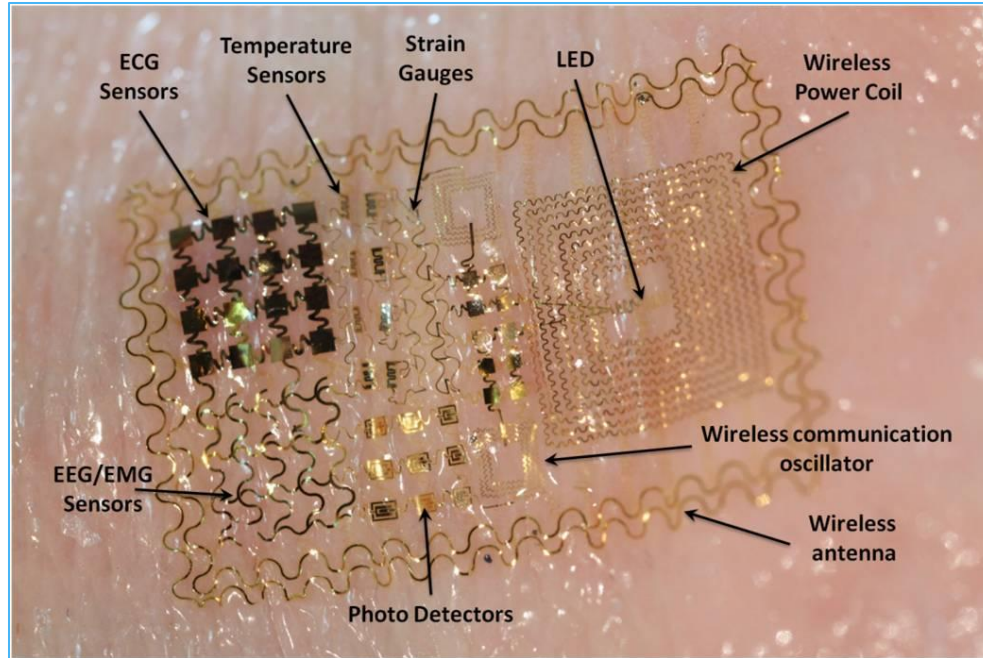


## Metria Wearable Sensor Technology

Disposable patch  
Heart and breathing rates, steps,  
Sleep duration, activity levels



# Sensors on your skin



**Foldable, stretchable electronics**

**John Rogers, UIUC**

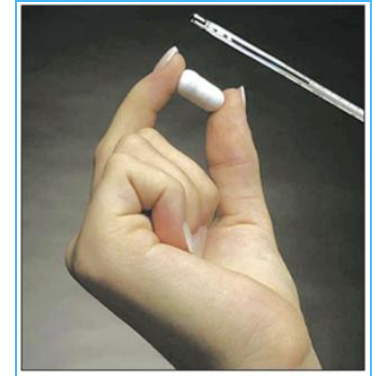
**Todd Coleman, UCSD**

# Ingestible & implantable sensors

## Ingestible core body thermometer pill

Pill in system 18-30 hours

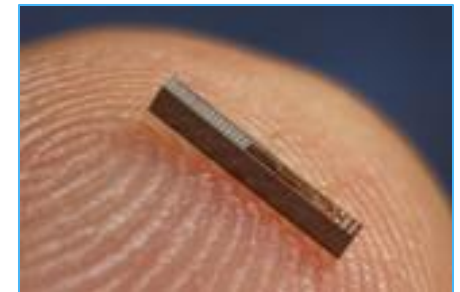
Johns Hopkins Applied Physics Lab + NASA



## Blood pressure sensor

Femoral artery in groin

Fraunhofer-Gesellschaft



## Implantable chip for personal blood testing

Enzymatic detection of substances such as lactate, glucose, troponin, ATP

Ecole Polytechnique Fédérale de Lausanne  
(In development)



# Visual tracking




## 'Weight loss' on Flickr




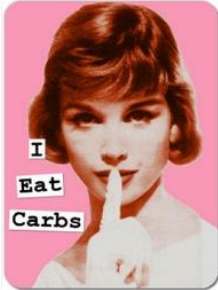
Photos courtesy of Flickr, clockwise L to R: uneduex, 157/365; Christi Nielsen, Diet; bark, 40+290 Notch; Vernon\_White, Weight\_Loss\_Montage\_2009-03-04\_side



# Pinterest

Search    Add + About ▾  Carol ▾


 **Sarah Reynolds** [Unfollow](#) 182 followers, 54 pins




**I Eat Carbs**

Favorite Secret

laurenconrad.com

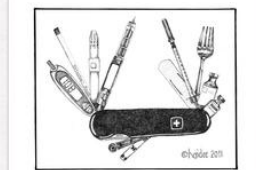


Glooko App Downloads Data From Major Glucose Meters To Help Track Diabetes || If you suffer from Diabetes you might be interested in a new iPhone application that allows you to download your readings directly from any of the 6 major glucose monitoring devices on the market using a specially designed connection cable. There are plenty of glucose monitoring applications already available on Apple's app store but almost all require manual inputting of the data. This is what makes the Glooko system and app different.




the optimist sees the glass as half full...  
the pessimist sees the glass as half empty...  
the diabetic just silently prays "there's enough left to cover a tremendous self embarrassing situation."

