PTOLEMUS
Consulting Group

2016
EDITION

CONNECTED INSURANCE ANALYTICS

Report

Free
abstract

The most comprehensive research on the UBI analytics market

From copper to gold: transforming telematics into predictive analytics

ABOUT PTOLEMUS CONSULTING GROUP

from Ptolemy, the Egyptian savant who built the 1st map of the world in the 2nd century

PTOLEMUS is the first international strategy consulting & research firm specialised in the connected vehicle and the Internet of Things (IoT).

We help our clients apply strategic analysis to this fast-moving ecosystem, across all its industries (automotive, insurance, assistance, fleet management, road charging, mobile telecoms, etc.) and on an international basis.

PTOLEMUS, founded by Frederic Bruneteau, operates worldwide and is present in 7 countries: Belgium, France, Germany, Italy, Russia, the UK and the US.

PTOLEMUS has performed nearly 50 consulting assignments related to insurance telematics and analytics.

For any enquiry, please send a message to contact@ptolemus.com

Our consulting services

Strategy definition
Vision creation, strategic positioning, business plan development, board coaching & support

Investment assistance
Strategic due diligence, market review, feasibility study, M&A, post-acquisition plan

Procurement strategy
Specification of requirements & tender documents, launch of tenders, supplier negotiation & selection

Innovation management
Value proposition definition, product & services development, architecture design, assistance to launch

Business development
Partnership strategies, detection of opportunities, ecosystem-building, response to tenders

Implementation
Deployment plans, complex / high risk project & programme management, risk analysis & mitigation strategy

Our fields of expertise

Car infotainment & navigation
Connected services (Traffic information, fuel prices, speed cameras, weather, parking, POIs, social networking), driver monitoring, maps, navigation, smartphone integration

Usage-based charging
Road charging / electronic tolling, PAYD / PHYD insurance, fleet leasing & rental, car sharing, Car As A Service, etc.

Telematics & Intelligent Transport Systems
ADAS, autonomous car, connected vehicle, fleet management, eCall, bCall, SVR, tracking, data analytics (driving behaviour, OBD / CAN-bus), VRM, V2X, xFCD

Positioning / Location enablement

M2M & connectivity

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THE AUTHORS OF THIS REPORT

Frederic Bruneteau, Managing Director, Brussels

MS, Management, HEC Paris and CEMS Master, University of Cologne

Frederic Bruneteau has accumulated 20 years of experience including 17 years of experience of the mobility domain and 8 years of strategic and financial advisory for companies such as **Arthur D. Little, BNP Paribas, SFR Vodafone** and **TomTom**.

He has become **one of the world's foremost experts of Usage-based Insurance** (UBI) and is interviewed on the subject by publications such as the *Financial Times* and *The Economist*. He has spoken at more than 20 related conferences worldwide.

As Manager of TomTom's worldwide Content & Services product line, he has also acquired a unique insight into the connected vehicle business and services. In particular, he launched TomTom's LIVE suite of connected services (traffic information, local search, etc.).

Within PTOLEMUS, he has **led 80 assignments in consumer and commercial telematics** for leaders such as Admiral, Aioi Nissay Dowa, Allianz, AXA, Baloise, Europ Assistance, Generali, LexisNexis, Liberty Mutual, Macif, Matmut, Michelin, Octo Telematics, Qualcomm and Toyota.

For instance, Frederic

- Assisted one of the world's largest insurance groups in designing its telematics strategy & business plan across Europe;
- Defined the **5-year device roadmap** of a major Telematics Service Provider,
- Helped the European provider of a smartphone UBI data collection solution in raising funding,
- Helped a **global automotive tier-1 supplier** in **defining its strategy** in the field of telematics insurance (UBI) and acquiring a driving behaviour dataset of 10,000 vehicles to examine the relevance of this data for its own objectives,
- Assisted a large insurance and data aggregation group in identifying the **future breakthroughs in the connected car value chain** and their impact on the auto insurance market.

Frederic co-authored the Connected Insurance Analytics Report and the UBI Global Study 2016.

Thomas Hallauer, Research Director, London

BA, International Business, South Bank University, London

Thomas Hallauer has gained 15 years of strategy, research and marketing experience in the domain of telematics and location-based services from companies such as Admiral, DriveFactor, Liberty Mutual, Michelin, Mobile Devices, Octo Telematics and Wunelli.

He is expert at highlighting new trends, unearthing profitable niches and marketing new products and services notably in the automotive, motor insurance, LBS, navigation and positioning industries.

Before PTOLEMUS, Thomas held management responsibilities with **Mobile Devices**, a leading provider of telematics technology platform and devices and with FC Business Intelligence (**Telematics Update**).

Thomas is the lead author of the ETC Global Study, the most thorough review of the Electronic Toll Collection and Road Charging market published in May 2015.

Thomas **reviewed and published the Connected Insurance Analytics Report.**

He also co-wrote the 2016 UBI Global Study, interviewing dozens of companies such as AAA, Admiral, Ageas, Allianz, Liberty Mutual, Mapfre USA and Zurich; and telematics suppliers such as Danlaw, DriveFactor, Geotab, Himex, IMS, The Floow and Verizon Telematics.

Sahand Malek, Consultant, Brussels

PhD, Automotive Engineering, University of Bath, & MS, Mechanical Engineering, University of Birmingham

Sahand Malek has gained almost 5 years of experience in telematics research and development projects on vehicle On-Board Diagnostics (OBD), data management and analytics, Usage-Based Insurance (UBI) and Advanced Driving Assistance Systems (ADAS).

He notably conducted an extensive academic study on the effect of driving behaviour on fuel consumption and road safety that led to the development of various frameworks and post-processing methods to analyse driving data. He managed to identify, classify, and model driving behaviour differences from real-world data from fleet drivers.

He also gained extensive experience in **conducting projects that are using on-board diagnostics tools (OBD)**, portable emission measurement systems (PEMS) and location-based sensors.

He has in-depth knowledge about many aspects of traffic and transportation science, as well as automotive engineering. He has proficient statistical and technical knowledge, and he is capable of providing advice on both managerial and technical levels.

Sahand is the **lead author of the Connected Insurance Analytics Report.**

IMPORTANT NOTICE

Disclosure

The recommendations and opinions expressed in this report reflect PTOLEMUS' independent and objective views. However, PTOLEMUS cannot provide any guarantee as to the accuracy of the information provided or the reliability of its forecasts.

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FOREWORD: THE END OF THE BEGINNING

2016 has been the year of take-off for Usage-Based Insurance (UBI). Public awareness about UBI has increased and, as of June, there were **more than 300 active programmes or advanced trials in 39 countries.**

Thus the need to understand how to make the most of the collected data has never been so high. In this regard, the market is still far from mature. This was recognised by two of the most advanced telematics insurers in the world, Generali Group and Progressive Insurance. In September, they announced a joint telematics research and development project to improve their behavioural driving profiling systems and develop a new generation of car telematics solutions. Similarly, asked if it could rate its customers only from driving data, one of the world's largest and most advanced insurance groups told us that it was not ready for that yet.

In our view, this is just the end of the beginning for connected insurance analytics.

This probably explains why resources for developing smart data interpretation models have never been so scarce. The insurance sector is facing a shortage of analytics professionals and data scientists. In October, Progressive announced its aim to hire more than 1,300 IT developers, software design engineers and data analysts!

The same way the car market is becoming an IT business under the impulsion of Tesla and Google, it seems that auto insurance is moving into what we later call *Bigdatanalytics*, the use of large volumes of driving data to generate actionable, real-time insights. UBI seems to be just one facet of this larger trend.

Who will drive this new revolution? The insurers who best recognise the magnitude of the change and learn fast.

In this report, we leverage our experience of assisting insurance companies in the design and launch of their telematics programmes, to help them successfully take the analytics route. We provide a **complete methodology on how to best take the analytics turn of UBI**. We hope that both our UBI Global Study and Connected Insurance Analytics report will help all stakeholders mature faster and learn from others' mistakes!

It has been a pleasure for us to write this report. We hope that you will enjoy reading it. If your company plays a role in this business and has not been mentioned in our report, please let us know so that we can update it in the coming months. Please send your comments to thomas@ptolemus.com.

Sincerely,

Frederic Bruneteau
Managing Director

INTRODUCTION: FROM COPPER TO GOLD

In a world generating ever increasing volumes of user-specific data, the question is no longer the volume and speed of the data being produced and collected. Now, **the primary focus is to extract meaningful insights from the data.**

Whereas in the Middle Ages, many dream of transforming copper into gold, insurers now expect to transform raw data into a true understanding of their customers, which should be the source to long-term value. In other words, **the data scientist has become the new alchemist!**

Companies are now using Business Intelligence (BI) more than ever before. Most of the BI processes to date have been focused on analysing corporate data to aid companies in strategic planning and decision-making. However, the availability of a new breadth of data types – from social media to user behaviour data – has encouraged many sectors to adapt to new ways of thinking about Big Data and analytics.

