

# More than Measures

Sean Munson · [smunson.com](http://smunson.com) · [@smunson](https://twitter.com/smunson)



Daniel  
Epstein



Christina  
Chung



Elena  
Agapie



Jessica  
Schroeder



Ravi  
Karkar



Jane  
Hoffswell



Sonali  
Mishra



James  
Fogarty



Julie  
Kientz



Jasmine  
Zia



Allison  
Cole



Roger  
Vilardaga



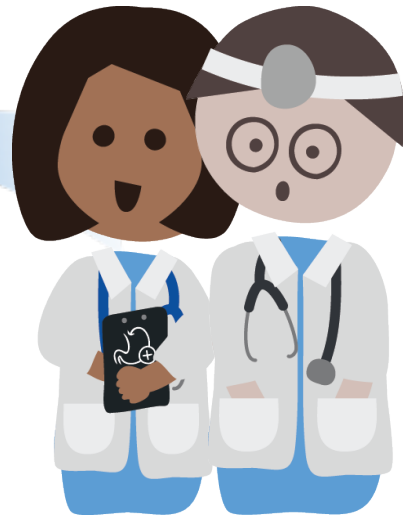
Nikki  
Lee



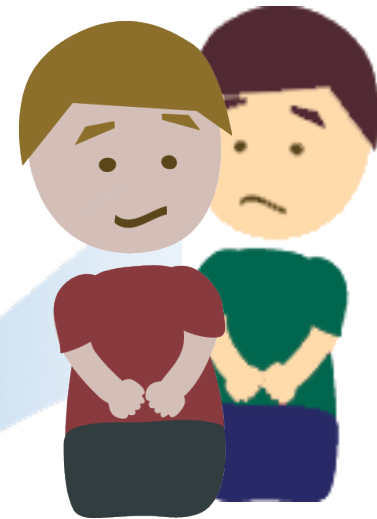
Laura  
Pina



**Individuals**



**Medical Team**



**Peers &  
support networks**



# WEARABLES ARE TOTALLY FAILING THE PEOPLE WHO NEED THEM MOST

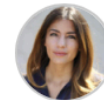


Then One/WIRED

AS THE INTERNET of Things becomes an actual thing, more steps are being counted, more sleep patterns are being logged, more activities are being app-ified. What isn't appearing in the data is much common sense or ambition. Instead, developers continue flocking to a saturated market filled with hipster pet rocks, devices that gather reams of largely superficial information for young people whose health isn't in question, or at risk.

OCT 27, 2015 @ 02:44 PM 4,500

# Why Wearables Are Out Of Reach For People Who Need Them Most



Jennifer Elias, CONTRIBUTOR

I write about wearable technology and the humans behind it. [FULL BIO](#)

Opinions expressed by Forbes Contributors are their own.



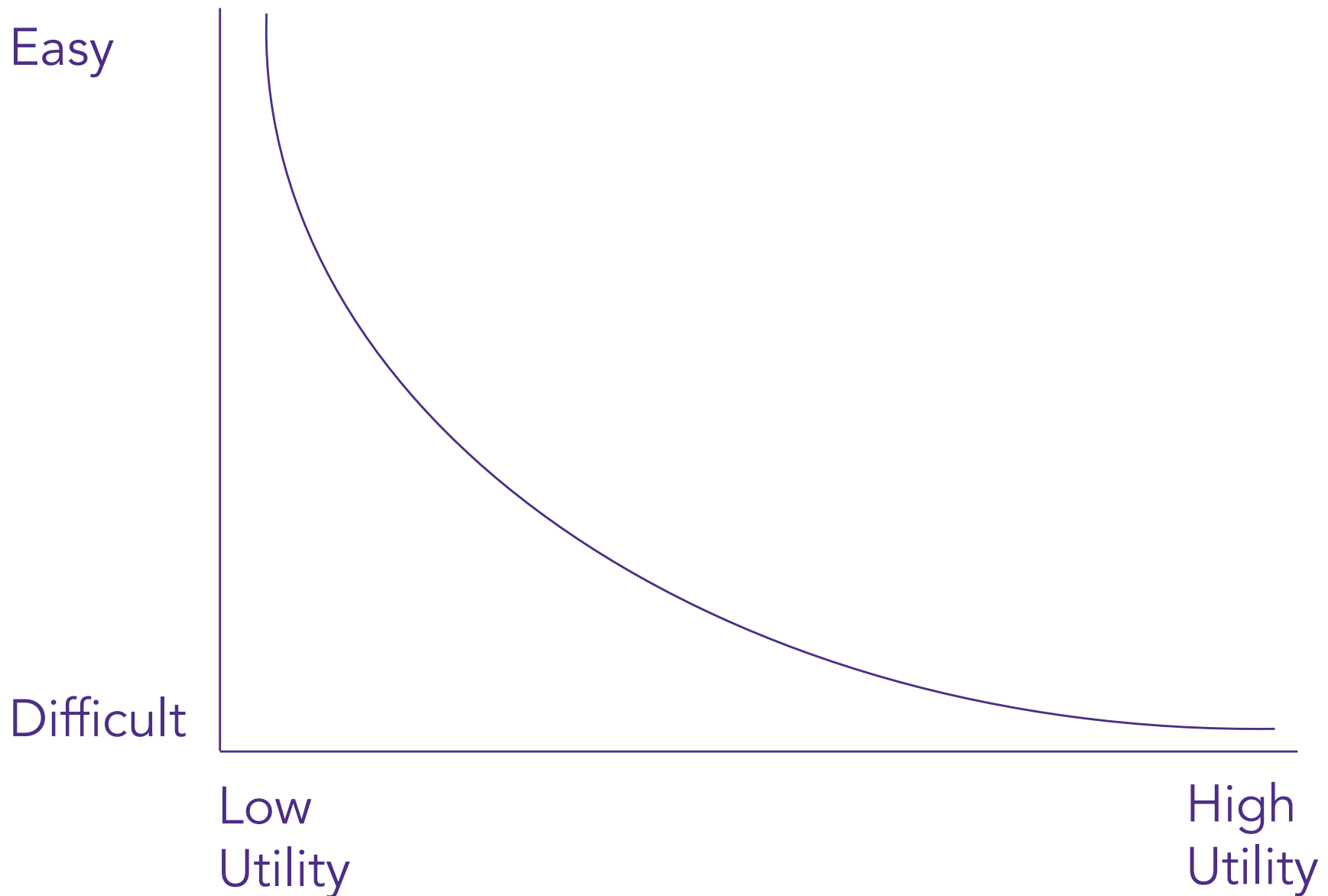
THORNTON, CO - FEBRUARY 24: Jane Awise, who suffers [ + ]