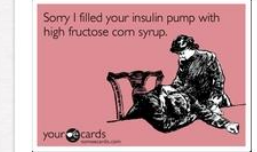
so true  
5 repins  
tumblrhetics.tumblr.com



7 repins  
igotthebeetus.tumblr.com




truth.  
1 like 6 repins  
igotthebeetus.tumblr.com



Sorry I filled your insulin pump with high fructose corn syrup.

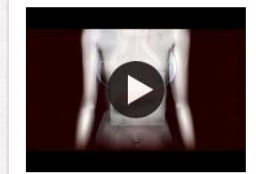
april fools?  
1 like 6 repins  
igotthebeetus.tumblr.com




Parents get belly tattoos to support son on insulin pump for Type 1 diabetes

In short, he told his parents that he felt different cause of wearing an insulin pump.

These parents are amazing!!  
2 likes 14 repins  
iwastesomuchtime.com

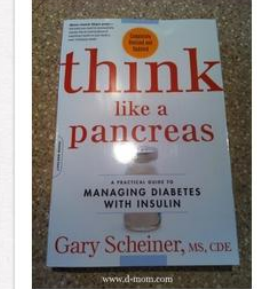


diabetes overview  
youtube.com



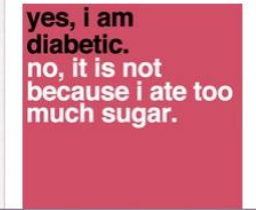
Why my insulin pump kicks your cellphone's butt

From Diabetes Daily...  
2 likes 3 repins  
diabetesdaily.com

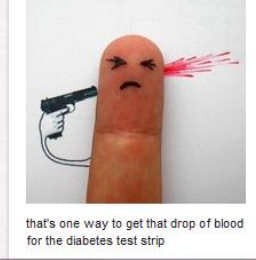


think like a pancreas  
A PRACTICAL GUIDE TO MANAGING DIABETES WITH INSULIN  
Gary Scheiner, MS, CDE  
www.d-mom.com

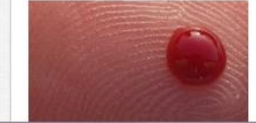
Think Like a Pancreas is my go-to diabetes book. A new edition was just released. Read more...  
1 like 1 repin  
d-mom.com




yes, i am diabetic.  
no, it is not because i ate too much sugar.



that's one way to get that drop of blood for the diabetes test strip





<http://pinterest.com/>  
<http://pinterest.com/sarahireynolds/the-sugar/>



# **What's your ideal tracker?**

**What would it measure?**

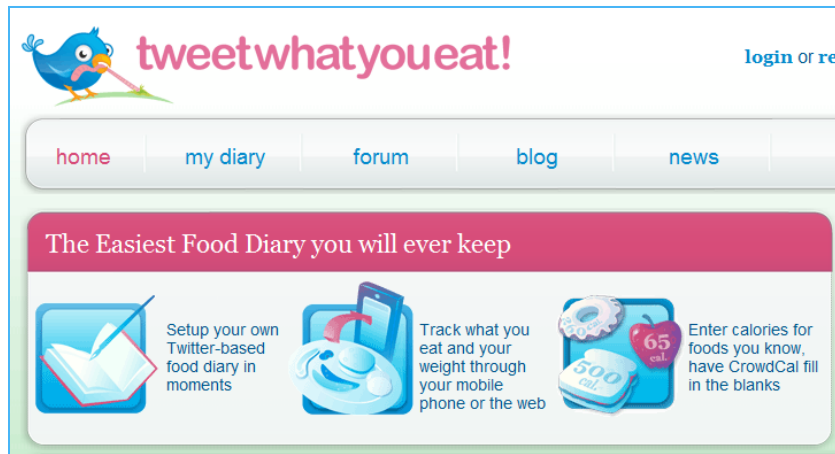
**Where would it attach? (visible or hidden?)**

**What features would it have?**

**How expensive would it be?**

**How accurate should it be?**

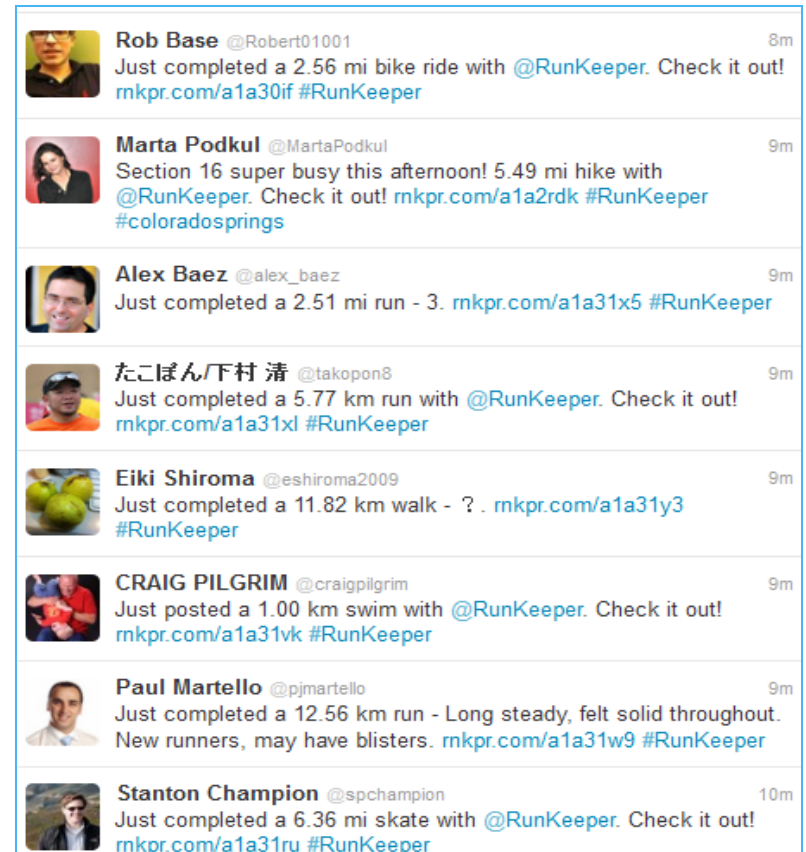
# What to do with the info: Share & Compare



