Telematics in Auto Insurance

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https://cmt.ai

Our Mission: To make the world's roads & drivers safer

- Artificial Intelligence
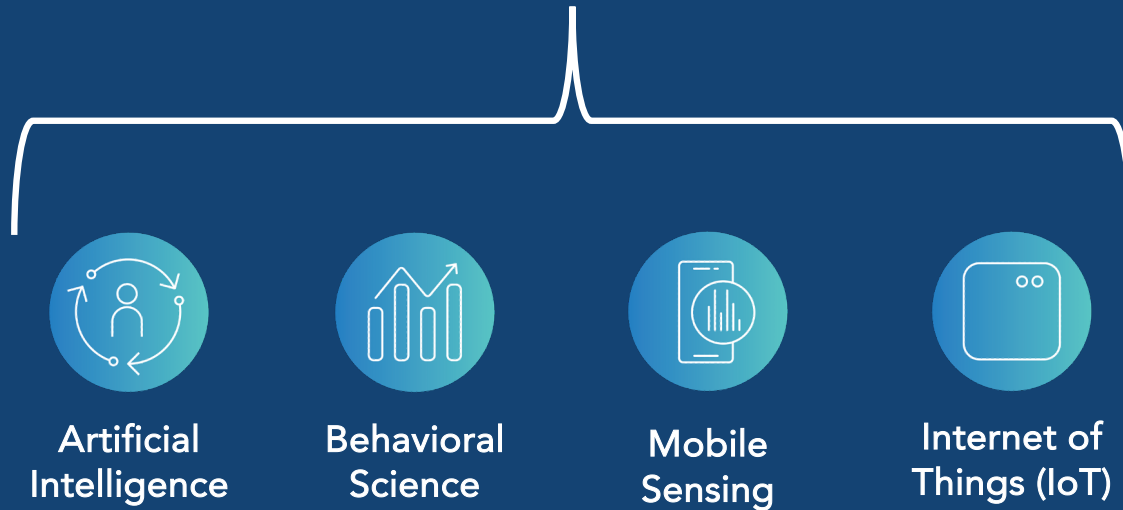- Behavioral Science
- Mobile Sensing
- Internet of Things (IoT)

CAMBRIDGE MOBILE TELEMATICS

Select US Customers

Select Global Customers

DriveWell

A complete mobile telematics and behavioral analytics solution

- Measure driving behavior with our **mobile SDK** and **Trip Processing**

- Collect even more data with **Tag**

- Offer better pricing with **Score**

- Improve driving behavior with **Engage**

- Reduce commercial risk with **Fleet**

Solutions Enabled:
Try Before You Buy, Pay How You Drive, Pay by Distance, and more

Why Telematics in Auto Insurance?

- Telematics is truly predictive of crash risk
- Consumers gain more control over their premiums
- Enables rate transparency
- Raises awareness of risky driving behaviors and how to improve them
- Lowers the number of crashes
- Aligns with public safety efforts to lower road fatalities
- Telematics is an equitable and fair measure of risk

Overview of Telematics Technology

Technology	What It Is	What It Measures	How Policyholders Engage With It
OBD-II	• Measures vehicle behavior • Connected to vehicle's on-board diagnostics port	Speed, trip distance/time, idling, and harsh braking	• Insurance company sends device to policyholder who installs it in the car • Policyholder sends back the OBD dongle after 90 days, on average
Mobile	• Measures driver and vehicle behavior • Smartphone app that uses mobile sensing to measure driving behavior	Phone use while vehicle is moving, speeding, harsh braking, harsh cornering, harsh acceleration, and road type	• Policyholder downloads the smartphone app that assesses driving behavior and provides in-app personalized feedback
Mobile + Bluetooth Tag	• Measures driver and vehicle behavior, as well as identifies the insured vehicle (mobile app only measures when in insured vehicle) • Mobile app linked to wireless Bluetooth device that is attached to the windscreen	Phone use while vehicle is moving, speeding, harsh braking, harsh cornering, harsh acceleration, and road type	• Insurance company sends device to policyholder • Policyholder links device to the smartphone and adheres it to windscreen • Policyholder downloads the smartphone app that assesses driving behavior and provides in-app feedback

How Telematics Reduces Risk

The more the driver engages with the mobile app, the more likely they will experience long-term behavior change

Continuous Engagement	• Instead of recording trips for a limited time, insurers are now engage with the driver through the length of the policy • This enables the insurer to better match rate to risk over the length of the policy and adapt to changes

In-App Feedback	• Displaying each trip route in the app so the driver can see their errors and where they occurred
	   • Historical and individual behavioral scoring
	   • tracking improvement
	   • personalized tips to improve

Gamification Techniques	• Elements to keep the driver engaged with the app, including achievement badges, leaderboards, and social competition
Incentives	• Rewards and variable discounts based on scoring are critical to enable driver risk reduction
Safety	• Elements like family monitoring drive further engagement and improved safety especially for new drivers
Transparency	• Providing direct feedback to the driver is key after every trip so they understand what is being measured and how it impacts what they pay

What Data is Collected?

