



The next Frontier in Population Health:

Rethinking
the
Principles
of

Mass Collaboration

Brigitte Piniewski, MD₁

HIMSS Oregon 2016

Sustained Engagement & Work force development

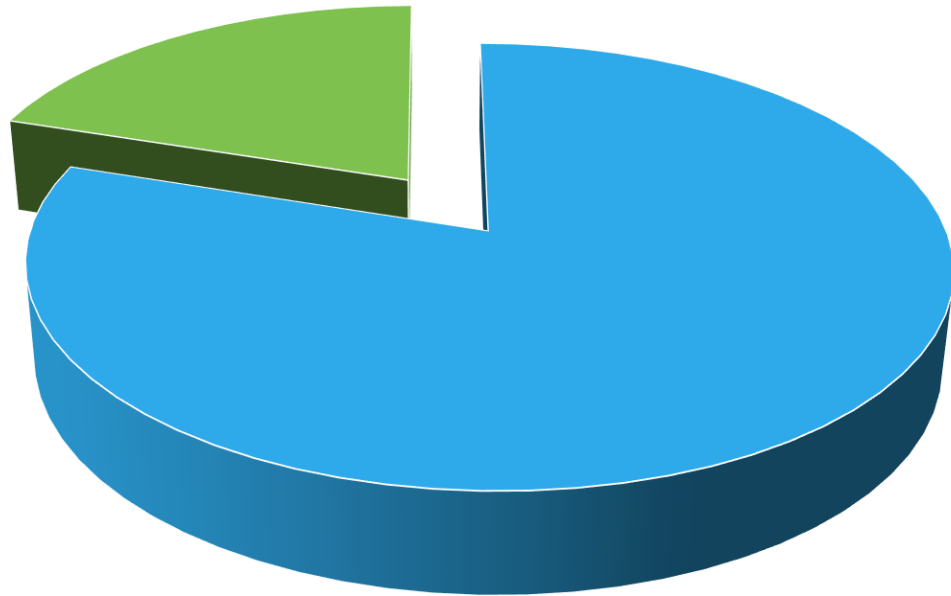
Disclosures!



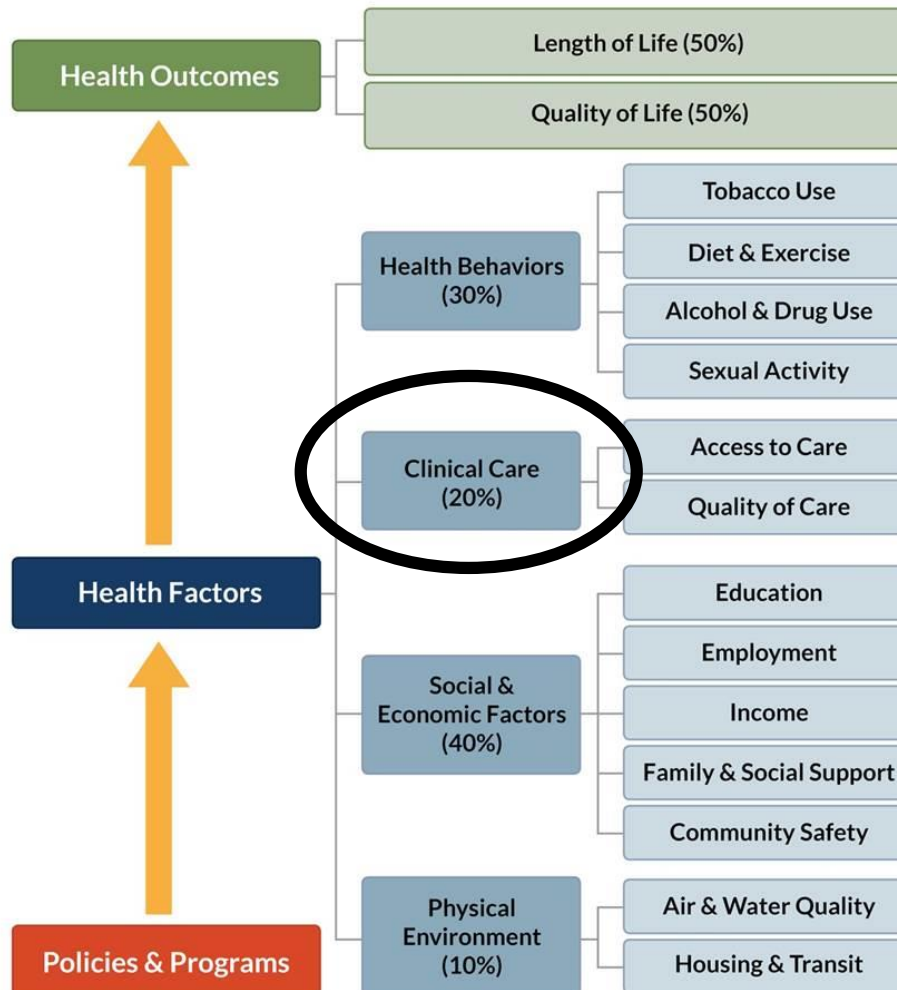
Strategic Advisor role for Good Rabbits

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

UBER



Mass Collaboration

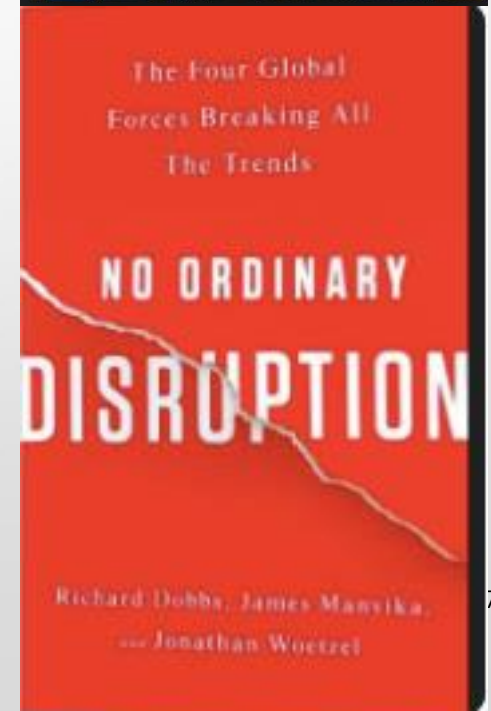
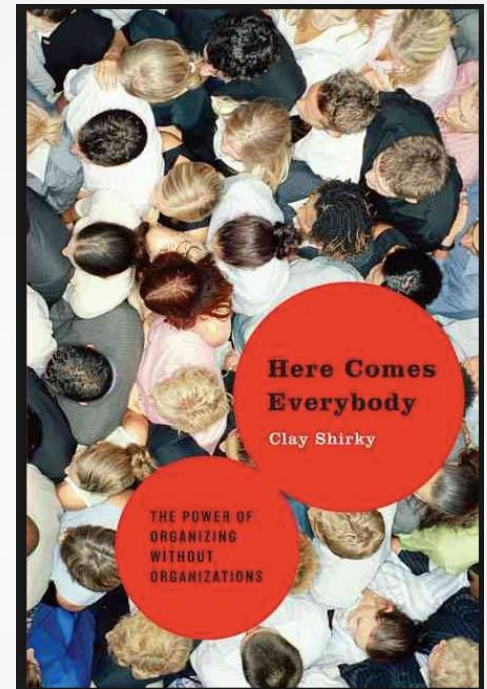


