Wellness Data, the Next UBI

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Have you ever fallen asleep behind the wheel?

- More than one in three drivers report having fallen asleep behind the wheel at some point in their lives

- More than one in ten has fallen asleep behind the wheel in the past year

- More than one-in-five fatal car accidents involves a drowsy driver

Ref: https://www.aaafoundation.org/drowsy-driving

Wellness Industry

- Wellness data has been widely used in Health Insurance

  - Health Risk Assessments/Questionnaire: lifestyle choices, including meals, sleep, work and exercise, in addition to seatbelt usage and speeding

- A sleeping giant for risk assessment in P/C Insurance

  - Current UBI application focus on behaviors surrounding the insured asset, but not a policyholder's larger decisions about wellness

  - A more effective approach might address how to minimize underlying risk factors that - when not properly accounted for - cause or contribute to P/C losses

Research Findings - BMI

Americans with a body mass index (BMI) over 35 are more than 50 percent more likely to be involved in fatal car accidents.

- Emerg Med J 2014;Vol31

Research Findings - Mental Health

Workers reporting "high stress" have medical costs nearly 50% higher when compared with workers reporting lower levels of stress.
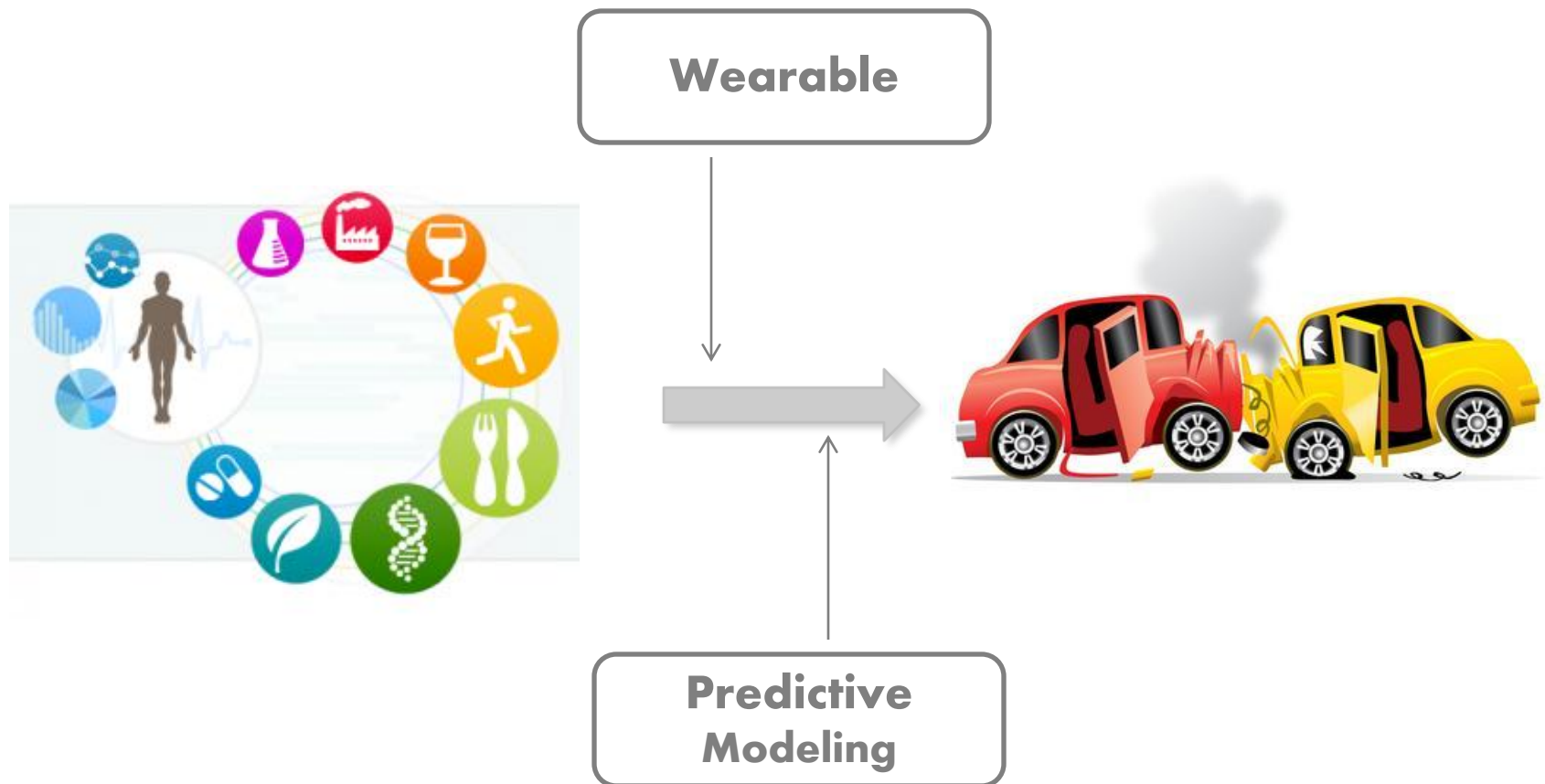
- Journal of Occupational & Environmental Medicine 1998;Vol40