The insurance sector has followed this trend. Since the first UBI programme was introduced in 2003, such programmes have spread around the world, from China to South Africa, Brazil and Australia, and we are observing considerable interest from both insurers and consumers regarding customised insurance policies.

Inevitably, with every UBI programme comes a large quantity of data; firstly, data that is familiar to insurers because they have been using it for years (policyholder age, occupation, vehicle information, etc.) and secondly, data that is new to insurers, such as driving speed and location. This driving data streams live from policyholders' mobile phones or from devices installed in their vehicles (e.g. black boxes, OBD dongles).

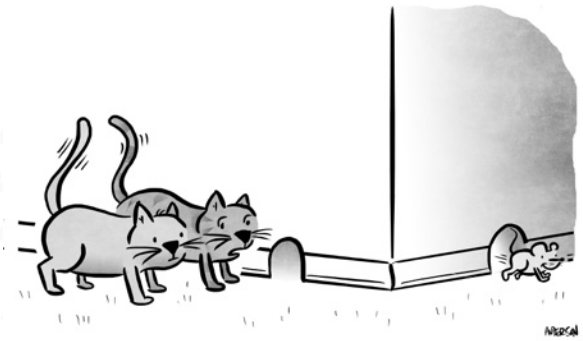
Big (driving) Data is gradually becoming a reality of UBI programmes worldwide. The size of the driving datasets collected by companies such as Verisk Analytics and Octo Telematics now exceeds 100 terabytes. The fast growth in the volume of driving data provides evidence that UBI is quickly becoming part of the Big Data era.

Insurers are now facing the same question: how to make sense of these increasing volumes of driving data? Understanding these datasets by only using Exploratory Data Analysis (EDA) can be useful to learn about their key features, for example, knowing which customer drove at the maximum speed, who drove the longest journey and who made more night trips than day trips.

However, analysing driving data can become more complicated when the aim goes beyond the basic understanding of driver performance, for example to improve pricing, underwriting and the risk selection process, or to predict claims losses or to profile drivers based on their accelerating patterns. In all of these cases, common analytical methods do not work, because the depth and volume of data make it a major challenge to understand every granular interaction and logical relationships governing it.

To identify patterns within driving data and the UBI book of business, granular level analysis is required. Hence more and more insurers are moving towards **advanced analytics** methods.

Of course, the ability of advanced analytics to forecast future events is highly prized by the insurance industry. However, what determines the accuracy of those predictions and risk models is the quality and richness of the data that is available in the first place.



"According to our current predictive analytics solution, the mouse should be exiting from this hole in 3... 2... 1..." #betterdata

For this report, we interviewed more than 20 industry leaders and asked them what they believed to be the biggest analytics challenges. Although having a skilled team and flexible infrastructure were listed by many respondents, everyone agreed that the biggest challenge – and also opportunity – is having access to high quality, accurate and enriched telematics data.

Succeeding in UBI is, therefore, partly a self-fulfilling prophecy: insurers need better and smarter data in order to better predict risks and losses, and with this comes an opportunity to expand the business and attract new customers, which will generate a new set of data.

Beyond the case studies on several major providers, we have also included our findings on dealing with telematics data by using our own recently conducted real-world driving exercise. In our driving field study, we used an OBD dongle and a GPS sensor to capture participants' driving behaviour and tested our recommended framework to make sense of this data.

For us, the completion of this report emphasised the understanding that the UBI market is evolving faster than ever before, and that it is the smart and enriched data that powers it. Finally, insurers without a proper data system and predictive analytics capabilities will not only be left behind. They will also be forced to offer service to those drivers who have been dissuaded from choosing a telematics solution in the first place

Sincerely,

Thomas Hallauer
Research Director

Sahand Malek
Consultant

20 BEST PRACTICES IN ANALYTICS

Before you start

- Advanced analytics requires expertise in data science, actuarial, psychology, marketing and IT.
- Building a driving score requires an infrastructure able to record, clean, filter, archive, store and exploit large amounts of data.

Recording data

- Data collection should meet frequencies of 1 Hz for location, 200 Hz for acceleration and at least 300 Hz for crash reconstruction.
- The core driving performance indicators, defined as speed, acceleration, deceleration, cornering, mileage and time should be collected at very low threshold levels.
- The data should be calibrated across all devices to obtain comparable datasets. Tests must demonstrate that all devices used in the programme have been tested together in the same car, delivering comparable data.
- Collect a minimum of 40,000 car-years of data to ensure your risk model is reliable.
- Build your data management architecture with driver privacy in mind, e.g. allow for geographic position to be deleted once the score has been calculated at the end of each trip.
- Collect separate crash and near-crash event data for forensic purposes, but also to inform risk assessment and claims management.

Processing data

- Parallel computing and big data frameworks should be used to provide real-time data analytics services.

Processing data

- Kalman filters should be applied first to clean data noise related to recording, driving and location.
- Machine learning should subsequently be used to ensure datasets are free from errors such as transport mode or driver ID.
- Utilise telematics data not only for pricing but also for CRM, fraud prevention and claims management.

Scoring drivers

- Scoring should be trip-based with adjustments made monthly and quarterly using weighting methods.
- Put driving behaviour into context by relating it to environmental information. The set of information layers should at least include: relative speed limit, road type and crash-prone locations.
- Correlate behaviour with past claims records, crashes and actual claims losses to continue improving predictiveness.
- Monitor driver distraction e.g. by using the driver's smartphone app.
- Detect and interpret crashes to understand the responsibilities, as well as how the driver anticipated and reacted to the situation.

Interacting with drivers

- Scoring criteria and sub-scores must be clearly expressed and made understandable to drivers. Criteria the driver cannot influence should be explained separately.
- Driver feedback should comprise immediately actionable rules, with trip-by-trip measurement and follow-ups, to ensure safe driving habits are adopted.
- Real-time information to the driver should not be distracting, but must be designed to make driving safer and more comfortable.

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LIST OF COMPANIES INTERVIEWED AND MENTIONED

As part of our research for the UBI Global Study and the Connected Insurance Analytics Report, we **held discussions with 205 organisations in 18 countries** including:

- 27 insurance companies and brokers,
- 45 Telematics Service Providers (TSPs),
- 12 analytics and data management suppliers,
- 21 Telematics Technology Providers (TTPs),
- 19 automotive Original Equipment Manufacturers (OEMs) and tier-1 suppliers,
- 8 Mobile Network Operators (MNOs),
- 5 financial investors.

We would like to **thank these organisations** for their precious contributions. They are listed hereafter and will benefit from a discount on our reports.

Following is the list of **434 companies mentioned** in the UBI Global Study and the Connected Insurance Analytics Report.

Company name	Country	Sector	Discussion	Mentioned
AA	UK	Automobile club		✔
AAA Club Partners	USA	Automobile club	✔	✔
AAA Data	France	Data analytics	✔	✔
Accutek Ind.	USA	ODM		✔
Achmea	Netherlands	General insurance	✔	✔
Accenture	USA	Systems integrator	✔	✔
ACI	Italy	Automobile club		✔
ACT Concepts	France	TSP		✔
ACTA	France	Roadside assistance provider		✔
ADAC	Germany	Automobile club	✔	✔
Admiral France - L'Olivier	France	Motor insurance	✔	
Admiral Insurance Group	UK	General insurance	✔	✔

Company name	Country	Sector	Discussion	Mentioned
Ageas	Belgium	General insurance	✔	✔
Agero	USA	Automobile club / TSP	✔	✔
Agnik	USA	Data management	✔	✔
AI Insurance	UK	General insurance	✔	✔
AIG	UK	General insurance	✔	✔
Aioi Nissay Dowa Insurance	Worldwide	General insurance	✔	✔
Alcatel-Lucent	France	Telecom equipment vendor		✔
ALD Automotive	France	Leasing company	✔	✔
Allianz	Europe	General insurance	✔	✔
Allianz Global Assistance	Europe	RSA	✔	✔
Allstate Insurance	USA	General insurance	✔	✔
Alo@Assurances	France	Consumer insurance		✔
Alpine	Japan	In-car audio equipment		✔
Altea	Italy	TSP		✔
Altech Netstar	South Africa	TSP		✔
Altima Assurances	France	General insurance	✔	✔
Amadeus Capital Partners	UK	Private equity fund	✔	✔
Amaguiz (Groupama)	France	Consumer insurance	✔	✔
American Family	USA	General insurance	✔	✔
Amodo	Slovenia	TSP	✔	
ANIA	Italy	Insurance trade association		✔
ANWB	Netherlands	Automobile club		✔
AnyDATA Corporation	USA	TTP	✔	✔
Aplicom	Finland	TSP/TTP	✔	✔
Apple	USA	Consumer electronics vendor		✔
ARM Holdings	UK	Processor design vendor		✔
Arval	France	Leasing company	✔	✔
ASFA	France	Insurance trade association		✔
Assercar	France	Repair centres		✔
Assicurazioni Navale	Italy	General insurance		✔
Association of British Insurers	UK	General insurance	✔	✔
Assurland.com	France	Online comparison site		✔
Atmel	USA	Semi-conductors vendor		✔
Atos	France	IT integrator	✔	✔