Utilization, COST
EMR, PHI, HiPAA
FDA, HIT security

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

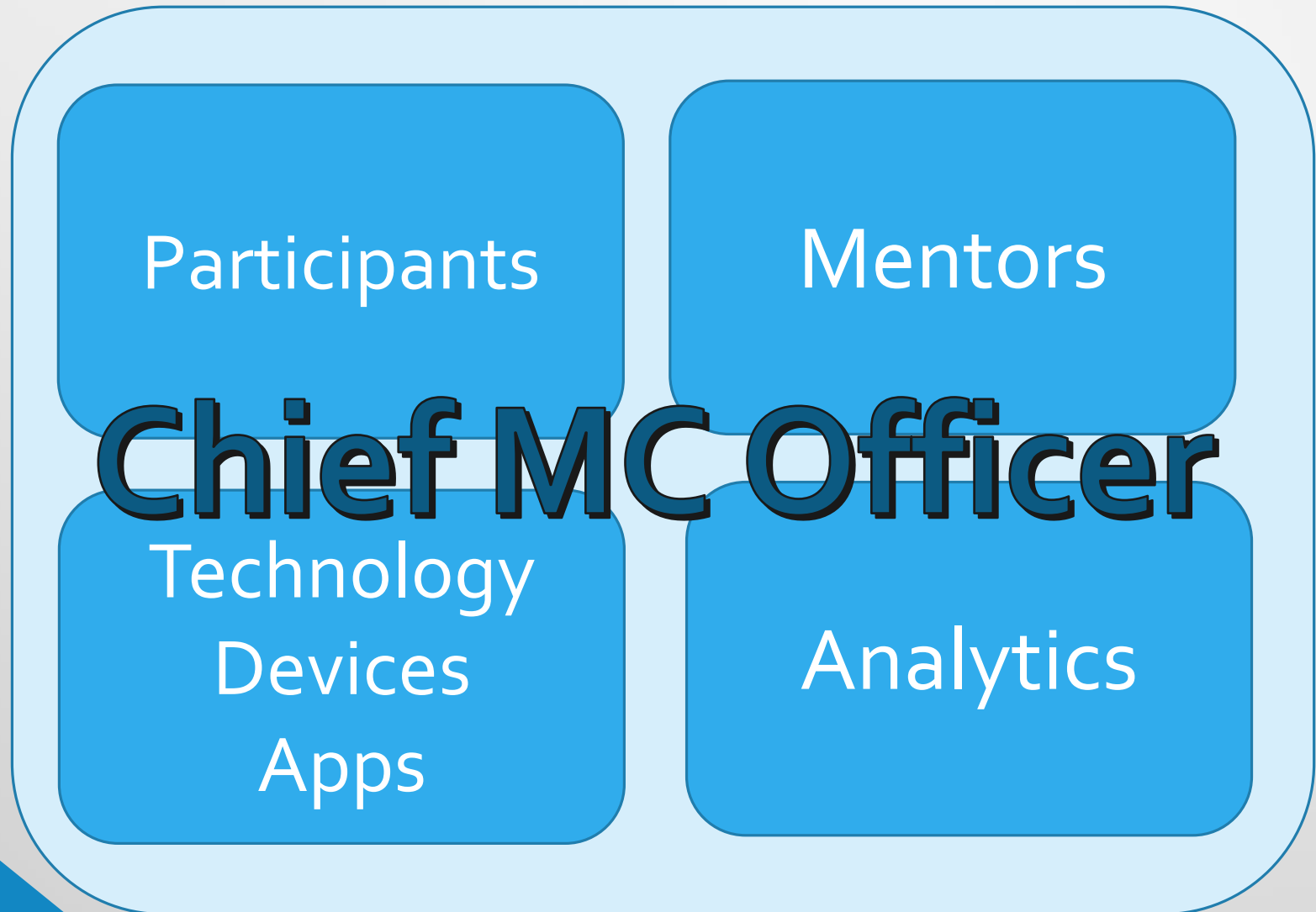
Surplus talent

- Compelling reason
- Greater good
- Lower the barriers
- $n = \text{MANY}$
- 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