The following data is required to accurately assess driving risk and motivate drivers to improve

Smartphone app

- **Accelerometer data** helps identify mileage and is used in the calculation of phone motion, screen interaction, and acceleration-based (hard braking, acceleration, and excessive speeding) events)

- **Gyroscope data** is used in the calculation of phone motion, screen interaction, and acceleration-based events

- **GPS data** helps detect when the vehicle is moving, provide a view of the trip route, and determines the speed limits encountered for speeding events, but location is not its own measurement

DriveWell Tag

- **High-frequency accelerometer data** detects when and how the vehicle is moving, is used to calculate overall mileage, and identifies acceleration-based events

What smartphone permissions are required?
- **Location**: to collect GPS data
- **Bluetooth**: to connect to the Tag
- **Motion & activity**: helps to detect when a trip starts & stops

Trip Processing

Converting raw sensor data from phone and Tag into useful features for risk factors

- Extract vehicle dynamics incl. braking, acceleration, velocity (e.g., US Pat. 9,228,836)

- Extract phone distraction metrics (patent pending)

- Patented map-matching algorithm handling sporadic/noisy position data improves battery (e.g., US Pat. 8,457,880)

- Mileage & speed estimation from accel data (US Pat. 9,842,438)
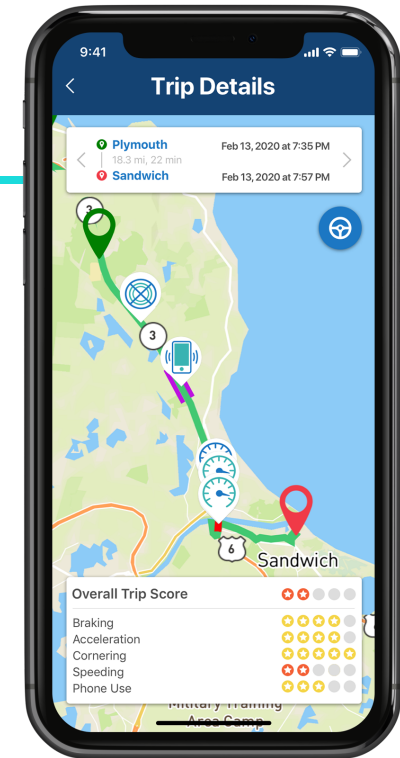
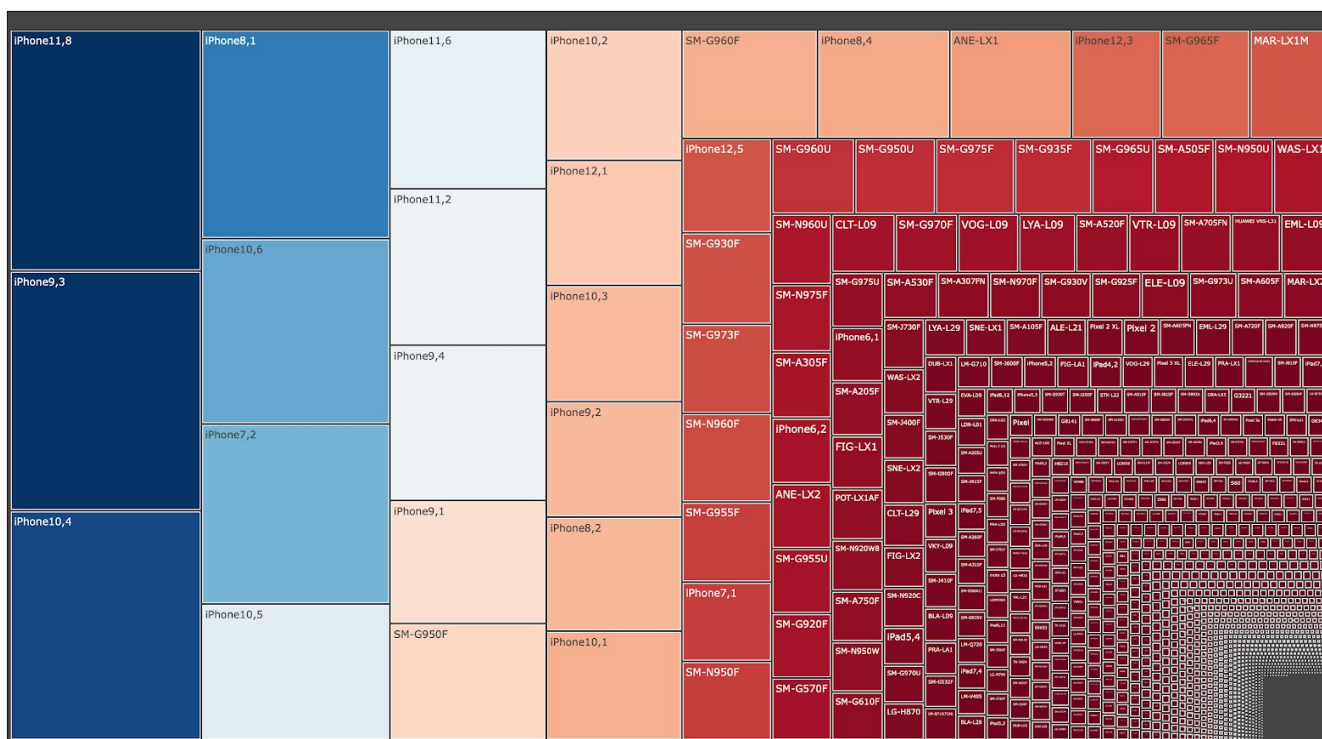## How It Works