Dr. Roy M. Arnold owns a healthcare

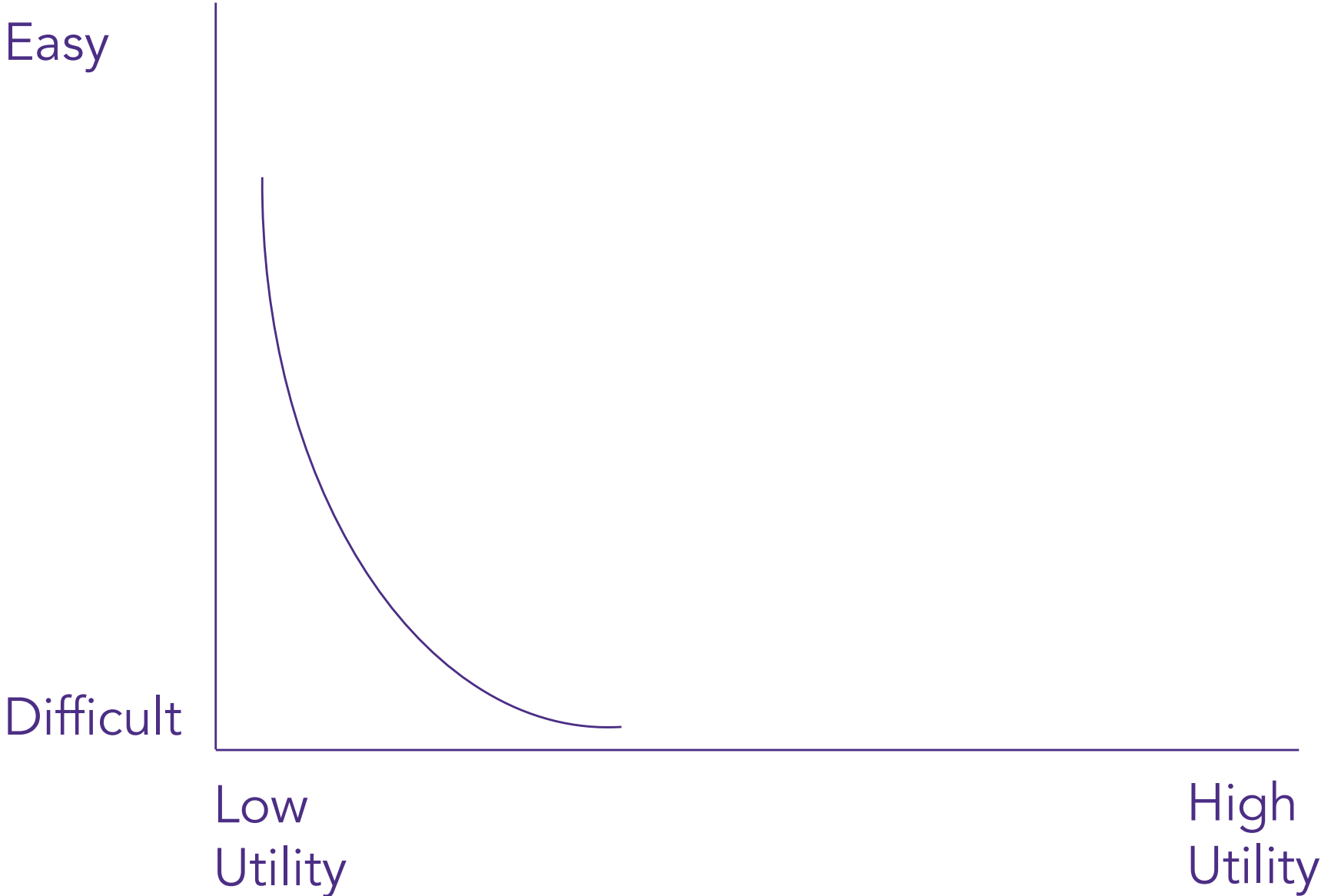




# A trade-off between effort and utility



# A more realistic view of where we are

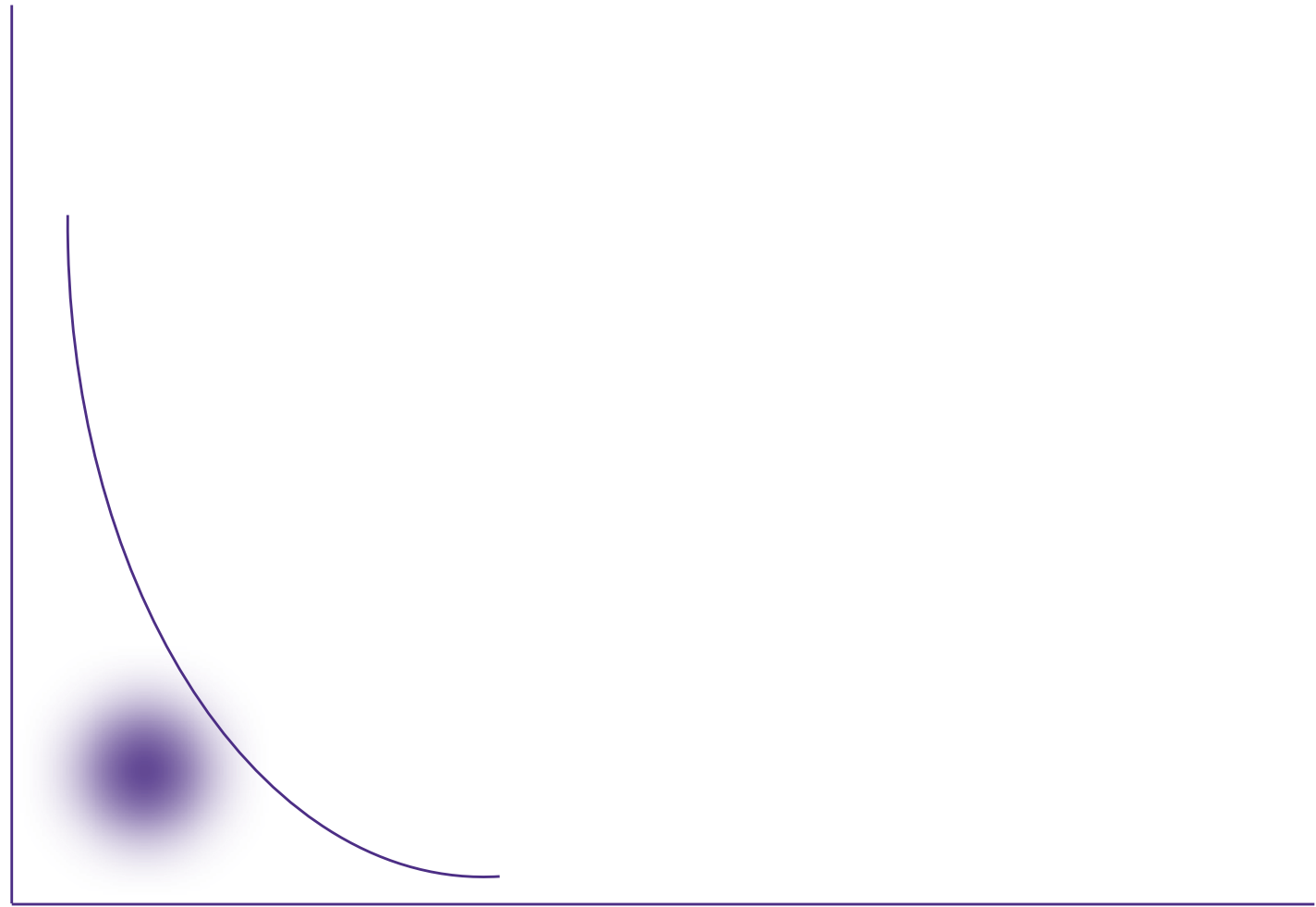


acknowledgement: Julie Kientz & James Fogarty



Easy

Difficult



Low  
Utility

High  
Utility

acknowledgement: Julie Kientz & James Fogarty

Easy

Difficult



Lower threshold to getting value

Make more value possible

Low Utility

High Utility

Diary				
TODAY				
1,210	1,077	285	792	418
GOAL	FOOD	EXERCISE	NET	REMAINING
<b>Breakfast</b> 500 cal				
Strawberries - Raw 49				
1 Scrambled Egg White 17				
Honey 304				
Nonfat Greek Strained Yogurt 130				
<b>Lunch</b> 577 cal				
Cilantro Lime Vinaigrette Dressing 180				
Beans - Black, cooked, boiled, with salt 227				
100% Apple Juice 120				
Guacamole Medium 50				