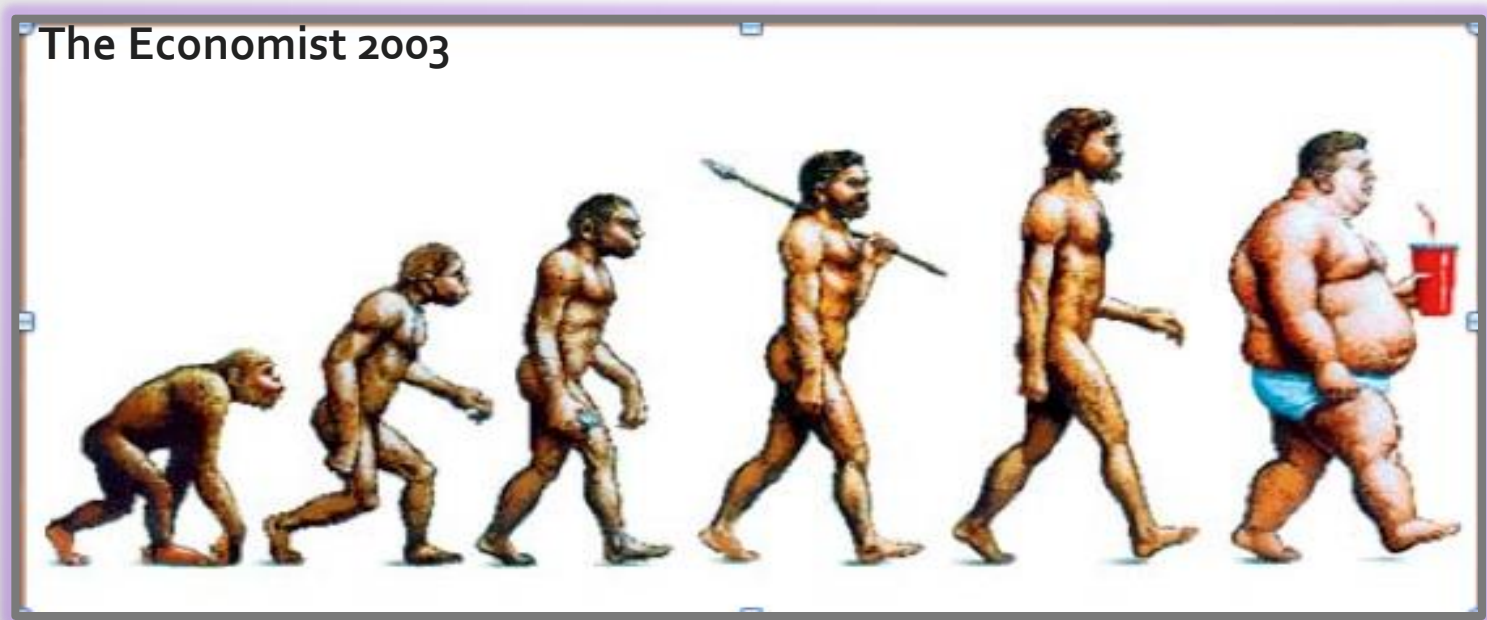


Daniel Lowd
Assistant professor
University of Oregon
lowd@cs.uoregon.edu
Co-Investigator



Rules have changed

We are no longer *Accidentally Well!!*

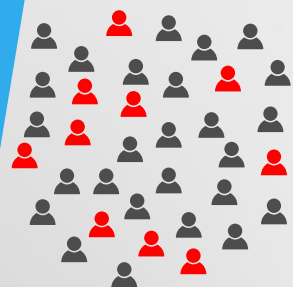


“Nudging lifestyles for better health outcomes: crowd sourced data and persuasive technologies for behavior change” Piniewski et al.

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

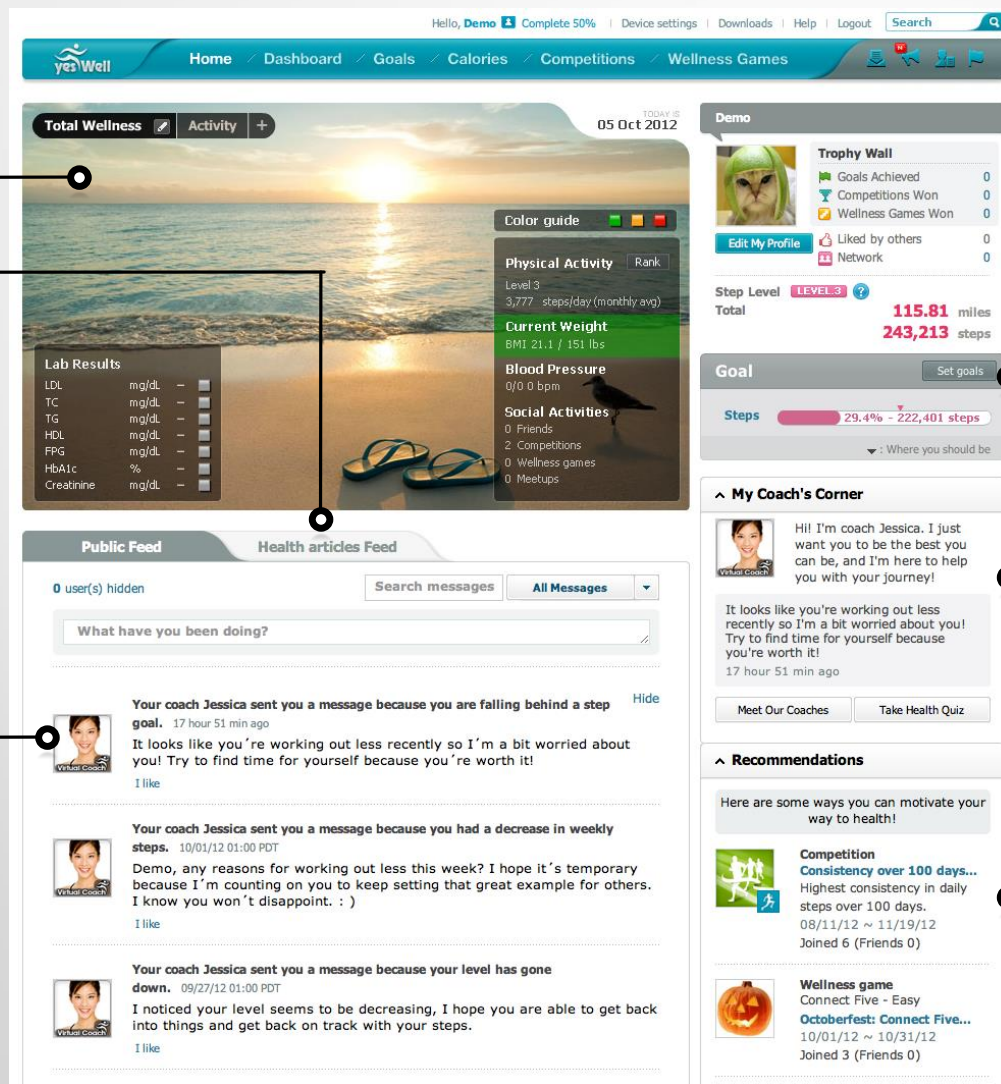
Personalized reading section

Social/coach nudging

Goals

Virtual Coach

Challenges, games, friends, & role models



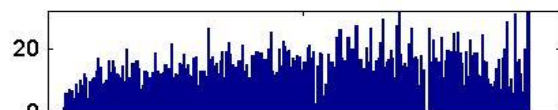
The screenshot displays the HealthMantic web service interface. At the top, there's a navigation bar with links: Home, Dashboard, Goals, Calories, Competitions, and Wellness Games. Below this, the main content area is divided into several sections:

- Total Wellness**: A large section with a background image of a sunset over the ocean. It includes a "Color guide" and "Physical Activity" (Level 3, 3,777 steps/day). Below this is a "Lab Results" table with columns for test name, unit, and status.
- Activity**: A section showing "Current Weight" (BMI 21.1 / 151 lbs) and "Blood Pressure" (0/0 0 bpm).
- Social Activities**: A list of activities including Friends, Competitions, Wellness games, and Meetups.
- Goals**: A section showing "Step Level" (LEVEL 3) and "Total" steps (115.81 miles, 243,213 steps). It includes a "Goal" section with a progress bar for "Steps" (29.4% - 222,401 steps).
- My Coach's Corner**: A section featuring a virtual coach named Jessica. She sends messages to the user, such as "Your coach Jessica sent you a message because you are falling behind a step goal." and "Your coach Jessica sent you a message because you had a decrease in weekly steps.".
- Recommendations**: A section titled "Here are some ways you can motivate your way to health!" It includes a "Competition" (Consistency over 100 days...) and a "Wellness game" (Connect Five - Easy).

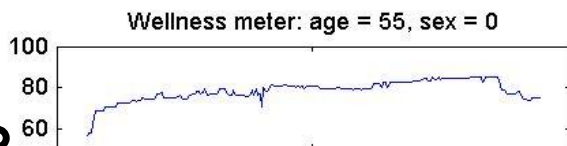
Best predictors

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

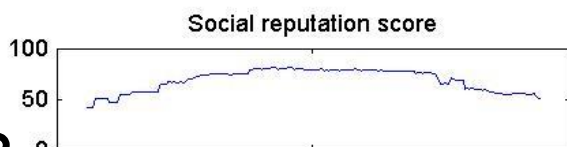
Steps



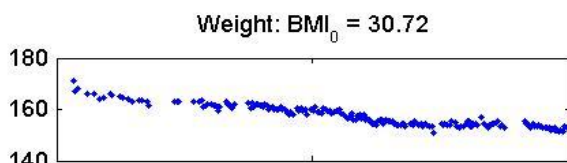
Wellness score



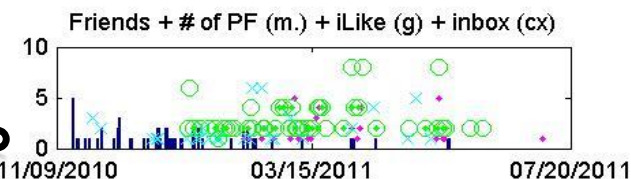
Social reputation



Weight



SN activities

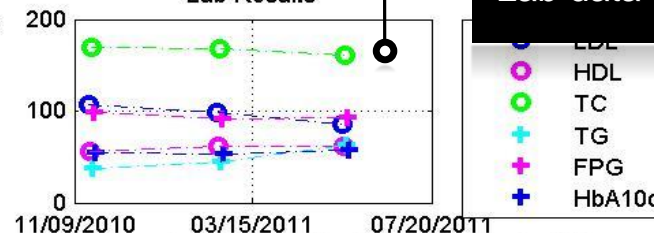


Eating habits : 8
Stress level : 4
Health rating : 8

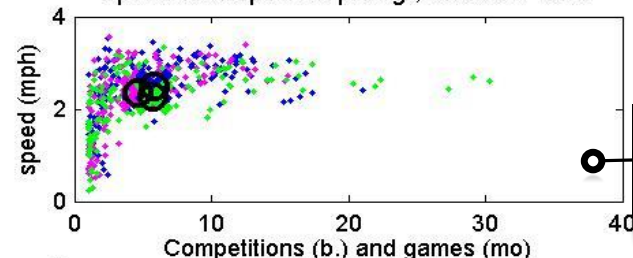
How active are you : 2
How active are you socially? : 5

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

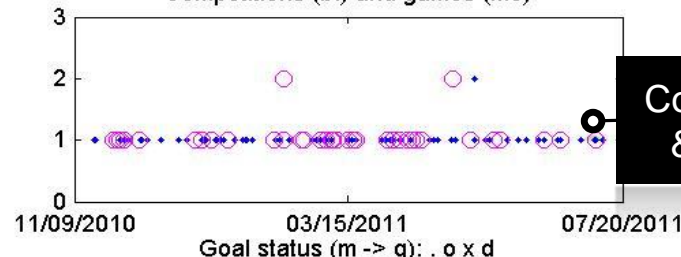
Lab Results



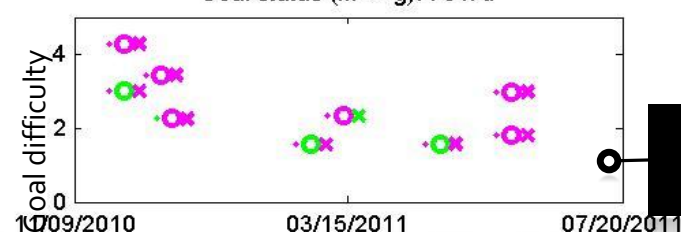
Speed vs. steps in K: pi-bl-gr, aerobic fr=0.70