The screenshot shows the website for "tweetwhatyoueat!". At the top left is a blue bird logo with a pencil in its beak. The text "tweetwhatyoueat!" is in pink. To the right is a "login or register" link. Below this is a navigation bar with buttons for "home", "my diary", "forum", "blog", and "news". A large pink banner reads "The Easiest Food Diary you will ever keep". Below the banner are three icons with text: 1. A notebook icon: "Setup your own Twitter-based food diary in moments". 2. A mobile phone icon: "Track what you eat and your weight through your mobile phone or the web". 3. A stack of papers icon: "Enter calories for foods you know, have CrowdCal fill in the blanks".



This screenshot shows a vertical list of tweets. The first tweet is from "oishi" (11:10 AM Mar 8th) mentioning weight (52.7 kg) and #withings. The second is from "Blogiy @ReinhardJung" (9:37 AM Mar 8th) about abspecken. The third is from "takuo\_jp" (9:13 AM Mar 8th) about weight (52.9Kg) and body fat percentage (7.721%). The fourth is from "tomoakisugiyama" (4:21 AM Mar 8th) about weight (64.8kg) and #withings. The fifth is from "yoneapp" (7:00 PM Mar 7th) about weight (72.0 kg) and #withings.




This screenshot shows a vertical list of tweets. The first is from "Rob Base @Robert01001" (8m) about a 2.56 mi bike ride with @RunKeeper. The second is from "Marta Podkul @MartaPodkul" (9m) about a 5.49 mi hike with @RunKeeper. The third is from "Alex Baez @alex\_baez" (9m) about a 2.51 mi run with @RunKeeper. The fourth is from "たこぼん/下村 清 @takopon8" (9m) about a 5.77 km run with @RunKeeper. The fifth is from "Eiki Shiroma @eshiroma2009" (9m) about an 11.82 km walk with @RunKeeper. The sixth is from "CRAIG PILGRIM @craigpilgrim" (9m) about a 1.00 km swim with @RunKeeper. The seventh is from "Paul Martello @pjmartello" (9m) about a 12.56 km run with @RunKeeper. The eighth is from "Stanton Champion @spchampion" (10m) about a 6.36 mi skate with @RunKeeper.

[www.tweetwhatyoueat.com](http://www.tweetwhatyoueat.com), Twitter: #Withings, #RunKeeper


# Track, share, compare

LATEST NIKE ACTIVITY


See what's happening in Nike+ around the world.



24280575 Daily Goals Hit



5512903 Achievements Earned



2168485072 Miles Run

JOIN THE NIKE+ COMMUNITY

TOTAL CALORIES 48,287,102,701 [JOIN NOW](#)

<http://nikeplus.nike.com/plus/>

# MAKE EVERY MOVE COUNT.



## ActiveLink™

Activity has always been a big part of the Weight Watchers plan — now there's ActiveLink, a state-of-the-art Activity Monitor and Website that counts every move you make and motivates you to move more!

Buy now

See below for details

## HOW IT WORKS

### 1 IT SETS YOUR GOALS

Wear the Activity Monitor for 8 days to get an accurate assessment of your current activity level. ActiveLink will learn about you and your moves, then create customized goals depending on how active you are.

### 2 IT TRACKS YOUR ACTIVITY

Simply take ActiveLink with you wherever you go, and its 3-way accelerometer will track your moves and convert them into activity **PointsPlus** values. Plug the monitor into your computer and it automatically syncs with your Weight Watchers Online Plan Manager.

### 3 IT MOTIVATES YOU TO BE ACTIVE

ActiveLink creates customized 12-week Challenges to help you get more active. Your goals gradually increase over time, and you might see yourself getting more active without even thinking about it. Plus, receive activity tips to keep you moving and motivated.

PHILIPS | WeightWatchers®

[www.weightwatchers.com](http://www.weightwatchers.com)

**1 in 4 internet users living with chronic conditions has looked online for someone with similar health concerns.**

[www.patientslikeme.com](http://www.patientslikeme.com)

Peer-to-peer Healthcare, Pew Internet, Feb 2011 [www.pewinternet.org/Reports/2011/P2PHealthcare.aspx](http://www.pewinternet.org/Reports/2011/P2PHealthcare.aspx)

My Asthmapolis

**ASTHMAPOLIS**  
Outsmarting asthma, together.

Our Solution About Us Data Privacy Blog Press Support Contact

**WHAT IS ASTHMAPOLIS?**

00:48 vimeo

**Better Manage Your Asthma**  
**For Patients**  
Experts recommend that people with asthma track their symptoms, triggers and use of asthma medications. The Asthmapolis sensor and mobile application can help you learn more about and better manage your asthma.