Collect sensor data

Adjust time & orientation

Extract risky events

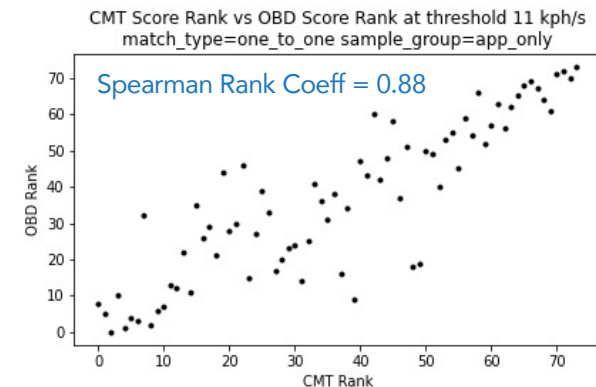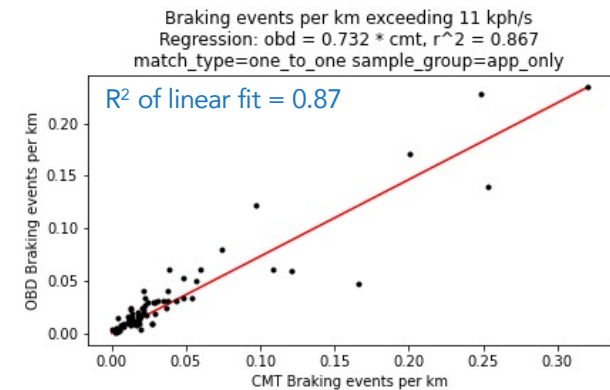Match to a map

Phone Model Variation

Distribution of phone models in CMT's dataset

- Platform supports more than 3,000 phone models, ensuring a **consistent user experience despite the phone model**

- Dataset includes a huge variety of Android models, many of which are only used by a small number of drivers

- Tag data provides quality control for Android devices

Hard Braking Event Accuracy

- Accelerometer-centric algorithms
  - More accurate than competing methods that rely on GPS speed
  - Better coverage (GPS outages)
  - Lower battery drain

- Tags improves our phone-only pipeline, providing "ground truth" acceleration data every day

- Rigorous comparisons against alternatives such as OBD-II and black boxes
  - R^2 of 0.87 of linear fit for braking events above 0.3g (11 kph/hr/s) shows high correlation

Braking events per km exceeding 11 kph/s
Regression: obd = 0.732 * cmt, r^2 = 0.867
match_type=one_to_one sample_group=app_only

R^2 of linear fit = 0.87

CMT Score Rank vs OBD Score Rank at threshold 11 kph/s
match_type=one_to_one sample_group=app_only

