



Hewlett Packard
Enterprise

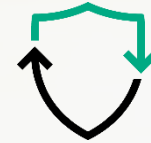


Big Data Monetization

Viktor Boldog
Analytics & Data Management Consultant



Transform
to a hybrid
infrastructure



Protect
your digital
enterprise

Enable
workplace
productivity



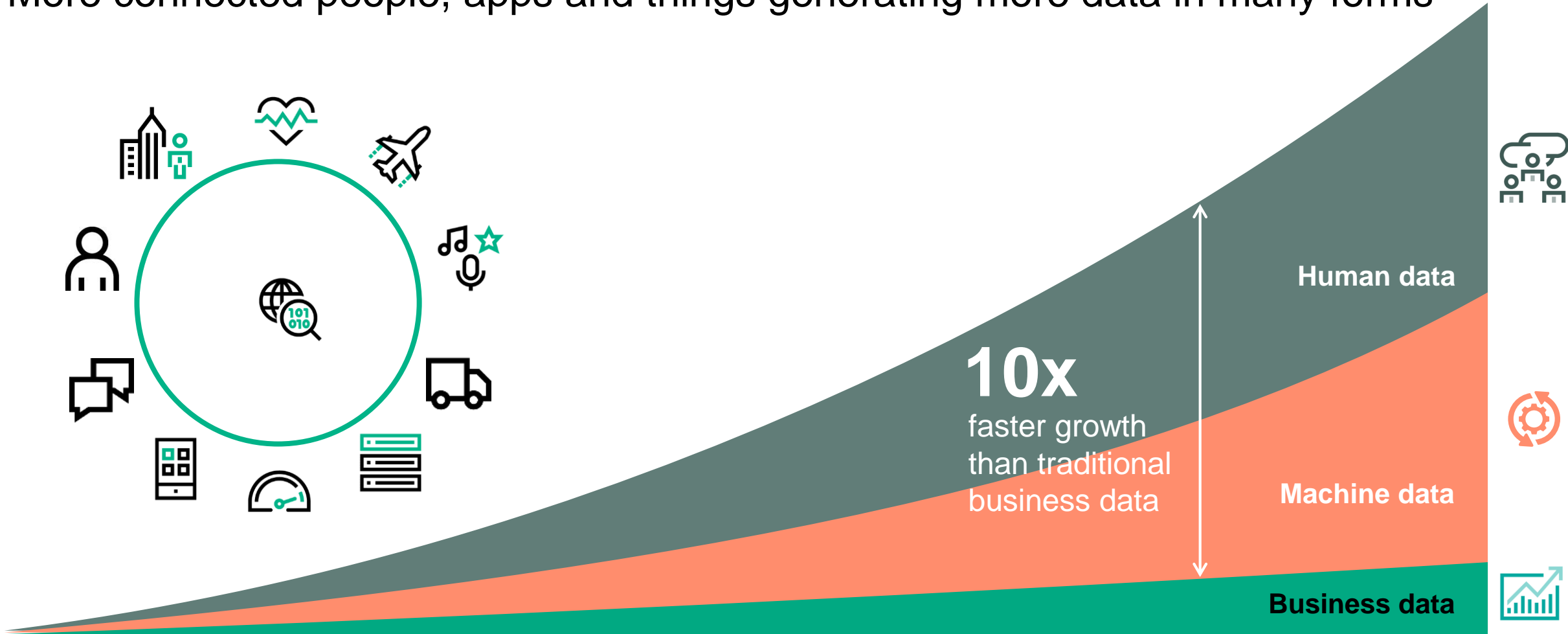
**Empower the data-
driven organization**

Harness 100% of your
relevant data to empower
people with actionable
insights that drive superior
business outcomes.

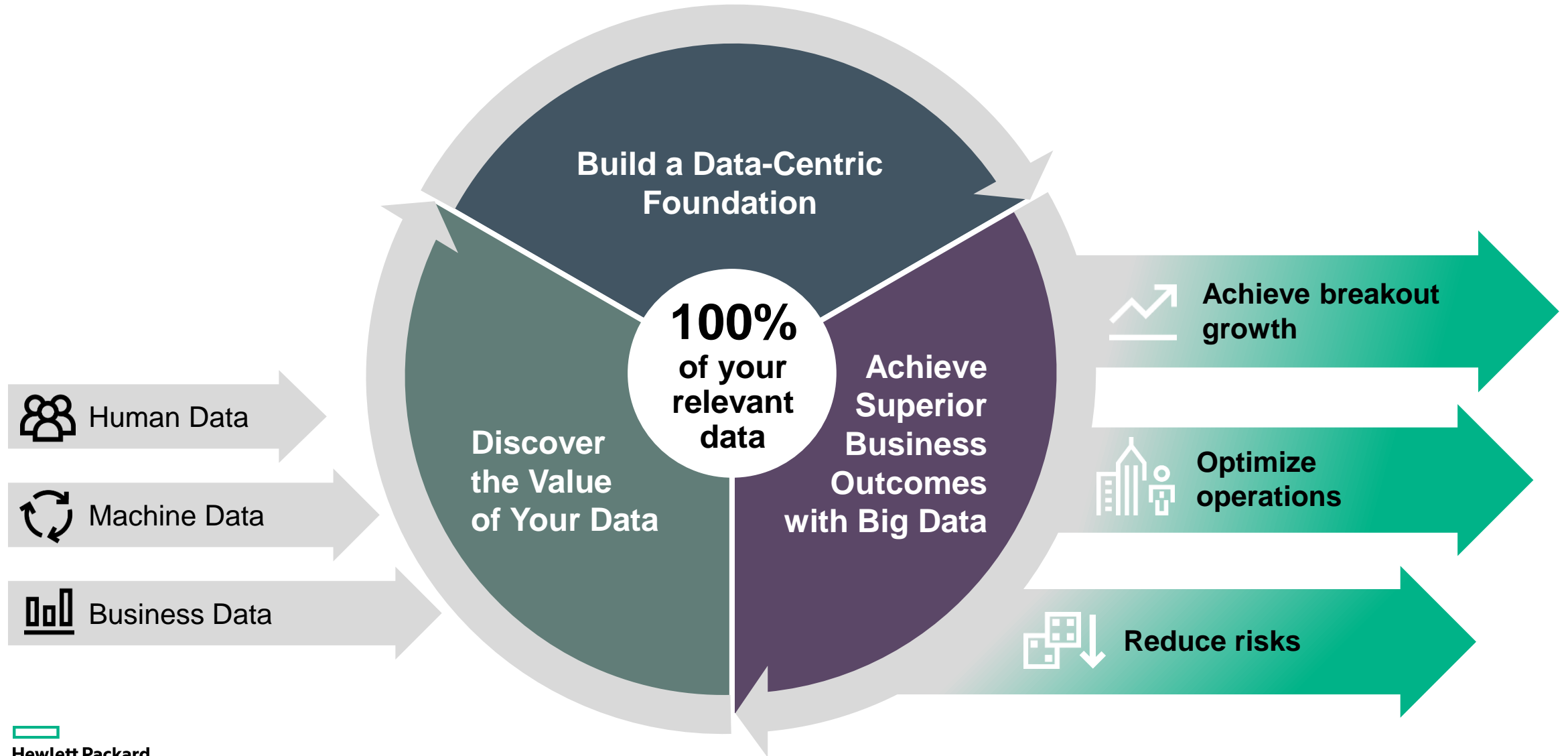


The data landscape is radically changing

More connected people, apps and things generating more data in many forms

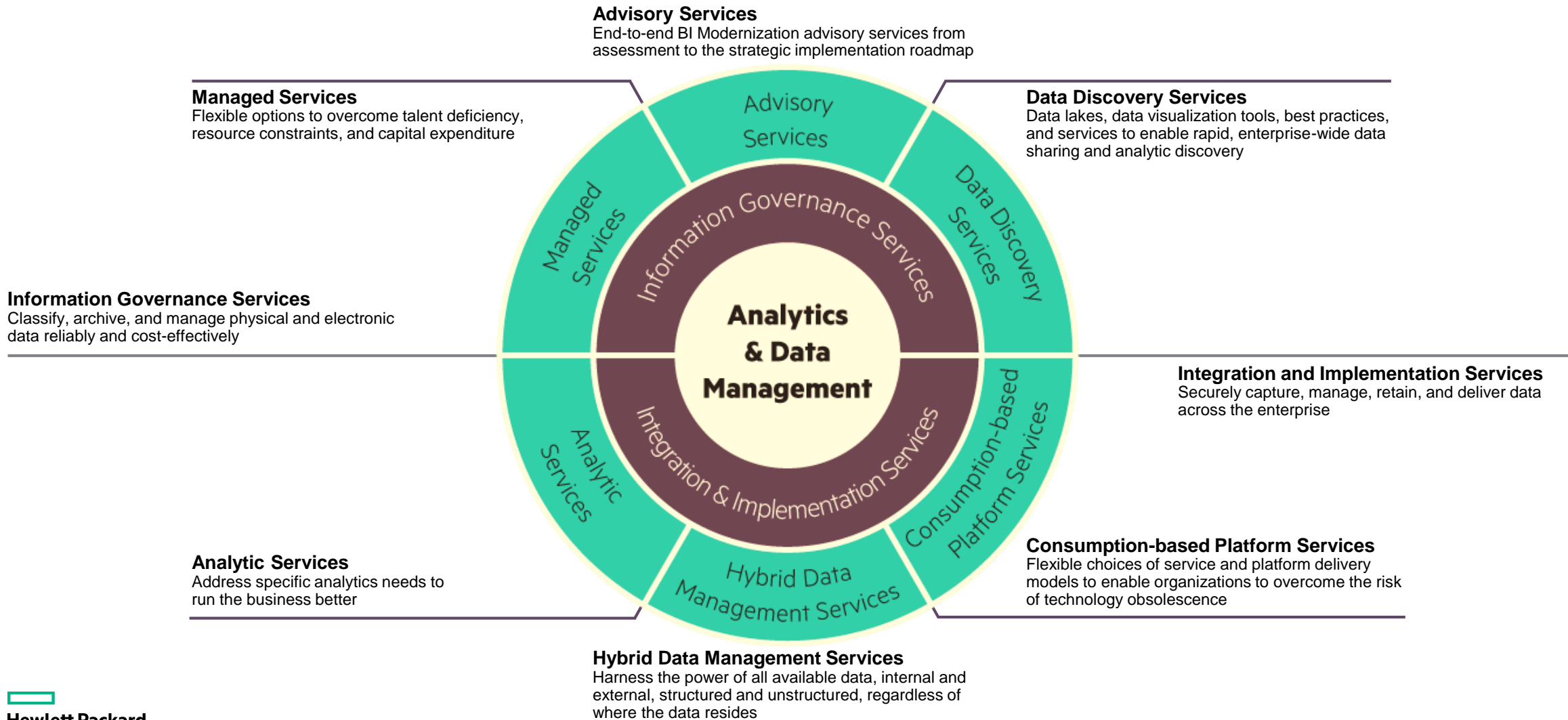


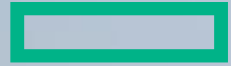
Accelerate your path to becoming a Data-Driven Organization