Company name	Country	Sector	Discussion	Mentioned
ATrack Technology	Taiwan	TTP	✔	✔
Audatex	USA	Solutions provider		✔
Audi	Germany	Automotive OEM		✔
Audiovox	USA	TTP	✔	✔
AutoDirect Insurance	UK	Consumer insurance		✔
Autoline	UK	Broker	✔	✔
Autoliv	Europe	ADAS - MVCM		✔
Automatic	USA	Connected services provider	✔	✔
Automile	Sweden	Connected services provider	✔	✔
Autosaint (Fresh! Insurance)	UK	Broker	✔	✔
Aviva (formerly Norwich Union)	UK	General insurance	✔	✔
Axa Assistance	France	Roadside assistance provider	✔	
AXA Direct	Europe	General insurance	✔	✔
Axa Global P&C	Worldwide	General insurance	✔	✔
B&Q	UK	Restaurant chain		✔
Baloise Assurances	Switzerland	General insurance	✔	
Barnes & Noble	USA	Book distribution chain		✔
Baseline Telematics	Canada	TSP	✔	✔
BDI (Bundesbeauftragte für den Datenschutz und die Informationsfreiheit)	Germany	Data protection authority		✔
Best Buy	USA	Electronics retail chain		✔
BGL Group Ltd	UK	General insurance	✔	✔
Bird & Bird	France	Law firm	✔	
BlaBlaCar	UK	Car sharing firm	✔	✔
Blockbuster	USA	Video rental chain		✔
BluO Fund	Luxembourg	Private equity fund	✔	✔
BMW	Germany	Automotive OEM	✔	✔
BMW Financial Services		Automotive OEM		✔
BNP Paribas Cardif	Chile	General insurance	✔	
BNV Mobility	Europe	TSP	✔	
Bouygues Telecom	France	Mobile operator	✔	✔
British Airways	South Africa	Airlines		✔
BT Software & Research	USA	Telecommunications operator		✔

Company name	Country	Sector	Discussion	Mentioned
Budget Insurance	UK	Personal line insurance		✔
Bull	France	IT integrator		✔
CalAmp	Worldwide	TTP	✔	✔
Cambridge Mobile Telematics	USA	TTP	✔	
CANgo	Europe	TSP	✔	
Cap Gemini	France	IT integrator		✔
Carrot Insurance	UK	General insurance	✔	✔
CATAPULT	Europe	AV-OEM		✔
CCC (Drivefactor)	USA	Claims management	✔	
CDL	UK	Software provider	✔	
Cellocator (Pointer Telocation)	Israel	TTP / TSP	✔	✔
CEN (European Committee for Standardisation)	Belgium	Standardisation organisation		✔
Censio	USA	TSP	✔	✔
CertEurope	France	Trusted third party services		✔
Cesar Satellite	Russia	TSP	✔	✔
Cinterion	Germany	Connectivity module provider		✔
Cinven	UK	Private equity firm	✔	
CLAL Insurance	Israel	General insurance		✔
Clarion	Japan	In-car audio equipment		✔
CMA Claims	UK	Claims adjuster	✔	
CNIL (Commission Nationale de l'Information et des Libertés)	France	Data protection authority	✔	✔
Co-operative Insurance	UK	General insurance	✔	✔
Cobra Automotive Tech.	Italy	TSP / TTP	✔	✔
Cognizant	USA	Enterprise resource software	✔	✔
Compagnie Générale d'Automatisme (CGA HBS)	France	Engineering firm		✔
Comparethemarket.com	UK	Online comparison site		✔
Confused.com	UK	Online comparison site	✔	✔
Continental	France	Tier-1 supplier	✔	✔
Corona Direct	Belgium	Broker	✔	✔
Corporate Vehicle Observatory	France	Research institution	✔	
Covea Group	France	General insurance	✔	✔

Company name	Country	Sector	Discussion	Mentioned
Coverbox	UK	Consumer insurance	✔	✔
Coverhound	USA	General insurance	✔	✔
Coyote	Europe	TTP	✔	
Crédit Mutuel Arkea	France	Consumer insurance	✔	
cTrack (Digicore)	South Africa	TSP	✔	✔
Cybit Masternaut	UK	TSP	✔	✔
Daimler Fleetboard	Germany	TSP		✔
Daimler Insurance Services	Germany	OEM	✔	✔
Danlaw	USA	TTP	✔	✔
Dash	USA	Connected services provider	✔	✔
Data Tec Co Ltd	Japan	ODM		✔
Davis Instruments	USA	TTP	✔	✔
DBV Winterthur	Germany	General insurance		✔
Delphi	USA	Tier-1 supplier		✔
Denso	Germany	Tier-1 supplier	✔	✔
Department of Transportation	USA	Government		✔
Detector	Spain	TSP	✔	✔
Deutsche Telekom	Germany	MNO	✔	✔
Diamonds	UK	Insurance broker		✔
Direct Line Germany	Germany	Consumer insurance		✔
Discovery Insure	South Africa	Consumer insurance	✔	✔
Disruptive Capital Partners	UK	Private equity firm	✔	✔
Diva	UK	Insurance broker		✔
Dixon's	UK	Consumer electronics retail chain		✔
Drive Power	USA	Data management provider		✔
Drive Service	Italy	Repair & maintenance services	✔	✔
DriveCam	USA	TTP	✔	✔
DriveFactor	USA	General insurance	✔	✔
DriveProfiler	Global	TSP	✔	✔
Driveway Software	USA	TSP	✔	✔
Drust	France	Connected services provider	✔	✔
Earnix	USA	Data management provider	✔	✔
Easy Mile	Europe	AV-OEM		✔
Eliocity	France	TSP	✔	✔

Company name	Country	Sector	Discussion	Mentioned
Elmic Systems	USA	Embedded software		✔
Equity Red Star	UK	General insurance	✔	✔
ERTICO - ITS Europe	Belgium	Trade association	✔	✔
Euromaster	France	Installation network	✔	
Europcar	South Africa	Vehicle rental		✔
European Commission	Belgium	Government	✔	✔
European Court of Justice	Belgium	Government		✔
European Data Protection Supervisor (EDPS)	Belgium	Data protection authority	✔	✔
Exigen	USA	Insurance software provider		✔
F&I	USA	Magazine		✔
Farmers Insurance	USA	General insurance	✔	✔
Faurecia	France	Automotive supplier	✔	
Fédération Internationale de l'Automobile (FIA)	Belgium	Trade association	✔	
Fiat Chrysler Automobiles (FCA)	Italy	Automotive OEM		✔
Fiat UK	UK	Automotive OEM		✔
Financial Times	UK	Newspaper		✔
Fleet Logistics	UK	TSP		✔
Fleetmatics / Sagequest	USA	TSP		✔
Fleetminder	Australia	TSP	✔	
FMG	UK	TSP	✔	✔
FMSCA (Federal Motor Carrier Safety Administration)	USA	Government		✔
Focus	Germany	Magazine		✔
Foley & Lardner	USA	Law firm		✔
Ford	USA	Automotive OEM		✔
Fujitsu Ten	Japan	Automotive supplier		✔
Garmin	USA	Electronics supplier	✔	✔
GE Equipment Services	USA	Fleet management company		✔
General Motors	USA	Automotive OEM		✔
Generali France	France	General insurance	✔	✔
Generali Group	Italy	General insurance	✔	✔
Genertel (Generali Group)	Italy	Consumer insurance	✔	✔

Company name	Country	Sector	Discussion	Mentioned
Geotab	USA	TSP	✔	✔
GirlMotor	UK	Insurance broker		✔
GMAC Insurance	USA	Consumer insurance		✔
gocompare.com	UK	Financial services comparison website	✔	✔
Golo (Launch Tech)	China	Connected services provider	✔	✔
Good Technology	USA	Mobile handset vendor		✔
Google	USA	Search engine		✔
Greenroad Technologies	USA	TSP	✔	✔
Groupama	UK	General insurance	✔	✔
Grupo Nacional Provincial	Mexico	General insurance		✔
Hannover re	Worldwide	Re insurance	✔	
Harman	USA	Tier-1 supplier		✔
Hastings Direct	UK	General insurance	✔	✔
HDI Gerling	Global	General insurance	✔	
HERE (formerly Navteq)	Worldwide	Maps & LBS supplier	✔	✔
High Point Auto Insurance	USA	Personal line insurance		✔
Himex (Evogi Group)	USA	TSP	✔	✔
Hitachi	Japan	Conglomerate		✔
Hollard Insurance	South Africa	General insurance	✔	✔
Honda	Japan	Automotive OEM		✔
HopeRun Technology	USA	Software development	✔	
HUK-Coburg	Germany	General insurance		✔
Hyundai	South Korea	Automotive OEM		✔
IBM	USA	IT integrator	✔	✔
ID Macif	France	Consumer insurance		✔
IDM Trucking	USA	Transportation		✔
If Insurance	Sweden	Insurance	✔	
iGate	UK	Software development	✔	
iGo4	UK	General insurance	✔	
iKube	UK	Consumer insurance		✔
IMA	France	Roadside assistance provider	✔	✔
Inzura	UK	TSP	✔	✔