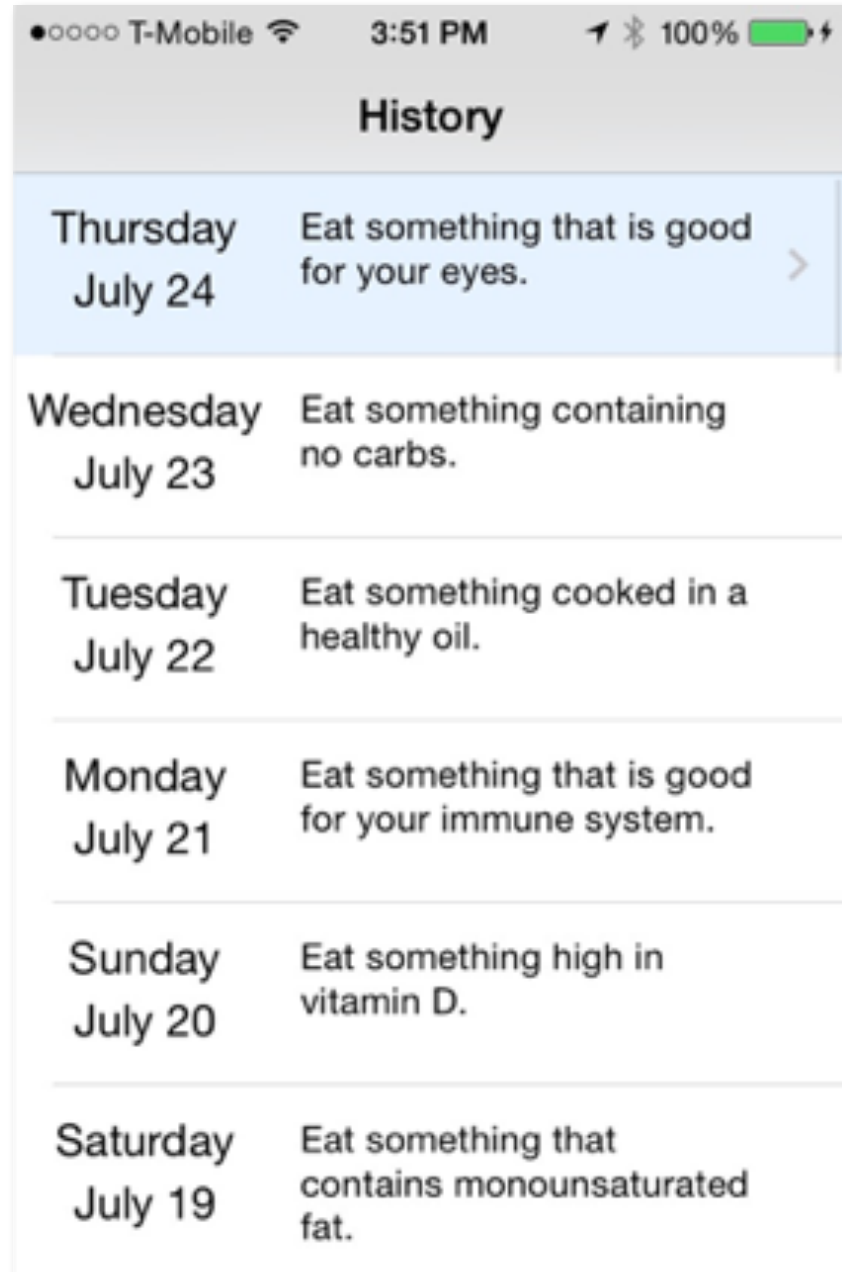
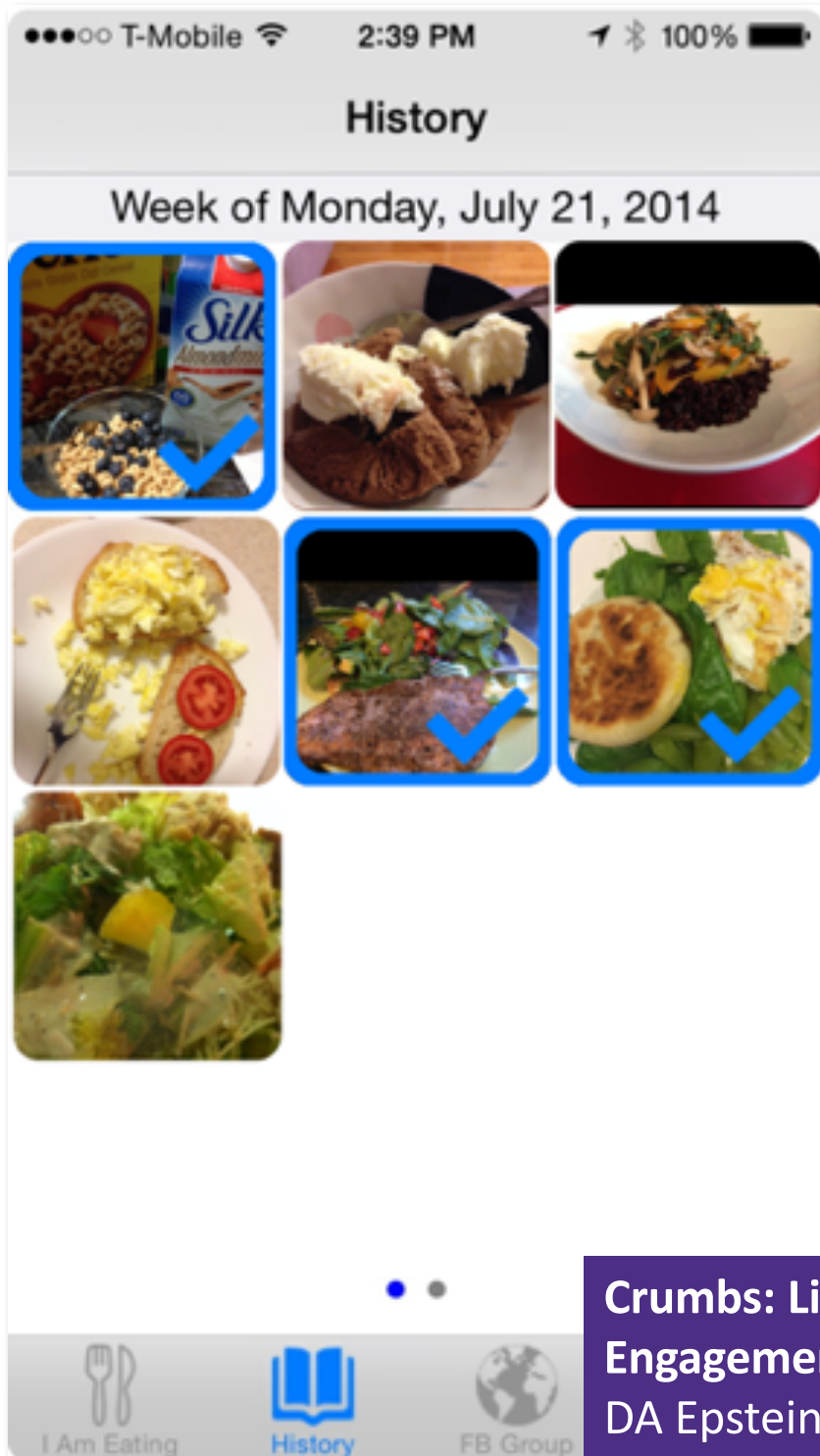
Name: Renee Fisher  
 "tolerable"  
 some FODMAPs  
 does own looking  
 Not watery, loose  
 Stanford Hospital and Clinics  
 Digestive Health  
 Food/GI Symptoms Record  
 Instructions: Please record everything you eat and drink (including ice and water taken with your medications). Circle your symptoms if any as they occur after meals and snacks.

Date: 6/22	Food & Beverages and Amount	Symptoms if any (circle).
Breakfast Time:	1 1/4 c oatmeal w/ 2 Truie milk 2 Tbsp fathead-1/4t sugar 1/2 Tr. Toss wheat free waffle water, tea 100z. Peppermint tea	Nausea Vomiting Heartburn Stomach Pain Diarrhea Constipation Sense of Urgency Gas Bloating Cramping Other: before breakfast
Snack Time: 11:00	1 slice french toast egg white, milk	
Lunch Time: 12:30	3 oz fresh cold broiled salmon 4oz cranberry juice 5 flour tortilla, toasted-avacado, olives lemon, low fat dressing - warm rice 1T. 1/2 FF ginger cookie whole foods	Nausea Vomiting Heartburn Stomach Pain Diarrhea Constipation Sense of Urgency Gas Bloating Cramping Other:
Snack Time: 3:00	Rice Crispies, ricemilk, blueberries	
Dinner Time: 6:00	1c. chicken broth 1T. rice 4oz organic broiled chicken breast Baked sweet yam, steamed carrots, Zucchini, cranberry sauce, tea, raspberry sorbet, homemade cake	Nausea Vomiting Heartburn Stomach Pain Diarrhea Constipation Sense of Urgency Gas Bloating Cramping Other: after dinner
Snack Time: 9:30	crackers, reduced sugar jam	

Date: 6/25	Food & Beverages and Amount	Symptoms if any (circle).
Breakfast Time: 9:30	1 1/4 c oatmeal w/ Truie cereal, 3 Truie milk - CA enriched - Trader J's wheat free waffle, maple syrup 1T. Peppermint tea	Nausea Vomiting Heartburn Stomach Pain Diarrhea Constipation Sense of Urgency Gas Bloating Cramping Other:
Snack Time: 11:00	1/4 c soy yogurt fr blueberries, mashed strawberries (yellow) cracker	
Lunch Time: 1:00	Toast- 3oz Roast Turkey Breast 1/4 avacado, mustard, romaine hard boiled egg white, baked potato chips - tea, 2oz cranb juice	Nausea Vomiting Heartburn Stomach Pain Diarrhea Constipation Sense of Urgency Gas Bloating Cramping Other:
Snack Time: 4:00	pretzels, 1/2t peanut butter, crackers	
Dinner Time: 6:30	Flour tortilla - 4oz Tilipka pan scared, lemon, olive oil, couscous Israeli, green beans fresh, carrots + peas, apple sauce 1/4 cup, blueberries 1/2 ginger cookie raspberry sorbet, small piece yellow cake (I baked)	Nausea Vomiting Heartburn Stomach Pain Diarrhea Constipation Sense of Urgency Gas Bloating Cramping Other:

Bedtime - water 100mg gabapentin - every night  
 align probiotic - 4-6 times a week after lunch