HPE Analytics and Data Management Services

Complete services portfolio from advisory to integration and management





Hewlett Packard Enterprise



Cape2Cape 2.0

Connected Car

Cape2Cape 2.0 – in a nutshell

Fastest drive from South Africa to Norway supported by HPE, Intel and Partners




**Hewlett Packard
Enterprise**



Race Team:
World Record Holder
Guinness Record Holder


**Hewlett Packard
Enterprise**

1 team

19 000 km

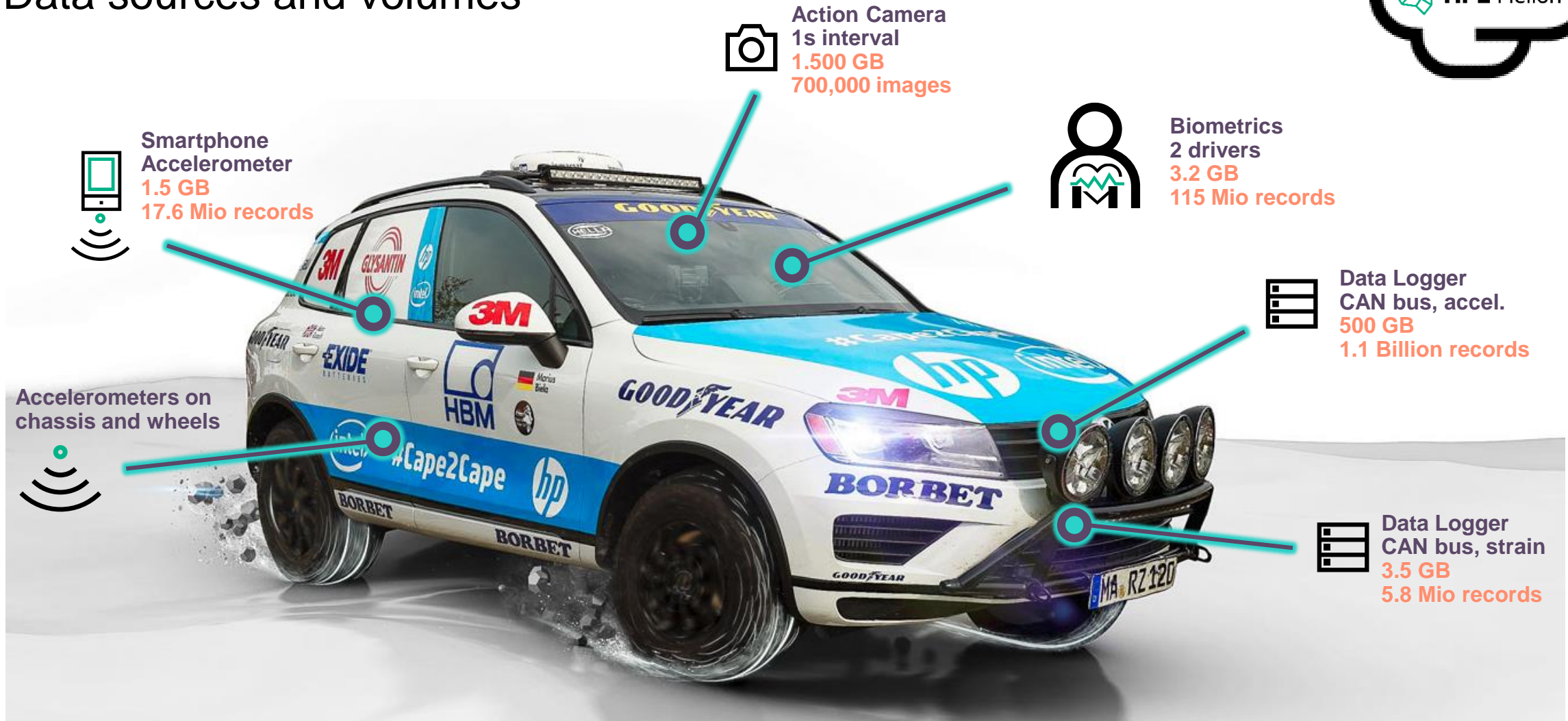
21 countries

9 days

Sept 20, 2015

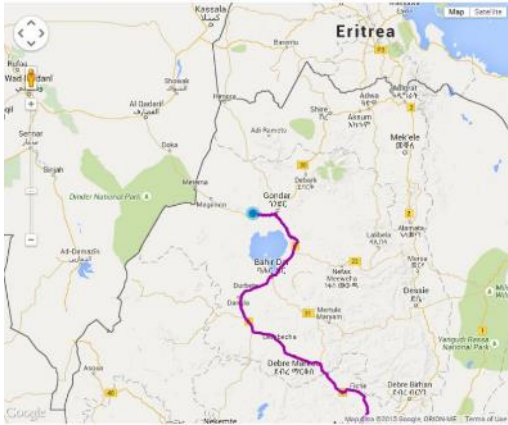
Data Metrics

Data sources and volumes



World-Record Dashboard

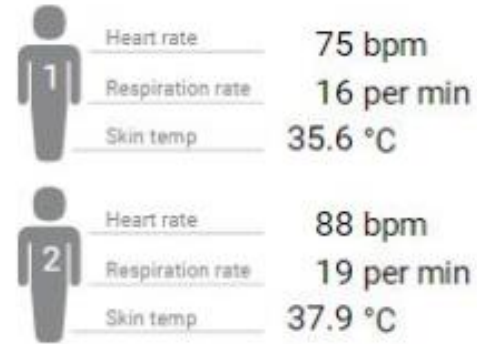
Location



Car performance

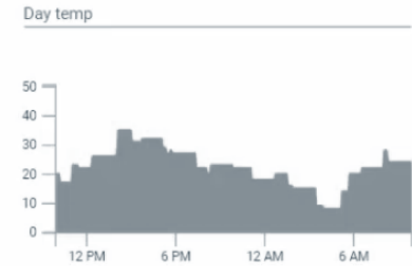


Health status



External conditions

2015-09-17 / Turkey
Police and migrants in stand-off near Turkey's Greek border
Hundreds of mainly Syrian migrants spent the night out in the open near Turkey's Greek border after police halted their bid to reach the frontier and cross into the European Union



Use cases



Biometrics



Driver profile



Road conditions

Biometrics

Correlating Biometric Data to Driving



Calculate Stress Level Clustering Level



Select Parameters

- Biometric parameters related to stress
- Cleansing, missing value treatment

Discrete Fourier Transformation (DFT)

- Determine main frequencies per biometric parameter

Select most relevant features

- Select top five features from DFT for further use

K-Means Clustering

- Calculate clusters based on top five features

Bring into order

- Determine lowest stress level cluster
- Order others according to distance

EPOC



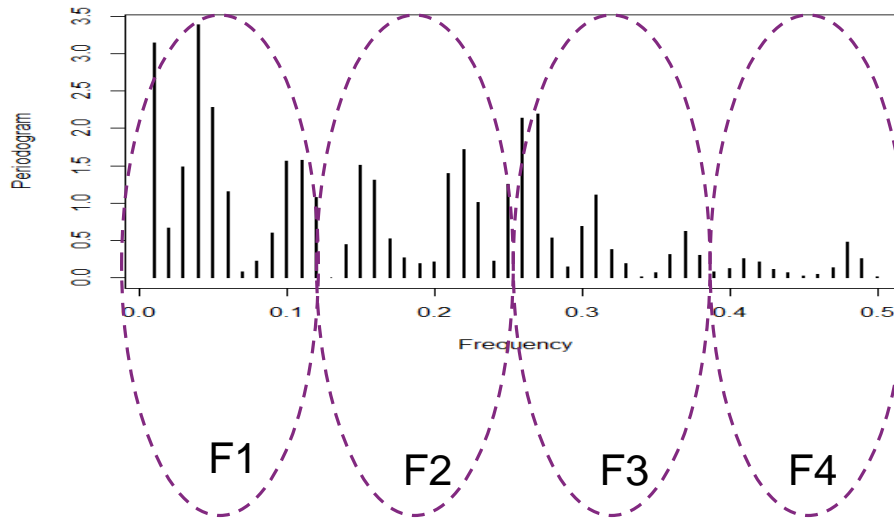
Interval Heart Rate



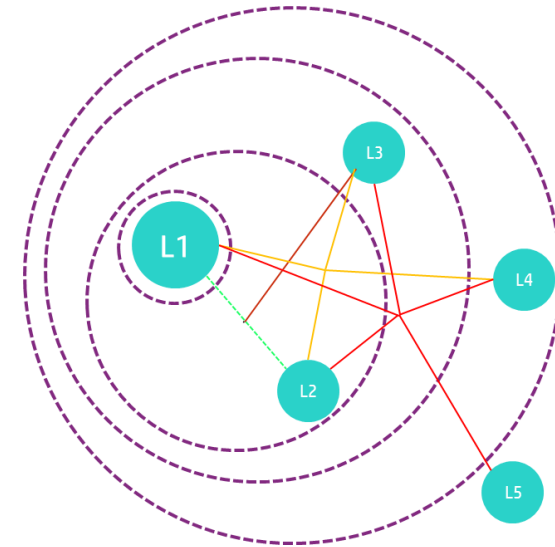
Respiration



Lateral acceleration



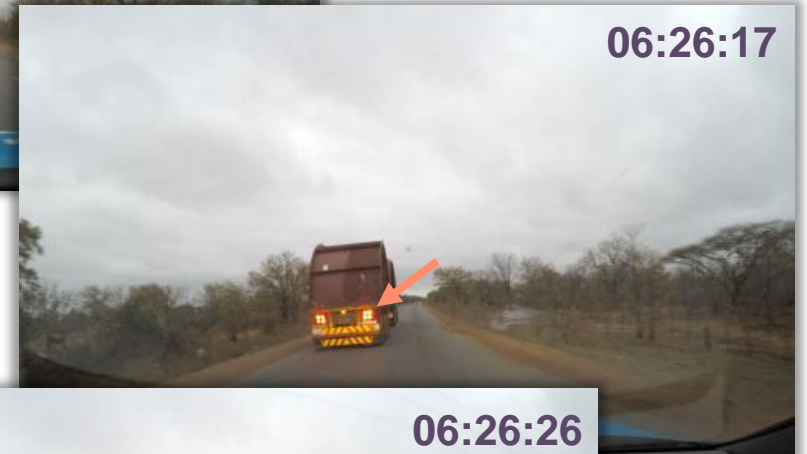
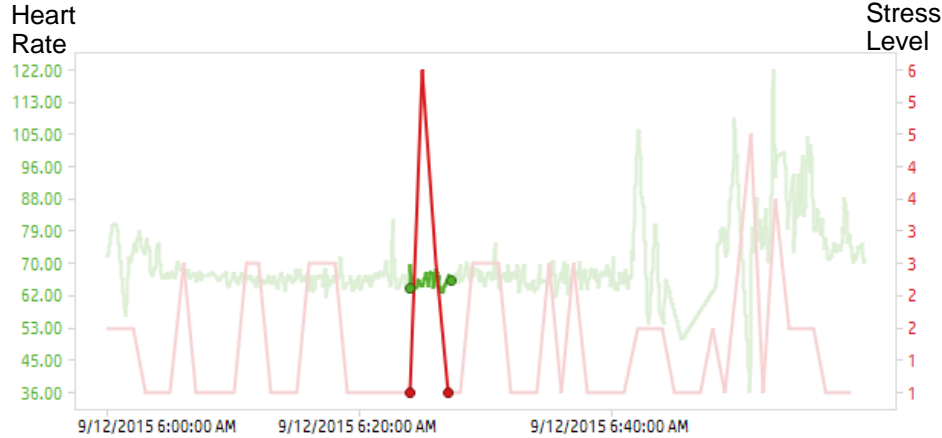
Feature Space Definition