**Remote Monitoring and Management**  
**For Providers**  
Healthcare providers who remotely monitor asthma symptoms and the use of medications by their patients can identify those in need of additional attention, and help them achieve better asthma control.

**Reduced Costs and Improved Quality**  
**For Payers**  
Asthma is the 5th most costly condition in the US estimated at \$56 billion annually. Improved asthma control reduces the cost of treating asthma by eliminating unnecessary hospitalizations, ED visits, and office visits.

**Spiroscout  
Attaches to inhalers  
Automatically tracks  
time & location  
of inhaler use**



<http://asthmapolis.com/>



# Track, share, compare, publish

A screenshot of a journal article page from Nature Biotechnology. The top section features the journal's logo in white text on a dark green background, with a stylized circuit board pattern in the background. Below the logo is a navigation breadcrumb trail: 'nature.com > journal home > archive > issue > computational biology > analysis > abstract'. Underneath is the journal's name and issue information: 'NATURE BIOTECHNOLOGY | COMPUTATIONAL BIOLOGY | ANALYSIS'. The main title of the article is 'Accelerated clinical discovery using self-reported patient data collected online and a patient-matching algorithm'. The authors listed are 'Paul Wicks, Timothy E Vaughan, Michael P Massagli & James Heywood'. There are links for 'Affiliations', 'Contributions', and 'Corresponding author'. At the bottom, the publication details are: 'Nature Biotechnology 29, 411–414 (2011) | doi:10.1038/nbt.1837' and 'Received 02 April 2010 | Accepted 10 March 2011 | Published online 24 April 2011'.

nature  
biotechnology

nature.com ▶ journal home ▶ archive ▶ issue ▶ computational biology ▶ analysis ▶ abstract

NATURE BIOTECHNOLOGY | COMPUTATIONAL BIOLOGY | ANALYSIS

Accelerated clinical discovery using self-reported patient data collected online and a patient-matching algorithm

Paul Wicks, Timothy E Vaughan, Michael P Massagli & James Heywood

Affiliations | Contributions | Corresponding author

*Nature Biotechnology* 29, 411–414 (2011) | doi:10.1038/nbt.1837  
Received 02 April 2010 | Accepted 10 March 2011 | Published online 24 April 2011

**Study of patients with amyotrophic lateral sclerosis (ALS) who tried lithium carbonate treatment off-label through their physicians**