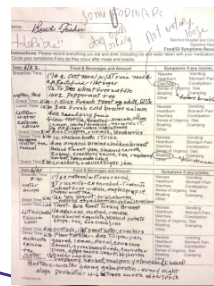
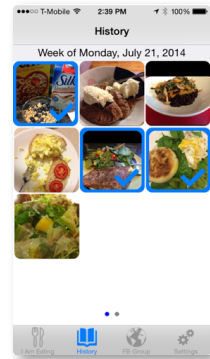




**Crumbs: Lightweight Daily Food Challenges to Promote Engagement and Mindfulness**

DA Epstein, F Cordeiro, J Fogarty, G Hsieh, SA Munson. *CHI* 2016

Easy



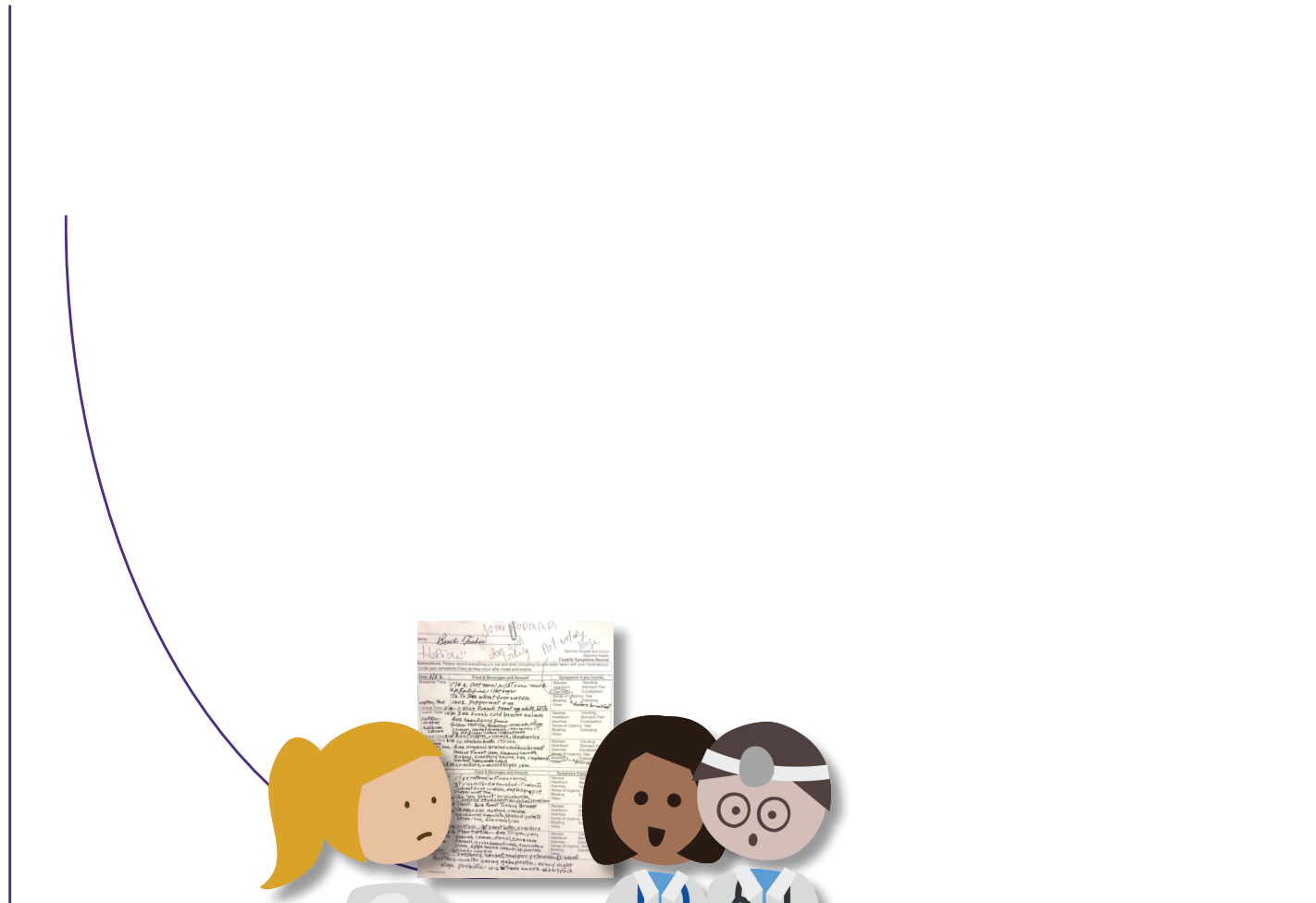
Difficult

Low  
Utility

High  
Utility

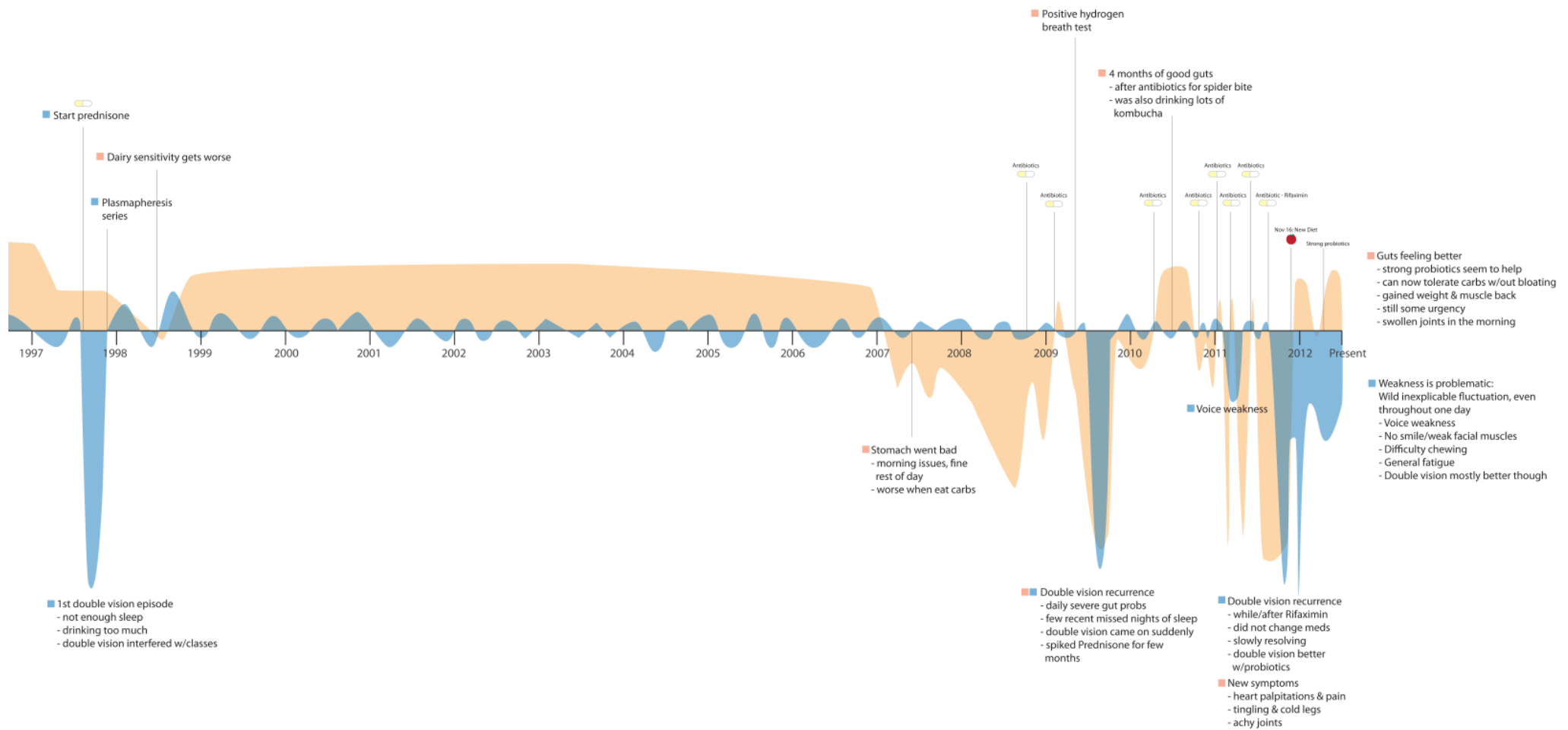
Easy

Difficult



Low  
Utility

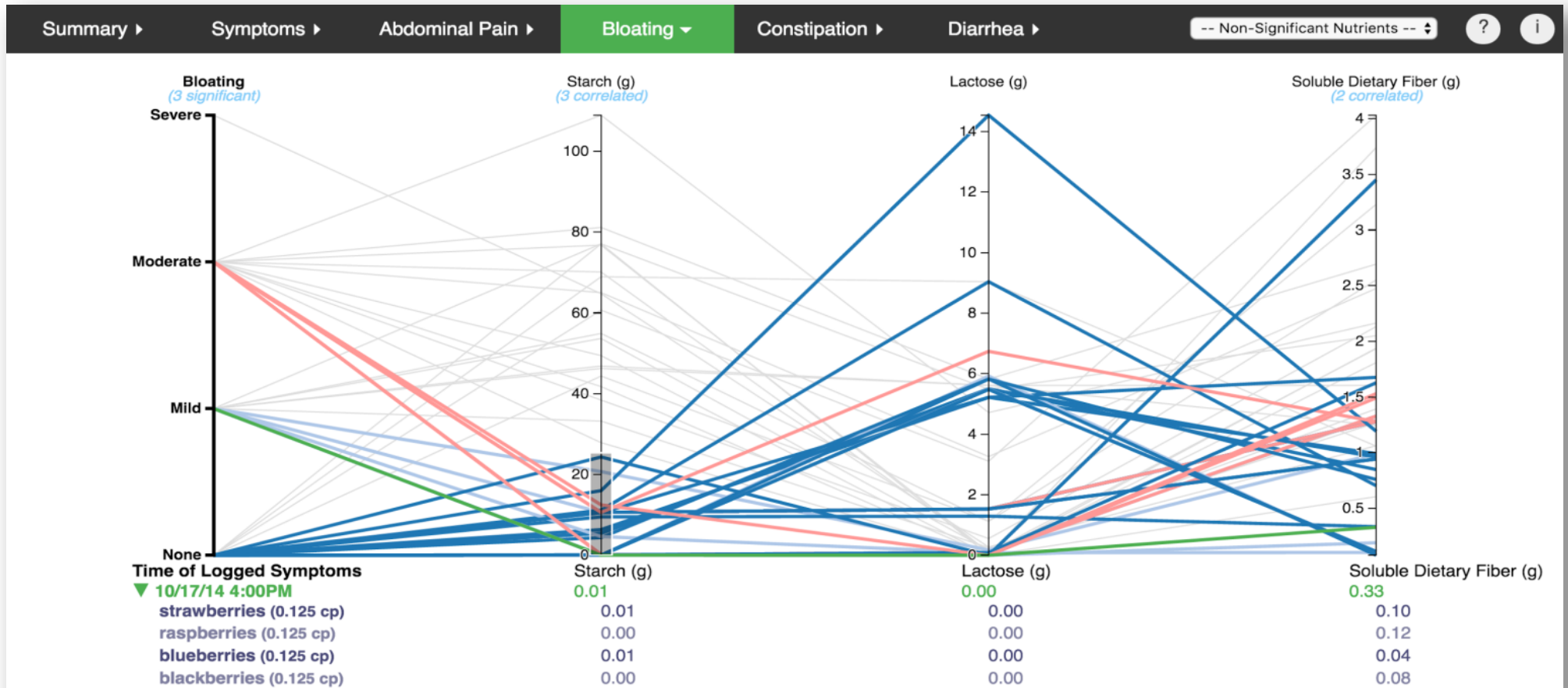
High  
Utility



Katie McCurdy | UVM Medical Center

<https://sensical.wordpress.com/2011/11/16/how-visualizing-health-problems-could-help-solve-medical-mysteries/>