Stress Level Definition

Overtaking & sudden Maneuvering

On 12th Sep @ 06:26

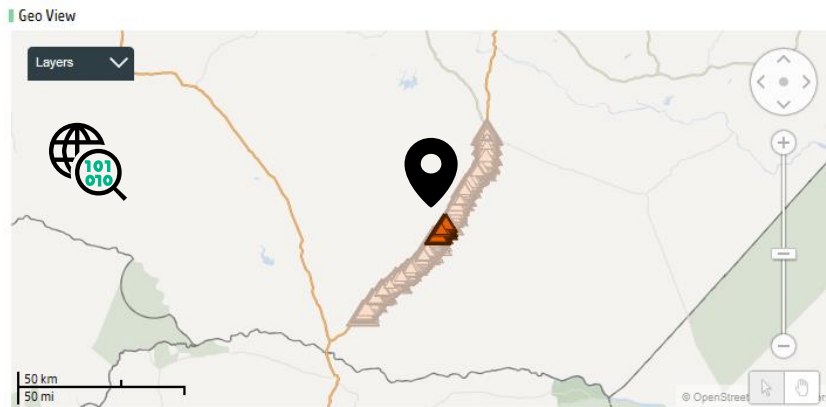


Overtaking two trucks – animals appear

Stress level jumps from 1 to 6

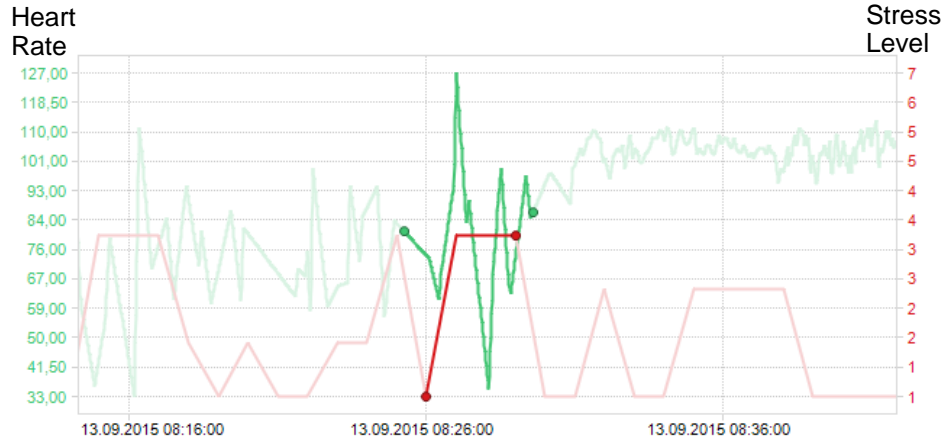
Location:

A4, Masvingo Province, Zimbabwe



Driving uphill on a crowded road with sun glaring

On 13th Sep @ 08:26



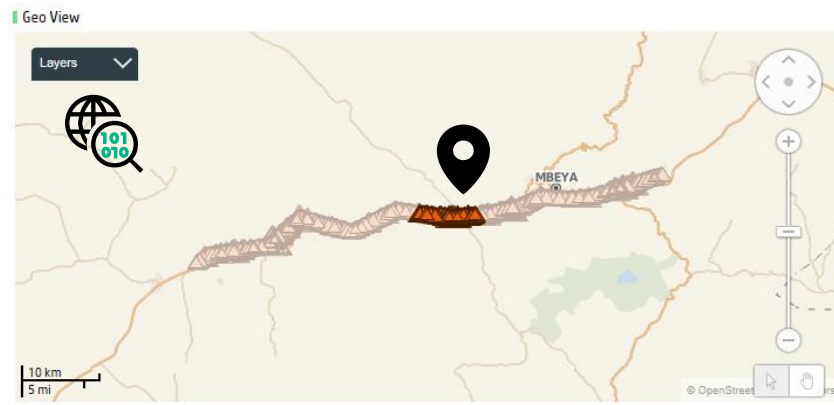
Driving uphill on a crowded road, oncoming traffic

Stress level jumps from 1 to 4



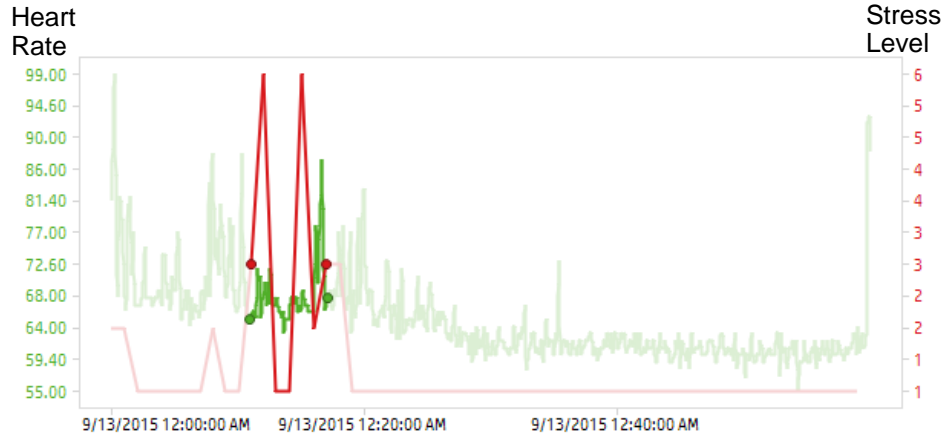
Location:

T1, Mbeya,
Southern
Highlands,
Tanzania



High Beam Lights during driving

On 13th Sep @ 00:12

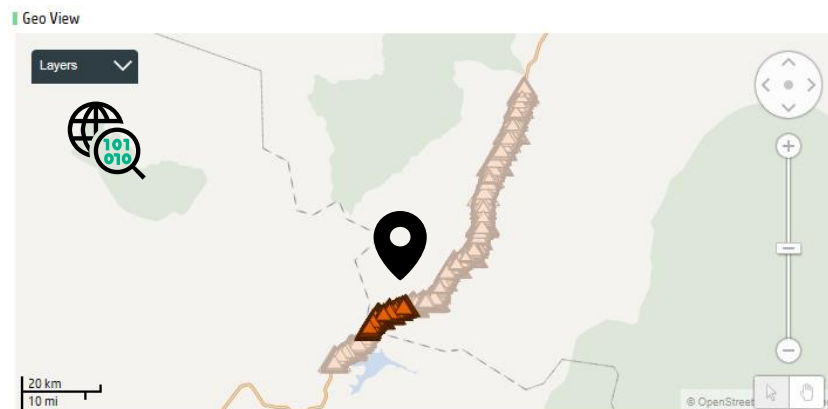


Night driving, high beams glaring

Stress Transition from 1 to 6 at multiple times

Location:

T2, Mabonde,
Central
Province,
Zambia



Stress level by country

Plan a route with lowest stress level

Lowest stress: **Sweden**

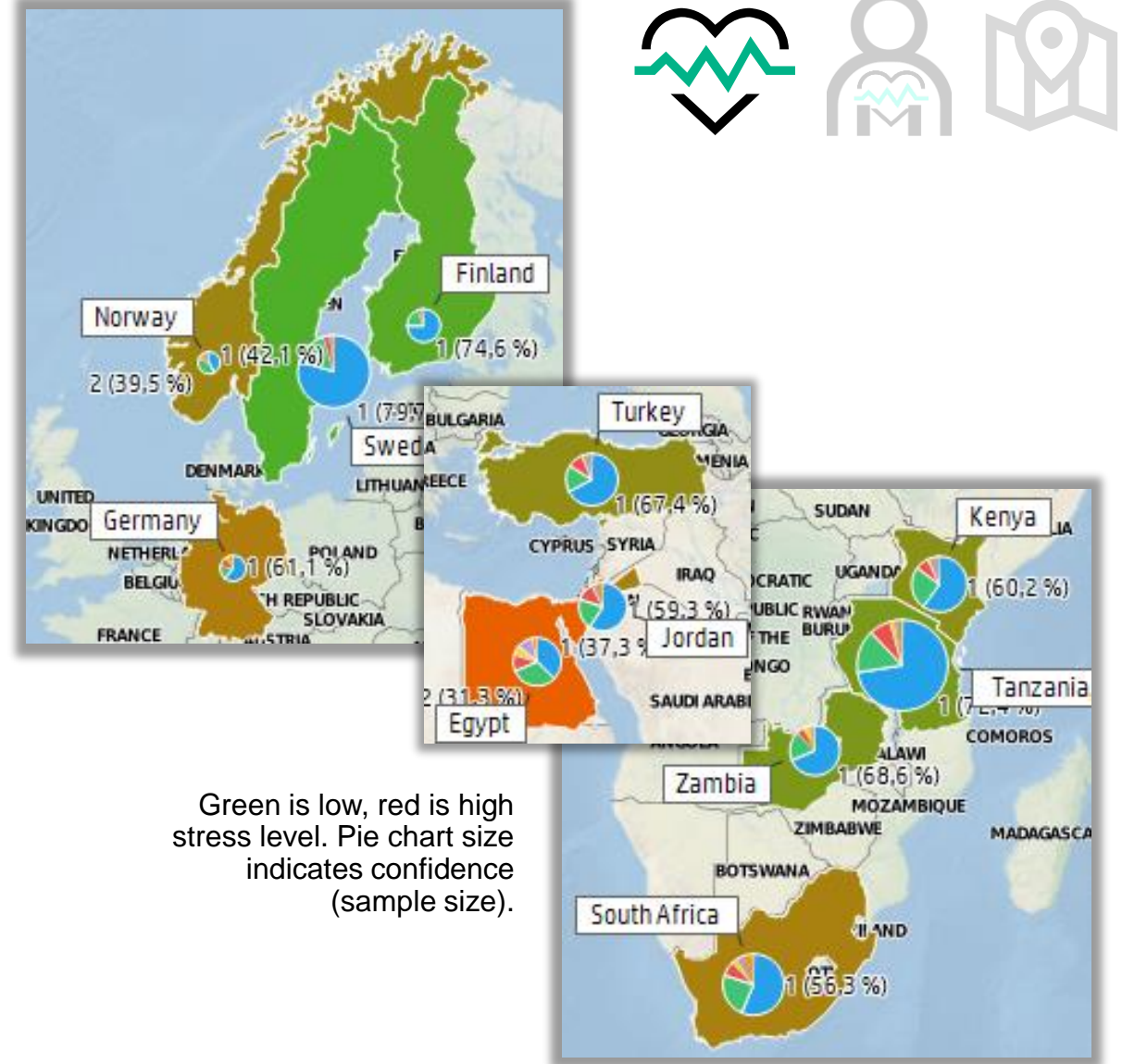
Medium stress: **South Africa**

High stress: **Egypt**

Contributing factors:

- Traffic and road conditions
- Border control and checkpoints
- Country passed by day or night
- Time pressure

A single drive is heavily impacted by coincidence, aggregated data from multiple trips or fleet data will provide **reliable results.**



Business Value - Biometrics



Do assistant systems actually reduce stress in the field?

R&D: Where to invest?

Stress as a factor in navigation

Improved health and fatigue recognition

Gamification

Feedback to driver

Self-optimization and activity tracking

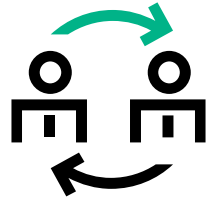
Biometrics - Key Findings



Heart Rate & Respiration Rate are key parameters

Mean & low frequency variations of HR & RR explain most variance in driver state.

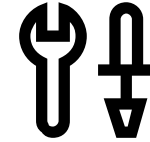
Biometric sensors should cover heart rate and respiration rate



Stress / excitement levels must be personalized

Individuals may differ in what is "normal" state.

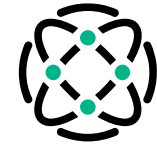
Baseline levels must be learned from data



Biometric sensor data can be extremely noisy

Missing and incorrect values can appear frequently.

Robust algorithms necessary



Broad range of events cause stress

Sudden obstacles, high traffic, glaring lights, ...