<http://www.nature.com/nbt/journal/v29/n5/abs/nbt.1837.html>

# Issues

**Cost**

**Ease of use**

**Accuracy, reproducibility**

**Range, response time**

**Tissue compatibility, safety**

**Clinically relevant information**

**Literacy & numeracy**

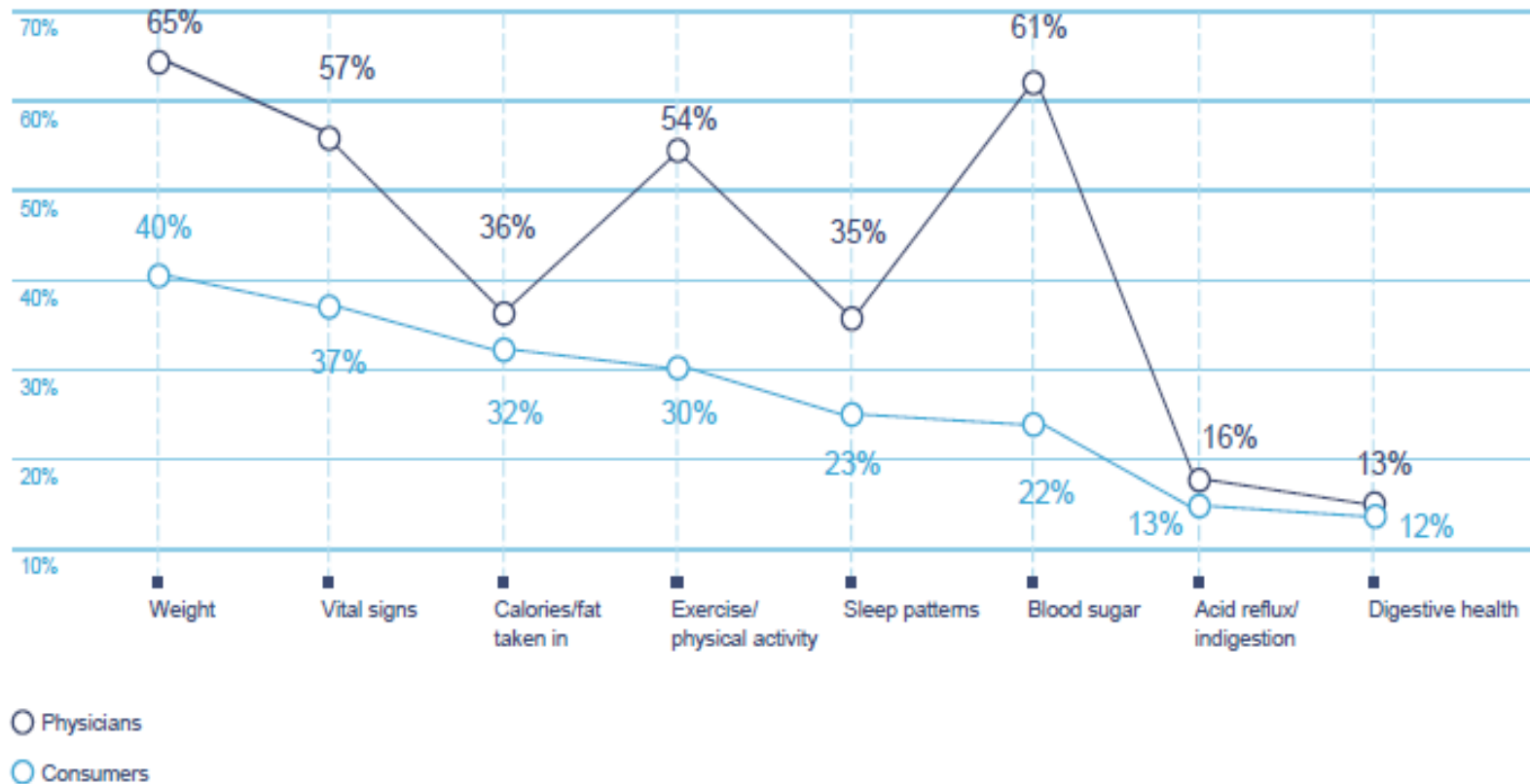
**Status vs. Stigma**

**Security**

**Privacy**

# What *can* be tracked vs. What *should* be tracked

Figure 5: What consumers and physicians want to track regarding health



# Accuracy

**Sensors are like real estate: Location matters!**



**“Jawbone UP gives me 2,025 steps for 20 mins of drumming to REM and Smash Pumpkins. [yfrog.com/mqrzudp](http://yfrog.com/mqrzudp)” @dvansickle, Twitter**