Research Findings - Eyesight

Refinements to eyesight testing requirements could save tens of millions of dollars in annual claims costs.

- 2012 report from RSA

Prototype on Auto Insurance

Wearable

Predictive Modeling

Wearable

- Activity Tracker
  - o Monitor and track fitness-related metrics such as distance walked or run, calorie consumption, and in some cases heartbeat and quality of sleep
  - o Fitbit, Jawbone, Garmin, Misfit, etc.

- Smartwatch
  - o Like wearable computers. Many run mobile apps, play music, answer phones, send text, collect information from internal or external sensors, etc
  - o Samsung Gear, Apple Watch, Sony SmartWatch, etc

Wearable

- Smart Accessory
  - Earbuds, Earrings
  - Integrated sensors for tracking movement, and some may tracking core temperature, heart rate, blood pressure and other health matrix

- Smart Lens
  - Google and Novartis developed a glucose-sensing contact lens that is able to detect the glucose level from human tears

Photo: Bragi

Wearable

- Sweat Sensor
    - Sweat is a rich source of chemical data that could help doctors determine what is happening inside the human body
    - Researchers have devised a soft, flexible, wearable sensor array to continuously monitor changes in four molecular components of sweat and to provide real-time tracking of a person's health
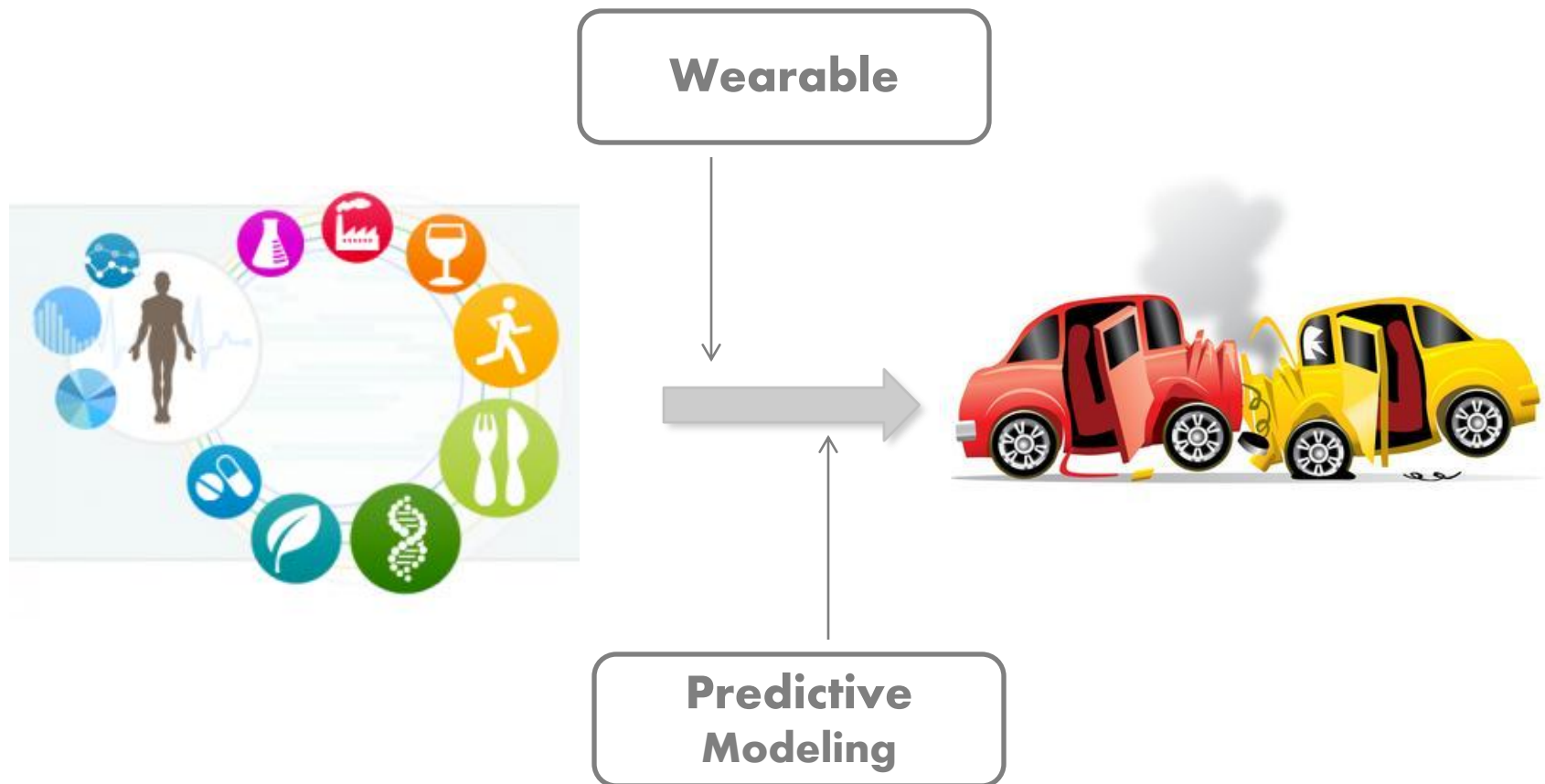