Potential for optimizing the driving experience



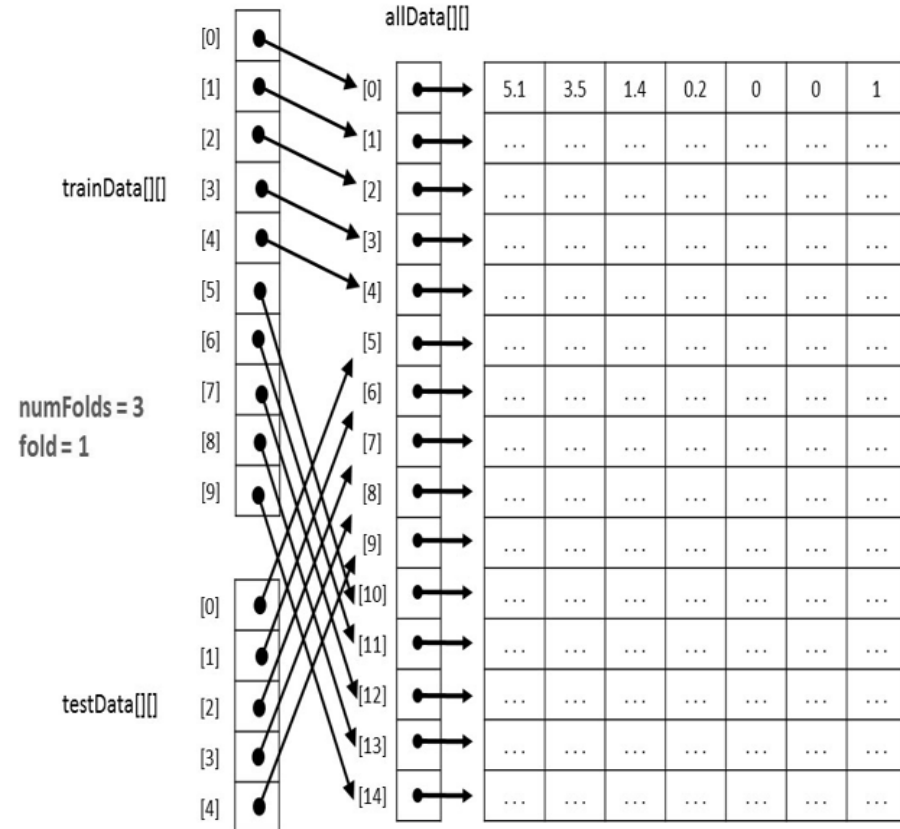
Know the Driver

Using Advanced Analytics to Identify the Driver
Categorize Driving Style and Car Usage



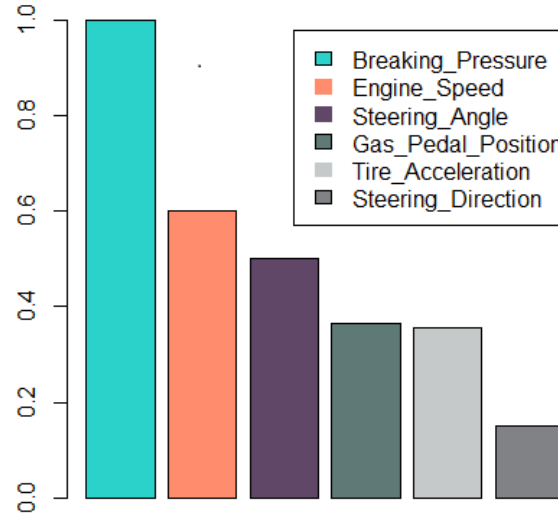
Identify the Driver – Random Forest

K-Fold Cross Validation, Variable Importance, Accuracy



K-Fold Cross Validation

Variable Importance

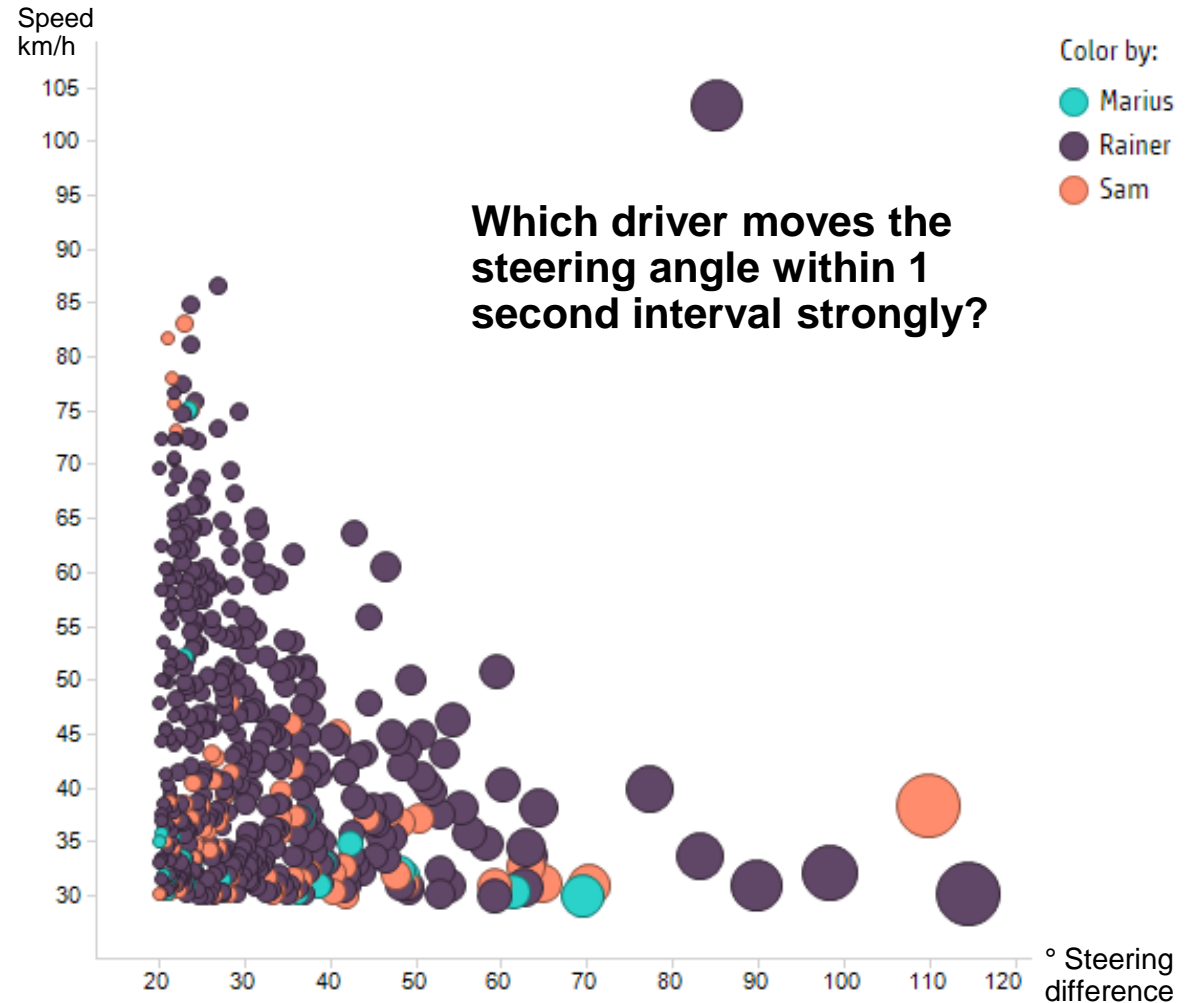
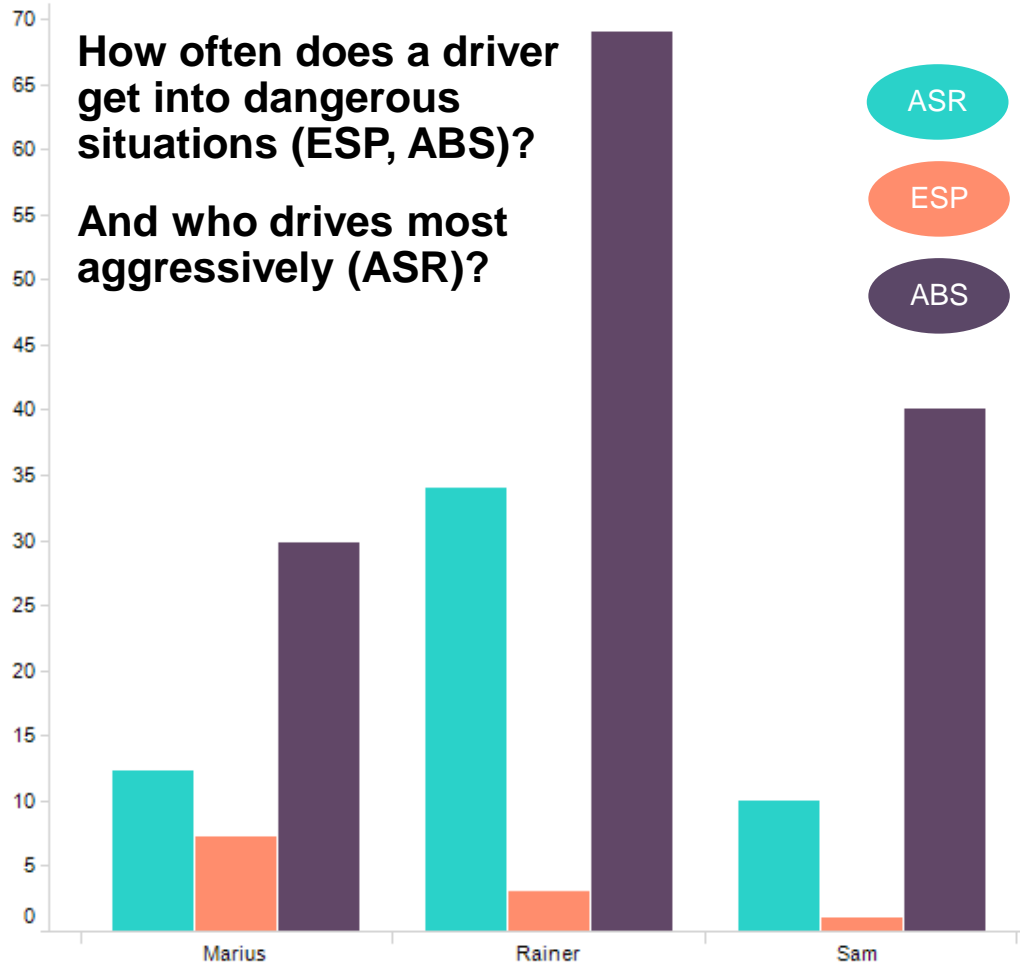


These car sensors are key drivers to identify the driver

Time Interval Sensor Data	Accuracy
One second granularity	76 %
One second results scored on one minute aggregation	87 %

Driving Style and Car Usage Characteristics

ABS, ESP, ASR & Strong steering corrections by Driver



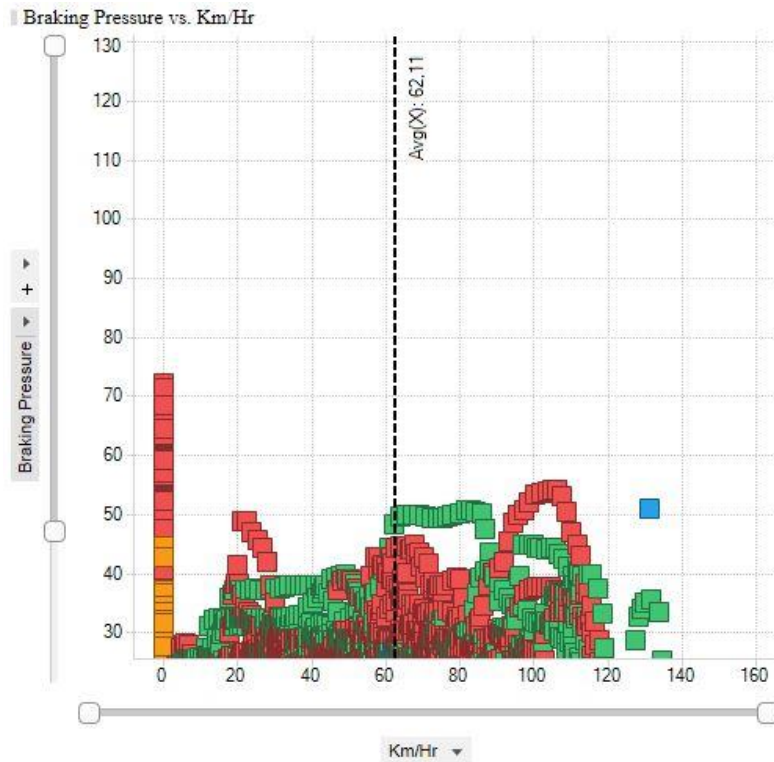
Driving Style and Car Usage Characteristics

How does Braking Pressure per Driver vary ?

