



The next Frontier in Population Health:

Rethinking  
the  
Principles  
of

# Mass Collaboration

Brigitte Piniewski, MD<sub>1</sub>

HIMSS Oregon 2016

# Sustained Engagement & Work force development

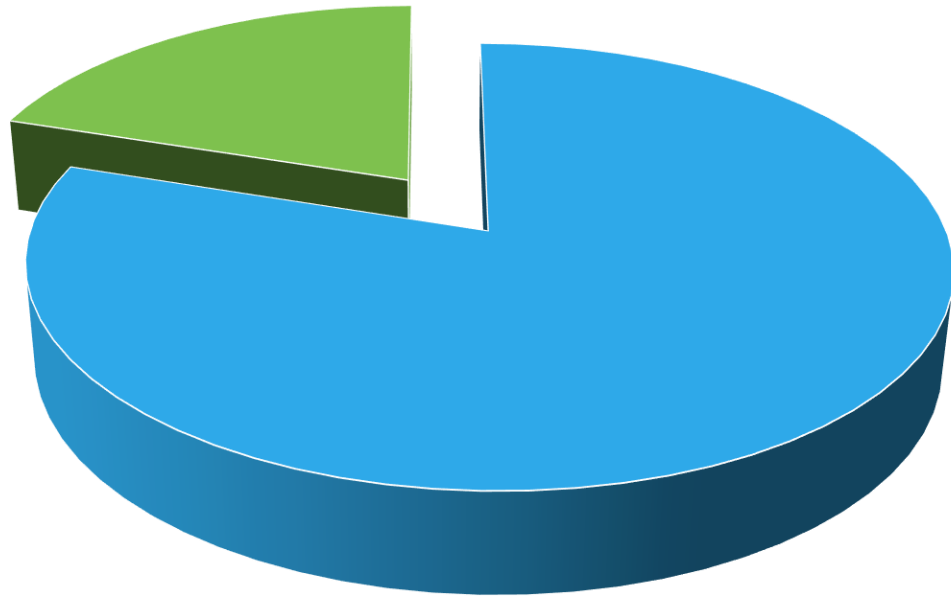
## Disclosures!



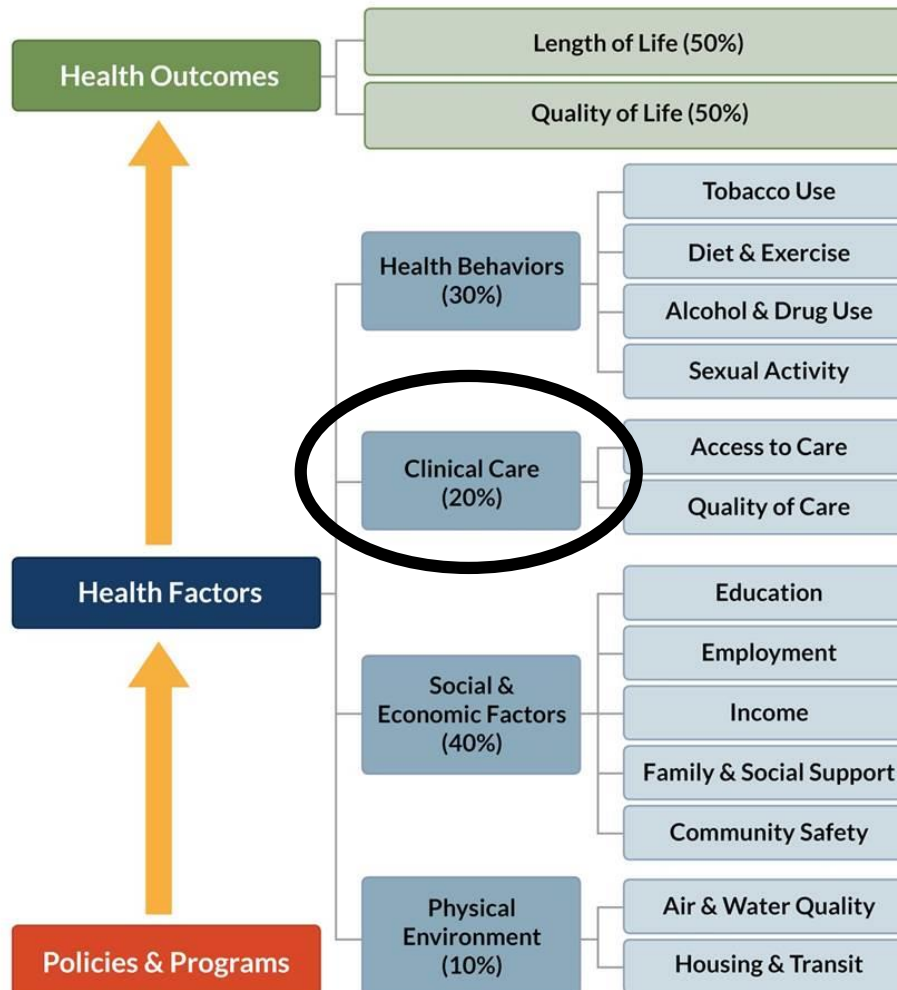
Strategic Advisor role for Good Rabbits

# Why now?

Non-healthcare contributors = 80%



# RWJ County Health Ranking



Clinical  
Care  
20%

# Next Economy Thinking

- Uber 3x \$\$\$ in San Francisco
- Airbnb 800 employees
- Hilton 152,000 employees
- Gig economy, peer to peer
- Continuous improvement imperative

The Uber logo consists of the word "UBER" in white, uppercase, sans-serif font centered on a black rectangular background.