Spearman Rank Coeff = 0.88

Phone Distraction Accuracy

CMT had reported millions of phone distraction events to end users

- About 1 in every 50,000 events had negative user feedback
- After investigation, <u>only 2.2% of events users provided feedback about were found to be non-distraction events</u>
  - Due to emergency maneuvers or data anomalies
- Most complaints are users who used phone while driving but felt use wasn't "distraction"
  - E.g. changing song or inputting navigation
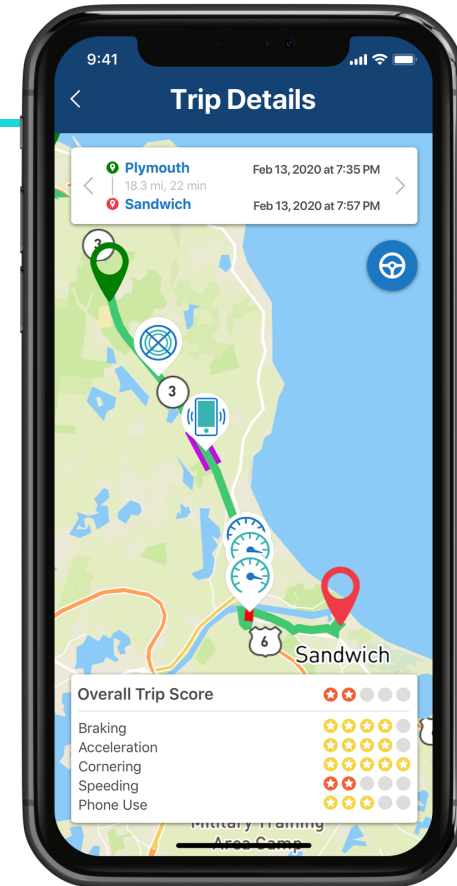
CMT Tag: Increased Accuracy

- **Attached:** the Tag is attached to the windscreen like a toll transponder

- **Insured-trips only:** the app only records data when the Tag is within range, limiting data collection to only trips in the insured vehicle

- **Hacker-proof:** because it doesn't plug in, the Tag doesn't create an entry port for hackers to hijack a car's internal systems like OBD hardware does
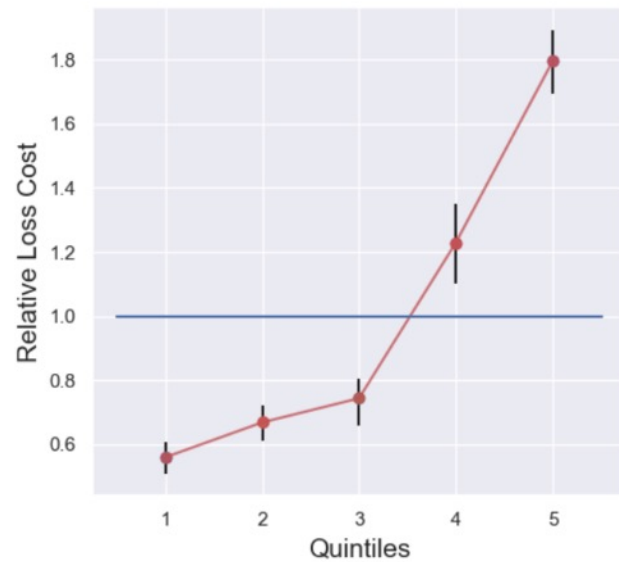
- Driving events recorded even when phone is absent, which ensures full coverage and is not reliant on the smartphone alone giving the highest degree of coverage for insured trips

- Secure device with unique security key

- No electronic connection to car
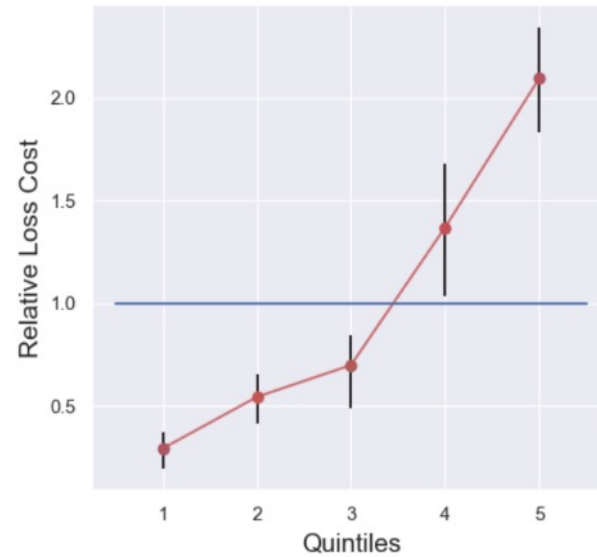
Driver Scoring
Variability and Equity

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CMT's Claim Validation

Total Loss Cost

Mean Lift
Decile: 4.2

**Total Bodily
Injury Loss Cost**

Mean Lift
Decile: 16.4

# Incremental Lift: Braking + Phone Motion Commercial Parnter

GLM Frequency model on total at-fault claims. Out-of-sample validation.

|	Frequency Lift	(IQR)		Loss Cost Lift	(IQR)
Phone Motion	1.75	(1.5-2.0)		3.2	(2.6-3.9)
Braking	2.75	(2.4-3.1)		6.0	(4.6-7.7)
Braking + Phone Motion	3.4	(3.0-4.0)		9.8	(8.1-11.9)

Score Variability

Correlation is generally high between exposure periods within 6 weeks of each other, which can be seen by the red "trough" down the diagonal (correlations above ~95%). However, correlations drop below 90% when the difference in periods reaches beyond 10-13 weeks

Indicated where the color changes from red to white: user scores drift over time, and more recent driving behavior may not be properly represented by a longer term average.