Company name	Country	Sector	Discussion	Mentioned
IMS	Worldwide	TSP	✔	✔
Industrial Alliance	Canada	General insurance	✔	✔
ICO (Information Commissioner's Office)	UK	Data protection authority		✔
Infrasure	UK	TSP	✔	✔
ING	Netherlands	Consumer insurance	✔	
Ingenie	UK	Broker	✔	✔
Innosurance	Australia	Commercial insurance		✔
Insurance Europe	Belgium	Insurance trade association		✔
Insurethebox	UK	Consumer insurance	✔	✔
Intellimec IMS	Canada	TSP	✔	✔
Interactive Driving Systems	USA	Risk management solutions		✔
International Road Union	Switzerland	Trade association		✔
Intesa San Paolo Assicuri	Italy	General insurance		✔
Iron Mountain	UK	Storage services		✔
ISACA (Information Systems Audit & Control Association)	Worldwide	Trade association		✔
ITB Telematics Solutions	UK	TSP		✔
Iveco	Italy	Automotive OEM		✔
IVOX	USA	Risk management solutions	✔	✔
Ixonos	Finland	Software developer		✔
Jaguar Land Rover	Worldwide	OEM		✔
Jambit	Germany	IT integrator		✔
Jooycar	Chile	Connected services provider	✔	✔
KDDI	Japan	Mobile operator		✔
Kia Motors	South Korea	Automotive OEM		✔
KKR	UK	Private equity fund	✔	
KPN	Netherlands	Mobile operator	✔	✔
Kuantic	France	TTP		✔
Ladybird	UK	Insurance broker		✔
Launch Tech	China	TTP	✔	
Leaseplan	Netherlands	Leasing company	✔	✔
Lexis-Nexis	USA	Enterprise resource software	✔	✔
LG Electronics	South Korea	Consumer electronics vendor		✔

Company name	Country	Sector	Discussion	Mentioned
Liberty Mutual	USA	General insurance	✔	✔
LinkedIn	USA	Social networking		✔
LocX	USA	TSP	✔	✔
Lysanda	UK	TTP/TSP	✔	✔
MAAF Assurances	France	General insurance		✔
MACIF Assurances	France	General insurance	✔	✔
Magneti Marelli	Worldwide	Tier-1 supplier	✔	✔
MAIF Assurances	France	General insurance	✔	✔
Mapfre	Spain	General insurance	✔	✔
Mapfre US	US	General insurance	✔	
Markerstudy Group	UK	Consumer insurance	✔	✔
Market IP	Belgium	Software developer	✔	
Marks & Spencer	UK	Retail		✔
Marmalade Group	UK	General insurance	✔	✔
Masternaut	Europe	TSP	✔	✔
Matmut Assurances	France	General insurance		✔
Mercedes Benz	Germany	Automotive OEM		✔
Meta System	Italy	TTP	✔	✔
Michelin	France	Tyre manufacturer	✔	
MitsUBIshi Electric	Japan	Conglomerate		✔
Mix Telematics	South Africa	TSP	✔	✔
Mobile Devices	France	TTP	✔	✔
Mobileye	Israel	TTP		✔
Modus	USA	TSP	✔	✔
Mojio	USA	Connected services provider	✔	✔
Money Super Market	UK	Comparison website	✔	✔
Montezemolo & Partners	Italy	Private equity fund	✔	✔
Moody's	USA	Rating agency		✔
MORE TH>N	UK	Consumer insurance	✔	✔
Motaquote	UK	Consumer insurance		✔
Movelo	Sweden	TTP, TSP	✔	✔
MyDrive Solutions	UK	TTP, TSP, Data management	✔	✔
Nationwide Insurance	USA	General insurance	✔	✔
Navteq / HERE	France	Map provider	✔	✔
navya	France	AV-OEM		✔

Company name	Country	Sector	Discussion	Mentioned
ND a Islandi Ehf	Island	n.a.		✔
NIS Glonass	Russia	Public-private partnership		✔
Nissan Europe	Europ	Automotive OEM	✔	✔
Nissan Motor Corporation	USA	Automotive OEM	✔	✔
No Nonsense Insurance	N. Ireland	General insurance	✔	
Nokia	Finland	Mobile phone vendor		✔
Norton Rose	UK	Law firm	✔	
Novacom Europe	Netherlands	TSP		✔
Novatel Wireless	Worldwide	TTP	✔	
NTT DoCoMo	Japan	Mobile operator	✔	✔
NXP	Netherlands	Chipset vendor	✔	✔
ÖAMTC	Austria	Automobile club		✔
OBD Experts	UK	Software developer	✔	✔
Octo Telematics	Italy	TSP	✔	✔
OECD	France	International organisation	✔	✔
Omnitracs	Netherlands	TSP	✔	✔
Oracle	USA	Software provider		✔
Orange	UK	Mobile operator		✔
Orange Business Services	France	Integrator / TSP	✔	✔
Orion Technology	Taiwan	TTP	✔	✔
ÖSA (Öffentlichen Versicherungen Sachsen-Anhalt)	Germany	General insurance	✔	✔
Osborne Clarke	Global	Law firm	✔	✔
Pacifica Assurances	France	General insurance		✔
Panasonic	Japan	In-car electronics		✔
PayGo Systems	Israel	TTP / TSP	✔	✔
Perr&Knight	USA	Actuarial consulting firm	✔	✔
PHS Datashred	UK	Business services		✔
Pioneer	Japan	In-car electronics		✔
Plymouth Rock	USA	General insurance	✔	✔
Polis Direct	Netherlands	Consumer insurance		✔
Privacy International	UK	Non-governmental organisation		✔
Progressive Insurance	USA	Consumer insurance	✔	✔
PSA Banque	France	Financial institution	✔	✔

Company name	Country	Sector	Discussion	Mentioned
PSA Peugeot Citroën	France	Automotive OEM	✔	✔
PTV	Europe	Software developer	✔	
Punch Telematix	Belgium	TSP		✔
QNX	Canada	Embedded software		✔
Quality Planning	USA	Insurance services		✔
Quanta	Brazil	TTP	✔	
RAC	UK	Automobile club	✔	✔
RACE	Spain	Automobile club		✔
RBS Insurance	UK	General insurance		✔
RCI	France	Leaser		✔
Real Insurance	Australia	Consumer insurance		✔
Reala Mutua	Italy	General insurance		✔
RealVNC	UK	Embedded software		✔
Redburn	UK	Brokerage firm	✔	
Redtail Telematics	UK	TSP	✔	✔
RelayRides	USA	Car sharing provider		✔
Renault	France	Automotive OEM	✔	✔
Renesas	USA	Semiconductors		✔
Risk Technology	UK	TSP	✔	✔
Robert Bosch	Germany	Tier-1 supplier		✔
Rosno (Allianz Group)	Russia	General insurance		✔
Royal & Sun Alliance	UK	General insurance		✔
Royal Exchange	Nigeria	General insurance	✔	
RS Fleet Installations	UK	Installation network	✔	✔
RSA	UK	General insurance	✔	✔
RSA Intouch	Russia	General insurance		✔
Safeco	USA	General insurance	✔	✔
SafeFleet	Europe	TSP	✔	
SageQuest	USA	TSP		✔
Samsung	South Korea	Consumer electronics vendor		✔
Sanford Bernstein	USA	Asset management	✔	
SAP AG	Germany	Enterprise resource software	✔	✔

Company name	Country	Sector	Discussion	Mentioned
Sara	Italy	General insurance		✔
SAS Institute	USA	Enterprise resource software	✔	✔
Scania	Sweden	Automotive OEM	✔	✔
Scope Technologies	Singapore	TSP/TTP	✔	✔
Seesam	Latvia	General insurance		✔
Sensomatix	Israel	Data management	✔	✔
SFEREN	France	General insurance		✔
Sheila's Wheels	UK	Insurance broker		✔
Sierra Wireless	Canada	Connectivity module provider	✔	✔
Sinocastel	China	TTP	✔	
SiRF (Qualcomm)	UK	Chipset vendor		✔
Sistran	LATAM	TSP	✔	✔
SmartDrive	USA	TTP		✔
Société Générale	France	Bank		✔
Sogessur	France	General insurance		✔
Solly Azar (Verspieren Group)	France	Insurance broker	✔	✔
Sompo Japan	Japan	General insurance	✔	✔
Sony Ericsson	Japan	Mobile phone vendor		✔
Sprint Nextel	USA	Mobile operator	✔	✔
SSP	USA	Data management	✔	✔
Standard & Poor's	France	Rating agency	✔	✔
State Farm Insurance	USA	General insurance	✔	✔
Stellar International	Ireland	n.a.		✔
Stok Nederland	Netherlands	TSP	✔	
Swiss Re	Switzerland	Reinsurance		✔
T-Matic	Poland	TSP	✔	✔
T-Mobile	Germany	Mobile operator		✔
Tag N Go	USA	TSP	✔	✔
Tapiola	Finland	General insurance	✔	✔
TCS	Switzerland	Automobile club		✔
Tech Mahindra Limited	India	Software developer	✔	
Telefonica digital	Spain	Mobile operator	✔	✔
Telefonica UK	UK	Mobile operator	✔	✔
Telekom Austria (TAG M2M)	Austria	Mobile operator	✔	✔

