INSURANCE
ReVOLUTION
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CONFERENCE

Wearables

Mark Hardy
JJ Carroll
Matthew Smuck, MD

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Today's View

Mark Hardy

Sr Manager, Direct Life & Health

TD Life

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Wearable?

7971
:08min.
FREE :08 min. Arms
Abs
2 WORKOUTS IN 1
:08min.
FREE :08 min. Thighs
Buns
2 WORKOUTS IN 1
2-Belt, 2-Post Massager
139.99
JCPenney 281

What's out there?

Experience design

Problem to solve

- Attract new buyers
- Retain customers
- Deepen relationships/relevance
- Inherent selection through targeting
- Behaviour modification

Experience...so far

JJ Carroll

Head New Solutions Group Strategy D&R,
Senior Vice President, Swiss Re

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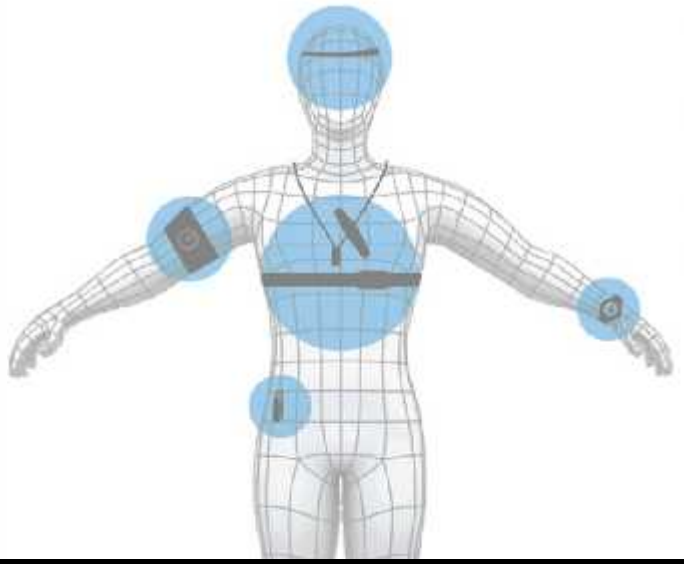
Agenda

- Use of data to streamline underwriting
- Incentivizing people to make behavioral change
- Keeping patients in their homes longer
- Conclusion & Lessons Learned



Objectives for insurers to streamline underwriting

Growth through:

- Higher conversion rates
- Increased consumer relevance

How to streamline:

- New data sources
- Interpretation of data

Examples of companies using data to streamline underwriting

LAPETUS	LifeQ	vivametrica	
The Lapetus Chronos bio demography platform constructs a point estimate of life expectancy (and healthy life expectancy) using a combination of select self-reported lifestyle questions and facial analytic technology which also validates smoking and BMI inputs.	LifeQ uses wearables to measure key physiological metrics in order to consult on a user's personal health. They have developed a unique sensor which increases the medical efficacy of the device moving it away from consumer grade toward medical grade with a proprietary algorithm.	Vivametrica uses wearable data to make an underwriting decision. Digital biomarkers are recorded and analyzed to form personal health scores and to predict risk for chronic disease.	GOQii combines wearables data with a personal coach to guide users to a healthier life style by setting and tracking health & fitness goals.

Case study learnings

Behavioral Economics testing

- Communications
- Discounts – now or in the future?

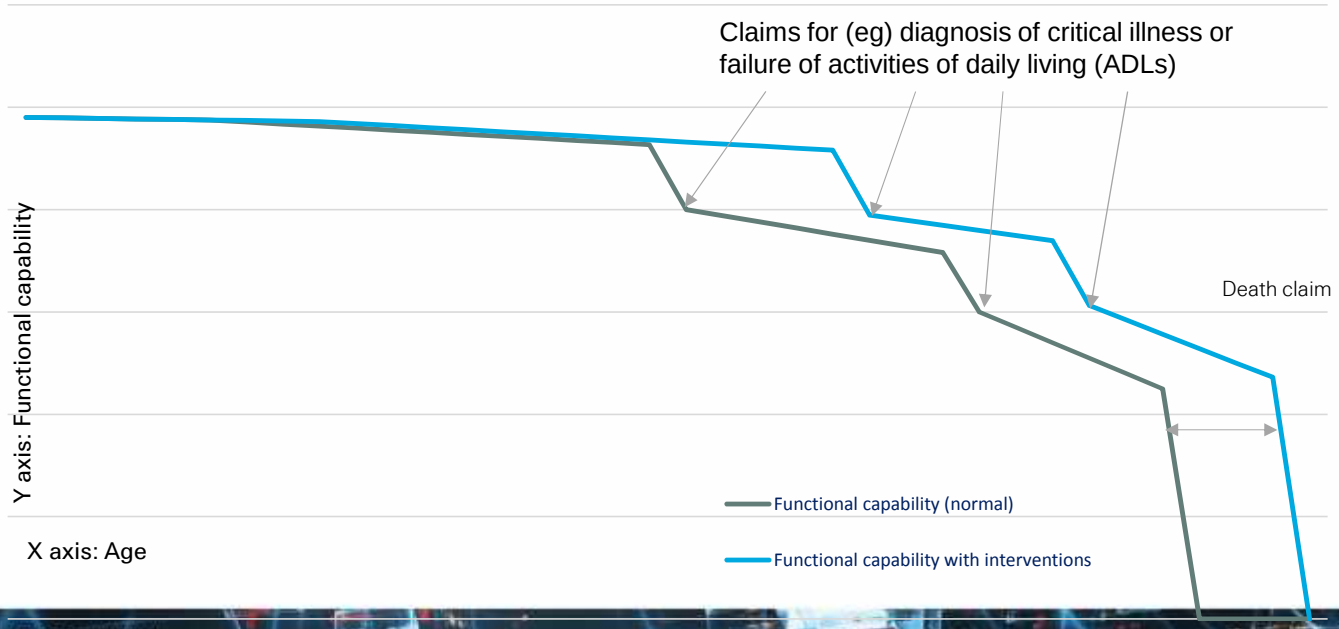
Engagement

- Goal setting
- Get the advisor involved

Staying at home

What's the impact of keeping people in their homes longer?
or getting them home sooner after a hospitalization?