PA trends



Competition & games



Goals

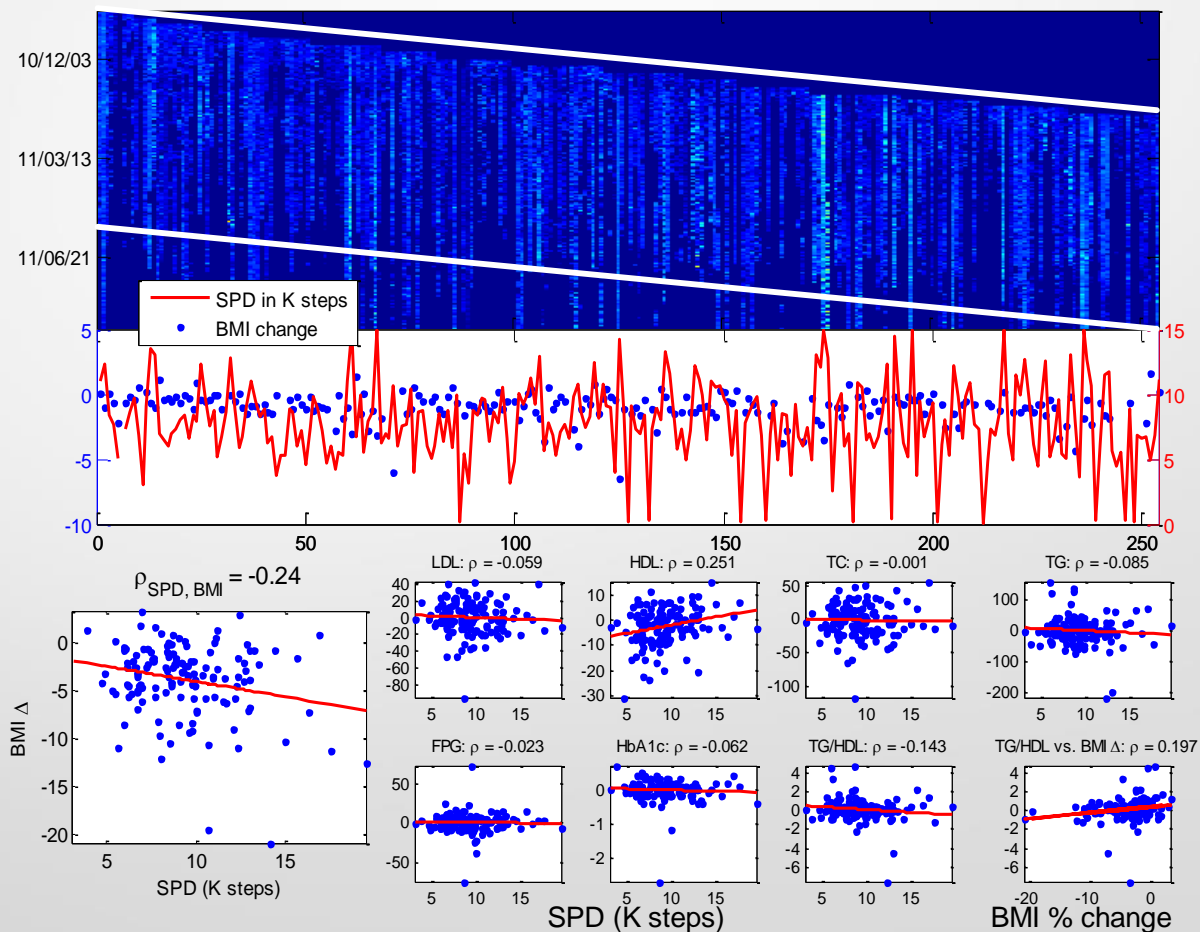
Topics of interest : 6
Which of these describe your current lifestyle? : 6 1
Which of these areas do you want to improve? : 1

Biometrics and biomarkers

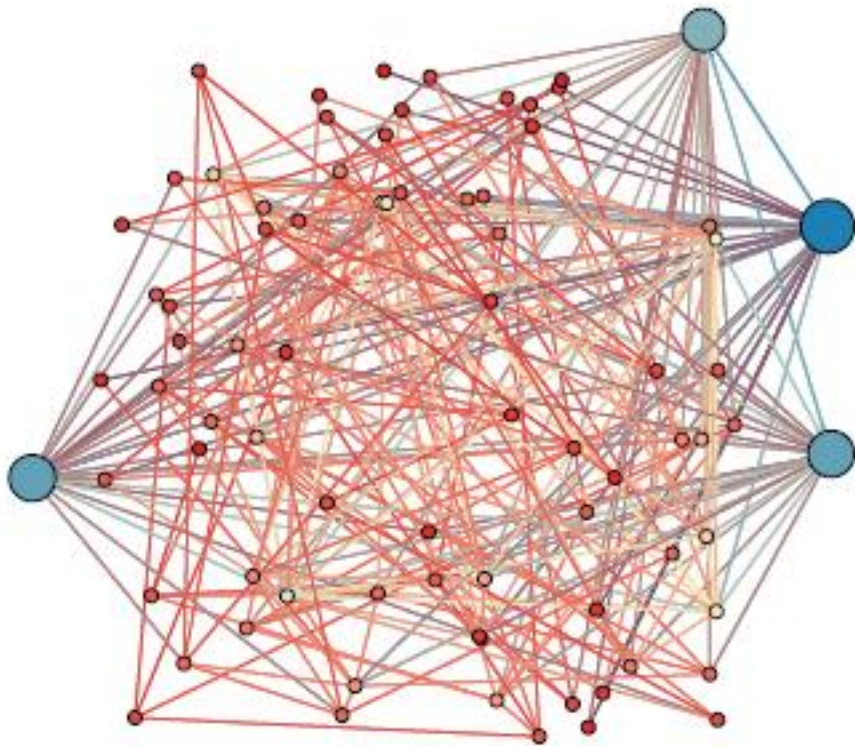
Steps per day:
Time (y) vs users

Significant Weight loss
Peer to Peer
Influencers

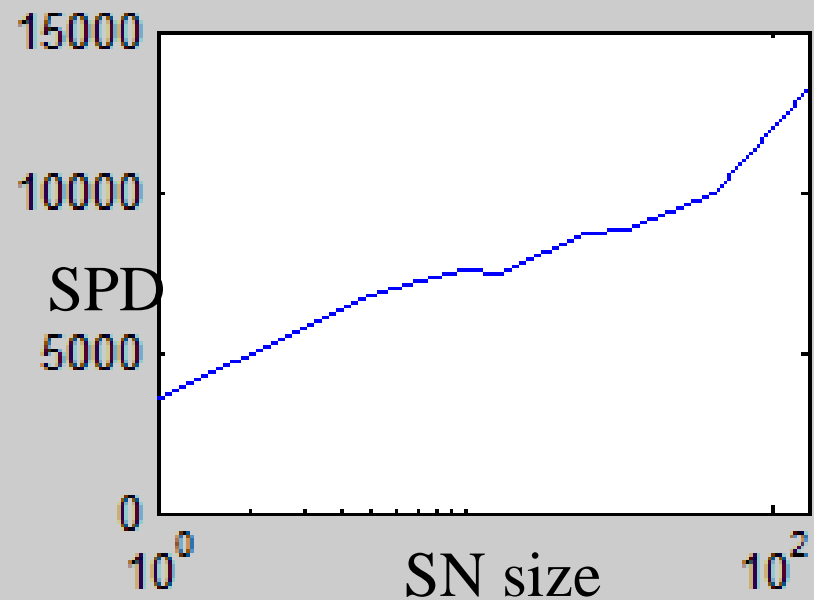
Correlation
SPD & HDL = 0.25
SPD & BMI = -0.24
SPD & TG/HDL = -0.20