# Status vs. Stigma



# Unhealthy track, share, compare

Pro-anorexia nervosa “pro-ana” communities



# Data visualization

Cause and effect vs. correlational

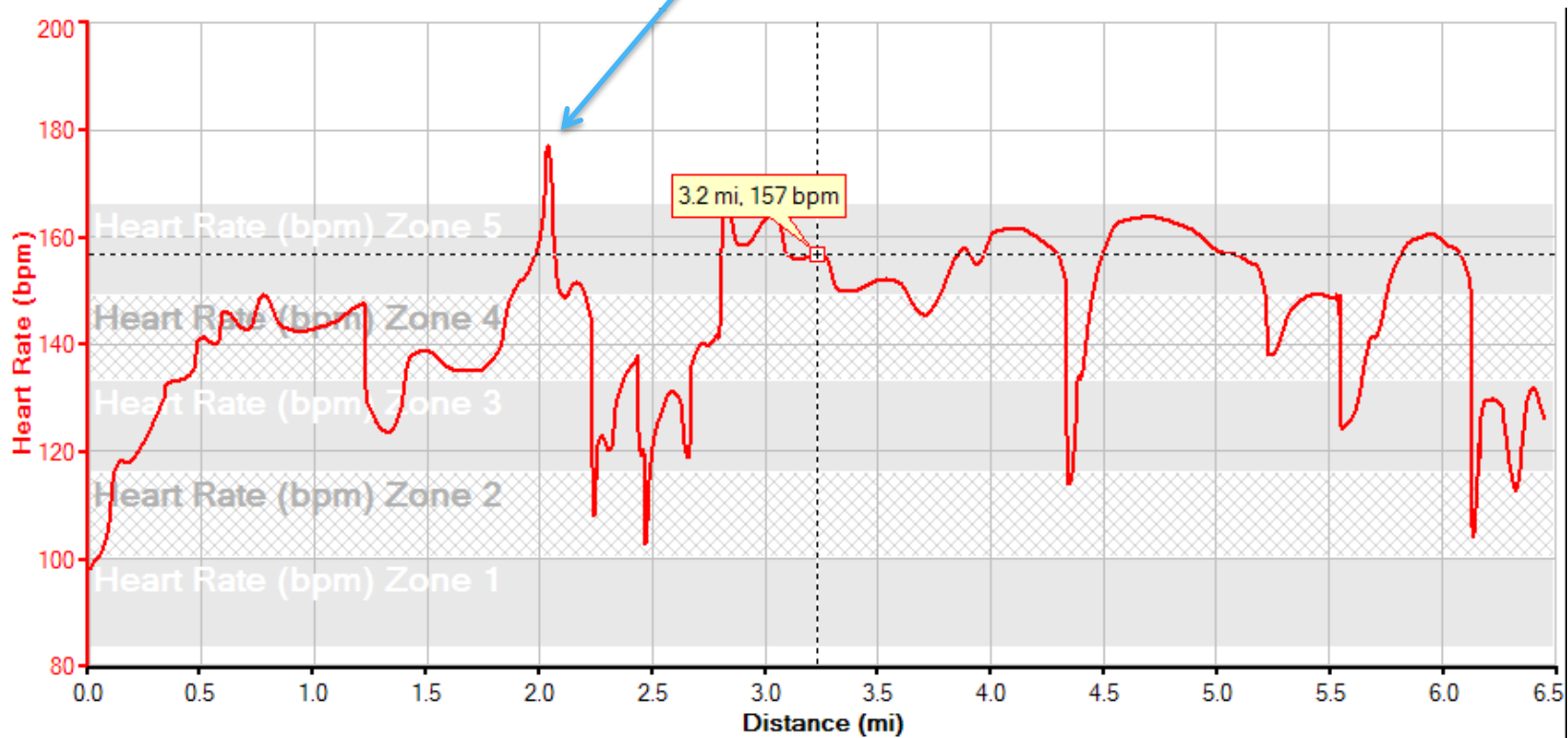
False positives / false negatives

Signal vs. noise



Photo courtesy of Chris.T. (Eng) on Flickr

???





# Health Literacy

—the degree to which a person can obtain, process, and understand basic health information and services needed to make appropriate health decisions.

**Nearly 9 out of 10 adults** have difficulty using everyday health information that is available in health care facilities, retail outlets, media, and communities.

*Innovations in Health Literacy - Workshop Summary*  
March 10, 2011 Institute of Medicine Report

# Health Numeracy

**“In general, I feel uncomfortable with health information that has a lot of numbers and statistics.”**

**54% strongly or somewhat agree**

**44% strongly or somewhat disagree**

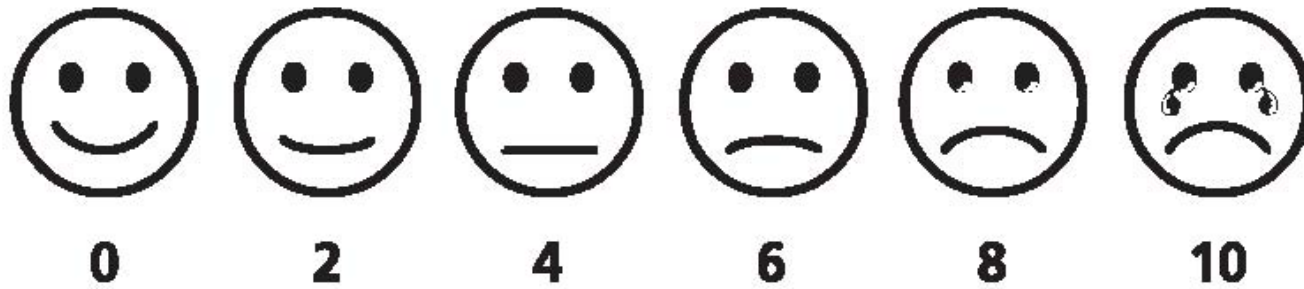
**“In general, I depend on numbers and statistics to help me make decisions about my health.”**