UBER

The Airbnb logo features a white outline of a stylized 'A' shape (the Airbnb logo symbol) centered on a red rectangular background. Below the symbol, the word "airbnb" is written in a white, lowercase, sans-serif font.

airbnb

# Mass Collaboration

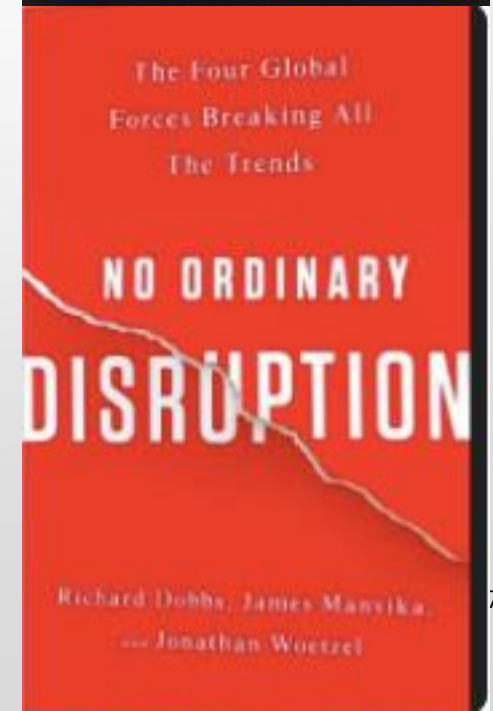
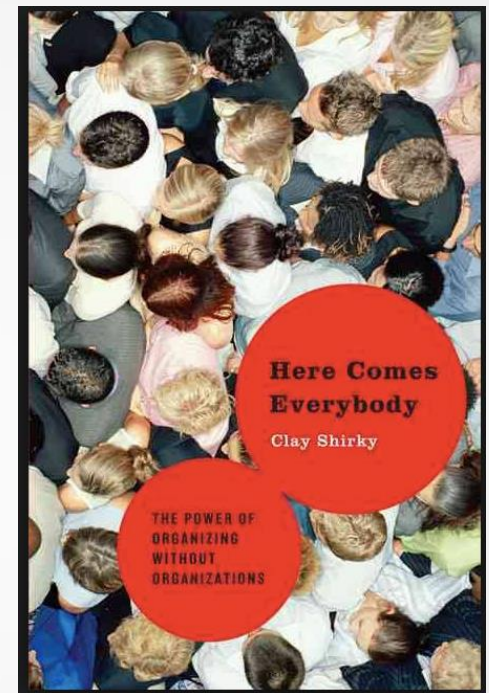
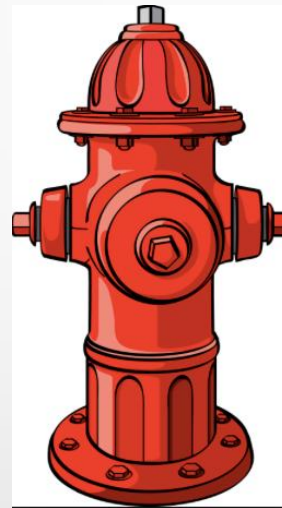


Utilization, COST  
EMR, PHI, HiPAA  
FDA, HIT security

Blue Zones  
Light weight  
Sharing economies  
Peer to peer  
Co-working  
Intelligence  
Meet-ups