Sustained Engagement



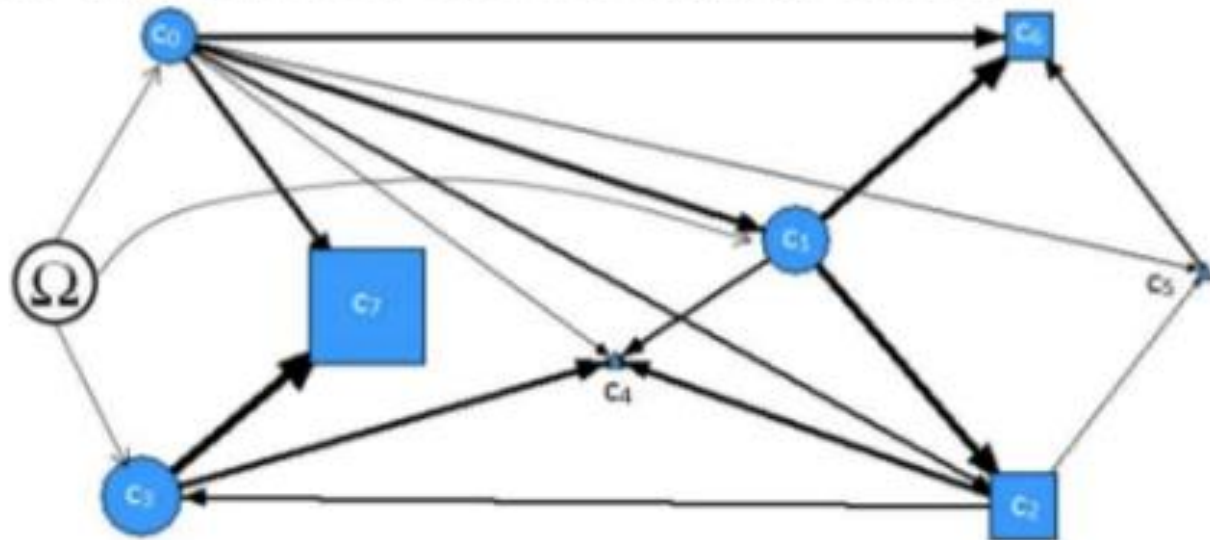
SPD(Steps per Day) vs. SN size



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

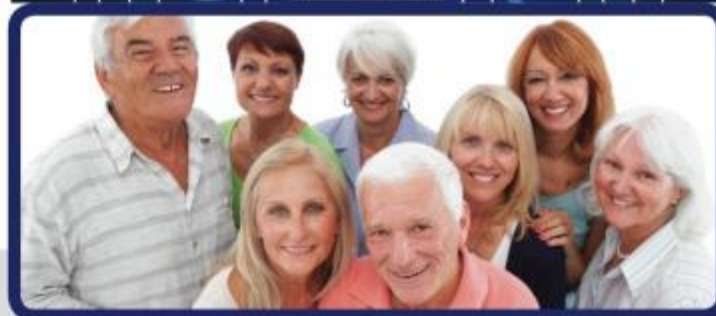
Detected Communities for Influence Propagation (CIKM'14)

- 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.