Photo: Wei Gao, UC Berkeley

Wearable

- Wearable Platform
  - Incorporate wearable technology, artificial intelligence and building information modeling to create an ecosystem

Prototype on Auto Insurance

Wearable

Predictive Modeling

Model Wellness in Personal Auto

- Data Source
  - The Behavioral Risk Factor Surveillance System (BRFSS) City and County Data
    - Health-related telephone survey system
    - Geographically aggregated to county level
  - ISO Stat Plan: Split into training and test datasets
    - A sample of 6M records (2009-2013) as training set
    - A sample of 3M records (2009-2013) as test set

- Modeling method
  - Pure Premium model
  - Tweedie Distribution
  - Log Link function
  - Control rating factors, such as territory loss costs, symbol relativities, class factors, etc

Model on Personal Auto - Variables

- Weight
  - Average body mass index (**BMI**)
  - % of population are **overweight** with BMI≥ 25
  - % of population are **obese** with BMI≥ 30

- Mental
  - % of population with **good mental health**
  - % of population with **bad mental health**

- Smoking
  - % of population are **regular smokers**
  - % of population are **smokers**
  - % of population are **former smokers**

- Drinking
  - % of population are **heavy drinkers**

Model on Personal Auto - Variables

- Chronic Health Conditions
    - % of population had a **heart attack** before
    - % of population have **angina or coronary heart disease**
    - % of population had a **stroke** before
    - % of population have **asthma currently**
    - % of population had **asthma formerly**
    - % of population **never have asthma**
    - % of population have **diabetes**
    - % of population have **pre-diabetes, borderline diabetes or gestational diabetes**

Univariate Analysis

Variable	BI	PD	Collision	Comprehensive
Good Mental Health	x	x	x	x
Bad Mental Health	x	x	x	x
Heart Attack		x	x	x
Angina/Coronary		x	x	x
Stroke	x		x	x
Current Asthma		x		x
Former Asthma	x	x		x
Never Asthma	x			x
Obese		x	x	x
Over Weight		x	x	x
Average BMI		x	x	x
Diabetes	x	x	x	x
Prediabetes	x	x	x	x
Regular Smoker	x	x	x	x
Smoker	x	x	x	x
Former Smoker	x	x	x	x
Heavy Drinker				x

Variable Selection

Variable	BI	PD	Collision	Comprehensive
Good Mental Health	- ↓	- ↓	- ↓	+ ↑
Bad Mental Health				
Heart Attack				
Angina/Coronary		- ↓		
Stroke	+ ↑			
Current Asthma		- ↓		
Former Asthma	+ ↑	+ ↑		+ ↑
Never Asthma				- ↓
Obese		+ ↑		
Over Weight				
Average BMI			- ↓	- ↓
Diabetes			+ ↑	+ ↑
Prediabetes				
Regular Smoker				
Smoker	- ↓	- ↓		+ ↑
Former Smoker				
Heavy Drinker				

A discount to smokers?