Company name	Country	Sector	Discussion	Mentioned
Telenav	USA	Navigation / MRM provider		✔
Telenor Connexion	UK	TSP	✔	
Teletrac	USA	TSP		✔
Telit Wireless Solutions	Italy	Connectivity module provider	✔	✔
Telogis	USA	TSP	✔	✔
Teradata Aster	USA	Data management systems	✔	
Test-Achats	Belgium	Consumer rights organisation		✔
Texa	Italy	TTP	✔	✔
Thatcham	UK	Certification company		✔
The AA	UK	Automobile club	✔	✔
The Carphone Warehouse	UK	Telecommunications retail		✔
The Co-operative Insurance	UK	General insurance	✔	✔
The Floow	UK	TSP	✔	✔
The Hartford	USA	General insurance	✔	✔
Thélem Assurances	France	General insurance		✔
Tiger Wheel & Tyre	South Africa	Tyre fitment centre		✔
Tokio Marine Risk Consulting	Japan	Risk consulting firm		✔
Toll Collect	Germany	Road charging provider		✔
TomTom Telematics	Netherlands	Consumer electronics vendor	✔	✔
Touring	Belgium	Automobile club	✔	✔
Towers Watson	USA	Actuarial consulting firm	✔	
Toyota	Belgium	Automotive OEM	✔	✔
Toyota Insurance	Japan	Insurer	✔	✔
Tracker	South Africa	TSP	✔	✔
Trafficmaster	UK	TSP	✔	✔
Trak Global	UK	TSP	✔	✔
Trakm8	UK	TTP		✔
Transics	Belgium	TSP	✔	✔
Transport Research Laboratory	UK	Research institution	✔	
Traqueur	France	TSP	✔	✔
Travelers Insurance	USA	General insurance	✔	✔
Trimble MRM	USA	TSP	✔	✔
TRL	UK	Automotive supplier		✔
uBlox	Switzerland	Chipset vendor		✔

Company name	Country	Sector	Discussion	Mentioned
UGF Group	Italy	General insurance		✔
Unipol	Italy	General insurance	✔	✔
Uniqa	Austria	General insurance	✔	✔
Uralsib Insurance	Russia	General insurance	✔	✔
US Bank	USA	Bank		✔
US Department of Transport	USA	Government	✔	✔
Valeo	France	Tier-1 supplier		✔
Vanguard plc	UK	Mobile phone retailer		✔
Vazhno	Russia	General insurance		✔
Vauxhall	UK	Automotive OEM		✔
Vector Capital	USA	Private equity firm		✔
VEDECOM	France	AV - Association		✔
Vehcon	USA	TSP	✔	
Verisk Insurance Solutions	USA	Software developer	✔	✔
Verizon Telematics (formerly Hughes Telematics)	USA	TSP	✔	✔
VHV	Germany	Insurance	✔	
Viasat	Italy	TSP	✔	✔
Vivium (P&V Group)	Belgium	General insurance	✔	✔
Vodafone Automotive	Europe	TSP	✔	✔
Volkswagen Financial Services	UK	Financial services		✔
Volkswagen Group	Germany	Automotive OEM		✔
Volvo Cars	Sweden	Automotive OEM	✔	✔
Volvo Trucks	Sweden	Automotive OEM		✔
Wunelli	UK	TSP	✔	✔
Xirgo Technologies	USA	TTP	✔	✔
ZUBIe	USA	Connected services provider	✔	✔
Zurich	Europe	Consumer insurance	✔	
Zurich Fleet Intelligence	UK	Commercial insurance	✔	✔

INTERVIEW WITH

LARRY THURSBY

VICE PRESIDENT

NATIONWIDE MUTUAL INSURANCE

Dear Larry, could you please tell us briefly about Nationwide's SmartRide programme history?

Nationwide launched ***SmartRide*** in Virginia during 2010 as a way to reward members with a new discount to make their insurance even more affordable. At that time, we didn't have all the tools necessary to personalise rewards for safe driving habits.

However, since then we've built a program offering **discounts of up to 40%** in most states. What's really exciting is how we've made the program evolve through new technologies.

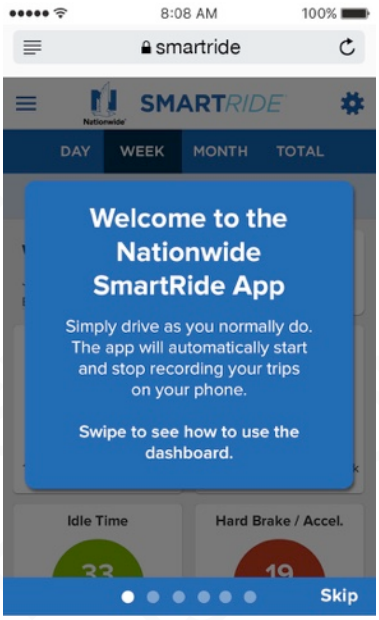
Originally, we started by asking drivers to plug an OBD dongle in their car, but now we're also offering a smartphone app that accomplishes the same thing. **Nationwide is also able to use driving data collected by new GM vehicles** through OnStar to calculate a ***SmartRide*** discount for customers who are interested in receiving a quote from Nationwide.

Where does it stand today? In particular, how many vehicles do you get the data from?

About **one-third of Nationwide's new customers** are enrolling in SmartRide across all eligible states, which means over a **quarter of a million vehicles** send us data. What's been most surprising is that our percentage of applicants has continued to grow each and every year despite the fact that we've done very little to market this program directly to consumers.

Your model relies on taking a snapshot of drivers' data for 4-6 months. How predictive has become the score derived from it of actual losses?

Nationwide began by using a vendor scoring model that could justify driving discounts of up to 25%. However, we've now built our **own proprietary scoring program** that supports discounts of up to 40% - higher than most other competitors. And it's not just a small group of our members who earn these large discounts: Nationwide expects one-tenth of all drivers to earn the maximum 40% discount and for the average ***SmartRide*** discount to be just over 20%. These **discounts directly reflect the expected improvement in loss ratios**.



Do you find that there is a significant self selection effect and that *SmartRide* drivers are much more prudent than other comparable customers?

SmartRide provides participants a **10% enrolment discount** for both our device and mobile programs before we've collected even one mile of driving data. We can do this because drivers who choose to participate in *SmartRide* have been consistently proven to have fewer claims than drivers who don't participate in the program.

As *SmartRide* grows in popularity, Nationwide will continue to monitor these results so that participating members are rewarded appropriately.

SmartRide has been using only 4 factors: mileage, harsh acceleration, harsh braking and night driving. Is this sufficient?

Nationwide's proprietary discount model considers fast accelerations and harsh braking as a single driving habit that we refer to internally as "**change in speed**." Indeed we then consider night driving and mileage.

The fourth element of driving behaviour that we use in developing a *SmartRide* discount is "**idle time**." Idle time measures the length of time drivers are stopped at a signal or in traffic. We've found that operating a vehicle in frequent stop-and-go traffic is riskier than driving in smooth flowing traffic.

One of Nationwide's strategic goals with telematics is to improve our members' safety by providing them with feedback and coaching on their driving habits. As a result, we're only using measurements in our *SmartRide* program that are **intuitive and can be controlled** to some degree. And we display detailed results for each driver/vehicle on our member web portals so that participants can learn and adjust as they go.

How predictive are your driving scores in predicting losses? To what extent are you able to calibrate your scoring with real claims losses?

We've found that driving behaviour is more predictive of future claims than most of the other considerations insurers have typically used to differentiate price such as the **number of violations** (aka: "tickets").

This shouldn't be too surprising given that violations are relatively infrequent compared to how telematics works. For instance, most drivers have less than one violation on their record in the most recent 3 – 5 year period, but telematics tells us how their vehicle is being driven **during every trip** taken.

Event-counting and thresholds are now often described as insufficient. What could be your recommended next step to rating driving behaviour?

One of the most fascinating aspects of telematics is how much there is to learn. Nationwide is constantly examining the driving information that members generate to find new and different ways to make *SmartRide* even more useful. And it's not just data analytics teams working on this – as we stated earlier, Nationwide believes that observations are only meaningful if we can communicate those findings back to our members in a way that allows them to become a safer driver and, as such, we also have **marketing and consumer behaviour experts** looking at how drivers respond to the new types of information we could provide.

What are the biggest analytics-related challenges that you are facing today?

Certainly the volume of data generated by telematics is like nothing we've ever dealt with before: we're receiving data from nearly **every second of every trip that our participating members take**.

However, the biggest challenge Nationwide is currently dealing with is understanding how the data we receive from different vehicles and collection methodologies varies.