Could we change the shape of the curve? A theoretical illustration of functional decline with & without interventions



Interventions at various stages may include health(ier) living programmes, regular monitoring, home adaptations, social activities etc

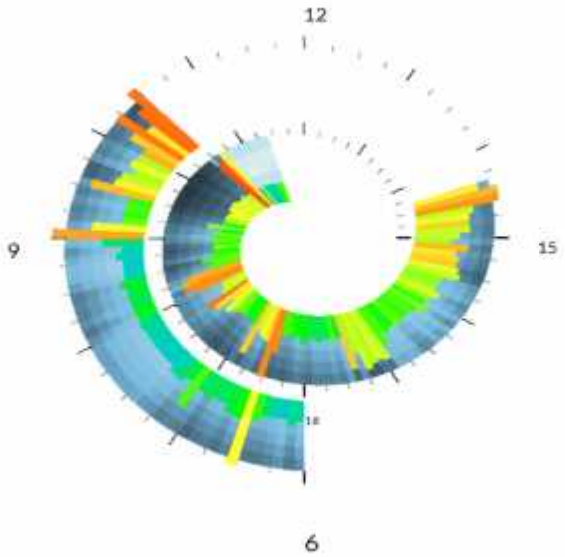
Extending the gap between claims brings benefits to insured and insurer

Medical grade wearables for:

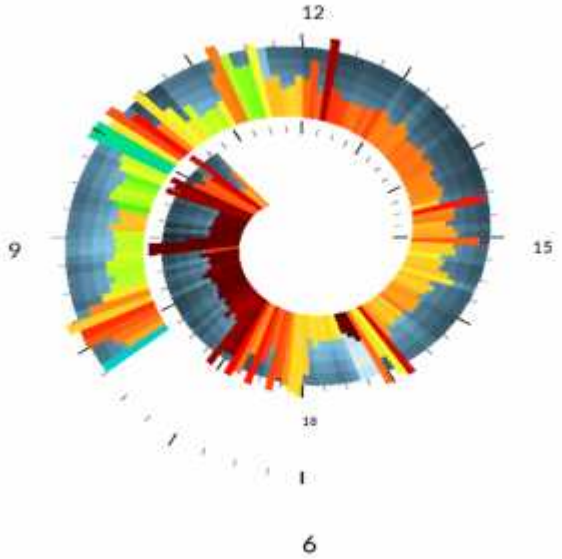
Biovotion

- Heart rate
- Blood oxygenation
- Skin temperature
- Skin blood perfusion
- Steps / Motion

A Quiet Sunday



A Day with Challenges



The role of wearables in insurance Lessons Learned

Alignment of interest
Consumer & Insurer

Obstacles to overcome

A look ahead

Matthew Smuck, MD

Stanford MEDICINE | Physical Medicine & Rehabilitation

Chief, Physical Medicine & Rehabilitation

Associate Professor, Orthopaedics

Director, Wearable Health Lab

vivametrica

Co-Founder

Scientific Advisor

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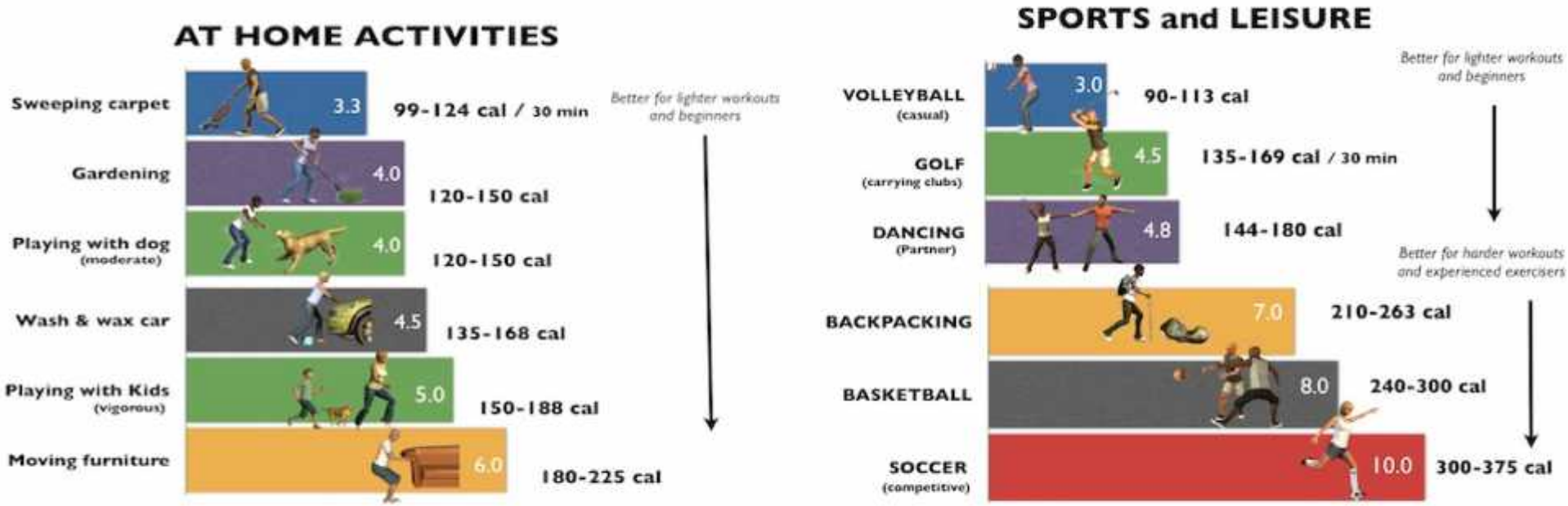
The Story of Physical Activity