• Smoking while driving may distract drivers and cause accidents; Smoking harms nearly every organ of the body and causes many diseases

• However,

  o Cigarette smoking had no negative effect upon performance for simple perceptual tasks compared with non-smokers[1];In nonabstinent smokers and nonsmokers, nicotine enhanced finger tapping and motor responses in tests of attention[2]

  o Among smokers, cigarette smoking may improve driving performance and that there may exist an optimal nicotine dose for the enhancement of cognitive and psychomotor function[3]

[1] Spilich GJ, June L, Renner J. (1992) Cigarette smoking and cognitive performance. Br J Addict. 1992 Sep; 87(9): 1313-26.

[2] Heishman SJ, Taylor RC, Henningfield JE. (1994): Nicotine and smoking: a review of effects on human performance. Exp Clin Psychopharm 2: 345–395
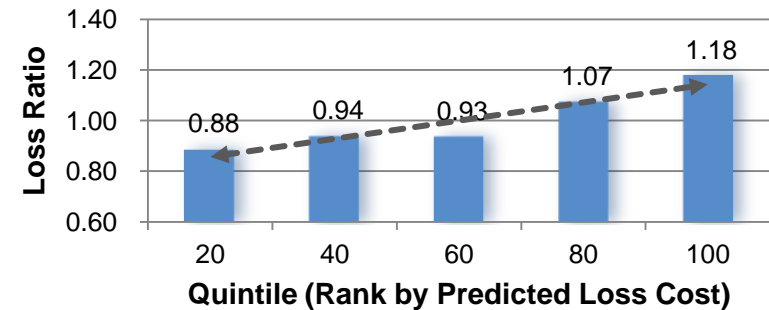
[3] Sherwood N.(1995):Effects of cigarette smoking on performance in a simulated driving task. *Neuropsychobiology* 1995; 32(3): 161-5.
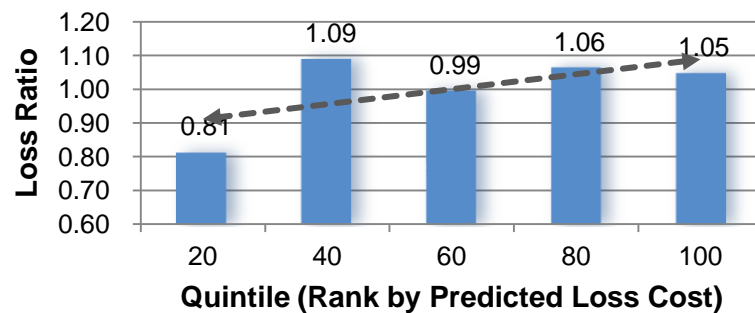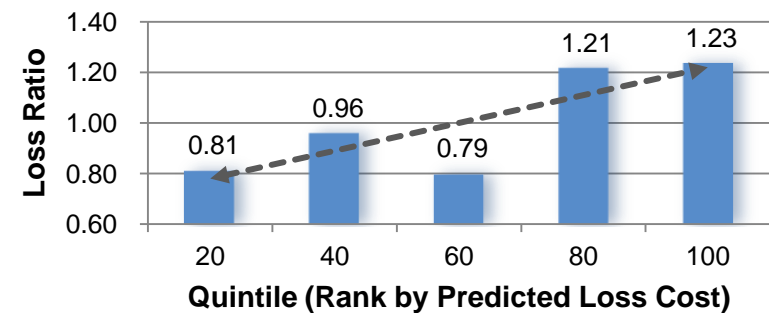
Wellness Model Result