Premium Score Correlations across Scoring Periods
N= 62112 Periods
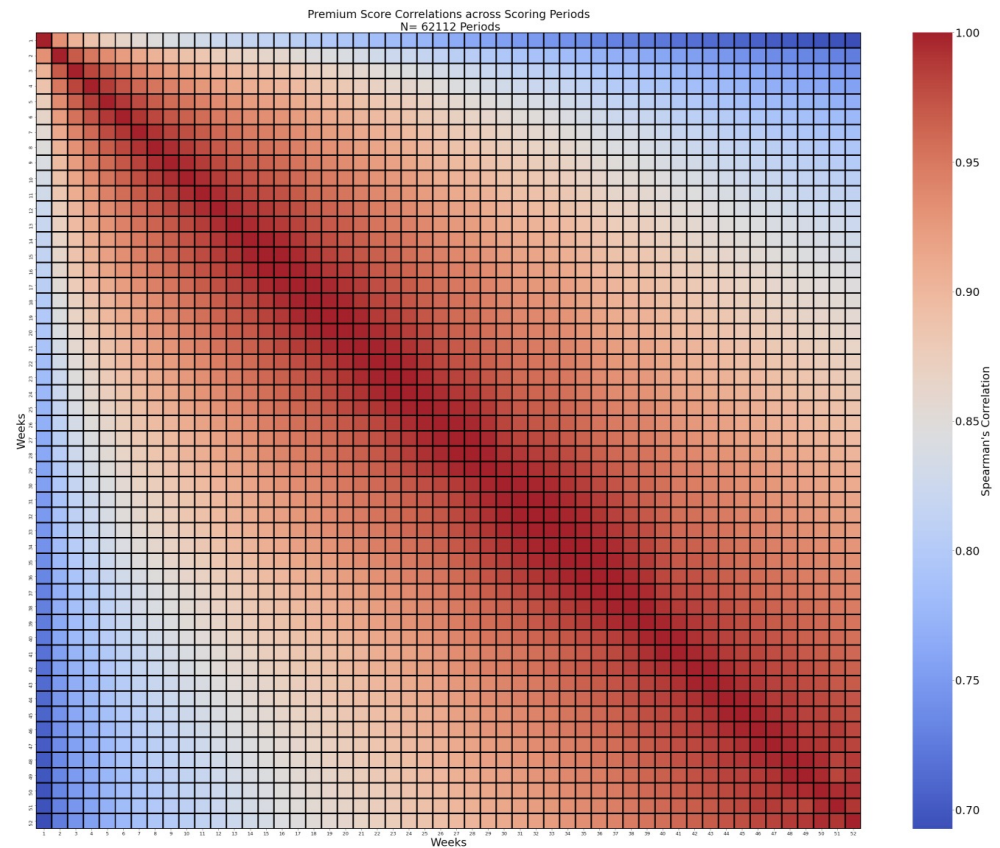
Disparate Impact Analysis