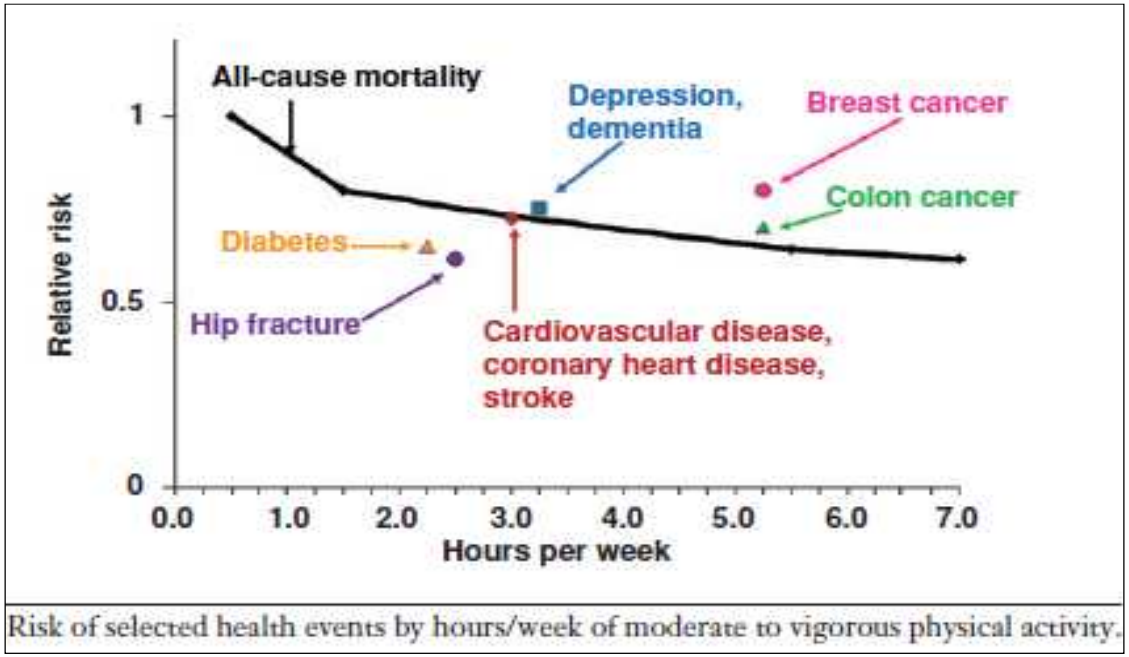
- Part I
  - Defining physical activity
- Part II
  - The future that is now
- Part III
  - The not so distant future

Defining Physical Activity



http://www.whyiexercise.com/metabolic-equivalent.html#gallery[pageGallery]/1/

Substantial Health Benefits



Risk of selected health events by hours/week of moderate to vigorous physical activity.

Part II – The future that is now

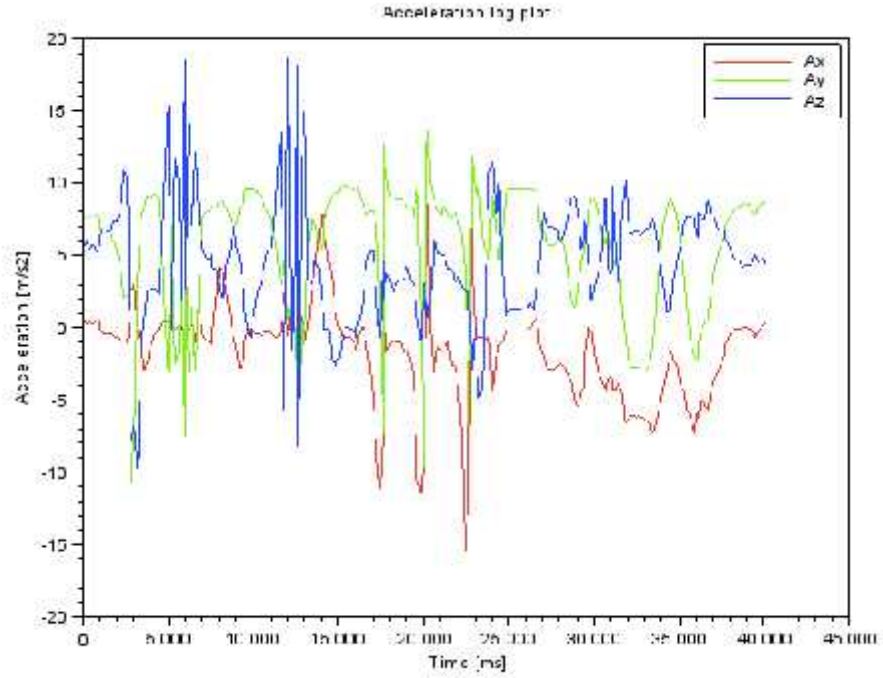
- Physical Activity Monitors

Part II – The future that is now

- Physical Activity Monitors
  - Measure volume, duration and intensity of physical activity
  - Validity and reliability supported by a large body of literature
  - Now considered a gold standard measure of physical activity

Physical Activity Monitors

- How do they work?

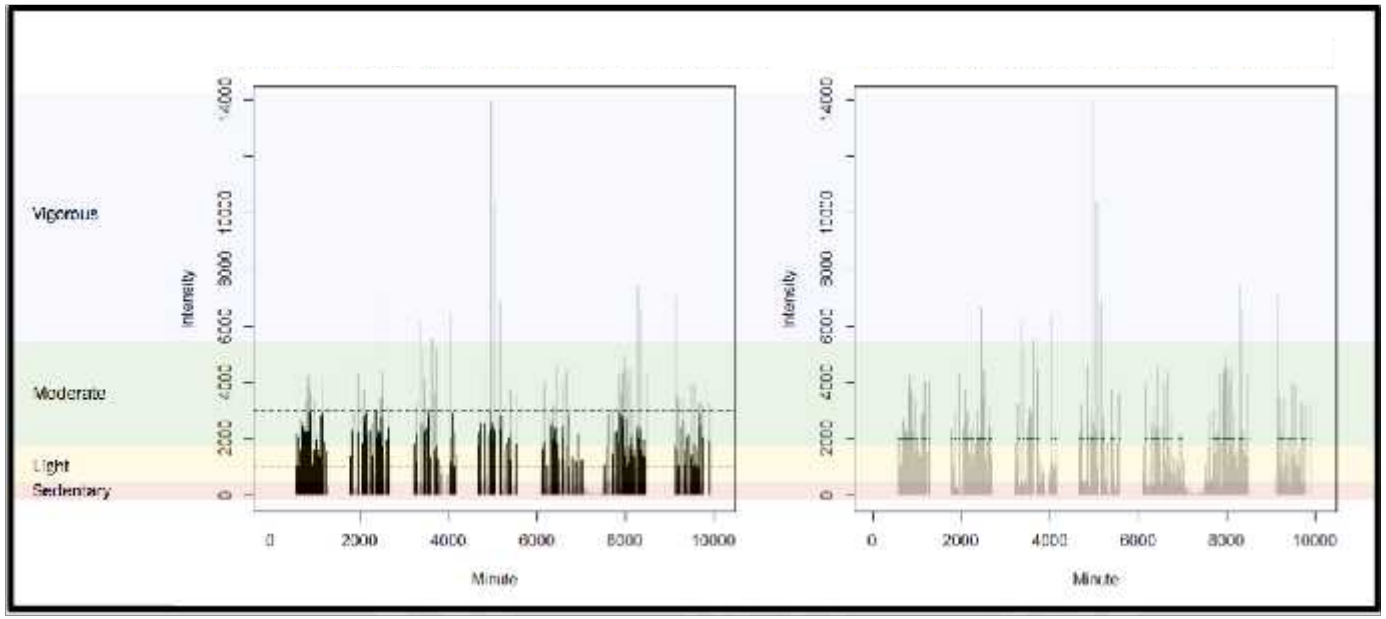


Raw signal

Physical Activity Monitors

- How do they work?