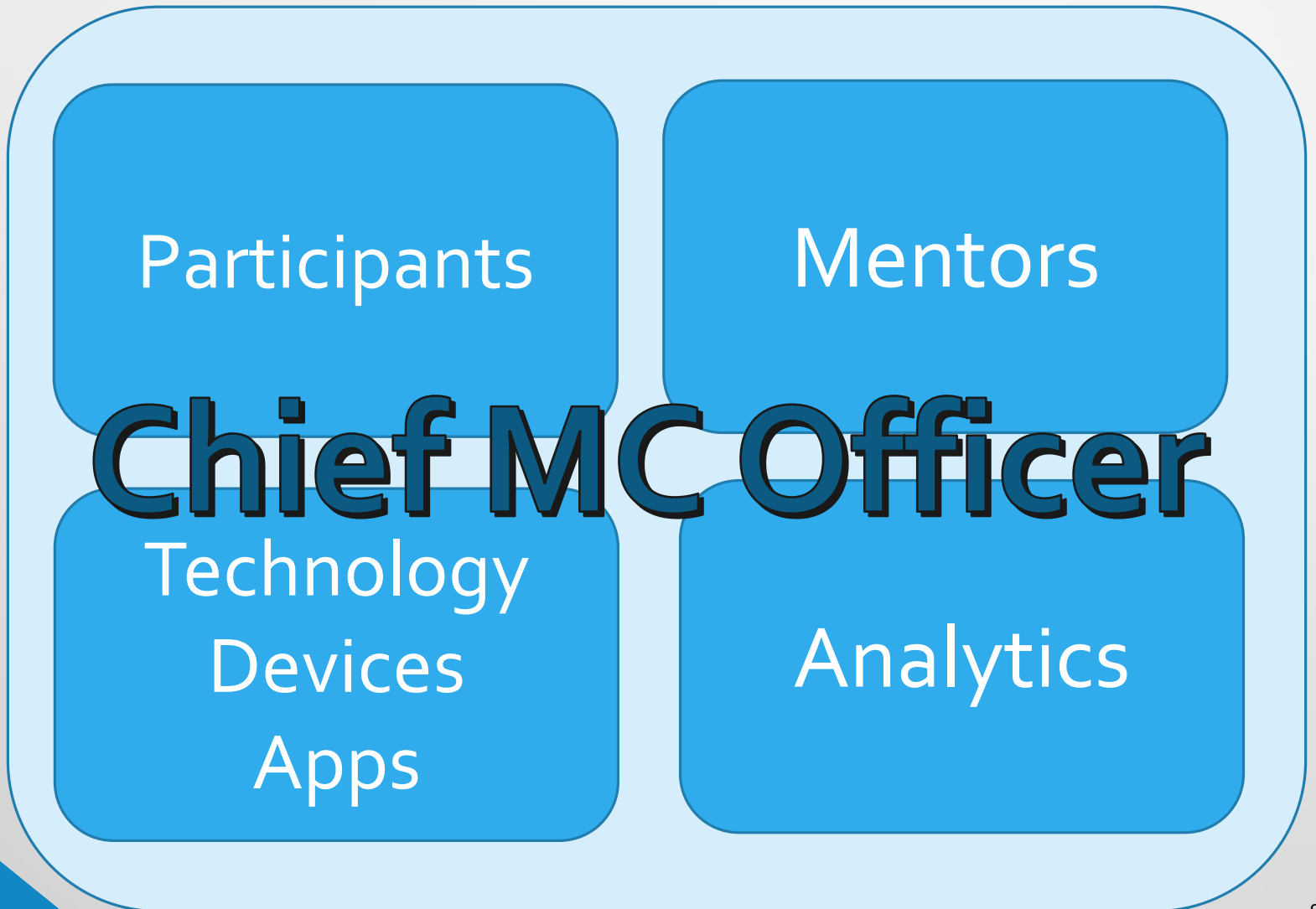
# Surplus talent

- Compelling reason
- Greater good
- Lower the barriers
- n= MANY
- Low cost
- Iterative



Local matters!

# Sprint Innovation





## COMMUNITY PARTNERS:



**Brigitte Piniewski, M.D.**  
Chief Medical Officer  
PeaceHealth Laboratories  
bpiniewski@peacehealthlabs.org  
Co-Investigator



**Ruoming Jin**  
Associate professor  
Kent State University  
jin@cs.kent.edu  
Co-Investigator



**David Kil**  
HealthMantic  
kilster@gmail.com  
Consultant



**Dejing Dou**  
Associate professor  
University of Oregon  
dou@cs.uoregon.edu  
Principle Investigator



**Junfeng Sun**  
Mathematical statistician  
National Institutes of Health  
junfeng.jeff.sun@gmail.com  
Co-Investigator



**Xintao Wu**  
Professor; Data privacy  
laboratory director  
University of North Carolina  
at Charlotte  
xwu@uncc.edu  
Co-Investigator



**Jessica Greene**  
Professor;  
Director of Research  
George Washington University  
jessgreene@gwu.edu  
Co-Investigator

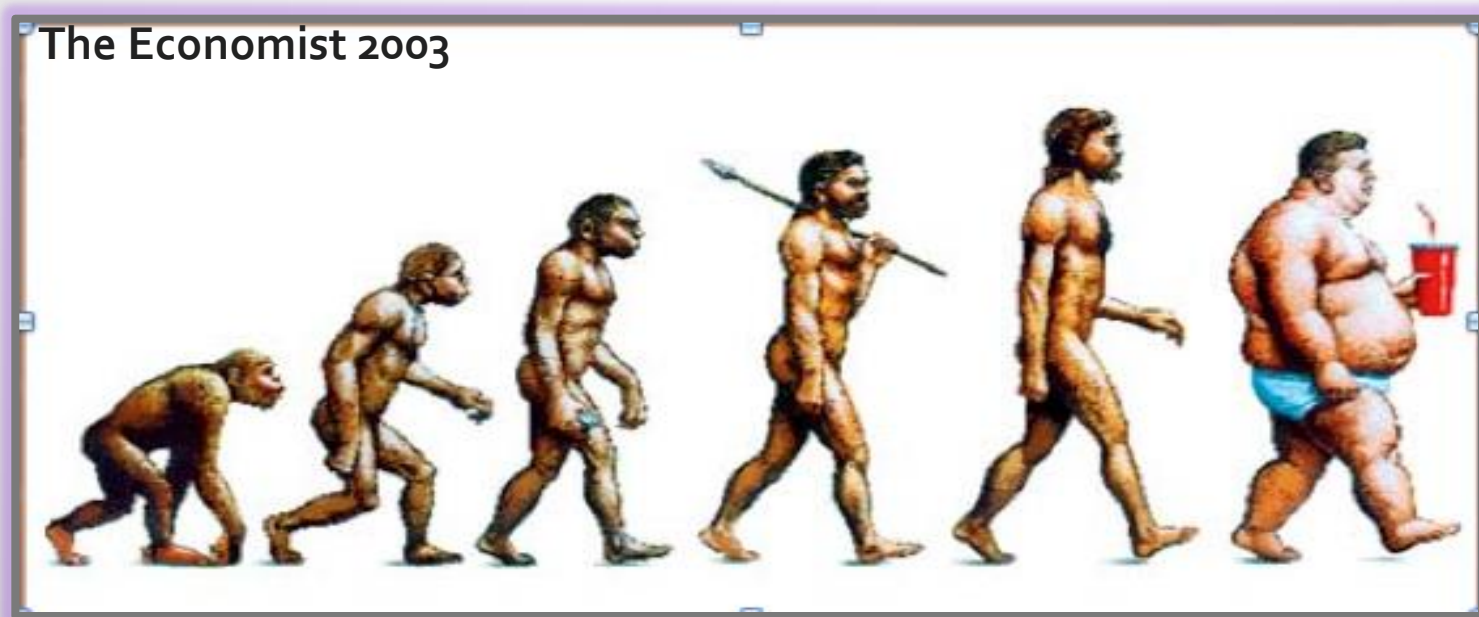


**Daniel Lowd**  
Assistant professor  
University of Oregon  
lowd@cs.uoregon.edu  
Co-Investigator



# Rules have changed

We are no longer *Accidentally Well!!*

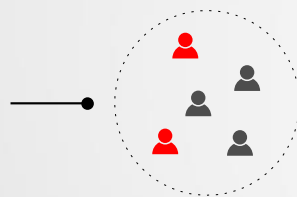


“Nudging lifestyles for better health outcomes: crowd sourced data and persuasive technologies for behavior change” Piniewski et al.