Avg. Driving Score vs Income in Zip Code (for Zips w/ >100 Drivers)
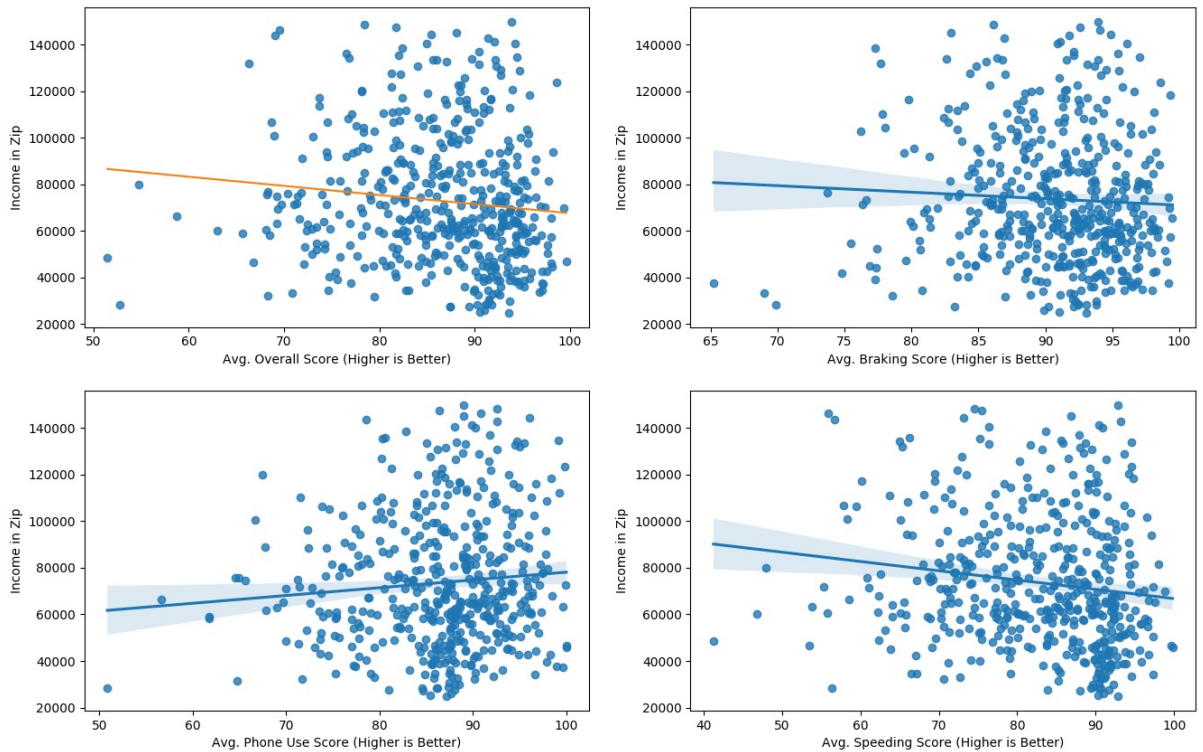
- Safe drivers are equally likely to come from lower-income areas as higher-income areas

- Drivers from lower-income areas speed less and have fewer hard braking events than drivers from higher-income

Telematics scores do not vary by driver residence

Income information derived from public source databases. Driving score data originated from an analysis of millions of trips on CMT's platform.

Unbiased Rating Factor

Telematics enables equitable insurance pricing

✓ Assesses driving factors truly predictive of claims, including phone distraction, at-risk speeding, and hard braking

✓ Measures the driver's real-world crash risk, regardless of income, race, education level or national origin

✓ Provides coachable factors that drivers can improve

✓ Empowers consumers with more control over their final premium

Securing Consumer Data & Privacy

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CMT Privacy Guarantee

1. **We do not sell any customer information ever**

2. **We do not share customer information with third parties unless expressly authorized by our users**

3. **We will only collect and maintain the minimum amount of data necessary to provide the services we offer**

4. **Individuals may contact us at any time to withdraw consent to processingg their personal data or request data modification, correction or erasure – You are in control of your personal data at all times**

5. **We promise to protect all data end to end to the highest level of the International Organization of Standards from the time we collect it through transmission, processing, storage and deletion**

6. **We continuously improve our physical procedural and technical controls to protect customer information and to comply with and advance international privacy laws and regulations.**

7. **We ensure the ongoing confidentially, integrity, availability and resilience of our systems and services to process all data entrusted to us**

Regulatory Compliance

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- CMT is one of the first US companies to obtain the new ISO 27701 Privacy Information Management System (PIMS) certification.

- CMT is fully compliant with the EU General Data Protection Regulation (GDPR), California Consumer Privacy Act (CCPA) and many other privacy regulations from around the globe.

- CMT demonstrates a strong dedication to championing the value of privacy through the creation of CMT products, through executive commitment to the CMT privacy and compliance program and with interaction and participation in privacy focused organizations and workgroups

- CMT is steadfastly committed to continuous improvement and takes a proactive approach to meeting future data privacy laws and regulations

Telematics Reduces Emissions

Aggressive and Dangerous Driving Burns Fuel and Creates Congestion

Driver Improvement Lowers Emissions:

According to FuelEconomy.gov, speeding, rapid acceleration, and braking lower gas mileage by:
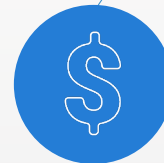
15-30% at highway speeds
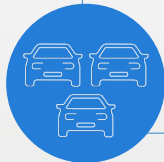
10-40% in stop-and-go traffic

Crashes Increase Congestion, Emissions:

In a study updated in 2015, the NHTSA estimated vehicle crashes caused:

$28 billion per year wasted due to congestion, including:
- Travel delay
- Excess fuel consumption
- Greenhouse gasses and criteria pollutants

4,441 gallons of fuel wasted

Engagement with telematics informs drivers of aggressive driving tendencies and incentivizes improvement of dangerous and risky habits on the road.