Some statistics show that driver distraction is the number 1 factor in fatal car accidents. Is your upcoming app solution a way to address this problem?

Our belief is that "distracted driving" comes in many varieties: It may mean making a call using hands-free technology, texting at a stop signal, or surfing the internet while your car is in motion. Nationwide's plan is to **monitor many of these scenarios** with the intention of collecting enough data that we can then begin to **develop an informed opinion** on how each impacts our members' safety. We'll then work with members to determine how those insights can and should be deployed – whether this means altering discounts, enabling functionality that blocks the riskiest behaviours, or other solutions to improve the customer experience.

Do you expect to introduce a permanent telematics device so that you can provide real-time driver feedback across the lifetime of the policy?

Nationwide has always believed that the cost of telematics data collection will reach a point where we'll be able to provide this service to our members on a permanent basis. And although in-vehicle device costs have come down – and app data collection solutions are lower still – **we have yet to reach this efficient cost frontier**.

Metromile, which just raised almost $200 million, has indicated they want to use the data from their dongles to better manage the claims process? Would you see this as a future direction for Nationwide too?

We see a role for telematics in the claims management process and envision solutions being built to better support our member experience. We're not certain whether that might mean **dispatching emergency or towing services** directly to the geo-coded location of a claim or helping avoid fraudulent injury claims from third parties. The key will be to create enough value that members are interested in having their insurer receive driving data on an ongoing basis.

Is telematics really effective at reducing losses in the long term? What kind of reduction have you been able to achieve?

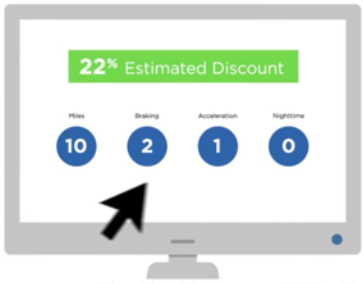
It's not clear to us how feedback from *SmartRide* changes a driver's in-vehicle habits over the long-term because we are still collecting only a single time period of driving data. What we do know, is that members are regularly accessing their driving data via our proprietary *SmartRide* dashboard. This tells us that they are highly motivated to change their behaviours, not just because of the discounts Nationwide offers, but also with the intent of becoming a safer driver.

When do you expect to use ADAS features to provide a Pay-What-You-Drive programme? Do you already estimate the impact of ADAS features on your claims statistics?

Rating based on advanced driver assistance systems, such as forward-collision warning with automatic braking, is somewhat elusive to insurers in the United States. The primary reason is that manufacturers are generally offering these safety features as optional equipment yet the 17-digit **Vehicle Identification Number (VIN) does not indicate whether a specific car includes this technology**. There are a handful of makes and models where every car includes a safety feature – for instance, all new Honda Accords come equipped with forward-collision warning. **In those situations, Nationwide is able to reward drivers with lower prices**. In the future we're hopeful that we begin to receive data directly from connected cars that tell us both whether a car includes an advanced driver assistance system as well as whether or not those systems remain "enabled" (aka: "turned on") by the vehicle owner.

What is the way forward for you to use the data telematics devices embedded by OEMs? Do you expect to join a hub or to connect with all OEMs directly?

There are a number of data aggregators already negotiating with OEM's about becoming a "hub" of connected car information for insurers. However, we believe that the initial solutions will come by way of **OEM's making direct connections with a handful of large insurers**, such as Nationwide, who have already made significant investments in telematics. Nationwide is already participating with GM to help add value to their OnStar services via a program that provides discounted auto insurance. We're also in discussion with a number of other OEM's to explore new and innovative approaches that will create value for vehicle owners using telematics.



Deutsche Bank recently downgraded its rating of Progressive's stock because of the future impact of autonomous vehicles. Is this going to be a tsunami for the auto insurance industry? How should insurers handle it?

Nationwide is executing against strategic plans to invest even more heavily in our diverse array of products so that we're prepared for a time when personal automobile could make up a much smaller portion of our business. These investments include leveraging our diverse capabilities to expand commercial growth in the industry as well as being even more effective at helping our members prepare for, and live in, retirement through innovative financial products.

In the more immediate-term as it relates specifically to personal automobile insurance, Nationwide works with repair facilities to assist our members with getting back on the road in a timely manner despite the **advanced electronics in their car that may delay repairs**. Nationwide believes that even minor collisions are a major disruption to our members' daily routines.

We also evaluate our coverage offerings to ensure they meet our members' needs. Repairing vehicles with sophisticated technology may sometimes takes longer than would otherwise be expected. We offer members who purchase rental car reimbursement coverage, the ability to extend the number of days they have access to a replacement vehicle by choosing an On Your Side repair facility and a qualified rental car provider.

NHTSA is mandating OEMs to share the data on autonomous vehicles. Are you discussing data sharing with manufacturers already?

Nationwide believes that our understanding of how consumers best receive coaching about their driving behaviour is a strategic advantage in the marketplace.

In addition, our **investment in telematics infrastructure**, will enable Nationwide to go confidently to market well before other carriers are prepared to do so.

Interview performed on 7th October 2016 by Frederic Bruneteau

INTERVIEW WITH

PAUL STACY

FOUNDER, WUNELLI

DIRECTOR, LEXISNEXIS

Paul, could you please tell us about Wunelli and LexisNexis?

Wunelli was acquired by LexisNexis Risk Solutions, a data analytics company, two years ago. Most of LexisNexis Risk Solutions insurance activities are in the US, branching out to other markets over the last few years, in contributory data services, delivering insurance insight through a single point of entry into insurers, for example, motor vehicle records in the US.

I was interested in selling the business to LexisNexis because I felt that they had the capital as well as the insurance contacts in the US to make telematics a mass market proposition.

Wunelli, who is responsible for much of the R&D and UBI innovation, has predominantly been a UK focused company has been taken around the world by LexisNexis Risk Solutions. We have set up operations in China, Brazil, and Spain. We were already in Australia but have made more progress there, and are rapidly becoming a big global player in telematics data and analytics.

LexisNexis is owned by a dual-listed Dutch / UK FTSE100 company called RELX.

How is the acquisition going? What have you achieved together in the last 2 years?

Today, we have 18 UBI programmes globally, and a lot of them are concentrated in the UK. We are actively operating in 4 large markets around the world, and we will add another 3 next year. In the last 3 years, we have seen rapid growth in data, connections and revenues in telematics.

Initially, we were focused on providing a solution via the traditional black box to young drivers or high-risk drivers in markets such as the UK. However, in the last several years, we have taken the smartphone route and have got a smartphone only solution as well as a tethered smartphone solution that sells very well in EU, Brazil and China. In the future, we will leverage data directly from OEMs and use our global platform to deliver rating points into Insurer systems via an existing single point of entry.

2Bn
Miles recorded with claims exposure

250k
Number of smartphone downloads

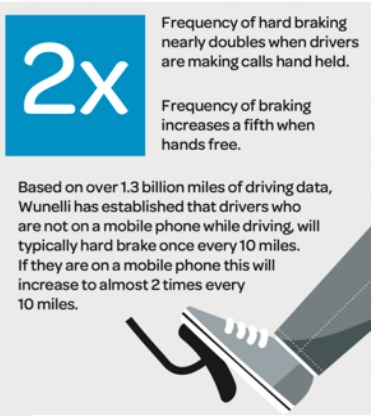
161
Stolen vehicles recovered

To what extent does LexisNexis Risk Solutions' insurance background help you today?

LexisNexis brings the **scale of analytics mindset**, **resources** and a **big data platform** to the table. To execute leading edge analytics, you need servers, software, a platform to run analytics from, and also good human capital in the form of PhDs or data scientists who can create insights from big data. LexisNexis has that big data perspective in mind.

In telematics many people fail not because of the technology or

their relationships with the market, but because **they fail to deliver the last mile;** they are not able to get the project into the insurance companies and get the insurers integrated. LexisNexis has already works within the point of quote process for more than **300 insurers** in the US; they use our products to complete quotation processes as well as rate their business. We also handle filings for a lot of US insurers. So in my mind, for telematics to be a success it needs to be a success in the US. The UK is always going to be a niche young driver market for telematics until it becomes mass market.



Today are you positioning yourself as a TSP or as an analytics provider? How do you differentiate from others?

We are both; I would describe LexisNexis Risk Solutions as a telematics service provider because we have invested in the end-to-end supply chain. We have our own platform, our road speed limit, database our system, and we are even developing our own hardware - the 12V dongle, in China.

We are a classic TSP, but also very much an analytics partner following the Wunelli acquisition. We hold all of our partners' telematics data, policy data as well as claims data. Moreover, to derive insight from these datasets we often do analytics for insurers.

We do analytics because it is self-fulfilling. Telematics is not a mass market product in most of our partners' portfolios. So for them committing their resources to this niche product is not going to happen. So we often step in and do the analysis for them.

Do you expect that in 10 years time all insurers will have their own analytics capabilities, or will they still rely on companies like yours?