## Supporting Patient-Provider Collaboration to Identify Individual Triggers using Food and Symptom Journals

J Schroeder, J Hoffswell, C Chung, J Fogarty, SA Munson, J Zia

CSCW 2017

# Foodprint

Diary Update <sup>25</sup>

Diary Analysis

Diary Review

## Symptoms

Abdominal Pain Bloating Constipation Diarrhea Stress

## Context

Photo Location Preparation Type

4 hours ago 6 hours ago 8 hours ago Previous meal Previous two meals

### NO SYMPTOM



There was fig  
22:58 1/24, Tuesday



Suki-yaki  
05:22 2/3, Friday

### MILD



shrimp ceviche  
21:42 10/5, Wednesday



yogurt + fruit + french toast +  
coffee  
21:43 10/5, Wednesday

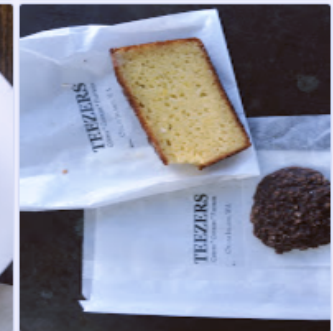
### SEVERE



chocolate cookie  
21:44 10/5, Wednesday

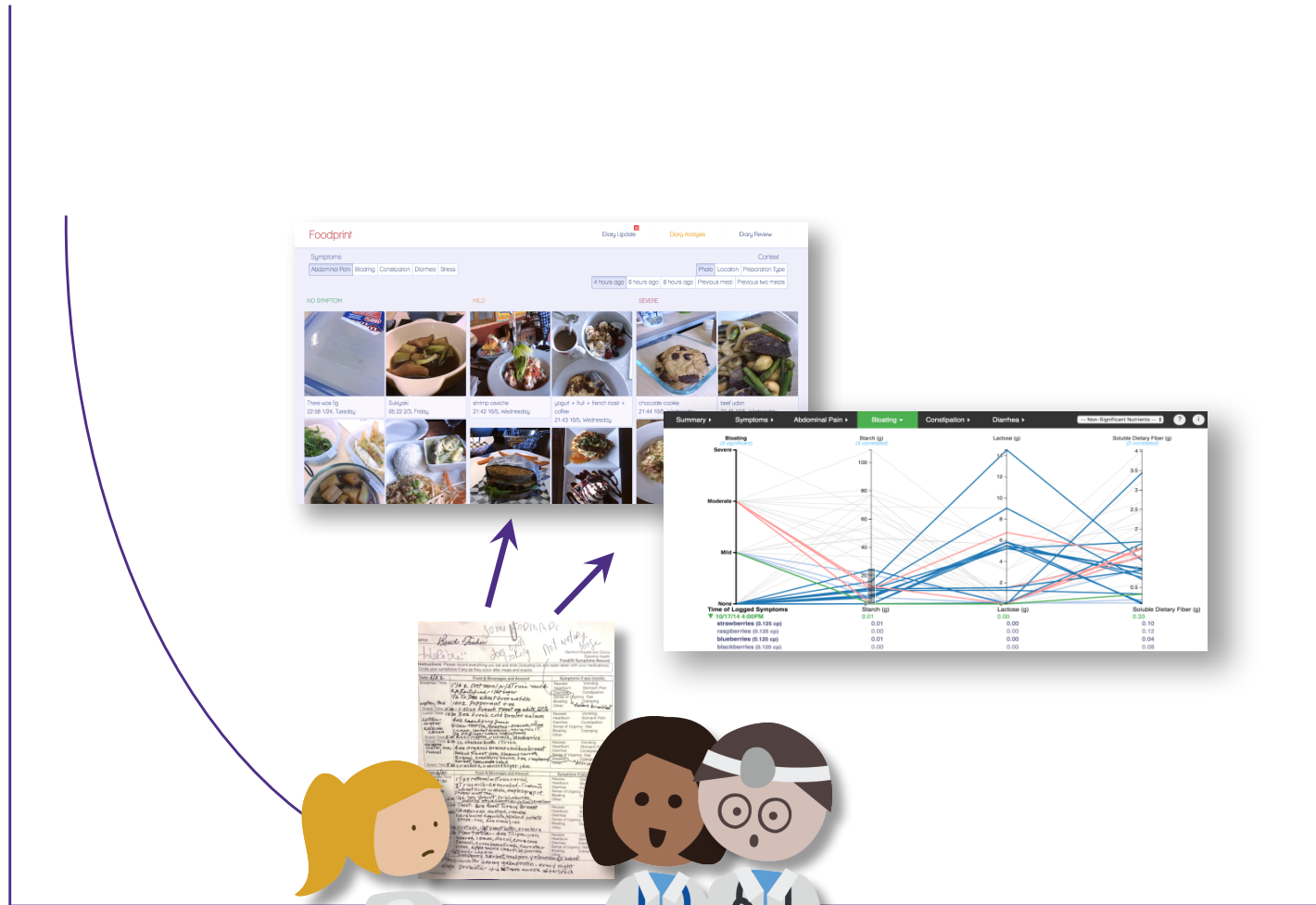


beef udon  
21:45 10/5, Wednesday



Christina Chung, in-work

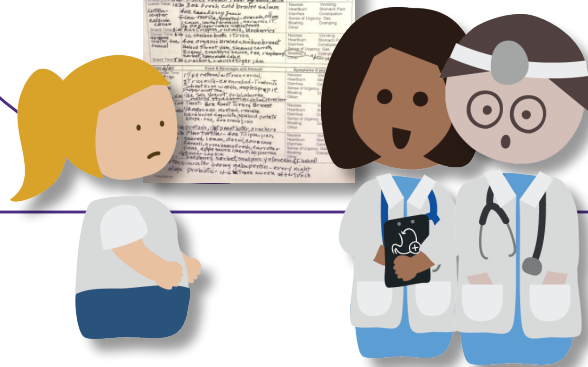
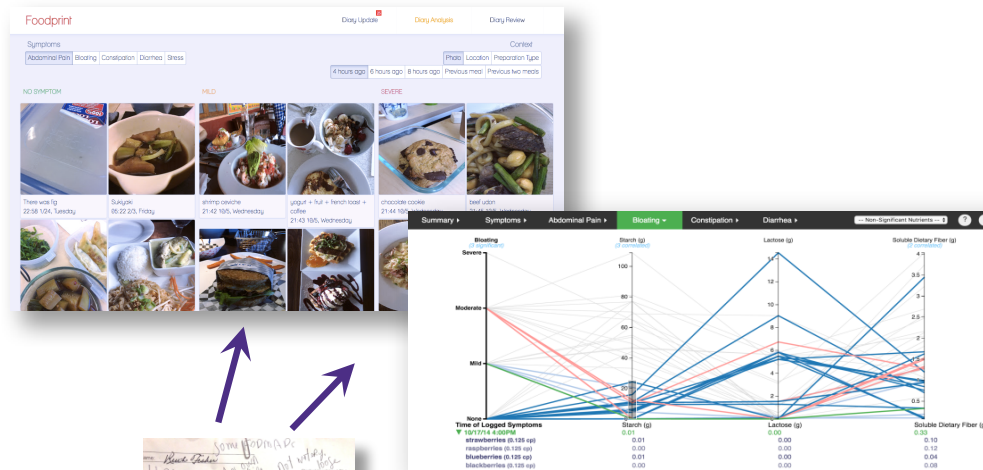
Easy



Difficult

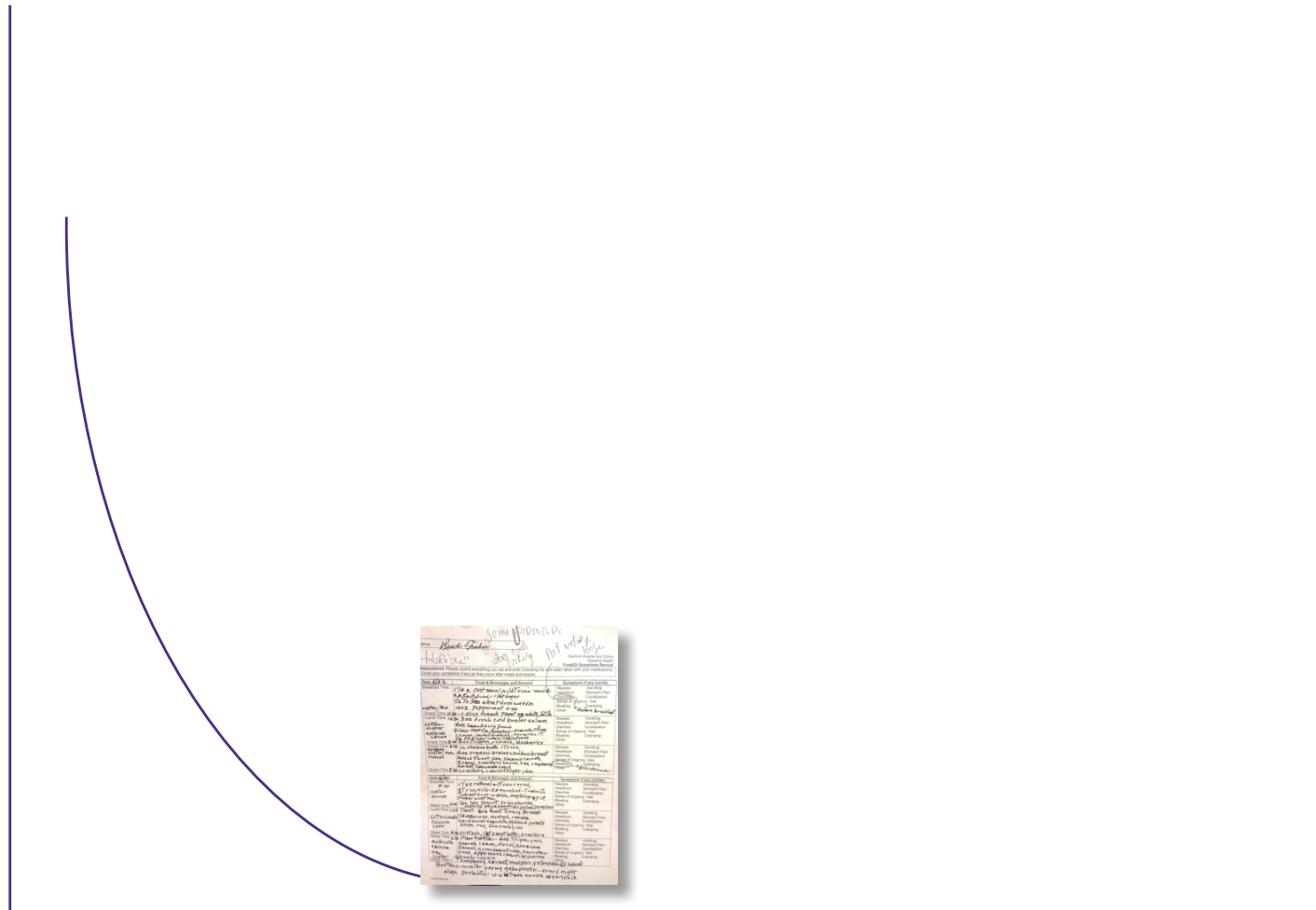
Low Utility

High Utility



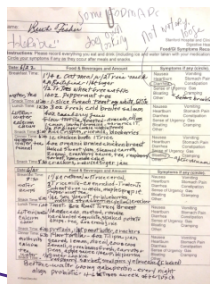
Easy

Difficult

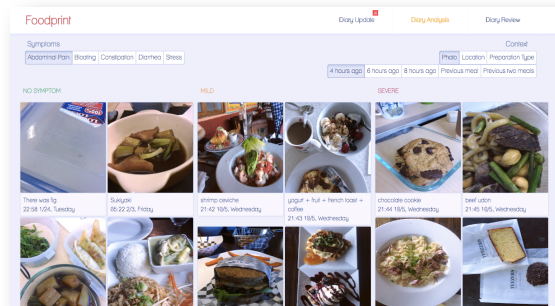
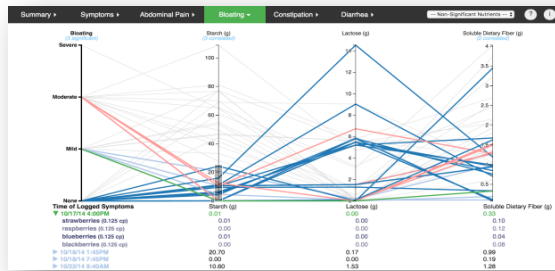
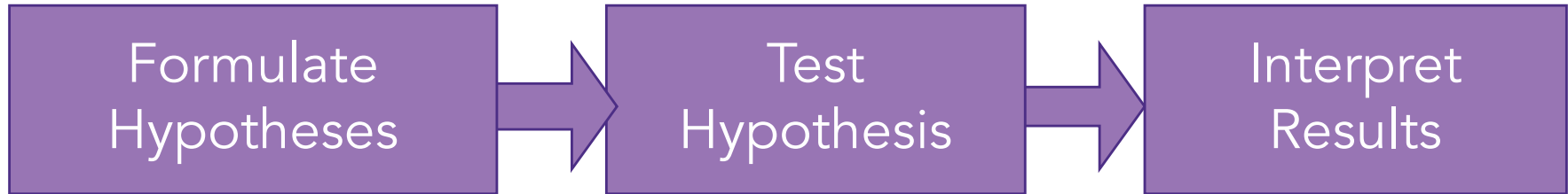


Low  
Utility

High  
Utility



# Scaffolding the scientific method for trigger detection



T-Mobile Wi-Fi 10:12 PM 59%

### Current Trial

This setup guide will walk you through the steps to create your self trial. A self trial helps you decide whether certain food affects your symptoms.