Processed signal

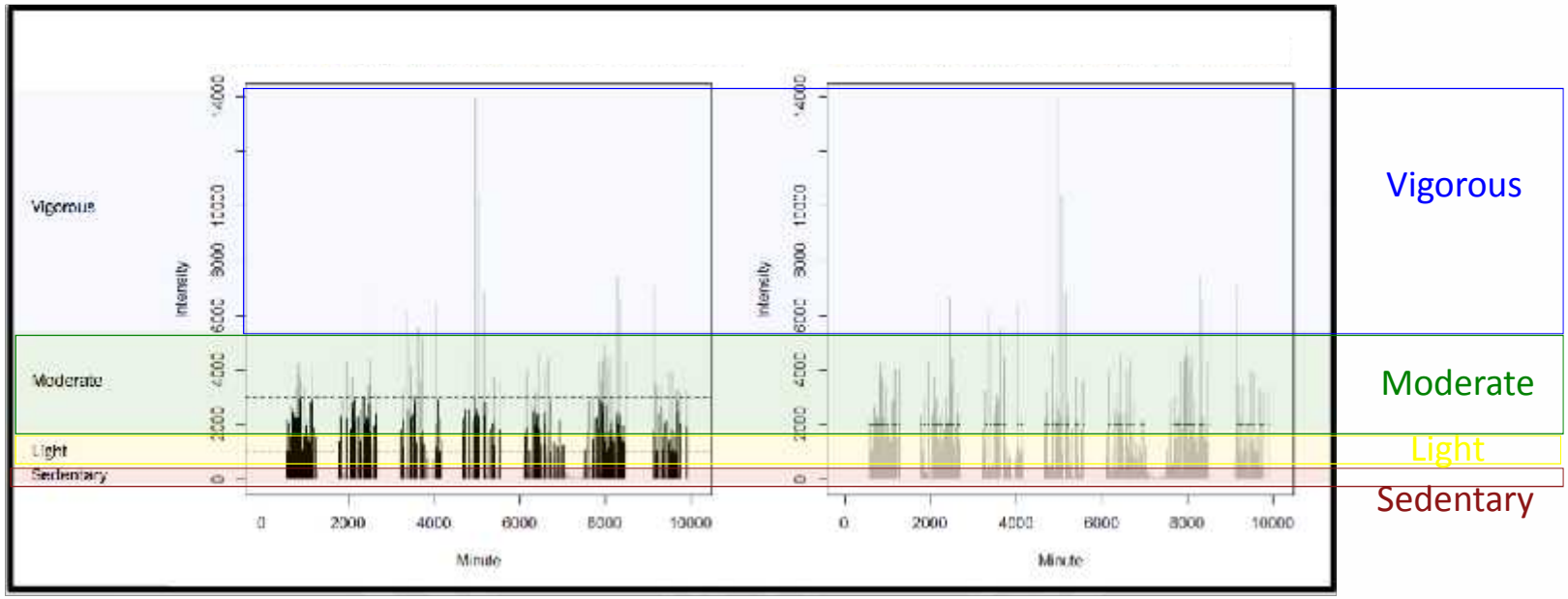


Physical Activity Monitors

- How do they work?

Validated Stratification by CPM (Freedson's cut points)

- Light intensity = < 1951
- Moderate intensity = 1952-5724
- Vigorous intensity = > 5725



Physical Activity Monitors

- How do they work?

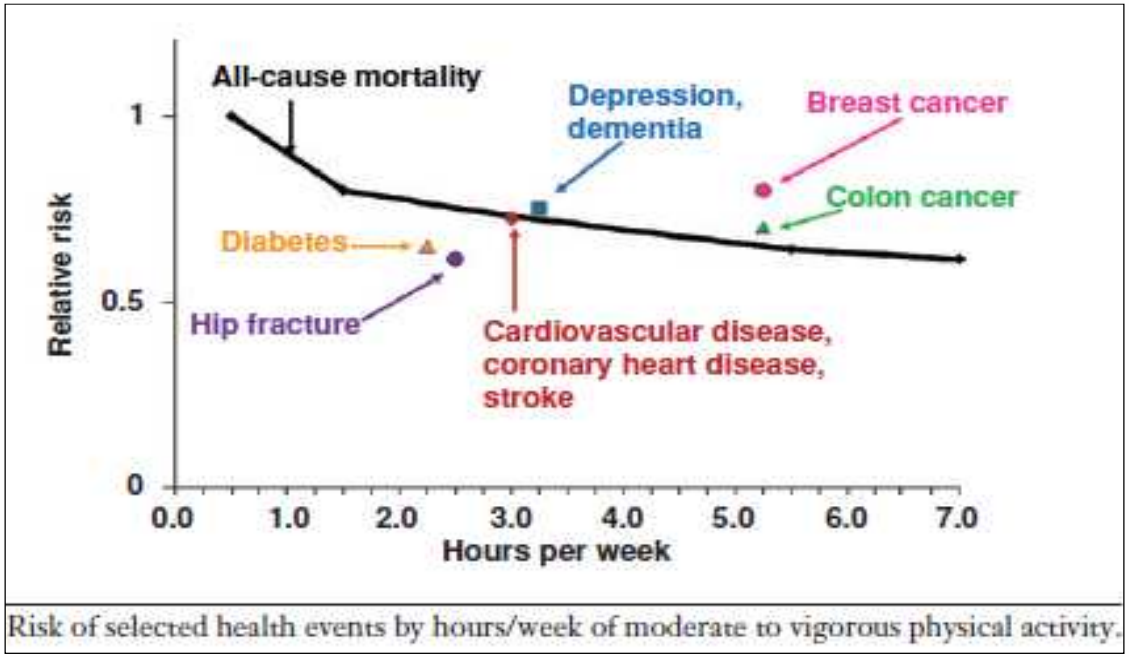
Common commercial device measurements

•Steps

•Calories

calories burned per minute = _____MET Value x 3.5 x _____kg body weight ÷ 200

Physical Activity & Health



Risk of selected health events by hours/week of moderate to vigorous physical activity.