EUR 24785 EN – 2011

# PeaceHealth clinical trial

## 500-Person Randomized Controlled Trial



500 People  
6 Months



### INCLUSION CRITERIA

BMI: 24- 42  
Age > 21  
CVD or Diabetes  
Up to 2 conditions OK

### **Population characteristics**

Mean BMI = 31  
Mean Age = 48  
Females = 398 (~80%)  
Diabetic = 6.9%  
On Statin = 13.5%

### DATA COLLECTION

**Intervals - 0, 3 & 6 month visits**  
Survey  
Blood draw

### **Continuous data collection**

Activity (minute sampling)  
Weight (wireless)  
Social network  
Service feature usage

### INCENTIVES

Modest per IRB  
Cookbook @ 3 mo  
\$25 Gift card @ 6 mo

# Web service features

Customizable health summary page

Personalized reading section

Social/coach nudging

The screenshot shows a comprehensive health dashboard. At the top, there's a navigation bar with options like Home, Dashboard, Goals, Calories, Competitions, and Wellness Games. The main content area is divided into several sections:

- Total Wellness Summary:** A large central area with a sunset background. It includes a 'Color guide', 'Physical Activity' (Level 3, 3,777 steps/day), 'Current Weight' (BMI 21.1 / 151 lbs), 'Blood Pressure' (0/0 0 bpm), and 'Social Activities' (0 Friends, 2 Competitions, 0 Wellness games, 0 Meetups).
- Lab Results:** A table listing various lab tests like LDL, TC, TG, HDL, FPG, HbA1c, and Creatinine with their respective units and checkboxes.
- Trophy Wall:** A section showing achievements such as Goals Achieved, Competitions Won, and Wellness Games Won, all currently at 0.
- Goals:** A section for setting and tracking goals, currently showing a 'Steps' goal at 29.4% completion (222,401 steps).
- My Coach's Corner:** A section featuring a virtual coach named Jessica who provides personalized nudging based on user activity.
- Public Feed / Health articles Feed:** A social feed area with a search bar and message filters.
- Recommendations:** A section offering suggestions for challenges, games, and role models.

Goals

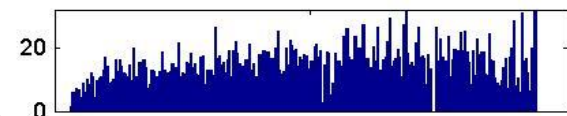
Virtual Coach

Challenges, games, friends, & role models

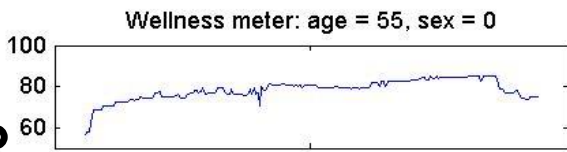
# Best predictors

SPD = 15522, user id = 597, CVD = (0.033, 0.043), DM = (3.058, 1.029)

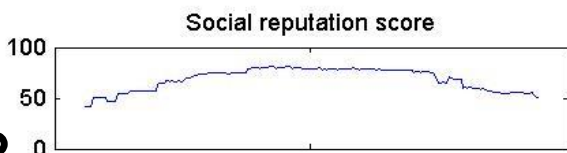
Steps



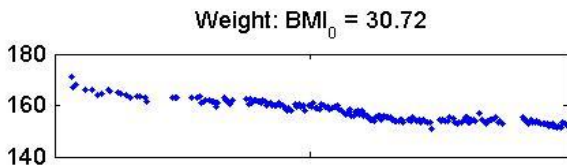
Wellness score



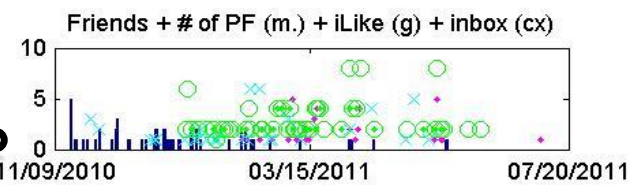
Social reputation



Weight



SN activities

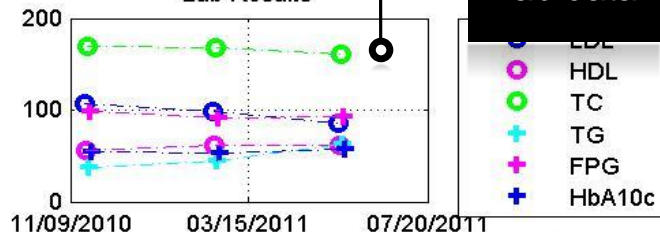


Eating habits : 8  
Stress level : 4  
Health rating : 8

How active are you : 2  
How active are you socially? : 5

What motivates you most to exercise : 2  
Describe your schedule : 7  
Hobbies : 7 6 1