**57% strongly or somewhat agree**

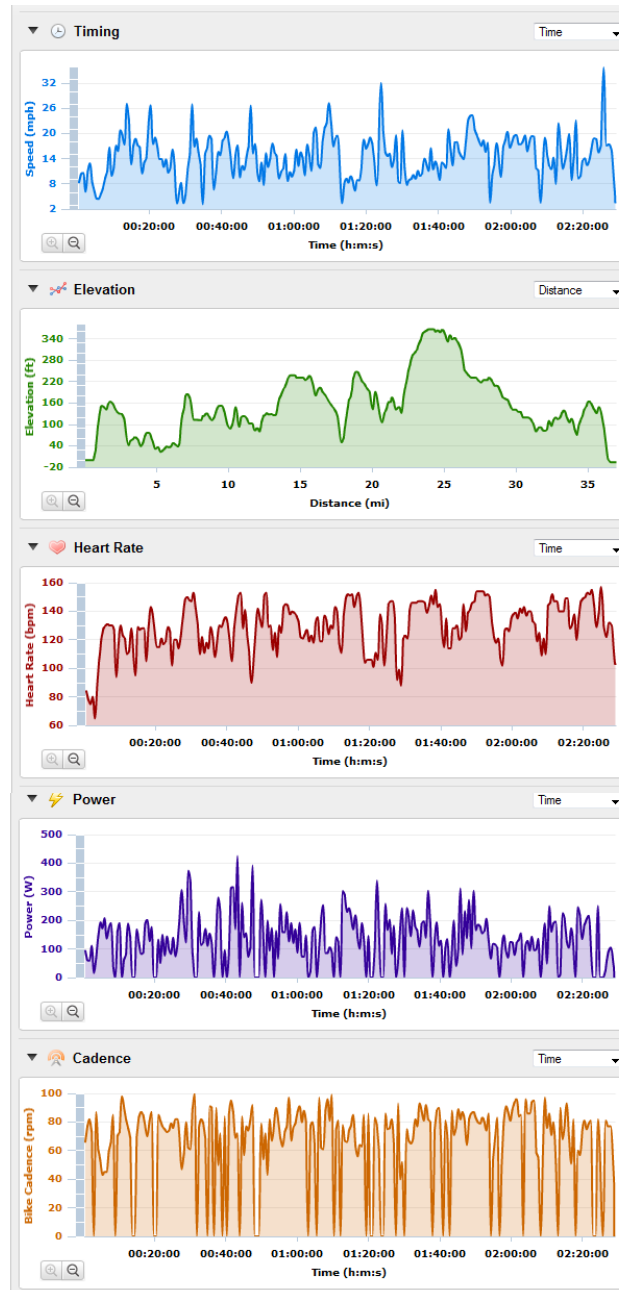
**42% strongly or somewhat disagree**

**Health Information National Trends Survey (HINTS), 2007**

## Pain Scale



**Speed**  
**Elevation**  
**Heart rate**  
**Power**  
**Cadence**



**Opportunities!**

# Data coaches

When asked about the last time they had a health issue,

**70%** of adults in the U.S. say they received information, care, or support from a health professional.



# Corporations

## Workplace disease prevention & health promotion programs

**Amt spent on programs: \$1.00**

**Medical costs fall \$3.27**

**Absenteeism costs fall \$2.73**



# Opportunities: kids, tweens, teens



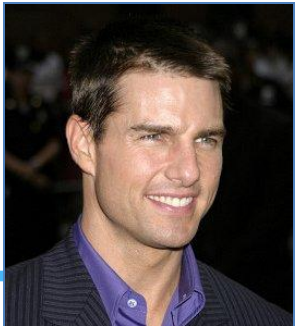


# Opportunities: Baby Boomers

**~78 million baby boomers**

**“Boomers want to shape the technology they use, unlike younger generations who allow their lives to be shaped by it.”**

**– Michael Rogers, Practical Futurist, in MIT Enterprise Forum Northwest Report**



# Global: Noncommunicable diseases - NCDs (cardiovascular, respiratory, diabetes, some cancers)



Photo courtesy of Gates Foundation on Flickr

# Prescribe self-tracking

**Could your clients benefit by tracking?**

**What would/should they track?**

**What are the desired outcomes?**

**What types of tracking might work best for them?**

**What communication styles are best for them?**

**Would they benefit by joining a tracking community?**

**How much time and money are they (and you!) willing to devote?**



# **The future of self-tracking**

# Mobile

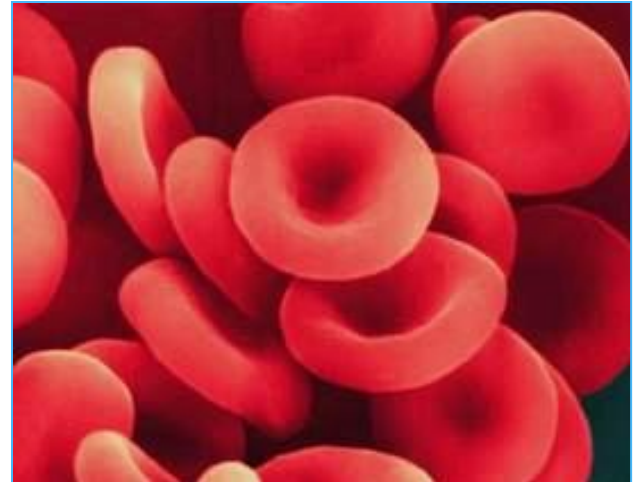
**Is the mobile phone the perfect self-tracking device?**

**Camera  
Microphone  
Video  
Location  
Apps  
Text  
Community  
24/7**

# The future of sensors

**“What used to take up a building  
now fits in my pocket,  
and what fits in my pocket  
will fit inside a blood cell in 25 years.”**

**– Ray Kurzweil, inventor and futurist**



# Microbiome

# e-textiles



# Nanotechnology

# Wearable Tech Pinterest Board

Search

**Pinterest** Add + About ▾ Carol ▾

**Pin 1:** **DIY pressure sensors - Felt with conductive thread to create electronic textiles sensors. From Lynne Bruning. DIY is the future of wearable tech!**  
2 repins  
libruning.com

**Pin 2:** **Implantable, wireless sensor ("neural interface microsystem") to record and transmit #Brain activity. Titanium. Verification & validation study, David Borton et al. Brown Univ, J. of Neural Engr #BCI**  
1 like 4 repins  
iopsience.iop.org

**Pin 3:** **ProfessionalCare SmartSeries 5000 Electric Toothbrush from Oral-B. "Wireless SmartGuide helps maximize brushing performance ... pressure sensor stops pulsations when brushing too hard." The guide includes timer, pressure control, various modes such as 'daily clean', 'sensitive', 'massage' and 'whitening.' Comes with a user guide.**  
3 likes 7 repins  
oralb.com

**Pin 4:** **Wireless implantable passive resonator sensor. Measures force as an indicator of healing in orthopedic implants. Could be integrated into spine fusion implants, fracture fixation implants, and total joint prostheses (such as knee). Eric Ledet, Rensselaer Polytechnic Institute (link goes to intriguing article) #bone**  
2 repins  
bonezonepub.com

**Pin 5:** **IntelliTum (Intelligent Implant for Tumor Monitoring). Electronic sensor chip implanted close to a tumor. Measures dissolved oxygen concentration, wirelessly transmits info to a receiver carried by the patient. Bernhard Wolf, Technische Universitaet Muenchen (TUM) [in development in 2011] #cancer**  
1 repin  
portal.mytum.de