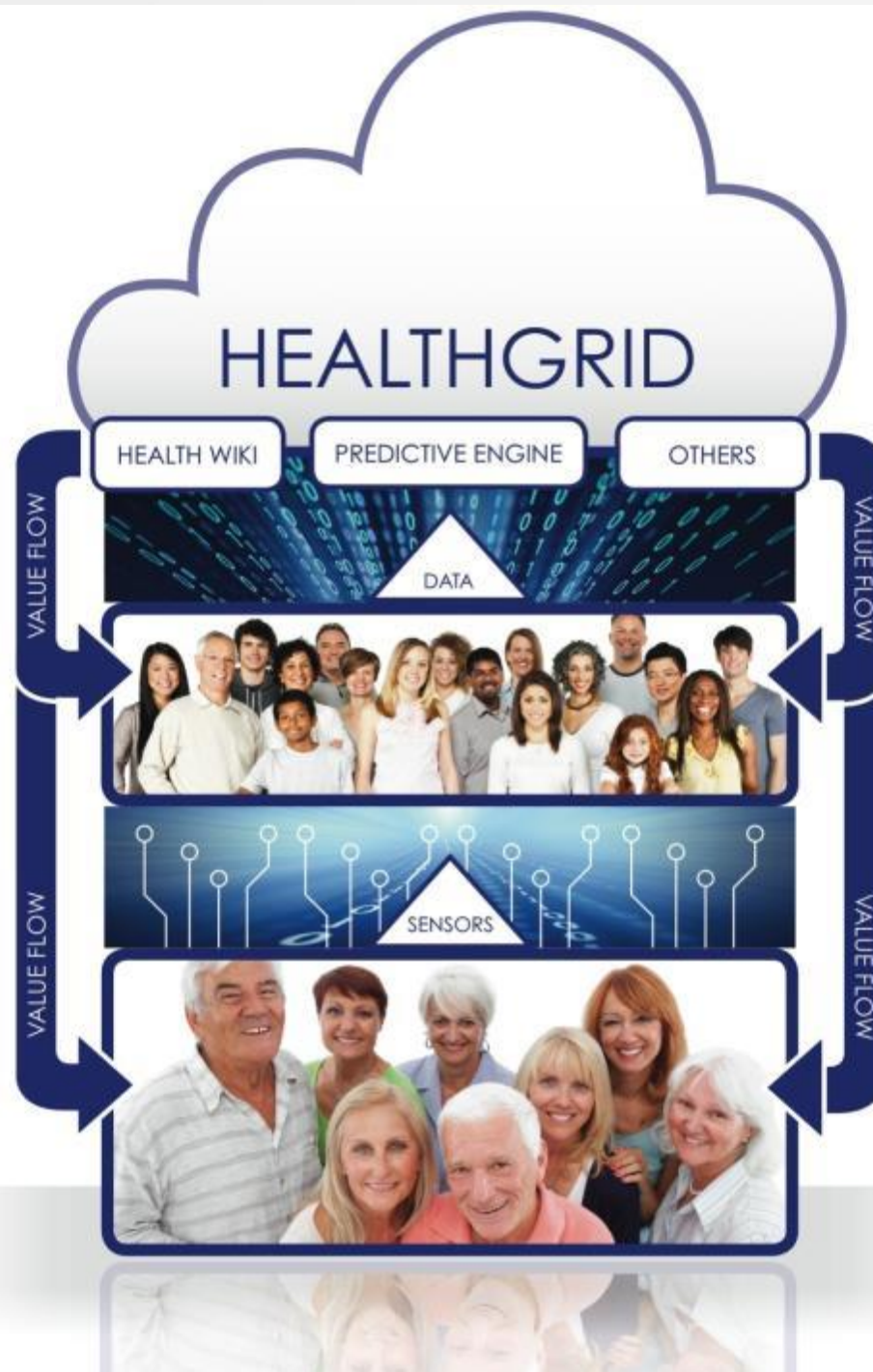






"HEALTHGRID"