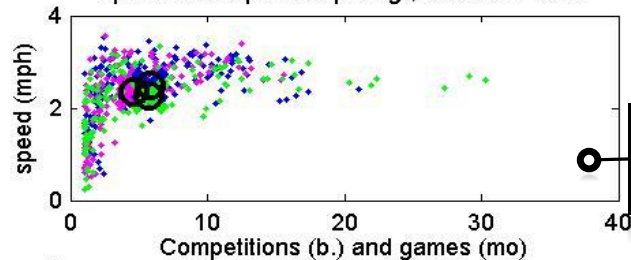
Lab Results



Lab data

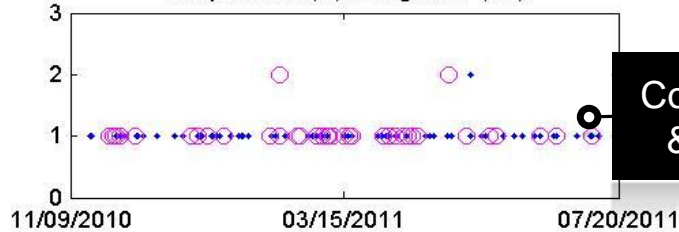
- LDL
- HDL
- TC
- TG
- FPG
- HbA10c

Speed vs. steps in K: pi-bl-gr, aerobic fr=0.70



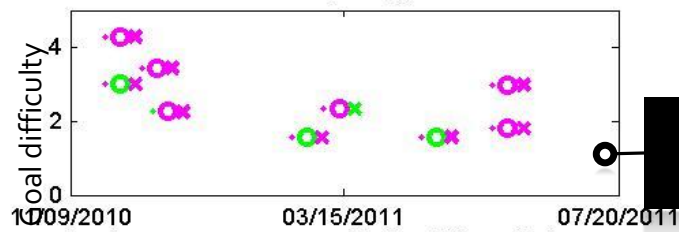
PA trends

Competitions (b.) and games (mo)



Competition & games

Goal status (m -> g): . o x d



Goals

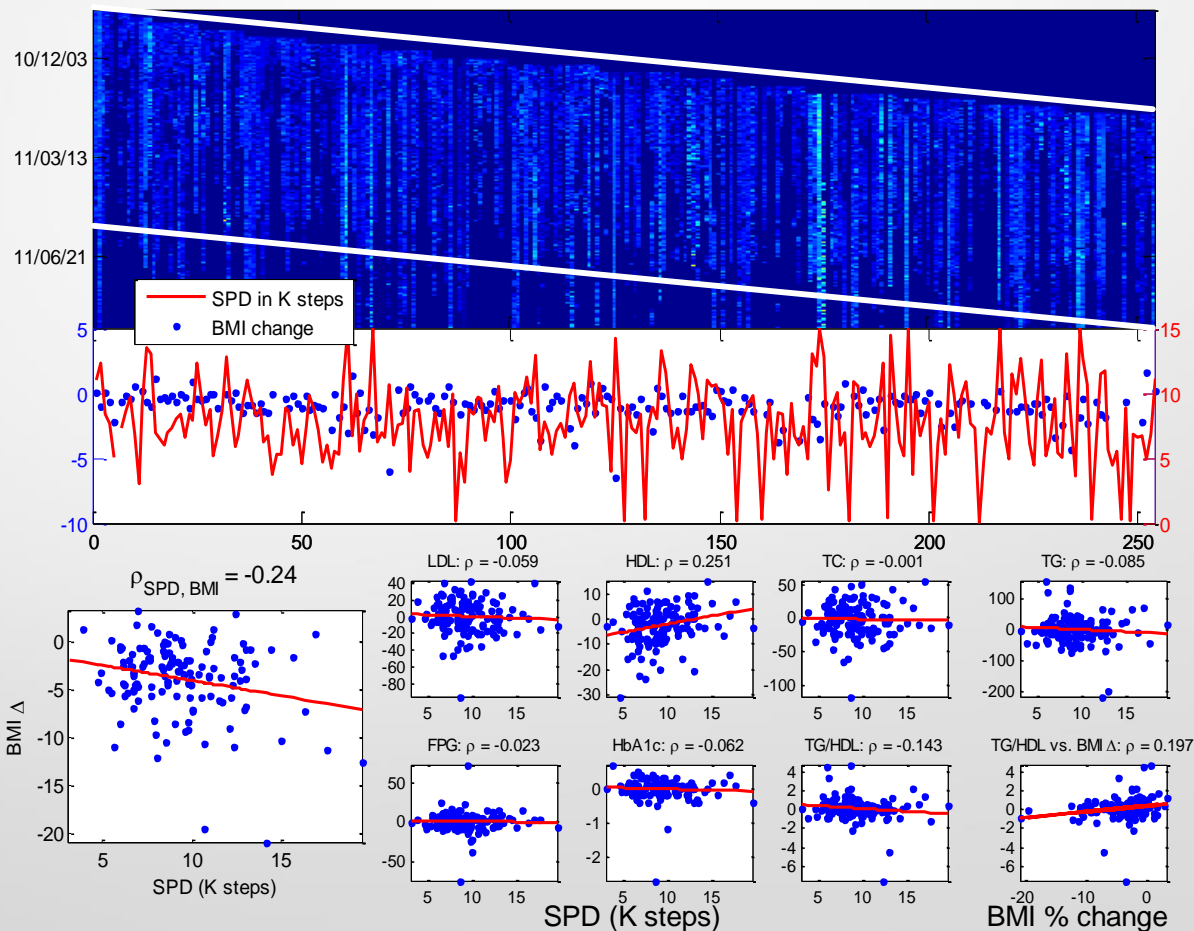
Topics of interest : 6  
Which of these describe your current lifestyle? : 6 1  
Which of these areas do you want to improve? : 1