During the trial, you will be asked to eat your trial food on some mornings and to avoid that food on other mornings.

We will help you track your progress and symptom levels by sending you daily reminders.

**Set Up A New Trial**

### Eating Caffeine Study Findings

May 27th – June 3rd

#### Abdominal Pain ⓘ

Based on the study, there is a **no evidence** that your abdominal pain decreases when you don't eat caffeine ( $p=0.762$ ). ⓘ

#### Abdominal Pain Severity

May 27th – June 3rd

Abdominal Pain Severity

Condition

■ Each square represents one day

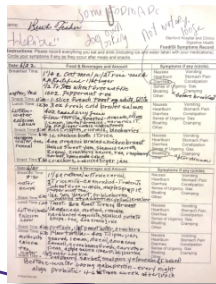
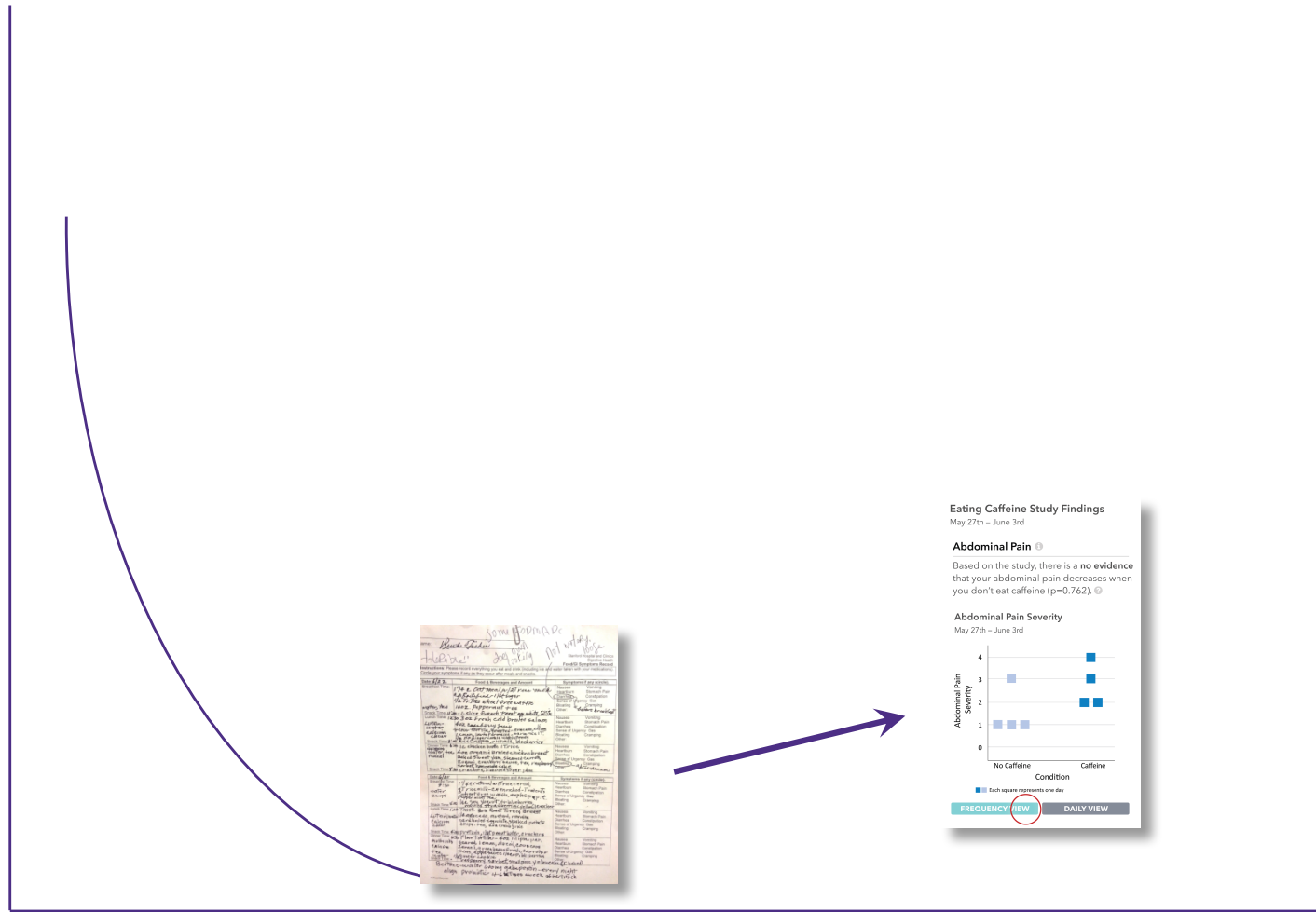
**FREQUENCY VIEW** **DAILY VIEW**

TummyTrials: A Feasibility Study of Using Self-Experimentation to Detect Individualized Food Triggers  
 R Karkar, J Schroeder, DA Epstein, LR Pina, J Scofield, J Fogarty, JA Kientz, SA Munson, R Vilardaga, J Zia. *CHI* 2017.

A framework for self-experimentation in personalized health  
 R Karkar, J Zia, R Vilardaga, SR Mishra, J Fogarty, SA Munson, JA Kientz. *JAMIA* 2016.

Easy

Difficult

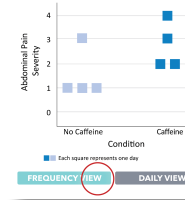


Eating Caffeine Study Findings  
May 27th - June 3rd

#### Abdominal Pain

Based on the study, there is a **no evidence** that your abdominal pain decreases when you don't eat caffeine (p=0.762).

Abdominal Pain Severity  
May 27th - June 3rd



High Utility

what and whose goals  
do the data actually support?

1,210	1,077	285	792	418
GOAL	FOOD	EXERCISE	NET	REMAINING

Breakfast 500 cal

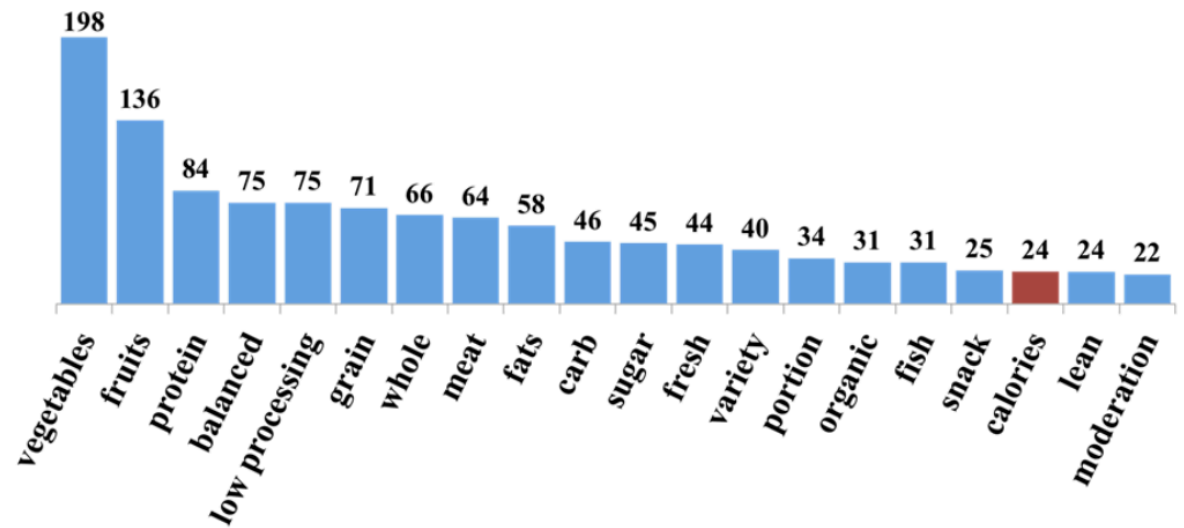
Strawberries - Raw	49
1 cup, halves	
1 Scrambled Egg White	17
1 egg white	
Honey	304
100 g	
Nonfat Greek Strained Yogurt	130
Fage, 1 cup (227 g)	

Lunch 577 cal

Cilantro Lime Vinaigrette Dressing	180
Nordstrom Cafe, 2 TBSP	
Beans - Black, cooked, boiled, with salt	227
1 cup	
100% Apple Juice	120
Old Orchard, 8 oz	
Guacamole Medium	50



Diary				
TODAY				
1,210	1,077	285	792	418
GOAL	FOOD	EXERCISE	NET	REMAINING
Breakfast		500 cal		
Strawberries - Raw		49		
1 cup, halves				
1 Scrambled Egg White		17		
1 egg white				
Honey		304		
100 g				
Nonfat Greek Strained Yogurt		130		
Fage, 1 cup (227 g)				
Lunch		577 cal		
Cilantro Lime Vinaigrette Dressing		180		
Nordstrom Cafe, 2 TBSP				
Beans - Black, cooked, boiled, with salt		227		
1 cup				
100% Apple Juice		120		
Old Orchard, 8 oz				
Guacamole Medium		50		



**Rethinking the Mobile Food Journal: Exploring Opportunities for Lightweight Photo-Based Capture.**  
 F Cordeiro, E Bales, E Cherry, J Fogarty. *CHI* 2015.