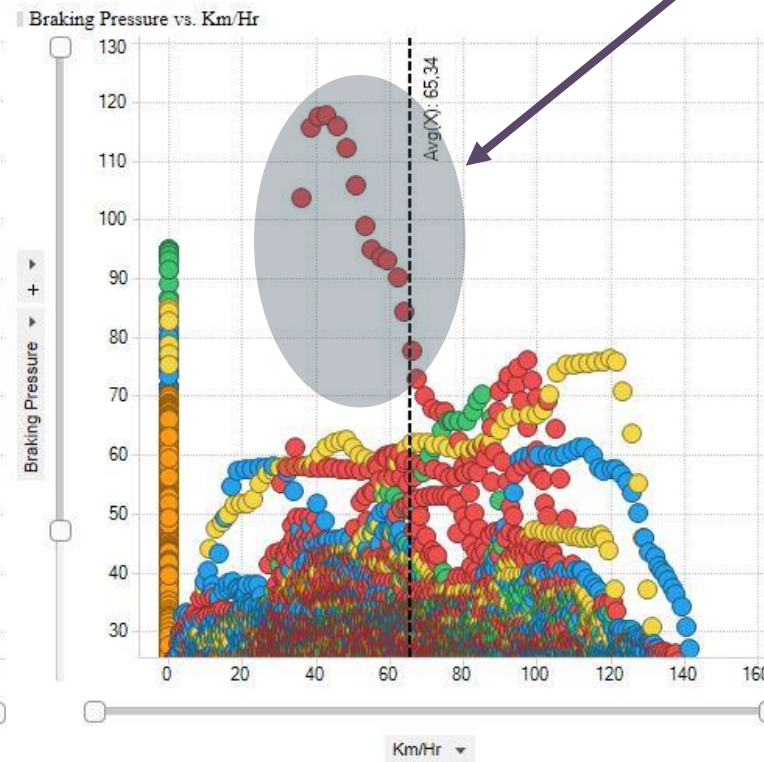


Rainer: Frequent heavy braking → Race driver
Marius: Almost no heavy braking → Cautious driver

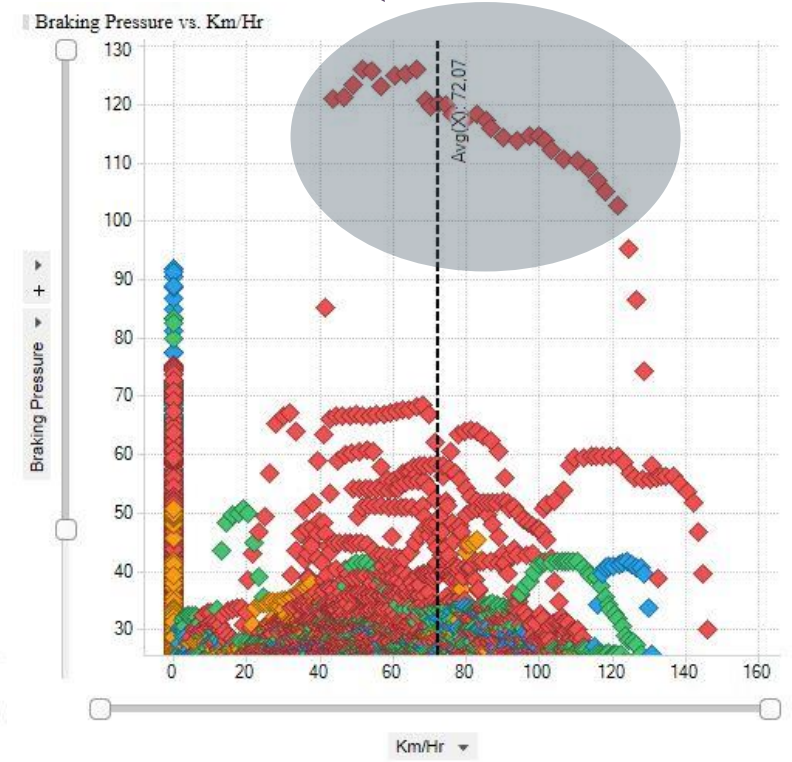
Braking events can be identified uniquely



Marius



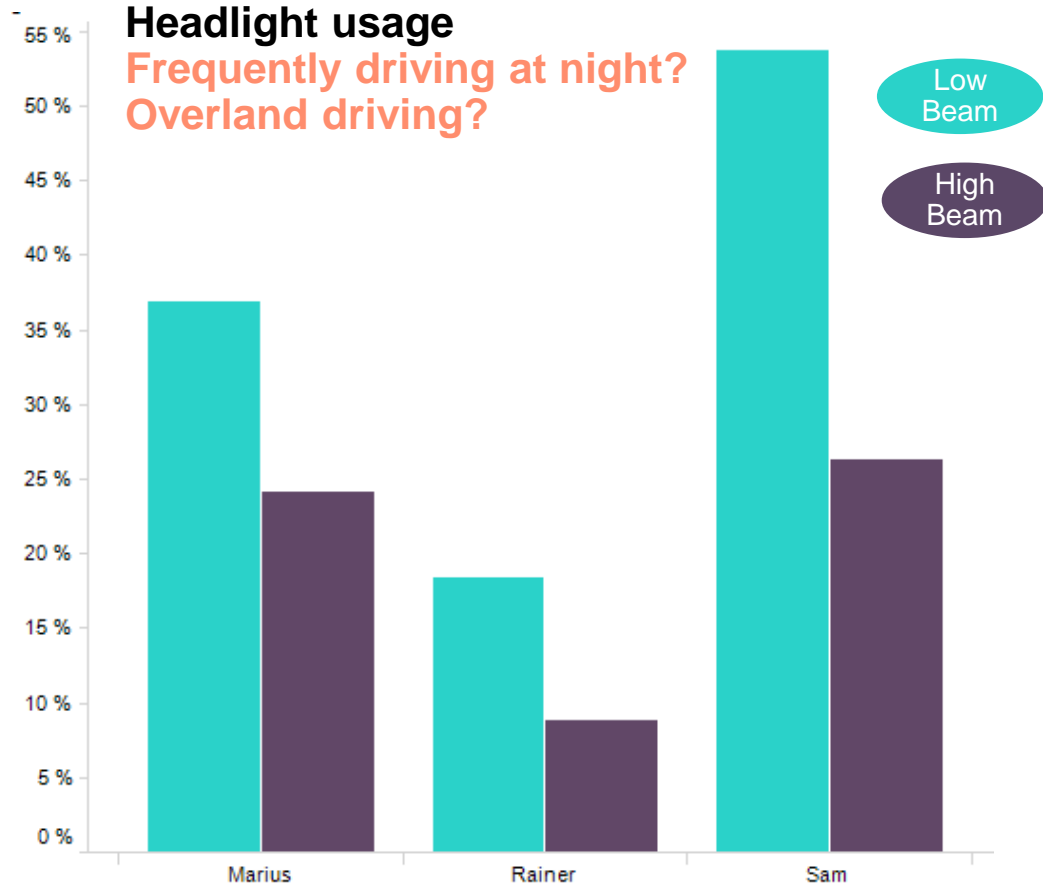
Rainer



Sam

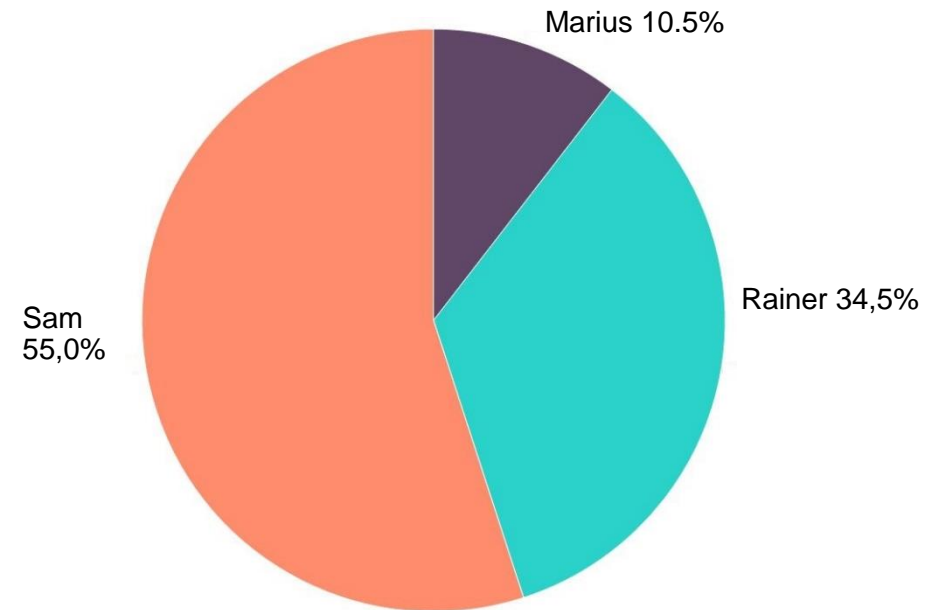
Profiling Sensor Data, further Car Usage Insights

Regional or Driver specific Car Usage



Derive region specific usage pattern by aggregating fleet data.