Insurers want to own the algorithms and want to understand how to use them for rating. None of our partners wants a black box solution from Wunelli or LexisNexis. They want to know how we turn GPS data into a driving score and why we do it the way we do it. There is no secret there, we give them the formula.

However, **there is no way an insurer can keep up with the growing variety of aftermarket and OEM data sources**. We are heading into a future where we are going to see an increase in data exchanges, particularly solving problems with data from OEMs and insurers will not play in that space.

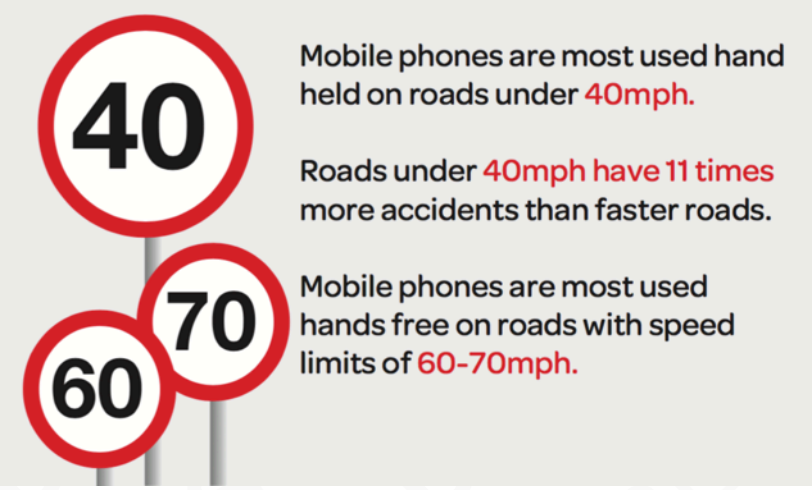
Our role is to effectively provide this data to the insurers so that they can use it in their ratings. We are very well positioned to take telematics to the next level because we have got very strong last mile point of quote capability. Our recent announcement regarding the acquisition of Insurance Initiatives Ltd (IIL) in the UK will give us a tremendous point of quote capability in the UK now.

The UK has been a disappointing market for UBI in the last 2 years, as it seems to plateau at around 4-500,000 policies. How can analytics help insurers go to the mass market?

The penetration of telematics data in the UK is capped because most of the data comes from expensive black box aftermarket solutions that effectively restricts telematics to be available only for premiums that are above £1000 a year. Quite simply, we need to deliver the same quality of data at a much lower cost to go to the mass market. It is not a function that telematics is not working; it is just that **the cost of data offsets the benefit it offers in rating and self-selection**.

That is why we are working on **12-volt cigarette lighter** dongle with Bluetooth. We want to bring down the cost of data significantly but increase the quantity of smartphone data recorded as well as deliver high-resolution crash data. Plus, we need to give something to the customer that they see value in. That is why we put USB charger on the top of it.

This device is specifically designed to bring the telematics market share in the UK up from 3%-4% to 15% in the next 2 to 3 years. **Analytics will help tremendously in showing insurers how to better use crash data**. The next battleground is the quality of accident notification and accident reconstruction reports.



How efficient are your driving scores in predicting losses?

Telematics impact (related to losses) is as good as all our different products (Credit (NFC / Attract), C.L.U.E. Auto, MVR, and Current Carrier Auto) combined.

We have 2 billion miles of driving data along with the loss exposure.

Telematics is quite orthogonal and tells us something new compared to traditional rating practice.

It does not replace other products, but enhances the rating and give new insights about the risk. The best way is to combine it with traditional rating practice.

We had some successes that have been published by Co-operative, our partner in the UK, regarding the reduction in frequency and severity in their telematics book.

In my view, **telematics offers a 30 points reduction in frequency.**

Most of that is largely made out of self-selection, but also more and more around using the actual data to improve rating at renewal.

Event-counting and thresholds are now often described as insufficient. What is your recommended approach to rate driving behaviour?

Contextualising the data is important. For example, if you are using speeding data, you need to ask yourself if the person is speeding on a motorway or in a residential area and based on that context you penalise him/her.

Filtering and normalising GPS data is also critical. We have learned that people can score differently just based on the type of handset they use. We have around **half a billion miles recorded from smartphones** through which we can learn, using analytics, how each phone behaves.

Another secret to driving behaviour profiling is to **choose factors that drivers can control**. We choose the traditional factors such as braking, acceleration and speed and then filter and validate that data to produce a fair score that accurately shows their driving behaviour and is good enough to use for an insurance discount.

From our data, we know that factors like driving in congestion, driving in rain or making lots of short journeys also contribute to claims but we do not want to penalise our driving scores for those factors because people can't control them. **We learned from lots of implementations that it is 80% science and 20% art** i.e. getting it right for the customer and choosing factors that they have got control over.

What are the biggest analytics-related challenges that you are facing today?

Not having enough human capital; Winning the war for talent to stay on the cutting edge of analytics is very difficult. Data scientist are in high demand at the moment, but it is not just about getting data scientists but also about being able to create knowledge managers who understand where the analytics resources need to be applied and can take the insights into the business.

Some statistics show that driver distraction is the number one factor in fatal car accidents? What are your thoughts and planes to address this epidemic problem?

We have learned a lot about what distracts drivers. It **comes back to the art of changing behaviours.** In our products, we reward drivers for not using their phone as opposed to penalise them for using it. It takes time to create that awareness and disciple in people to not use the mobile phone. The temptations are very high; I think average person touches his/her phone 2000 times a day, whether they are driving or not. We have the technical capability, with our Bluetooth solution, to effectively

disable the phone from ringing during the journey; so we take this distraction away just through a setting feature. However, you always need to leave the customer in control of that. Thus, we ask our customers whether they want that setting in place when they install the app.

Increasing cases of driving under the influences of drugs and or alcohol are recorded, is there a way for telematics to solve that problem?

It is very difficult to use GPS data to look for those isolated events. You can have signs to identify the difference between an intoxicated and a non-intoxicated driver based on speed. For example, if a driver is driving substantially below the speed limit on a familiar road with no congestion, then it could be a sign.

However, it is very difficult and very circumstantial. There won't be a huge amount of evidence that we can present to the insurers to make them feel comfortable to challenge a customer using this type of analytical feature.

What is your method to accurately rate different vehicles e.g. a Fiat 500 and a Ferrari?

We have not seen such huge amount of variation between braking events on different engine sizes. If somebody generates a lot of braking events, it is because of their driving style and not based on the vehicle's functions like bigger brake callipers.

Variation in different vehicles is naturally normalised because people's behaviours are much more influential. I would say it is easier to get more braking events in a Ferrari, but if you are a cautious driver you would not generate them even if you drive a Fiat 500.

Several insurance companies such as Allstate, Generali or Unipol have recently indicated their willingness to build their own driving scoring algorithm. what would you tell insurers who are tempted to do the same?

If they were a big global company, I would encourage them to do it but if they were a small regional or single country insurer, it would be too expensive for them.

However, even big companies would not be able to collect the data from multiple sources themselves. I think they should build analytical capability and their own driving score but they should come to us to get that data because we will work with the OEMs in various territories.

What would you say to insurers who are tempted to go for a "good enough" , "80/20" approach that they develop themselves?

I would say: Go with an 80/20 approach and do it yourself. These factors (driving parameters) are so good in predicting losses that an 80/20 is good enough to start the journey. **I would suggest they start learning and not wait for perfection** or 100% accuracy because that will never come.

Don't you think this would be against your interest?

No not at all. **A rising tide lifts all boats.** I want more insurers to start this journey and to use this data and think about the future of their pricing and underwriting, whether they use us or not. Ultimately, we are better off if more insurers are thinking about this. I would rather encourage them to move forward and start their journey because I know this will support us in the long run.

We are investing heavily in developing relationships with OEMs and large data partners. And, in the future, we will have the driving scores of most insurer customers. This gives them a good reason to talk to us anyway.

What impact do you expect the new and forthcoming active safety features will have on driver score?

These features only encourage telematics. The data coming out from these vehicles needs to be understood at a granular level so that we can know who controls the vehicle, driver or the system.

We will of course calculate driving scores when people have physical control over the vehicle but when they don't we will provide data to support more product based insurance. In a way we just have to toggle our view of the risk over the journey. And, our LexisNexis's telematics platform will help us to digest the data from autonomous vehicles.

Interview performed on 26th August 2016 by Frederic Bruneteau

INTERVIEW WITH

ALDO MONTEFORTE

CEO & FOUNDER

THE FLOOW

Aldo, could you please tell us briefly about the Floow's position now? How many vehicles do you get the data from?

As an organisation, we completely focus on mobility and are **inspired by the vision of making individual mobility safer and smarter**.

Currently, our team counts 70 people, built over a period of 5 years. We are very proud of our scientific heritage, as the majority of our team is made of scientists from Sheffield University and other leading academic centres. The technical team includes computer scientists, data scientists and phycologists. This make-up provides the organisation with a unique blend of hard sciences and social sciences working under one roof.