# Biometrics and biomarkers

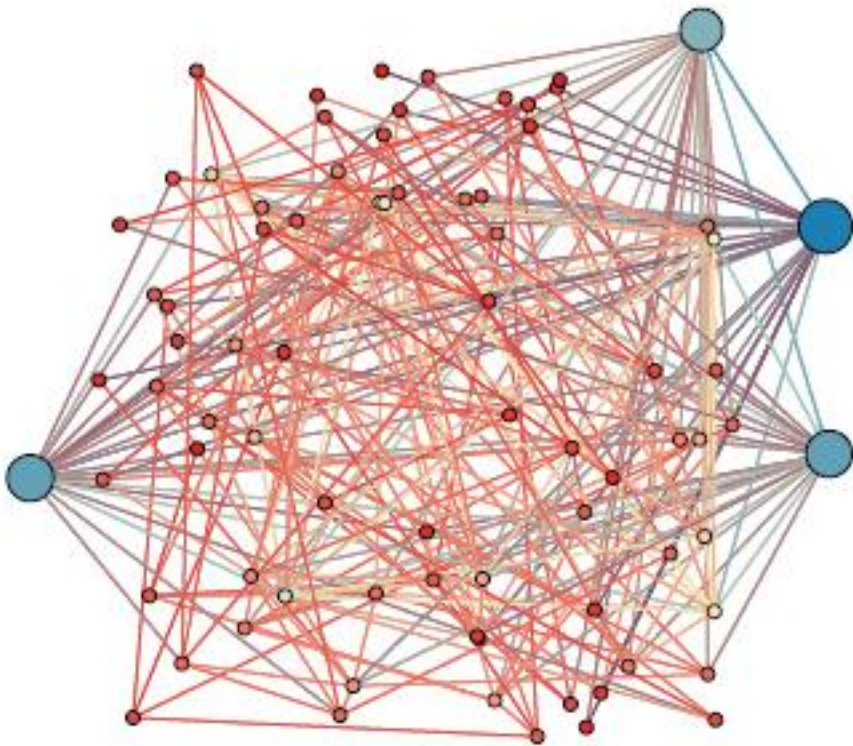
Steps per day:  
Time (y) vs users

Significant Weight loss  
Peer to Peer  
Influencers

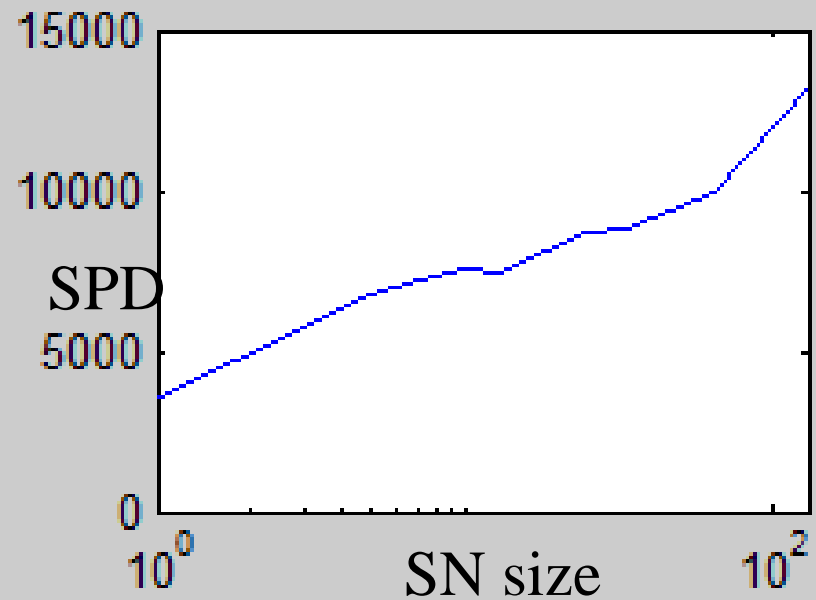
Correlation  
SPD & HDL = 0.25  
SPD & BMI = -0.24  
SPD & TG/HDL = -0.20



# Sustained Engagement



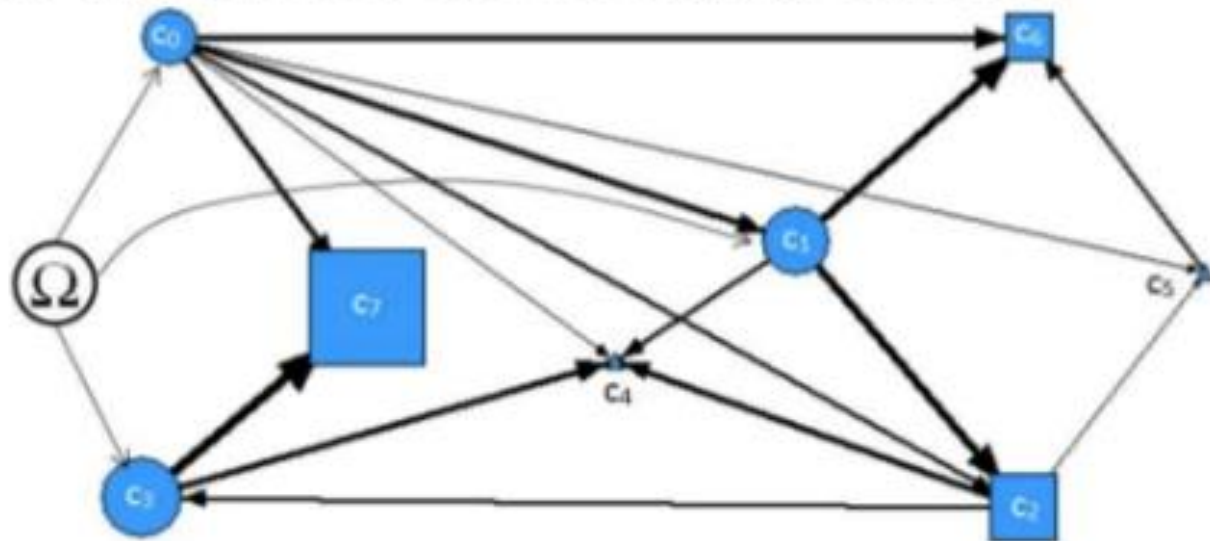
SPD(Steps per Day) vs. SN size



*The larger your social network, the more active you are.*

# Detected Communities for Influence Propagation (CIKM'14)

- Influencers: circle nodes
- Influenced users: rectangle nodes
- Non-Influenced users: triangle nodes



N. Phan, D. Dou, X. Xiao, B. Piniewski, and D. Kil, "Analysis of physical activity propagation in a health social network," in CIKM'14, pp. 1329–1338.