The Most Accessible & Affordable Form of Telematics

- Smartphone-based telematics uses a device owned by the vast majority of the population

- **81%** of all Americans now own smartphones, that number has increased by 140% since 2011

- Smartphones are now **ubiquitous**:
    - They're no longer just for the wealthy: 71% of households with less than $30,000 in annual income have smartphones
    - One in five Americans use their smartphone as their primary means of internet connection, specifically younger adults, minorities, and lower-income populations
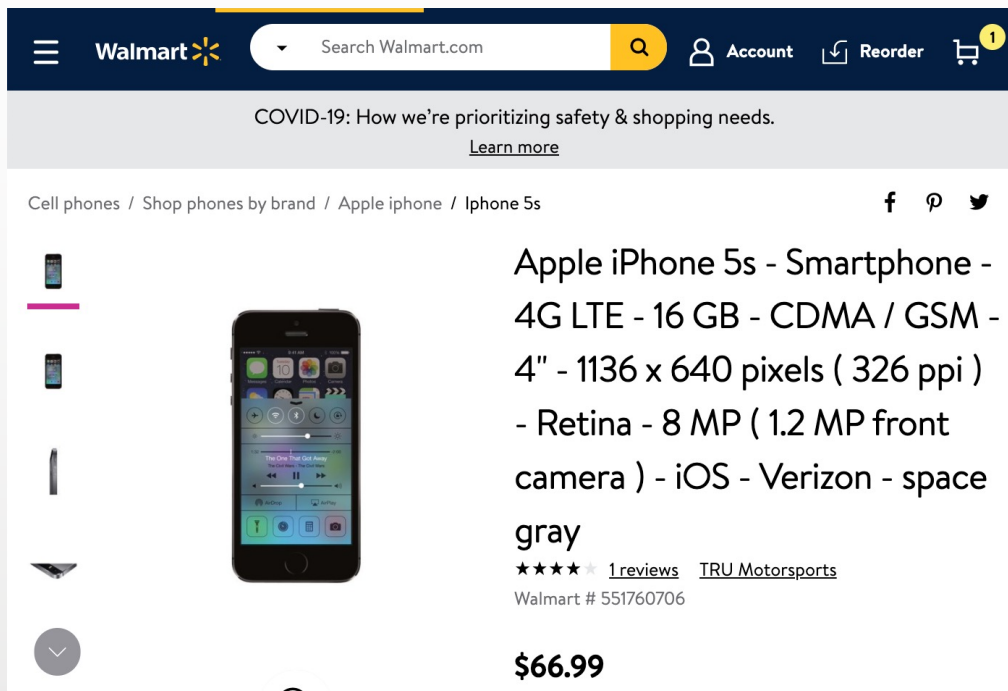
Source

Mobile Telematics is Widely Available

Smartphone Ownership % by Various Demographics

Total	81%	Less than $30,000	71%
White	82%	$30,000 - $49,000	78%
Black	80%	$50,000 - $74,000	90%
Hispanic	79%	$75,000+	95%