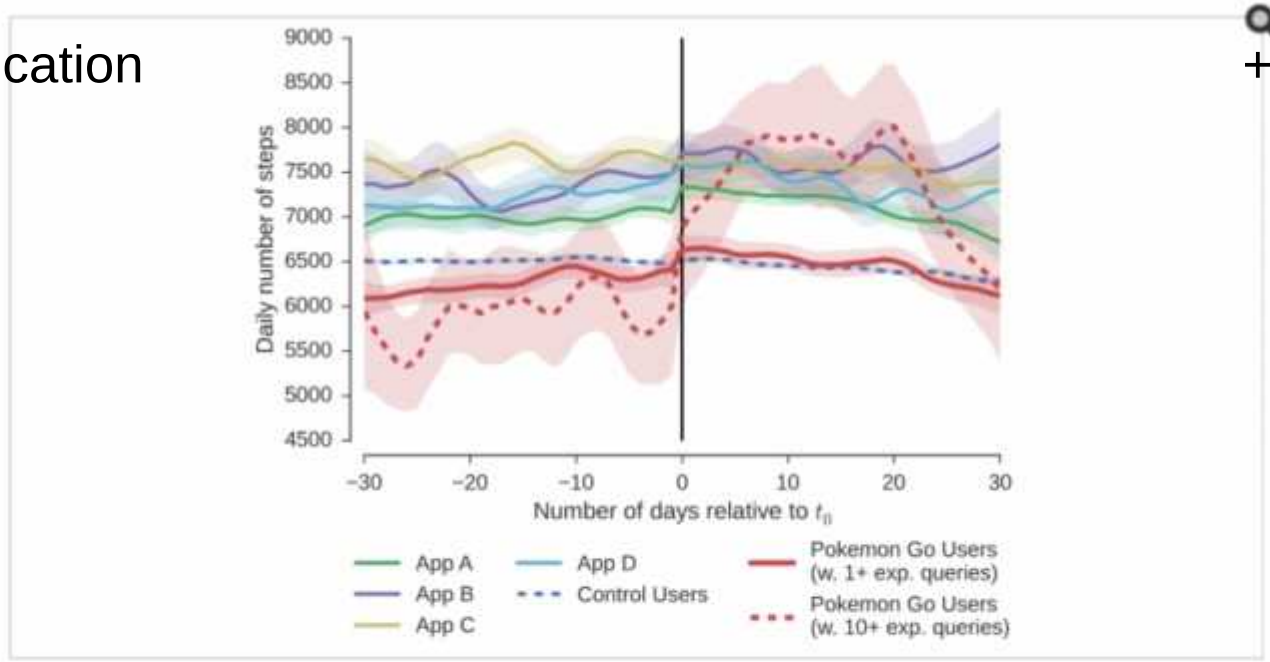
Physical Activity Monitors

- What can we do with this?

Part II – The future that is now

- Gamification

+2000 steps/day

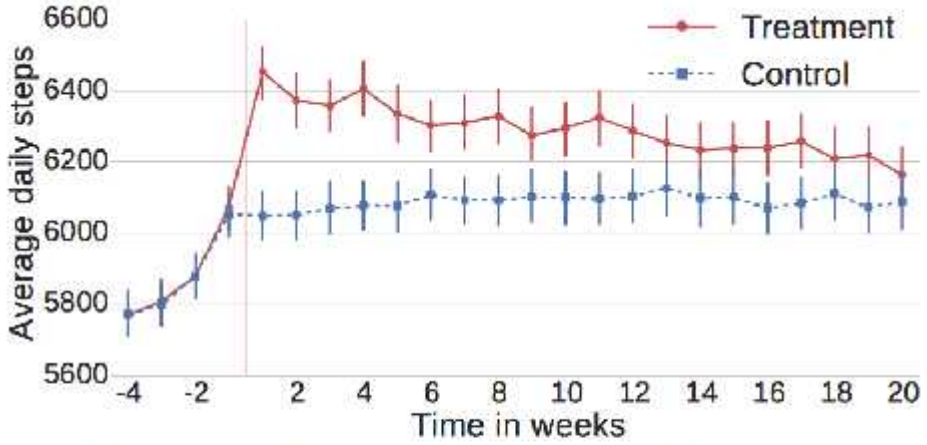


Comparing the effect of the Pokémon Go app with leading consumer health apps (A, B, C, and D). Pokémon Go users are less active than the average wearable user (control) before starting to play, but see larger increases in physical activity compared with the 4 consumer health apps.

Althoff T, White RW, Horvitz E. Influence of Pokémon Go on Physical Activity: Study and Implications. J Med Internet Res. 2016 Dec 6;18(12):e315.

Part II – The future that is now

- Social Networks



+400 steps/day

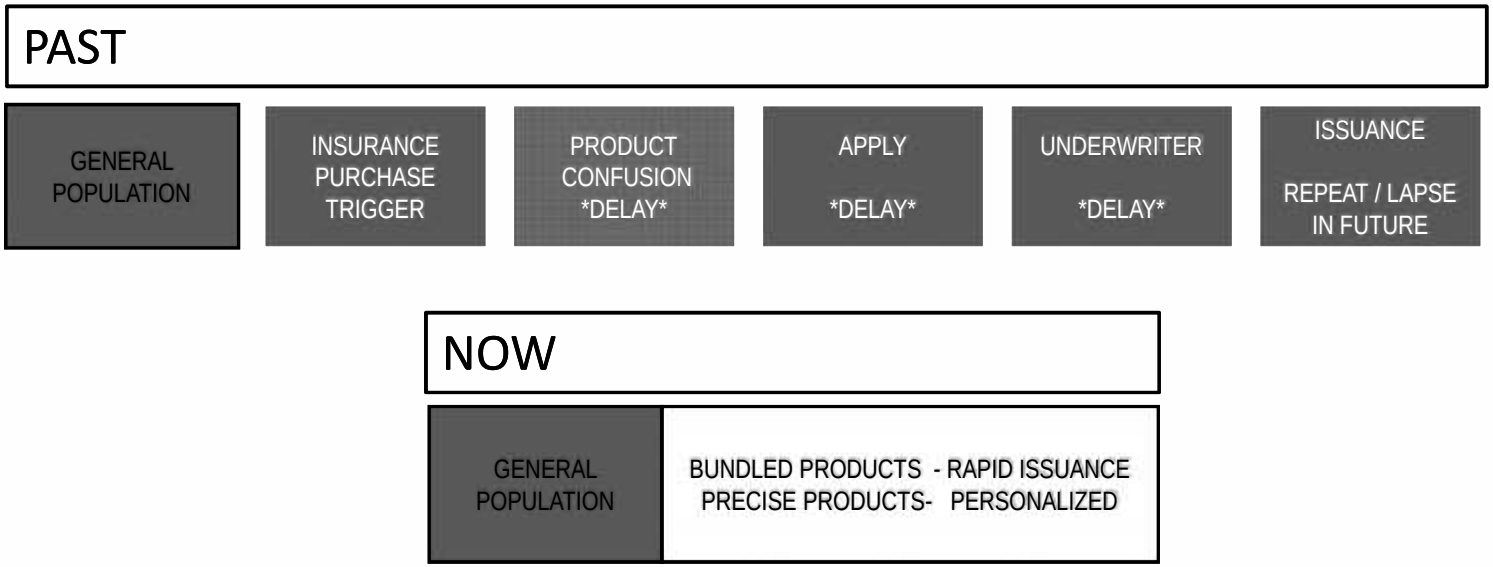
Figure 4: Average daily steps for users that do join the social network at time zero (treatment; red) and matched users that do not (control; blue). We observe a significant boost in activity of 406 additional daily steps in treatment users that diminishes over 20 weeks but no difference in control users.