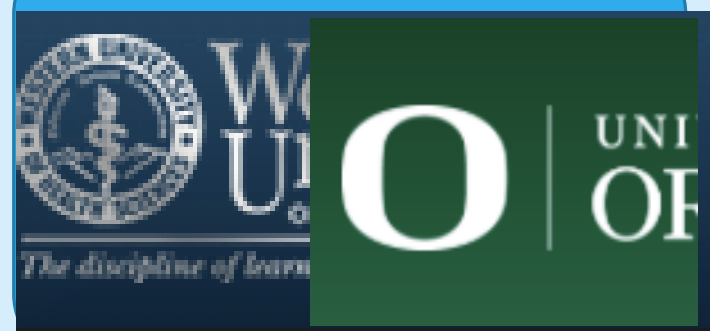






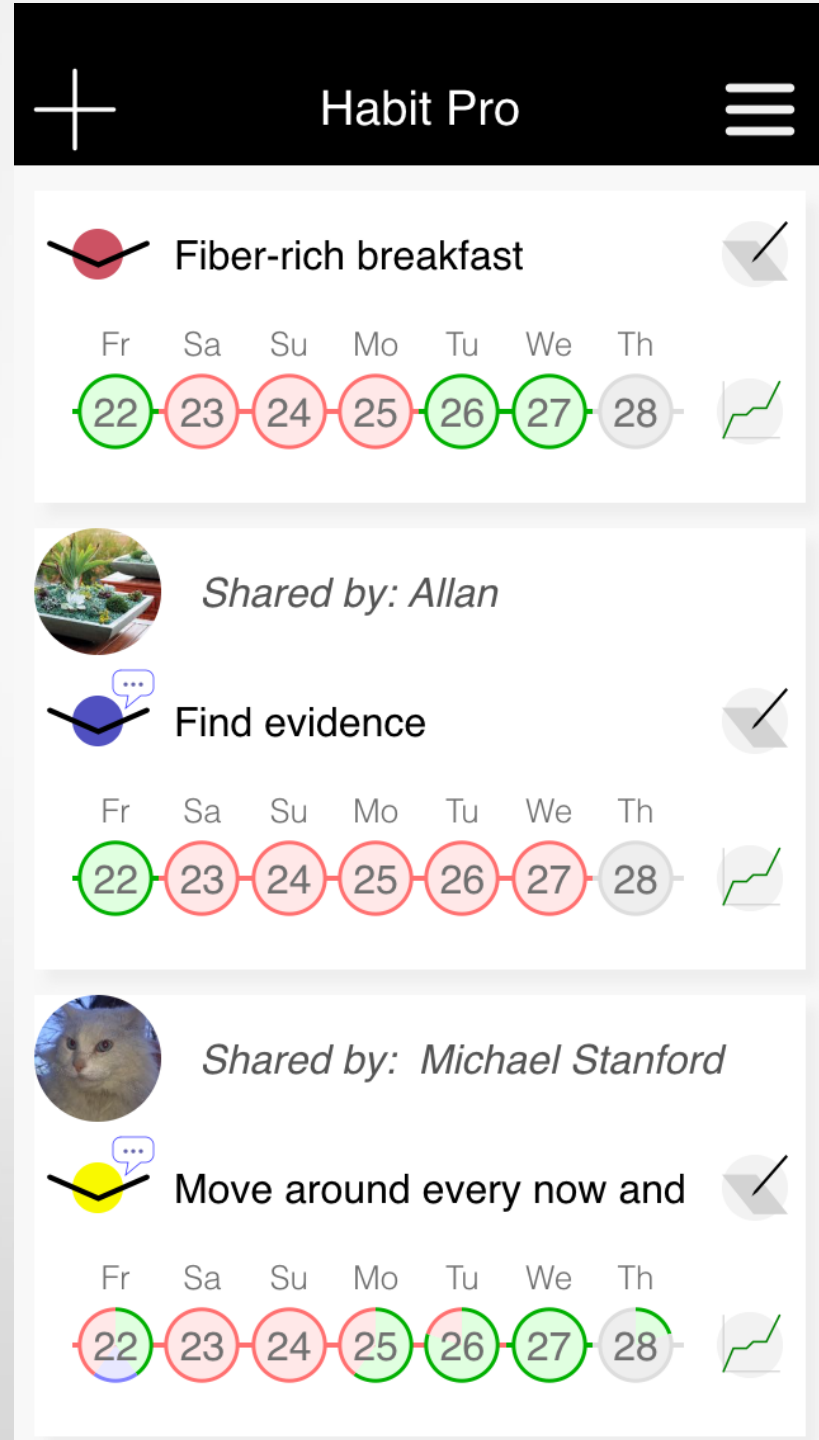


2016 Sprint innovators





- Activity
- Nutrition
- Sleep
- Social
- Other





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



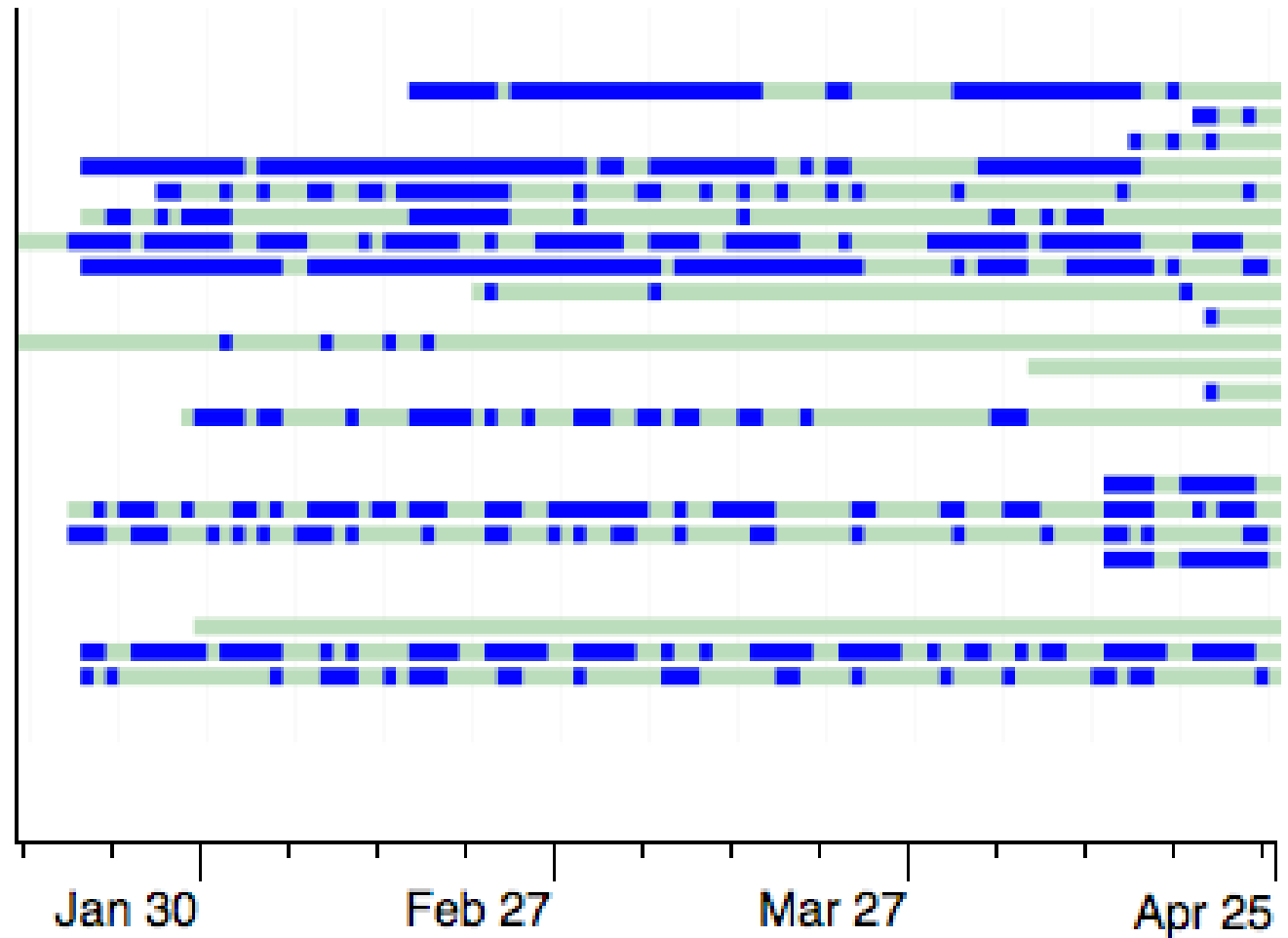


Western
University
OF HEALTH SCIENCES

The discipline of learning. The art of caring.

2016

Usage



Practitioner of the Future



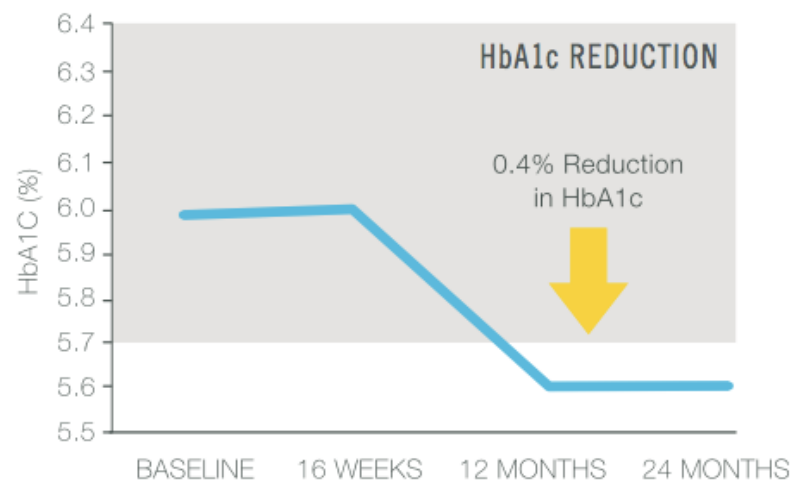
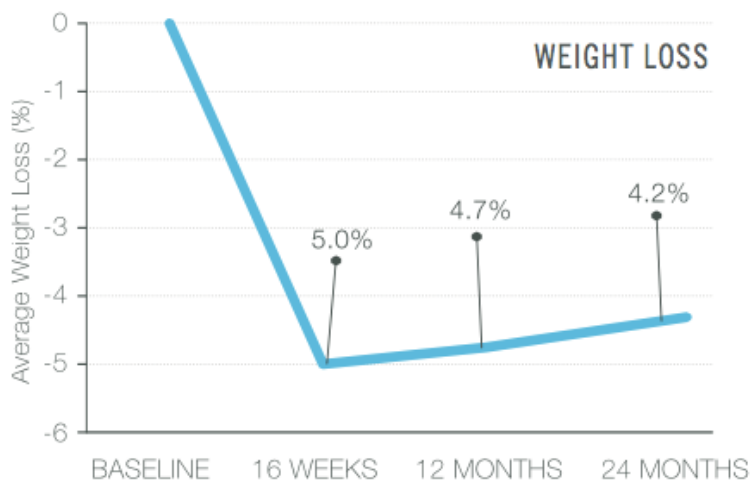
Digital Therapeutics: Omada



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* ^{1 2}



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

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

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