# "HEALTHGRID"



DATA



SENSORS



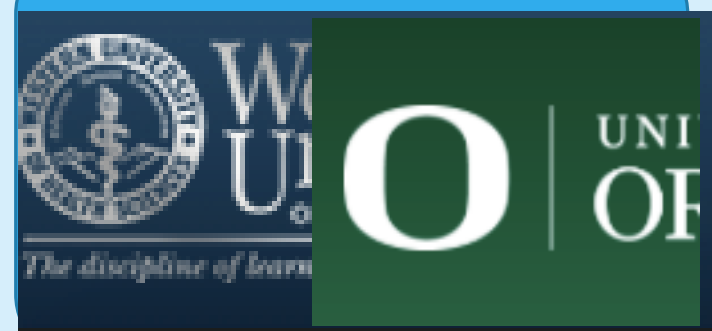


# HEALTHGRID





# 2016 Sprint innovators







- Activity
- Nutrition
- Sleep
- Social
- Other

**Habit Pro**

**Fiber-rich breakfast**

Fr	Sa	Su	Mo	Tu	We	Th
22	23	24	25	26	27	28

*Shared by: Allan*

**Find evidence**

Fr	Sa	Su	Mo	Tu	We	Th
22	23	24	25	26	27	28

*Shared by: Michael Stanford*

**Move around every now and**

Fr	Sa	Su	Mo	Tu	We	Th
22	23	24	25	26	27	28

The image shows a screenshot of the Habit Pro app interface. At the top, there is a black header with a white plus sign on the left, the text "Habit Pro" in the center, and a white hamburger menu icon on the right. Below the header, there are three habit cards. Each card has a colored circle with a checkmark icon, a title, and a weekly progress bar. The progress bar consists of seven circles representing the days of the week (Fr to Th), with numbers 22 through 28 inside them. The circles are colored green or red, indicating completion status. To the right of each progress bar is a small line graph icon. The first habit is "Fiber-rich breakfast" with a red circle and checkmark. The second habit is "Find evidence" with a blue circle and checkmark. The third habit is "Move around every now and" with a yellow circle and checkmark. Between the second and third habit cards, there is a profile picture of a cat and the text "Shared by: Michael Stanford".



Bed at 11:00pm



February 2016



10:05 am

18

19

20

21



8:53 pm from Allan

Early night tonight?



9:00 pm from Michael Stanford

Thanks for asking. It's hard with a family. I was up past 11 last night doing algebra with Luke

22

23

24

25

26

27

28

29



11:05 pm

30

31

April 2016

1

2



7:34 pm from Allan

What will it take...



9:05 pm from Michael Stanford

Reminders! At 10:00!



9:45 pm from Allan

Ok we'll see if that does the trick ...