Tim Althoff, Pranav Jindal, Jure Leskovec. Online Actions with Offline Impact: How Online Social Networks Influence Online and Offline User Behavior. Last revised 16 Dec 2016 (v2) https://arxiv.org/abs/1612.03053

Althoff T, White RW, Horvitz E. Influence of Pokémon Go on Physical Activity: Study and Implications. J Med Internet Res. 2016 Dec 6;18(12):e315.

Part II – The future that is now

- What can we do with this?

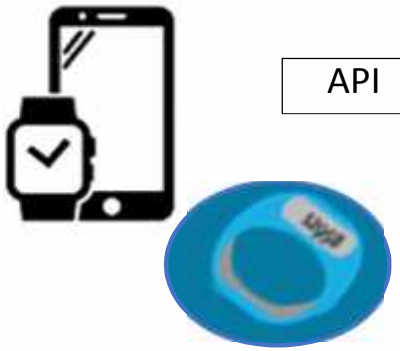


Physical Activity Monitors

- What can we do with this?

Rapidly Issue More Policies
Lowest Cost
Least Adverse Selection
Decrease Claims Costs

Vivametrica Platform



API

API

API

Data/Device Agnostic

Personalized Health
Risk Analysis
*Patent Pending

Underwriting
Behavior change
Wellness profiles

Comparison of Underwriting

Traditional variables	Vivametrica variables
Age	Age
Gender	Gender
BMI	BMI
Blood tests (cholesterol, HDL)	Waist size
Blood pressure	7 days wearable data
Resting heart rate	
Tobacco	
Alcohol	
Family history	
Personal health history	

VivaMe Health Risk Assessment

vivametrica

HRA

ARTHRITIS

CARDIAC

LUNG

TYPE II DIABETES

MOOD

VO_2 MAX

AEROBIC FITNESS

FINANCIAL CALCULATORS

ROI

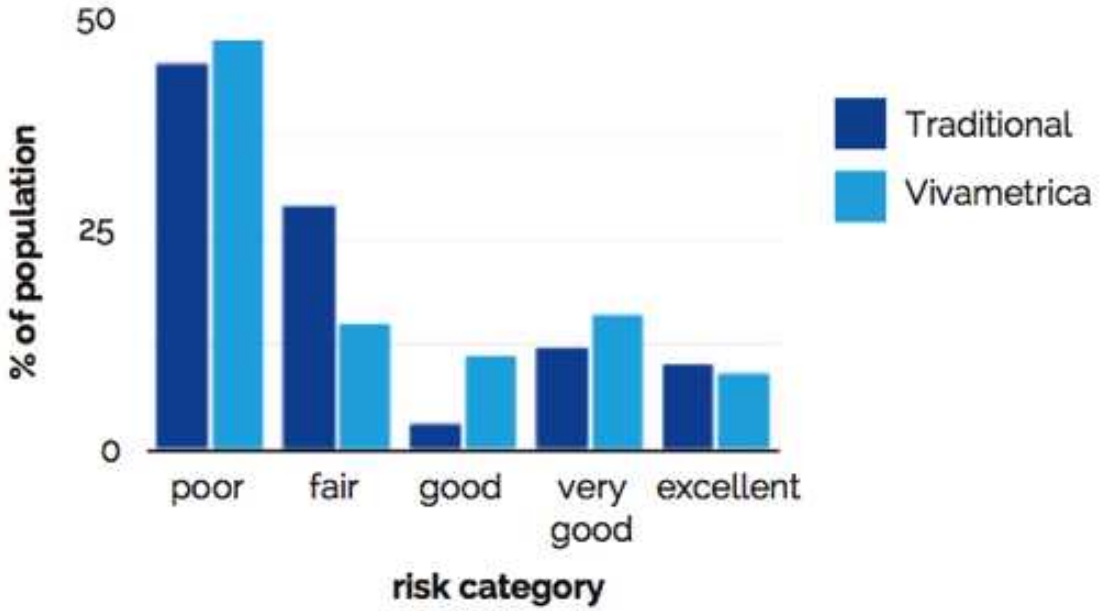
Study 1:
Traditional life underwriting vs. Vivametrica methods

vivametrica

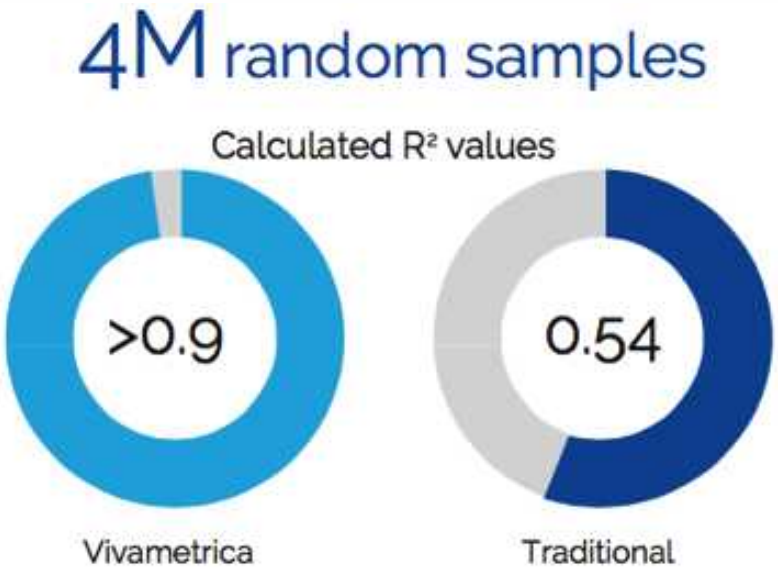
4500 person sample

>80% correlation
in overall risk categorization

93% agreement
in people categorized as poor
(uninsurable)