Turn Light Usage



Business Value - Know the Driver

Using Driver Analytics as Competitive Advantage



Constant feedback on actual car usage

Fleet Management

Identify No. of drivers in e.g. family, car owner change

Promote extra parts, new assistance systems, new car

Localized car design & manufacturing

Targeted localized advertising, add-on revenue

Car model analysis – Usage of model characteristics

Accident and hit-and-run driver identification, theft detection

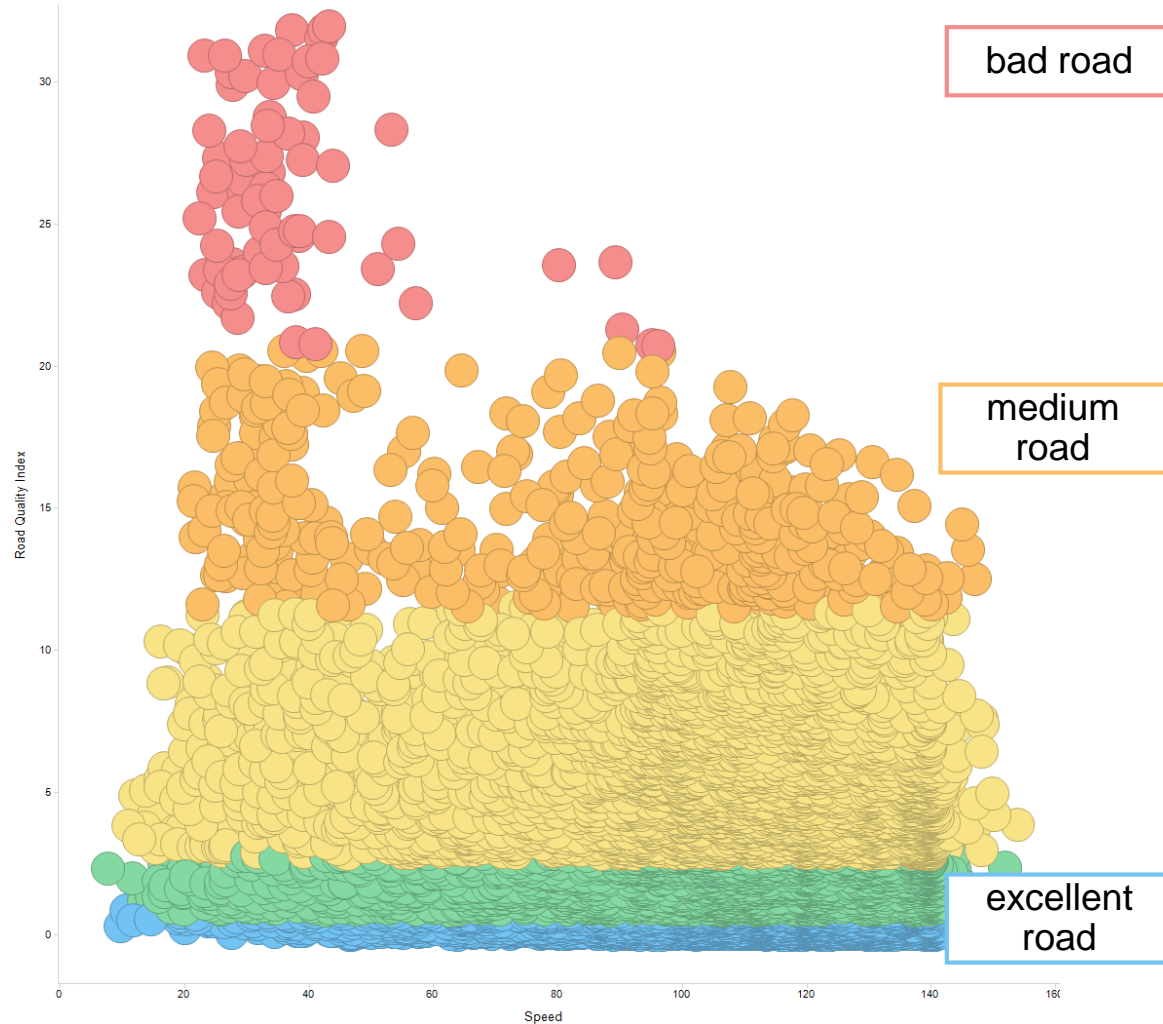
Road Conditions

Determine Road Quality
Warn about dangerous Spots



Road Quality

Road Quality Index vs. Speed



Definition

Road quality is determined by the roughness. Roughness is the frequency and intensity of vertical wheel acceleration.

Method

Count acceleration events in five different acceleration intensity categories per 10 seconds and divide by speed.

Smartphone Data

- Smartphone shows similar acceleration as dedicated sensor on chassis on 100ms aggregation.
- Pothole and speed bump detection.
- Challenge: Smartphone needs to be **fixed to car solidly** and needs good GPS reception.

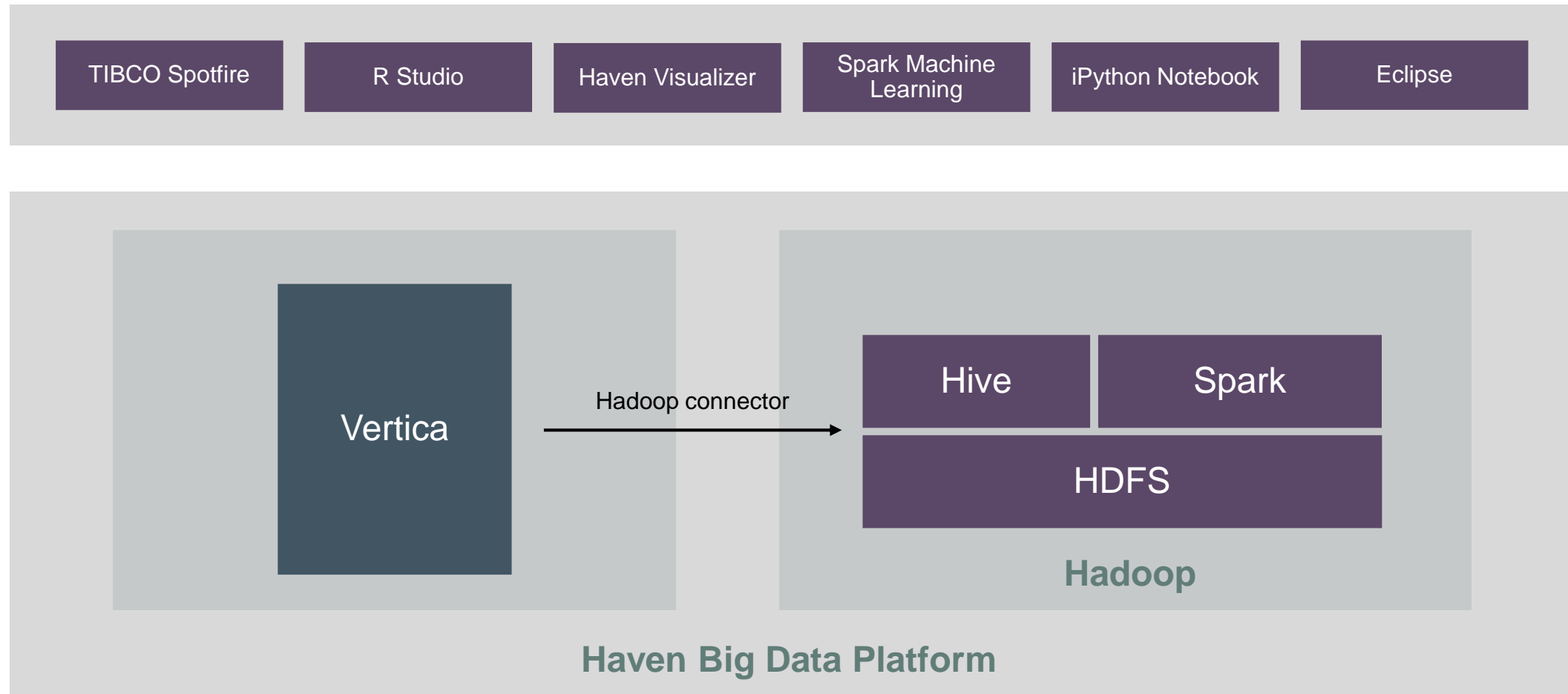


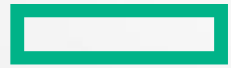
The image shows the open trunk of a white SUV. Inside, two spare tires are secured with orange ratchet straps. Two red fire extinguishers are positioned on either side of the tires. Various tools, including a jack and a wrench, are also visible. The car is parked on a grassy area near a rocky coastline with waves in the background. A teal border highlights the top portion of the trunk's interior.

Extract – Load – Transform Car Sensor Data

Cape2Cape Solution

Analytical Architecture



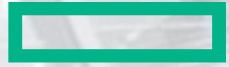


Hewlett Packard Enterprise

Days	Hours	Mins	Secs
9	: 04	: 09	: 27



HPE makes it happen!