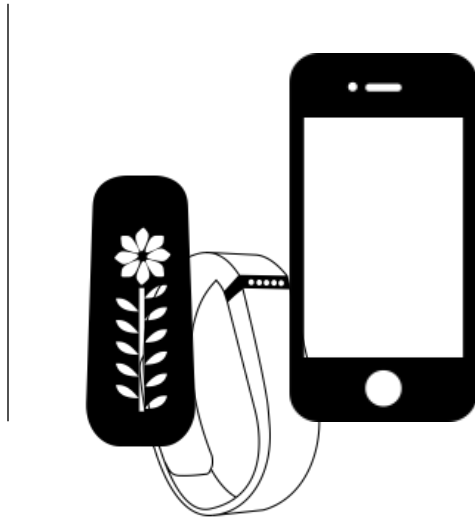
Finding the Right Fit: Understanding Health Tracking in Workplace Wellness Programs  
C Chung, N Gorm, I Shklovski, SA Munson *CHI* 2017.



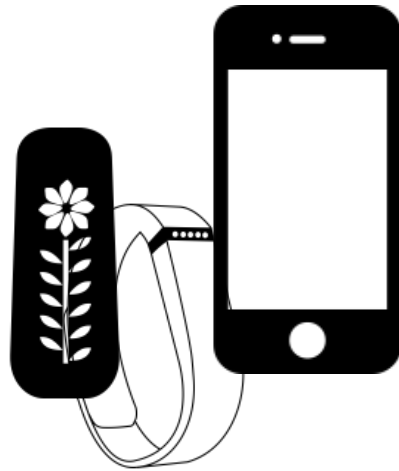
Finding the Right Fit: Understanding Health Tracking in Workplace Wellness Programs  
C Chung, N Gorm, I Shklovski, SA Munson *CHI* 2017.



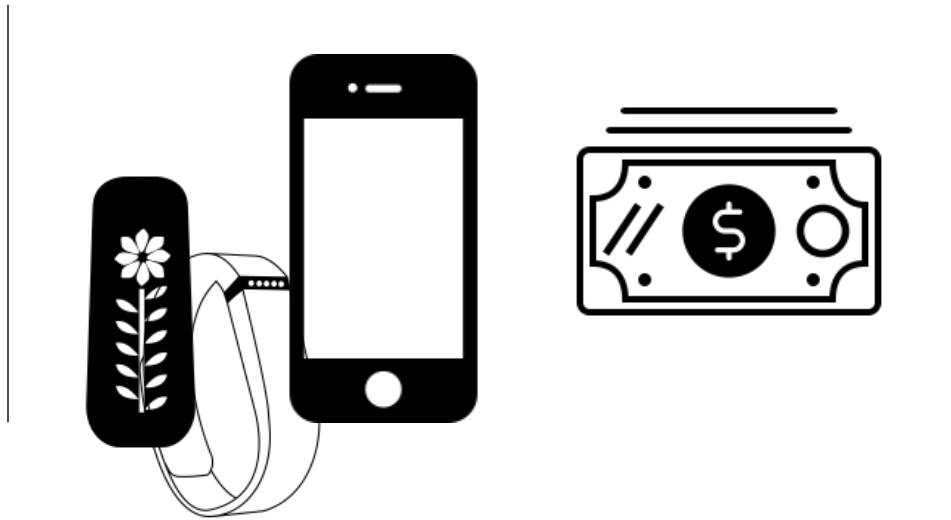
Finding the Right Fit: Understanding Health Tracking in Workplace Wellness Programs  
C Chung, N Gorm, I Shklovski, SA Munson *CHI* 2017.



Finding the Right Fit: Understanding Health Tracking in Workplace Wellness Programs  
C Chung, N Gorm, I Shklovski, SA Munson *CHI* 2017.



Finding the Right Fit: Understanding Health Tracking in Workplace Wellness Programs  
C Chung, N Gorm, I Shklovski, SA Munson *CHI* 2017.



Finding the Right Fit: Understanding Health Tracking in Workplace Wellness Programs  
C Chung, N Gorm, I Shklovski, SA Munson *CHI* 2017.

you get what you measure,  
so be careful what you measure



The Atlantic SUBSCRIBE

Popular Latest Sections Magazine More

## How Self-Tracking Apps Exclude Women

"Self-knowledge through numbers" seems like a genderless goal, yet the actual products out there are anything but.



Matt Paish/Flickr

ROSE EVELETH  
DEC 15, 2014 | TECHNOLOGY

THE VERGE

TECH SCIENCE MORE

APPLE TECH

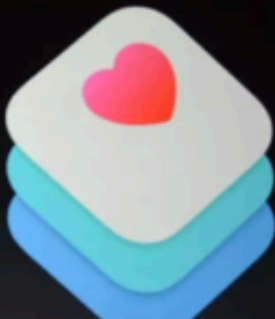
## TL;DR

296

### Apple promised an expansive health app, so why can't I track menstruation?

by Arielle Duhaime-Ross | Sep 25, 2014, 12:55pm EDT

f SHARE t TWEET in LINKEDIN



Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools

DA Epstein, NB Lee, JH Kang, E Agapie, J Schroeder, LR Pina, J Fogarty, JA Kientz, SA Munson *CHI* 2017. ·



## Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools

DA Epstein, NB Lee, JH Kang, E Agapie, J Schroeder, LR Pina, J Fogarty, JA Kientz, SA Munson *CHI* 2017.



“[My app is] clearly trying to support my getting pregnant (which is not my intent) and not just agnostically for tracking”

Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools

DA Epstein, NB Lee, JH Kang, E Agapie, J Schroeder, LR Pina, J Fogarty, JA Kientz, SA Munson *CHI* 2017. ·



“[My app is] clearly trying to support my getting pregnant (which is not my intent) and not just agnostically for tracking”

“Sex options assume sex with a man... [it] reminds me I am not a ‘normal’ woman whenever I use the app.”

design can also exclude  
& implicitly promote goals

## Varied Goals

1. Get actionable insights
2. Satisfy curiosity
3. Have a record
4. Participate socially
5. Collecting rewards
6. Fetishized Tracking

**A Lived Informatics Model of Personal Informatics.**  
Epstein DA, Ping A, Fogarty J, Munson SA. *UbiComp* 2015.

**Personal tracking as Lived Informatics**  
Rooksby J, Rost M, Morrison A, Chalmers MC. *CHI* 2014.

# Personal Data for the Public Good

# Personal Data for the **Public Good**

often starts by understanding and enabling the **personal good**.



to get there, we need

1. Designs that make more possible, and that lower the burdens associated with personal use of health data
2. An empathetic understanding of what matters to people tracking, their goals, and how that changes
3. A variety of designs that support this richness of goals, and ways to work with resulting data

to get there, we need

1. Designs that make more possible, and that lower the burdens associated with personal use of health data
2. An empathetic understanding of what matters to people tracking, their goals, and how that changes
3. A variety of designs that support this richness of goals, and ways to work with resulting data

but this means we are going to have to learn to work with messier data!

# More than Measures

Sean Munson · [smunson.com](http://smunson.com) · [@smunson](https://twitter.com/smunson)

AHRQ#1R21HS023654

NSF# OAI-1028195, IIS-1344613, IIS-1553167

University of Washington Innovation Award

Intel Science and Technology Center for Pervasive Computing

Robert Wood Johnson Foundation



**HUMAN CENTERED DESIGN & ENGINEERING**  
UNIVERSITY *of* WASHINGTON



# More than Measures

Sean Munson · [smunson.com](http://smunson.com) · [@smunson](https://twitter.com/smunson)

& many collaborators



Daniel  
Epstein



Christina  
Chung



Elena  
Agapie



Jessica  
Schroeder



Ravi  
Karkar



Jane  
Hoffswell



Sonali  
Mishra



James  
Fogarty



Julie  
Kientz



Jasmine  
Zia



Allison  
Cole



Roger  
Vilardaga



Nikki  
Lee



Laura  
Pina



HUMAN CENTERED DESIGN & ENGINEERING  
UNIVERSITY of WASHINGTON