Study 2:
Ability Of Models To Explain Variance In Health



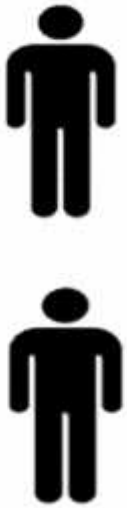
1000 random samples of 4000 different people (unrestricted random sampling)

Dependent Variables:

- Disease risk (cardiovascular & diabetes)
- Presence of disease (cardiovascular & diabetes)
- Risk categorization (very good, good, standard, sub-standard, non-insurable)
- Dichotomous (insurable vs. not)

Mortality Risk: Effect of Physical Activity

65 YO Male BMI 25 *Mortality risk per 100,000



Mortality risk of 59.7*

80%

Mortality risk of 11.8*

Study 3:
Ability of models to predict 10-year mortality

Vivametrica model was 17% better at predicting 10 year mortality compared to traditional

17%

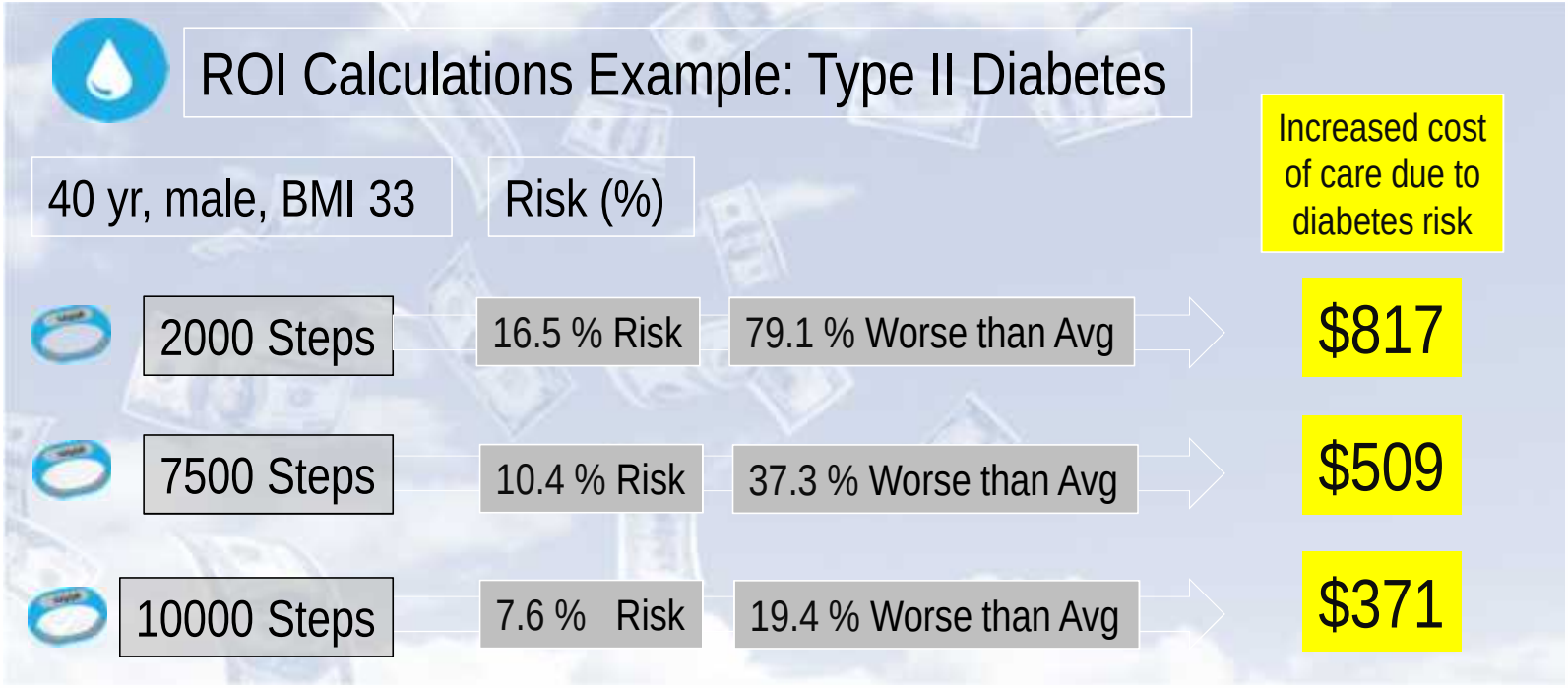
Most powerful variables in prediction:

steps per day, minutes of moderate activity, smoking, waist size

Traditional variables with minimal impact:

cholesterol, BMI, resting heart rates

The future that is now: An Example



Part III – The not so distant future

- Activity Monitors - processed data

ELSEVIER

The Spine Journal 14 (2014) 209–216

THE SPINE JOURNAL

2013 Outstanding Paper Winner: Medical and Interventional Science

Does physical activity influence the relationship between low back pain and obesity?