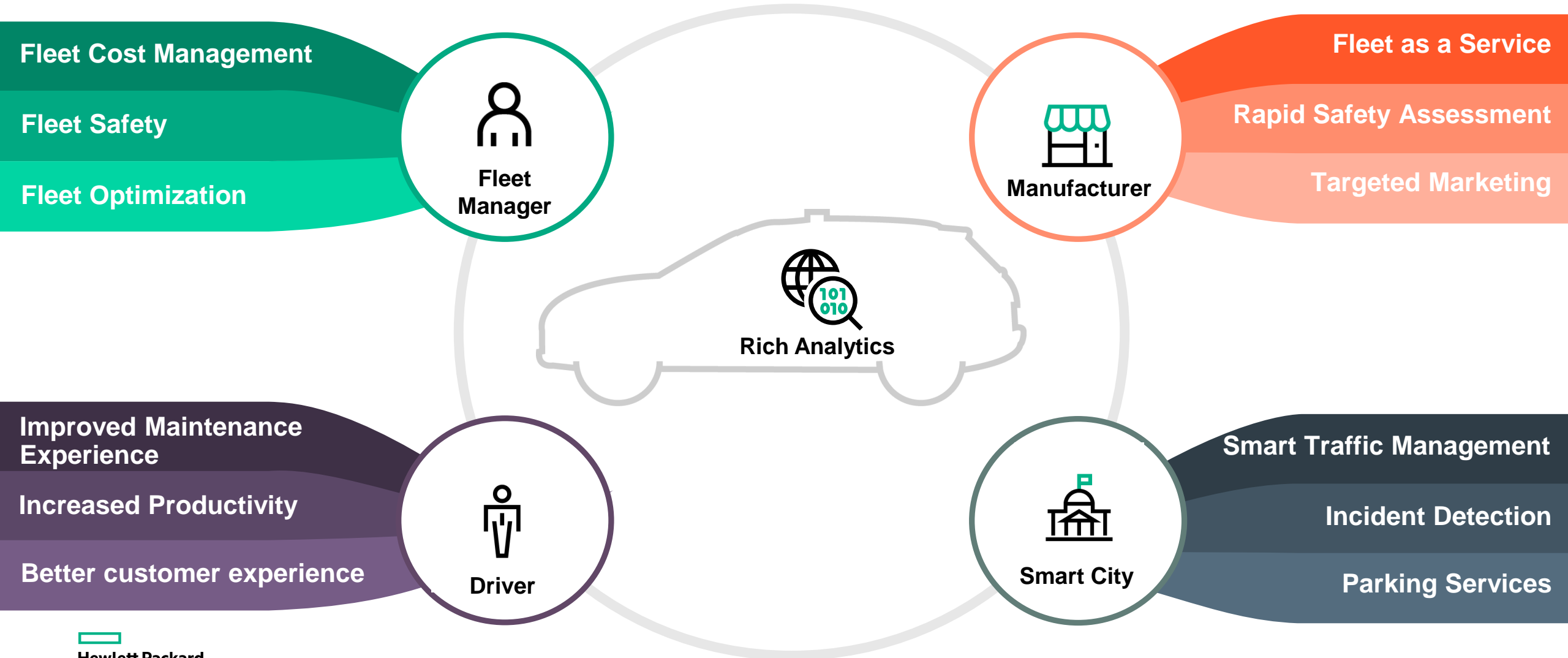
**Hewlett Packard
Enterprise**

Fleet Management Analytics



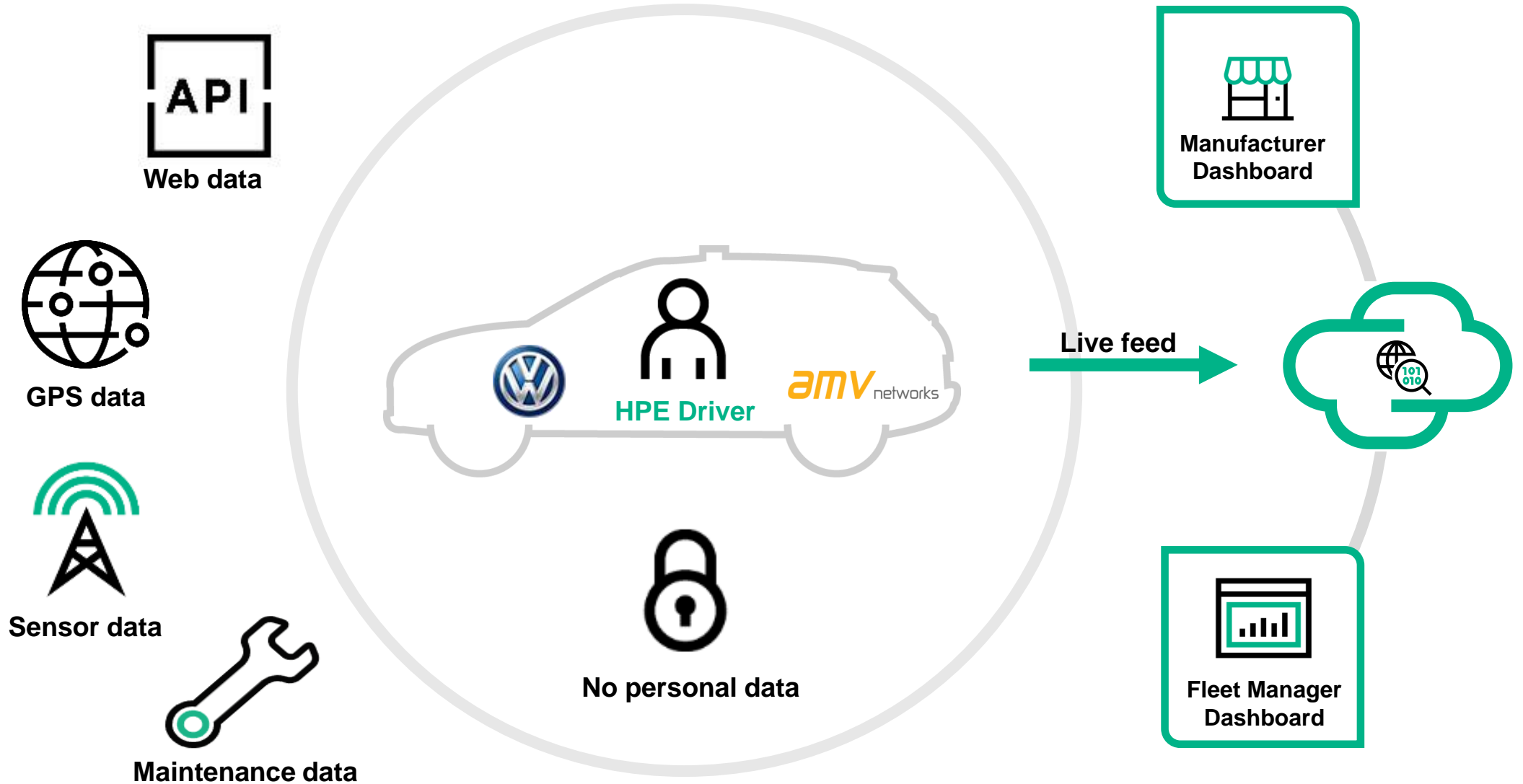
Improve Existing and Introduce New Business Models and Services

Business outcomes for various stakeholders



Connected Vehicle

Solution Overview



In Numbers



81

Fleet vehicles



75,177

Trips driven



918,302

Kilometers driven



POI

data to enrich
analysis



2-5 sec

sensor reading



180

days

data gathered



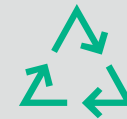
100 %

non personal data



14
Million

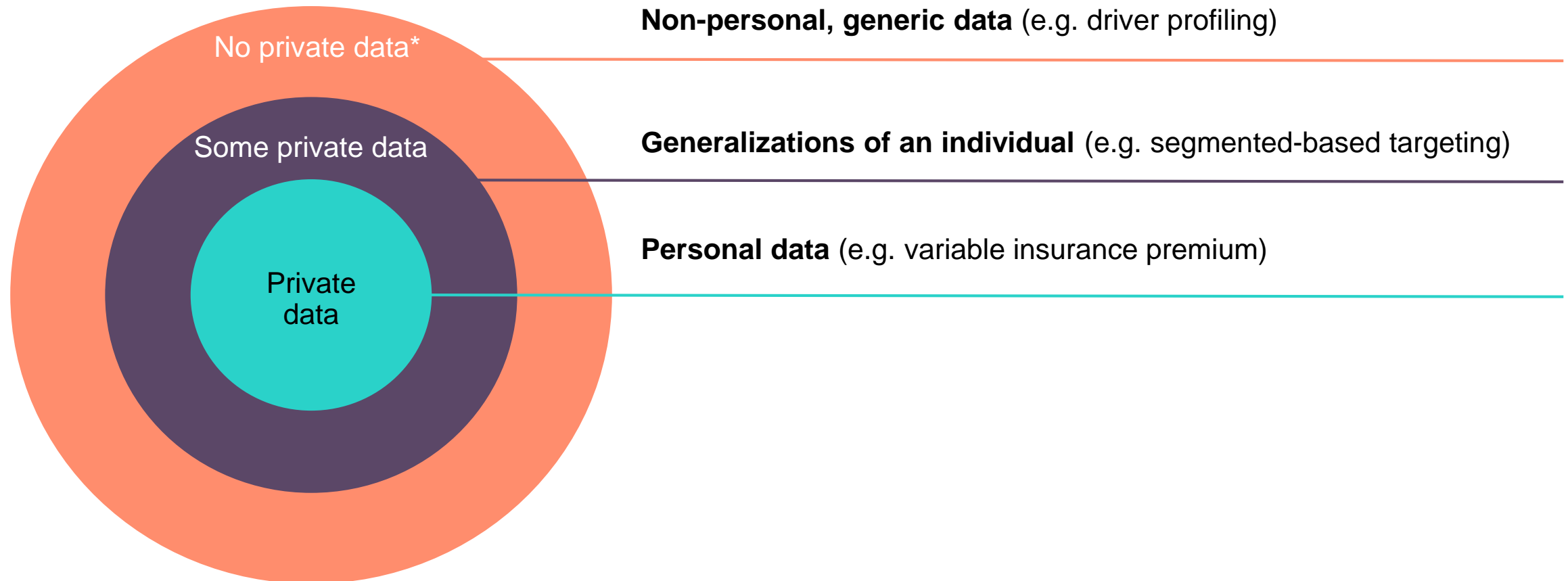
of sensor data records



roadwork, weather, traffic
and maintenance data

Securing the data

Car manufacturers could offer 3 levels of privacy from the sensors



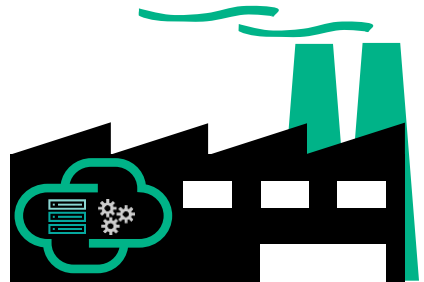
IoT Platform – Functional Diagram

Fleet Manager Dashboard

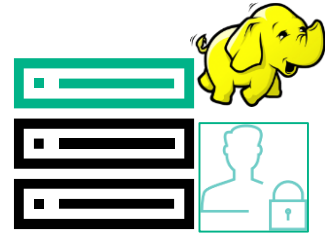
Driver Dashboard

Manufacturer Dashboard

Other



HPE Cloud Platform



Data Lake & Analytics

HPE Voltage



Database & Analytics

HPE Voltage



Visualization & Analytics

HPE Voltage



#_DATALAB



RDBMS

amv networks



Data Relay (One Day Storage)



GPRS



81 HPE Company Cars



ASG Units AMV



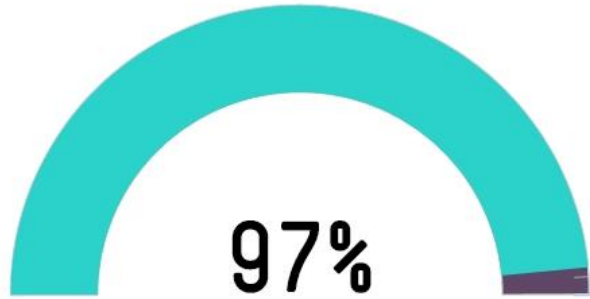
No Private Data



GPRS



Regular Maintenance Compliance

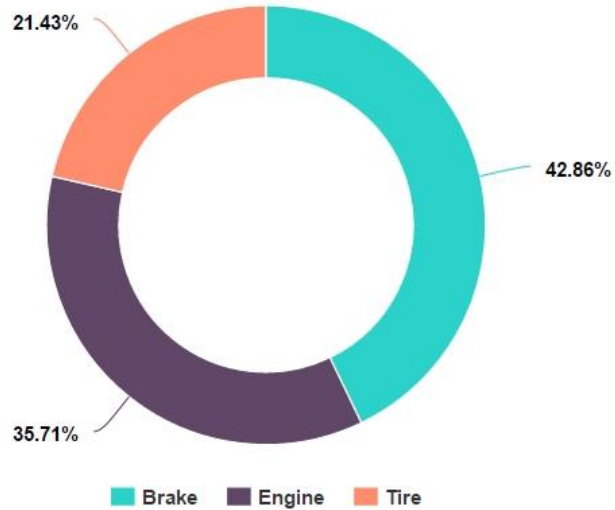


Vehicles Scheduled for Regular Maintenance

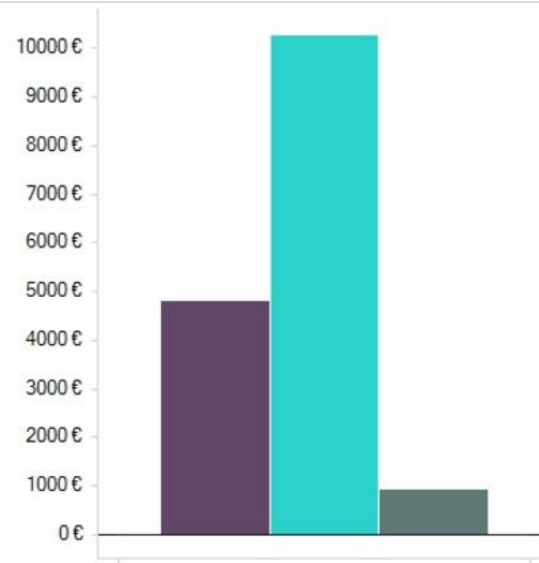
Previous **1** 2 Next

Driver Name (Encrypted)	Type of Maintenance	Due In
T-Bz-1N 8Uyejy 80wg	Oil Change	2 Months
qH-cr-aoJ PQV7lcs nsQ2pk	Oil Change	2 Months
ox-Dq-VRS pCfeiE rmiMAC	Tire Change	2 Months
oro-T2-8n8 Olqj1 n6xk	Tire Change	3 Months
M6-Jf-Rizd Cvvii9cf L3fBqbi1C	Brake Pad Change	3 Months

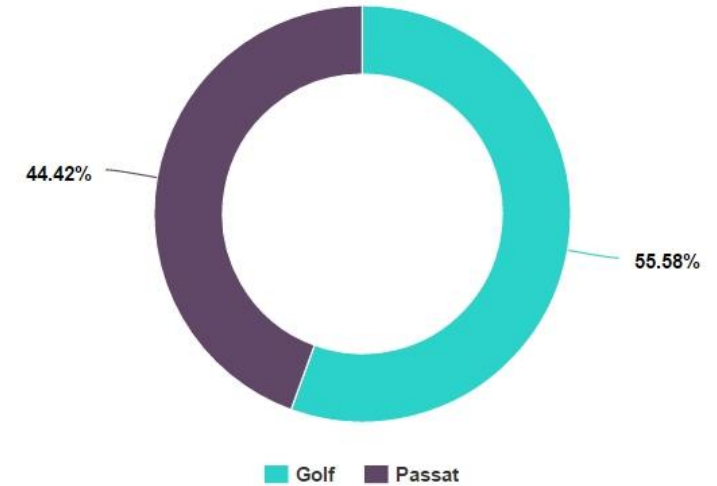
Predicted Maintenance by Part



Predicted Cost



Predicted Issues by Model





KNOW YOUR FANS

SOCIAL MEDIA ANALYSIS FOR NASCAR



WORLD WIDE IMPACT



- ✓ **NASCAR FAN-BASE**
 - Gender split : 63% Male – 37% Female.
 - 47% are 18-44.
 - 40% are families with kids under 18.
 - One of the most loyal Fan-base in Sports :
 - 50% talk positively about brands that are sponsor in NASCAR.
 - 33% always buy products or services from companies that sponsor NASCAR.