Residual Lift Chart - BI
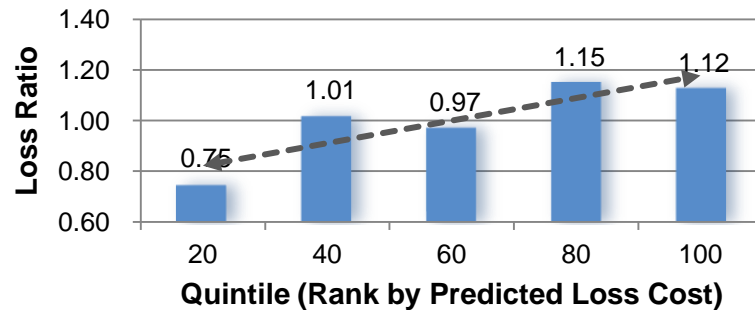
Residual Lift Chart - PD

Residual Lift Chart - Collision

Residual Lift Chart - OTC

Conclusion

• We do see improvement for most coverage over current common rating structure and there is opportunity for better risk selection

• The result of some wellness variables seem to be contradict our instinct. Human behavior could change how certain wellness characteristics result in model

Next Steps

• Current model utilized static county level health information from CDC. It will be more precisely to reflect individual's risk characteristics by using their own health history or data captured from their wearables

• The same practice could extend to other Line of Business, such as Homeowners, Workers Compensation, etc

• More modeling techniques should be considered since the current model is mainly for proof of concept

Potential Implementation

- Rating/Underwriting
    - o Based on GLM result, create health risk scores and factors.
    - o Provide discount to policyholders with low health risk score

- Marketing
    - o Targeted marketing for cross-sells

What happened in Life Industry?

- John Hancock (Manulife's U.S. Unit)

In April 2015, John Hancock partners with Vitality to integrate life insurance with a comprehensive healthy living program for consumers

- o The products offer potential for savings on annual premiums, as well as discounts and rewards from leading retailers to encourage policyholders to take small steps to improve their health
- o New policyholders will receive a free Fitbit to help track their progress
- o Rolled out in parts of Africa, Asia and U.S.
- o A similar program will be launched in Canada

What is happening in P/C Industry?

- Driver Safety Ratings by Allstate

  o Filed a patent application(Patent #: 9,269,202)

  o Take into account of speed laws, road signs, traffic signals

  o Incorporating real-time feedback such as warnings that you are driving over the speed limit or approaching a stop sign

  o In addition to popular "telematics" data collected by vehicle, monitor and evaluate your heart rate, electrocardiograph signals and blood pressure through your hands from sensors embedded in the steering wheel

What is happening in P/C Industry?

- Total Impairment Score by State Farm

  o Filed a patent application (Patent #: 9,165,326)

  o Combine biometric measurements with automotive data to create a "total impairment score"

  o Monitor your every move while driving, measure your emotions, detect angry behavior and deliver stimuli such as music to calm you down("Emotion Management System")

  o The system can monitor below biometrics:

    ▪ Heart rate
    ▪ Grip pressure on the steering wheel
    ▪ Body temperature
    ▪ Arm movement
    ▪ Head direction and movement
    ▪ Vocal amplitude and pattern
    ▪ Respiration rate

What is happening in P/C Industry?

- AIG & Human Condition Safety

  o AIG partner with a startup "Human Condition Safety", who makes wearable devices to monitor the movements of employees in factories, on construction sites and at other hazardous workplaces to reduce on-the-job accidents

  o The system uses sensors attached to the back of workers' safety vests and transmits data about their movements in real time

  o Could potential reduce workplace injuries and decrease fraud in Workers Compensation

Issues to Be Addressed

- Privacy

- An automated system is not sophisticated enough to account for the unique characteristics of individual drivers, e.g. if a driver is in recovery from a heart attack, or on medication, etc

- What a potential health score may mean

- Regulatory issues

Future of Wellness in Insurance

- Foresee the Change
  - Millennials will likely dominate the market in the years to come
  - The least engaged of any generation presently buying insurance
  - "Worried well" generation - increasingly join in health and wellness activities for prevention or reassurance rather than waiting for treatment
  - The integration of high-tech wearables into insurance underwriting or rating may promote the engagement of Millennials

- Be Innovative
  - Think out of box and not be limited by current concerns

- Be ahead of Market
  - Move fast and play offense stead of defense.

Reference

- Jim W.(2015): Getting Well Soon: The Next Trillion-Dollar Industry for P/C Insurers. *Carrier Management, 2015 Jun;*

Survey:
http://bit.ly/218IffV

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