Matthew Smuck, MD[a,*], Ming-Chih J. Kao, PhD, MD[b], Nikhraj Brar, MD[a], Agnes Martinez-Ith, MD[a], Jongwoo Choi, MD[a], Christy C. Tomkins-Lane, PhD[c]

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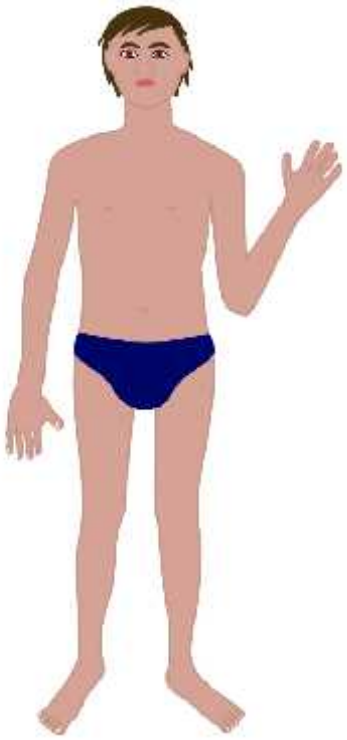
[b]*Department of Anesthesiology, Stanford Medicine Outpatient Center, 450 Broadway St, Pavillion C, Redwood City, CA 94063, USA*
[c]*Department of Physical Education & Recreation, Mount Royal University, 4825 Mount Royal Gate SW, Calgary, AB, Canada T3E 6K6*

Received 2 February 2013; revised 8 October 2013; accepted 7 November 2013

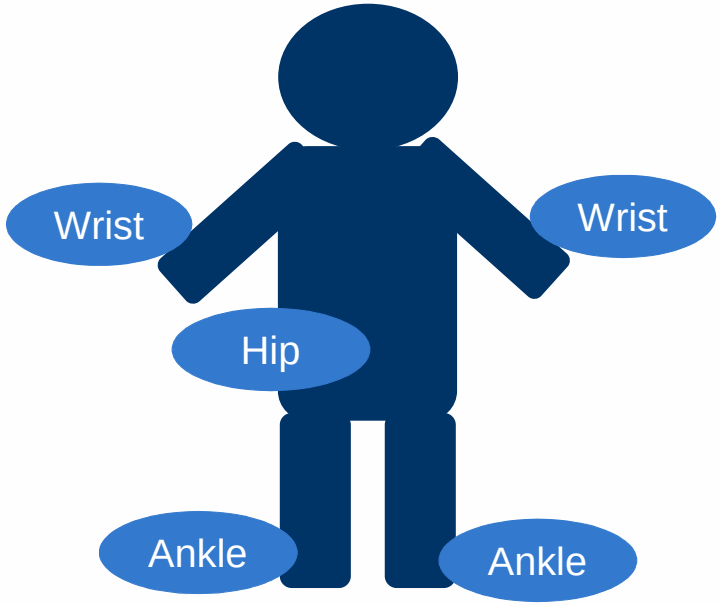
Part III – The not so distant future

- Sensors and Monitors



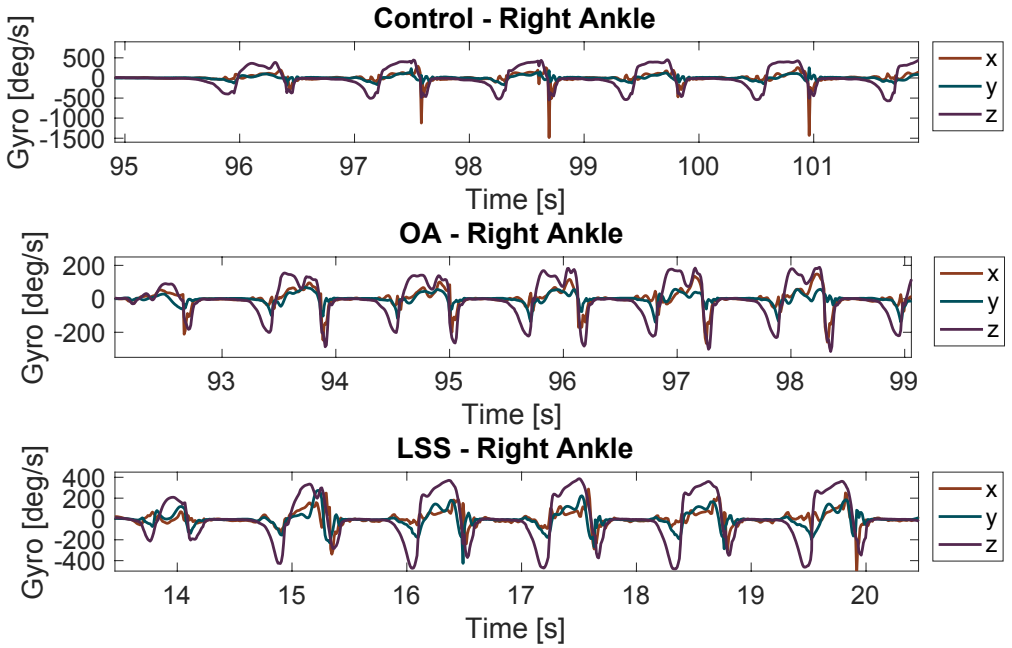
Part III – The not so distant future

- Activity Monitors - raw data



Part III – The not so distant future

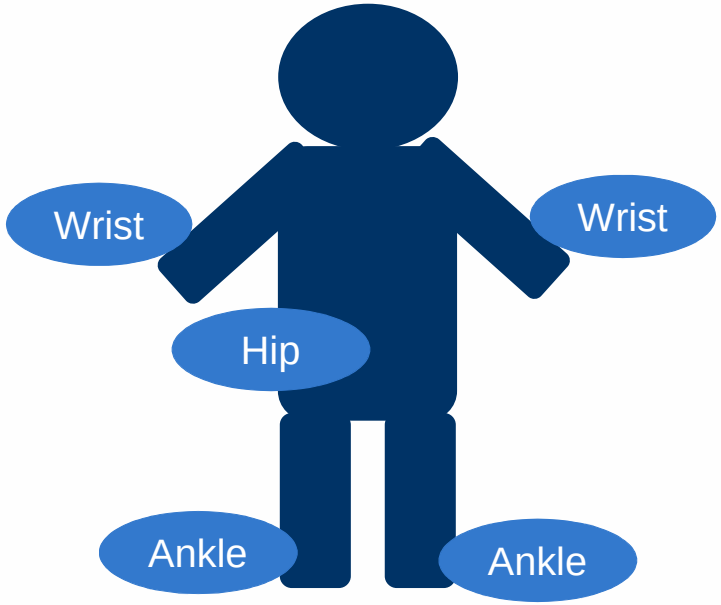
- Activity Monitors - raw data



Exemplary Plot – Comparison of Gait

Part III – The not so distant future

- OpenSim



Wearables – A Look Ahead

Conclusion

- The future that is now
  - Opportunity to leverage current state

- The not so distant future
  - More sensors, more data, more insight, more opportunity

Thank you

Binni Rana, VP Client Markets, Swiss Re