**Pin 6:** **"Hyper-IMS" (Intravascular Monitoring System for #Hypertension Patients) project. Blood pressure sensor to be placed in the femoral artery in the groin. Measures BP 30 times/second. (2009) Fraunhofer-Gesellschaft, Germany**  
1 like 4 repins  
fraunhofer.de

**Pin 7:** **Interactive compression wear from Radiate Athletics. "Visually informs you of your intensity of athletic performance by changing colors according to your body's thermo-output. Special atoms within the fabric will gain a carbon electron when valence electrons are accelerated through the application of heat, affecting the way that the atoms reflect light-waves."**  
3 likes 5 repins  
radiateathletics.com

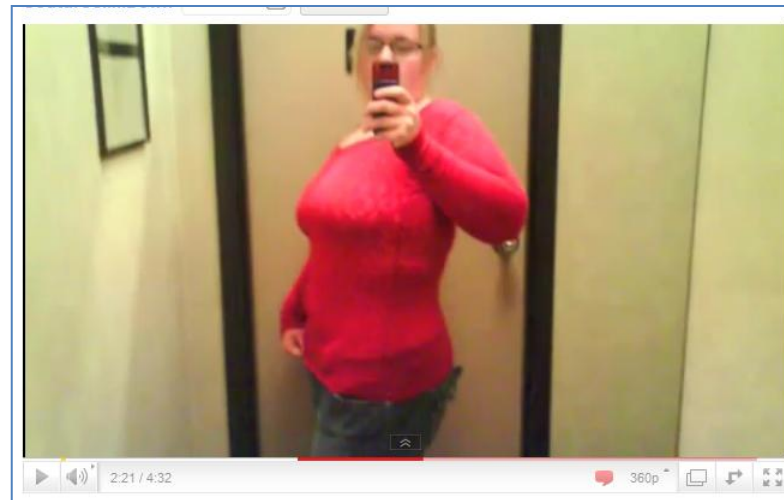
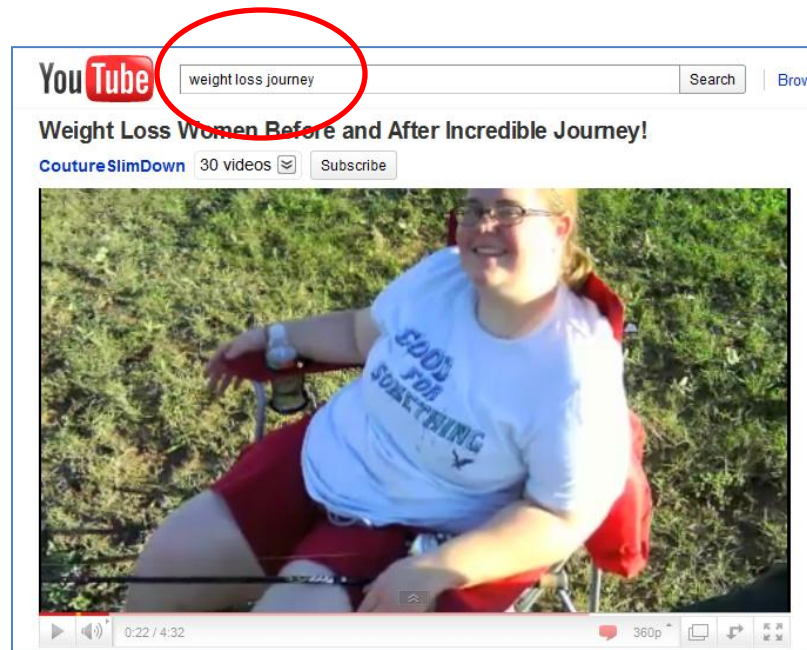
**Pin 8:** **Amico. "Stylish bracelet that brings social networks to life. It connects you to relevant people in real life ... grooves denote network path, intersections denote cross paths, vibration ... alerts user of a nearby connection ... and found connection LED light shines through translucent silicone ... to help you identifying the match." Bluetooth, water resistant. From Trovare, Inc. [Launching soon]**  
2 repins  
amicobracelets.com

**Pin 9:** **UVeBand. Wristband that monitors exposure to the sun's UVA and UVB rays (it doesn't just detect sunlight). Vibrates when it's time to reapply sunscreen. Solar powered self-charging.**  
1 like 8 repins  
uveband.com

**Pin 10:** **Implantable chip - goes under the skin to function as a personal blood testing laboratory. Includes 5 electrochemical and molecular sensors, radio transmitter. Bluetooth. Enzymatic detection of substances such as lactate, glucose, troponin, and ATP. (In development) From Giovanni de Micheli & Sandro Carrara, Ecole Polytechnique Fédérale de Lausanne (EPFL) Learn more [actu.epfl.ch/...](http://actu.epfl.ch/)**  
4 repins  
epfl.ch

**Pin 11:** **RFduino: Finger-tip sized, Arduino compatible, wireless enabled microcontroller. "Simply plug the RFduino into a USB port of any**

<http://pinterest.com/caroltpin/wearable-tech/>



<http://www.youtube.com/watch?v=-ws-yl37IWE>

**How do we:**

**Make the data tell a story?**

**Use the data to educate and empower?**

**Make the data actionable?**

**Have the data answer questions that haven't been asked?**

**Carol Torgan, PhD, FACSM**  
**Kinetics :: From lab bench to park bench**

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