3

4

Type a message here



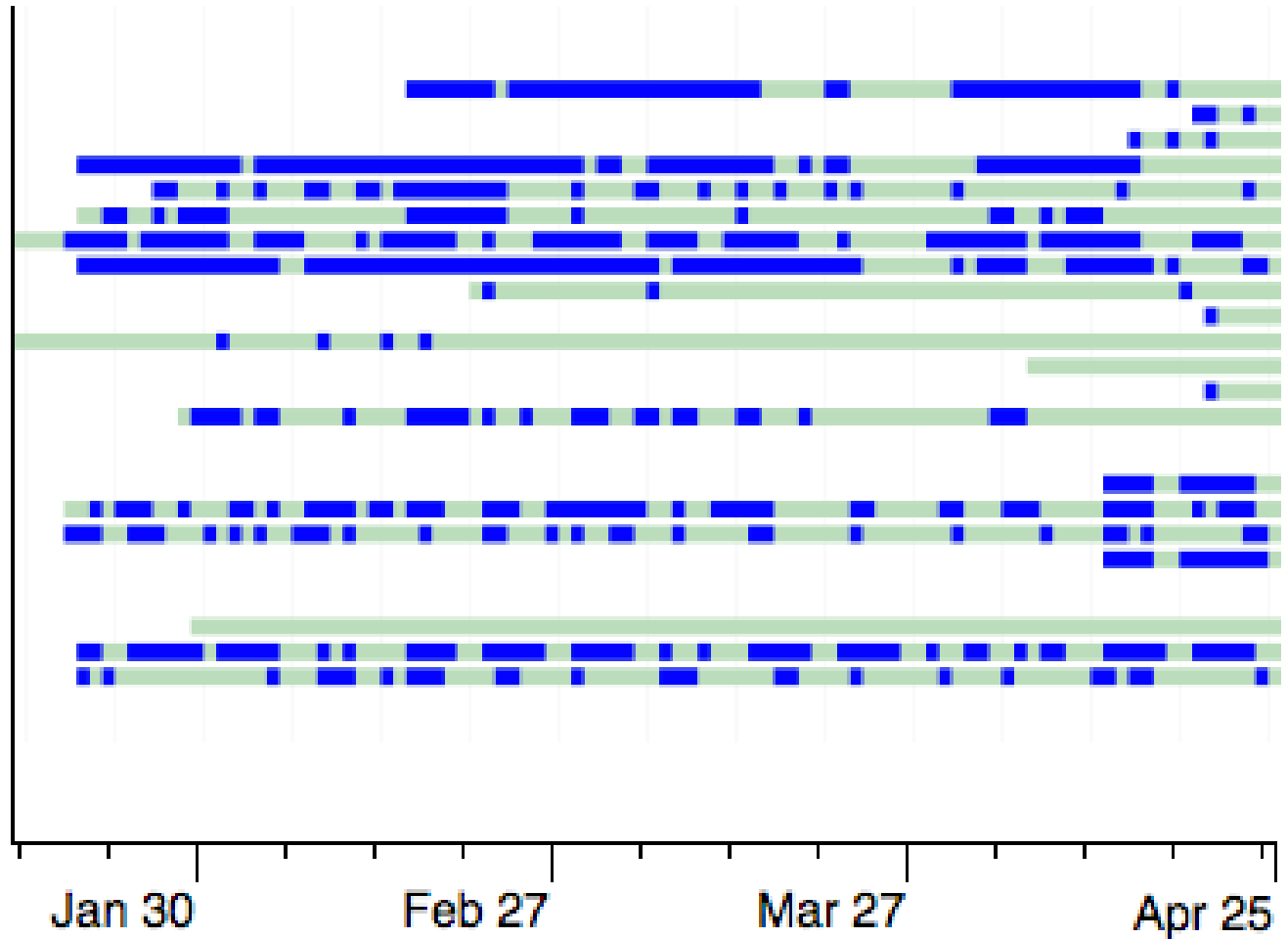


Western  
University  
OF HEALTH SCIENCES

*The discipline of learning. The art of caring.*

2016

## Usage



# Practitioner of the Future



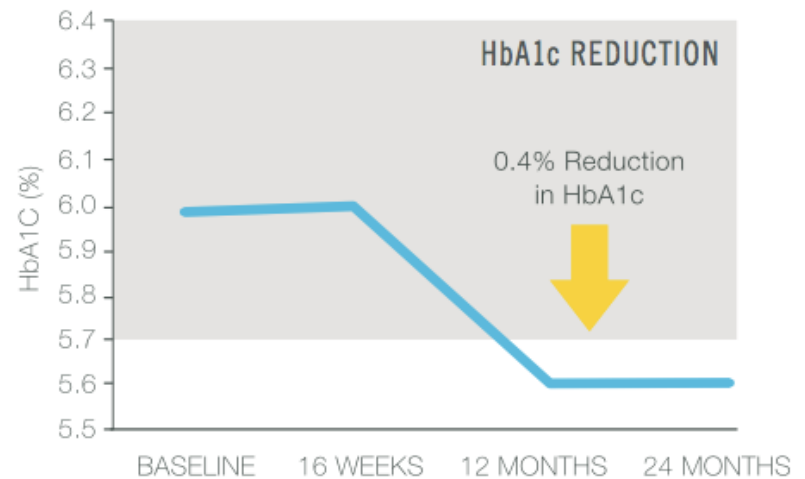
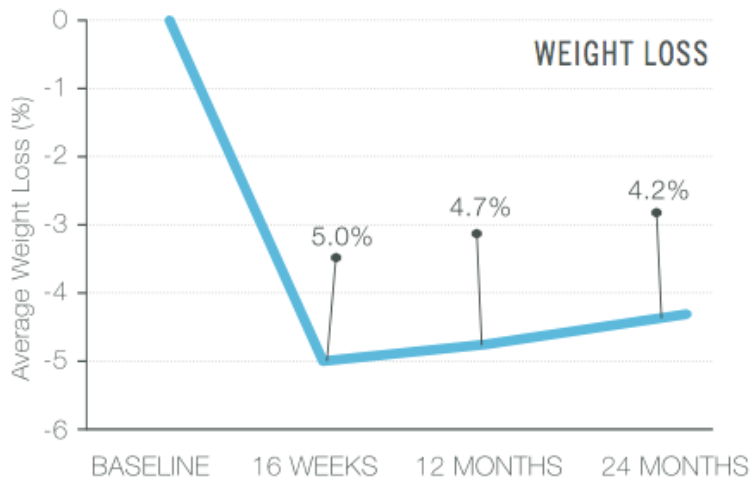
# Digital Therapeutics: Omada



# Outcomes-Based Community Health

## PREVENT'S 1 & 2-YEAR PUBLISHED RESULTS DEMONSTRATE SUSTAINED CLINICAL OUTCOMES

Results published in: *Diabetes Educator* and *The Journal of Medical Internet Research* <sup>1 2</sup>



**75% OF SURVEYED PARTICIPANTS\* REPORT A MODERATE OR SIGNIFICANT INCREASE IN SATISFACTION WITH THEIR HEALTH PLAN FOR OFFERING PREVENT.**

# Sprouting Mass Collaboration



**80%**

# Next Frontier in Population Health

## Culture

- Cross-Generational collaboration, Click through, downloads, app usage

## Technology-Digital asset

- Volume, diversity and continuous flow of data

## Clinical

- Insulin Resistance as a standard unit of health value efficiency



# Acknowledgements

- Ran Whitehead, PeaceHealth Laboratories
- Dejing Duo, University of Oregon
- Ruoming Jin, Kent State University
- Xintao Wu, University of Arkansas
- Jessica Greene, George Washington School of Nursing
- Robyn Dreibelbis, College of Osteopathic Medicine Pacific
- Di Lacey, College of Osteopathic Medicine of the Pacific
- Michael Stanford, Good Rabbits Inc.
- Allan Johnson, Good Rabbits Inc.
- others

# Questions? Comments!

[Bphealthnet@gmail.com](mailto:Bphealthnet@gmail.com)

Details: CWRU Chapter 6:  
Personalized Medicine  
and Public Health  
eBook

<http://www.amazon.com/Wireless-Health-Remaking-Pervasive-Technologies-ebook/dp/BooQWO14U>