Source

Thousands of Smartphones Support Mobile Telematics
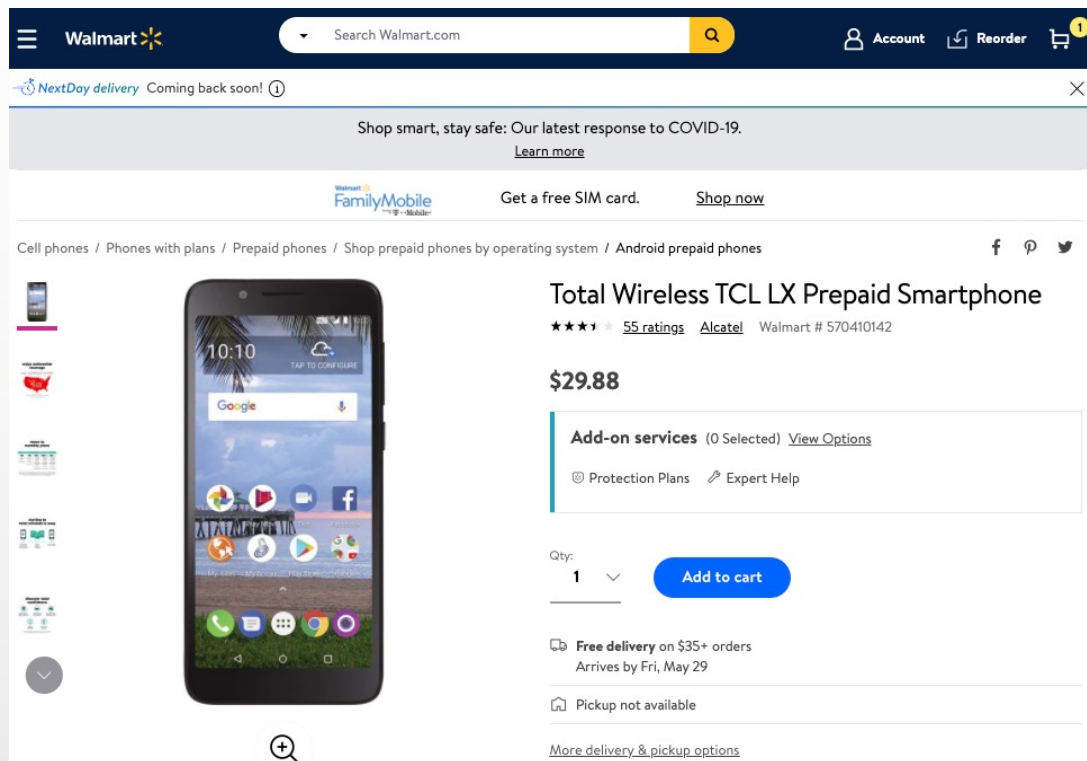
- CMT's **DriveWell** app works on over 3,000 phones manufactured and sold worldwide

- The average lifespan of a smartphone in the U.S. is 2.87 years making most currently functioning smartphone compatible with CMT's technology

Telematics is Accessible

- Other affordable phone models include the Samsung Galaxy S5, the HTC one, and the Motorola Moto X.

- The DriveWell App only needs a WiFi connection; it even works on prepaid devices!

Telematics In Insurance

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Case Study: Rewarding Safe Driving

Rewards is an additional telematics deployment method

Discovery Insure in South Africa incentivizes safe driving through its **Vitality Drive** rewards program

- Drivers earn Vitality Drive points by driving well, improving driving behavior, and maintaining their vehicles. Points can go toward rewards like fuel vouchers, Uber rides, and car service discounts.
- Drivers earn a Vitality Drive status based on their points. The higher the status, the better the rewards.

- Customers joining Vitality Drive achieve an average **17% improvement in driving behavior within one month**
- Vitality Drive customers that remain in the program **have fewer and less-severe crashes**, resulting in a 25% lower absolute loss ratio compared to those who leave the program

Source: Discovery Insure's 2020 Interim Results

Case Study: Safest Driver Contests

Telematics is used by more than insurers to reduce risky driving behaviors

CMT partners with municipalities on Safest Driver contests to promote habitual safe driving with cash prizes. Results from select contests include:
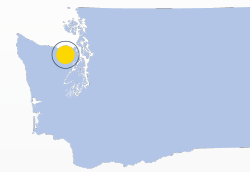
Seattle's Safest Driver (2017)
- 35% reduction in phone distraction
- 30% reduction in hard braking
- 28% reduction in speeding
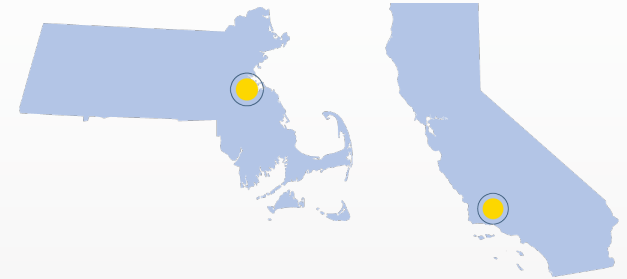
Boston's Safest Driver (2019)
- 48% reduction in phone distraction
- 57% reduction in hard braking
- 38% reduction in speeding

LA's Safest Driver (2019)
- 25% reduction in overall risky driving behaviors
- 30% reduction in phone distraction
- 35% reduction in speeding

Positive Behavior Change

Telematics-based programs encourage drivers to improve

A study titled "The Impacts of Telematics on Competition and Consumer Behaviors in Insurance" investigates the outcomes of PHYD. Concluding that PHYD programs have a meaningful impact on driving behavior and fatal car accidents, the study's findings include:

- PHYD programs reduce crash risk by about 50% for enrolled drivers
- Vehicles in fatal crashes per registered vehicles decreases by 1.6% for each additional firm offering PHYD insurance programs

- A driver who brakes hard more than eight times in 500 miles is 73% more likely to be involved in a crash
- PHYD customers decrease their daily hard-brake frequency by an average 21% after six months