- ✓ **EVENTS**
 - 6 events involving 7 countries.
 - Average attendance 25K *per event*
- ✓ **DRIVERS**
 - 80 drivers from 18 Nationalities.
- ✓ **TV BROADCASTING**
 - 5 Continents – 190 countries.
 - Over 100 millions households.
- ✓ **LIVE STREAMING : FANSCHOICE.TV**
 - The official NASCAR & AMA web-TV.
- ✓ **WEBSITE : NASCAR HOME TRACK**
 - 1.5 Million unique visits
 - More than 5 million page views.
 - More than 1000 websites coverage.



- ✓ **SOCIAL MEDIAS REACH**
 - Twitter : 1.7 million impressions
 - Facebook : 950 000
 - YouTube + Facebook videos : 400 000
 - Flickr : 45 000 views
- ✓ **PRESS PUBLICATIONS**
 - Regular feature in National and International media as well as Sport and racing press.

This is the era of multi-channel content and analytics

 **8,000**
tweet per minute

 **1,000,000**
post per race events

 **75,000,000**
FAN around the world

 **100,000**
tweet during real-time
race

 **565,000**
post per day

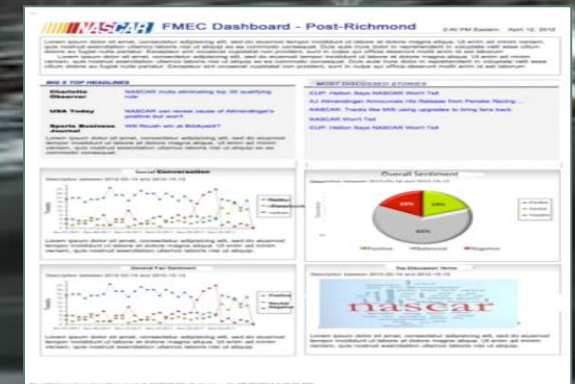
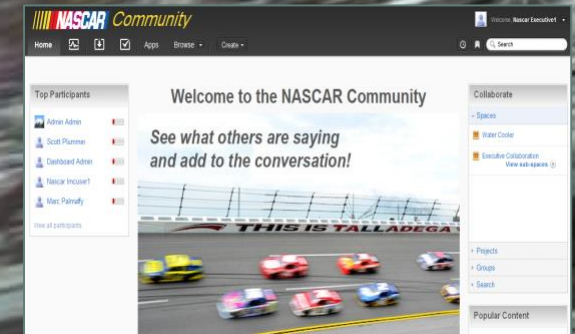
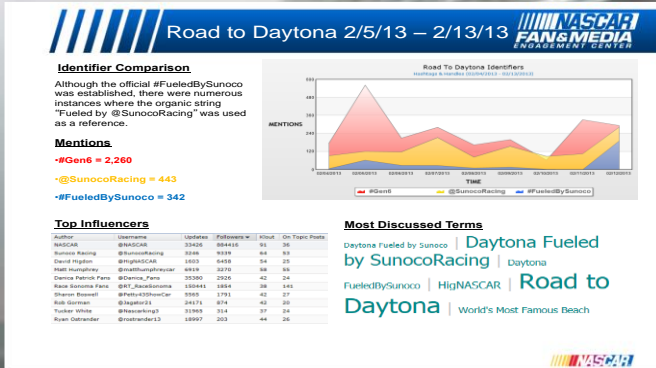
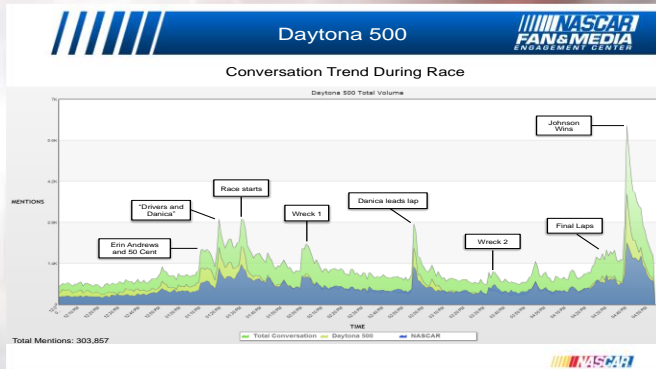
“HP’s technology helps us turn millions of tweets, posts, and stories into real-time business insights that help NASCAR win with our fans,”
says **Steve Phelps**, Chief Marketing Officer, NASCAR.

NASCAR Interactive Media Command Center

Analyzes fan sentiment, identifies emerging issues and trends for actionable insights

Gather

Engage



Analyze

Share



KNOW YOUR CITY

London, Mexico City, St. Luise

SafeCity
LONDON



Powered by
HPE IDOL and HPE Vertica

ALERT

TERRORISM



TRANSPORT



WATCH

POLICE AND
CRIME



NORMAL

FIRE



MEDICAL



POLLUTION



REFUSE AND
RECYCLING



SCHOOLS AND
EDUCATION



UTILITIES



WEATHER



LAST HOUR



Location : The M25 anticlockwise exit slip at junction J1B . Status : Currently Active. Return To Normal : Normal traffic conditions are expected between 17:00 and 17:15 on 8 June 2016. Delay : There are currently delays of 10 minutes against expected traffic. Reason : Congestion.



LAST 6 HOURS



hold it up to the sun and check for holes but this all Israeli bag anytime we find filters with holes we destroy them and we dance we don't give them back the the the the the the the edge of the the what the good Location : The A27 westbound between the A2025 and the junction with the A24 South. Status : Currently Active. Return To Normal : Normal traffic conditions are expected between 20:00 and 20:15 on 13 June 2016. Delay : There are currently delays of 10 minutes against



LAST 12 HOURS



laws to be tightened about the type of weapons people to get hold of even as small change like background checks to be tighter when it comes to private sales but even since then nothing has changed so despite the fact that the world here is shocked at is picking over every detail of the story there isn't really much optimism that there could be changing gun laws and I certainly think the president didn't really



LAST 24 HOURS



Thanks for your patience. traffic released. 2 of 3 lanes closed #M20 forward for her to bring communities together that well yesterday we run our our cruise together weird people that should our church just a whisper surely people that showed up just to help we had pretty early maybe decision that we are going to help the First responders are



Location : The A27 eastbound between the junctions with the A286 and the A259 Chichester East . Status : Currently Active. Return To Normal : Normal traffic conditions are expected between 10:45 and 11:00 on 13 June 2016. Delay : There are currently delays of 10 minutes against

Taxi booking apps as an extension of your taxi business. Need a Taxi Booking App Call at +1 518 512 8204 @taxi.york

traffic conditions are expected

Currently Active

Normal traffic conditions are expected between 17:00 and 17:15 on 8 June 2016. Delay : There are currently delays of 10 minutes against expected traffic.

Return To Normal

Congestion info highwaysengland

Location : The junction of the A2270 and the A27 . Status : Currently Active. Return To Normal : Normal traffic conditions are expected between 16:45 and 17:00 on 13 June 2016. Reason : Congestion.

Reason : Congestion.

hold vigils

MEDICAL 

1	0	21	3
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POLICE AND CRIME 


0	0	9	0
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SCHOOLS AND EDUCATION 

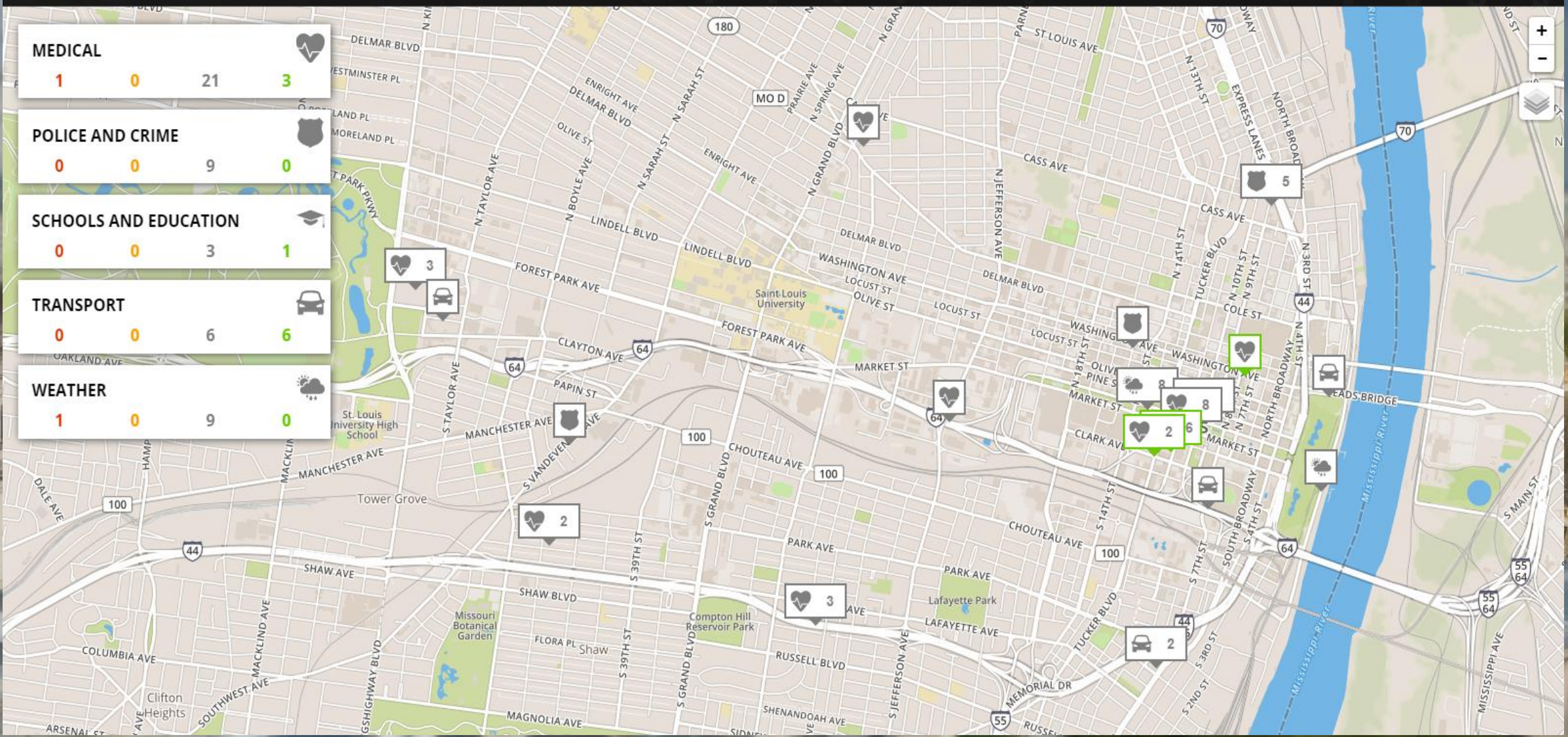
0	0	3	1
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TRANSPORT 

0	0	6	6
---	---	---	---

WEATHER 

1	0	9	0
---	---	---	---





Hewlett Packard Enterprise

An aerial night view of a city street, likely in Japan, showing illuminated buildings, a street with cars, and a sports field (possibly a soccer field) on the right. The scene is lit up with city lights and stadium lights.

Big Data Solutions

Harness all of the possibilities of big data to unlock your organization's future in the idea economy.

<https://www.hpe.com/us/en/solutions/big-data.html>