We serve a large and growing number of leading insurance organisations worldwide. Our major markets are the UK, Ireland, Nordics, Continental Europe, and North America. We have been investing heavily in the Chinese market to build an early presence there. **I am pleased to say that today sees the launch of our first Chinese pilot with one of the top 10 Chinese insurance companies**.

We are focused on UBI. In fact, almost all our clients are insurance companies. And, we help them bring insurance telematics to market through a device agnostic platform. We are completely neutral to the source of data as we work with all devices: smartphones, OBDs, conventional black boxes and original devices embedded by OEMs.

That said, smartphones have a special place in our offering. We pioneered smartphone as sensors since 2012 and our telematics app is considered an industry leader, featuring efficient auto start/stop, minimal battery use, severe crash detection, engaging end user services etc. This was confirmed by the recent PTOLEMUS No.1 smartphone telematics service provider award for Europe.

We have arrangements with car makers such as Renault-Nissan and PSA to help them monetise data generated from vehicles, effectively exploiting vehicles' original sensory capabilities and removing the need for aftermarket devices.

At present we have more than 200,000 (and growing) connected users who all converge to our platform through a mix of devices.

Today it seems you positioned firstly as an analytics provider, do you also provide the telematics part?

Yes. We cover the full value chain, from data collection to data processing, management and interpretation. On data collection, excluding smartphones where we promote our proprietary app technology, we partner with high quality hardware specialists such as Meta Systems or Trackm8. From our first day as a business we opted to work with hardware providers and take responsibility for the transformation of raw data into insurance grade insights and services.

The UK has been a disappointing market for UBI in the last 2 years, as it seems to plateau at around 4-500,000 policies. How can analytics help insurers go to the mass market?

I think disappointment is relative to the expectations of an observer.

We do not believe UBI will experience a "big bang" dynamic. Instead It will expand very gradually and in fits and starts, at a pace well below current expectations.

However, a market of around 500,000 policies provides a sufficient volume for good quality analytics for predicting the probability of an accident based on how you drive relative to how others are driving in the same location.

Our sense is that we are still at the beginning of a journey towards mass market telematics. Telematics is still very much a "push" proposition where insurance companies are reaching out to their client base and trying to entice them with discounts.

The challenge and the opportunity is in to transform this "push" into a pull proposition.

This calls for a range of rich and diverse services that engage users more, and leverage the incredibly granular understanding of individual mobility patterns afforded by telematics.

Telematics data and analytics can also help bringing other stakeholders into the ecosystem and open up new opportunities.

For example, analytics can be used to charge road usage based on driving behaviour, or in estimating the value of a vehicle to be sold in the used-vehicle market based on its validated historical usage.

Such concepts are on the horizon but it will take time to bring them into the public domain.

How efficient are your driving scores in predicting losses? To what extend are you able to calibrate your scoring with real claims losses?

The correlation between our score and people who have claims is very high. We are very close, based purely on GPS data and in percentage terms, in being as predictive as an insurer who uses their knowledge about all of the customer's other risk factors.

The incremental benefit regarding the accuracy of prediction when using our telematics scores is between 10% – 30% and is about 10 times as predictive as other new factors like credit scores.

Our scores are calibrated against external or 3rd party data sources and then against insurers' own claims data.

Event-counting and thresholds are now often described as insufficient. What is your recommended approach to score driving behaviour?

We have avoided event based approach from the very beginning of our business. **We follow a continuous contextual analysis approach where we look across the entire customer journey.**

What are the biggest analytics-related challenges that you are facing today?

Getting good quality and consistent data from the different devices in our portfolio whether it is Android or iOS smartphones, OBD devices or black boxes and gaining consistency across manufacturers is always a challenge.

Then making sure that context is properly taken into account and understanding how different road infrastructures such as motorways or city roads affect driver behaviour.

Having enough claims data to train our new scores used to be an issue as well. However, we are now at the point where this can be done as we have collected granular data from the very beginning and claims data are flowing through given volumes and exposure levels achieved.

Ultimately our objective is to create behavioural scores that are highly predictive of future accidents. However, **these scores should not be taken too far or overcomplicate things** and leave the insurers with over fitted models. Scoring methods should be simple and understandable by the customers both end users (drivers) and insurers.

Some statistics show that driver distraction is the number one factor in fatal car accidents. What are your thoughts and planes to address this epidemic problem?

Distraction is a massive problem and one we focused on since day one. Our smartphone based scores include distraction, measured both in terms of call state and phone manipulation. However, we observe that **people opting for our telematics services tend to not use their smartphone much while driving** perhaps because they are aware of the monitoring function in place.

Today do you recommend your insurance customers who use an app for driver monitoring to also use a beacon in the vehicle?

It depends on the variable that our insurance partner is trying to solve for. For example, many insurance companies deploying telematics are constrained by the need to capture data for every instance of vehicle movement. In this case, smartphone solution, which is great to collect behaviour information, is not sufficient.

So, in the presence of such binding constraint, we may encourage our clients to consider a tethered solution which gives them the ability to collect data from vehicles and minimise the cost of data transmission thanks to the smartphone's cellular engine. However, "tethered" has complexities from a customer experience standpoint as it demands end-users to perform multiple actions such as installing the device, downloading the application and paring the device with the smartphone. If an insurer needs to solve for vehicle movement data and slick customer experience, a traditional OBD may well do the trick, though at a higher cost.

We are still in a world of sub-optimal solutions, and this will change when vehicles are equipped with original telematics capabilities. However, it will take years for in-vehicle telematics to become a substantial proportion of assets in circulation.

What is your method to accurately rate different vehicles e.g. a Fiat 500 and a BMW series 5?

Driving behavioural scores can be tailor to the vehicle if required - i.e. you would expect that a BMW may be able to accelerate faster than a Fiat and can do more damage if it were to hit something. However, to a large extent the differences between claims frequency and costs is already allowed for in an insurers standard rating and may therefore not need to be explicitly allowed for in the behavioural scores depending, of course, on how you are integrating them into the overall price.

However, there are only limited factors where this is the case; speed, time of day, fatigue etc. are all the same (relatively speaking) in any vehicle. Even harsh braking (despite possibly being safer in better equipped vehicles) is generally an indicator of lack of attention to the road conditions ahead and therefore could be equally penalised regardless of vehicle.

Ideally you may look to create scores based on how close to the edge of the vehicles safety envelope you drive but since most driving is not so much limited by the vehicle as the traffic around you this may be unnecessary.

As more claims and exposure data is collected, the way in which telematics products are rated is likely to move more towards the behavioural scores with minor adjustments for traditional factors vs the current approach of mainly traditional factors with a minor adjustment for telematics and when this happens there is likely to be a requirement to interact the scores with some of the other factors such as the vehicle being driven.

Several insurance companies have recently indicated their willingness to build their own driving scoring algorithm, what would you tell insurers who are tempted to do the same?

There is an interesting polarisation between insurers who believe they can do everything internally and those who choose to collaborate with service providers and technology vendors like The Floow.

Call me biased, however I believe the latter group stands a much better chance to integrate telematics productively and cost-effectively in their operations.

It takes a lot of experience to acquire, store securely, cleanse, process, contextually enrich and extract meaning from unimaginable quantities of raw, noisy GPS and accelerometer data. Our insurance partners allow us to play this role and work collaboratively with us to benefit

from our exposure to global markets and different experiences.

In addition, we have designed our scoring methodology to be customised based on individual clients, and we encourage clients to use it as a tool to generate unique algorithms specific to their requirements. Our insurance partners use our technology to build their own unique IP.

Could you please tell us more about your analytics partnership with Agero in the US?

Agero has a license to distribute our technology in the US market and they are currently engaged in a number of UBI pilots. They are a value-added partner who can either resell our technology on a standalone basis or incorporate it with its proprietary road safety and emergency services.

Could you please explain the role you are playing in the Renault-Nissan data hub? When should we expect it to be active?

OEMs like Renault and Nissan are key partners to The Floow. They own the vehicle infrastructure and control access to data of high quality and of great interest to our insurance partners. Our role consists in helping them extract value from the potential embedded in their original raw data. The transformation of raw data from the vehicle into insurance grade scores for underwriters is at the heart of our relationship with the Alliance.

The relationship is fully functional and live. We expect that we will sell our first policies in the UK market by the end of this year. The data will be generated directly from the vehicle using Renault's R-Link devices and would be sent to us for scoring as part of a UBI proposition.

It is a global arrangement designed to be implemented in any geography where we find willing insurers. However, the first market will be the UK as we have clients there who are eager to bring this solution to market.

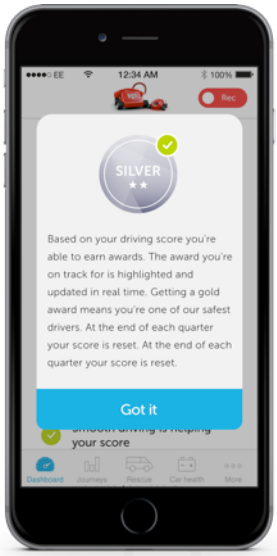
Your company managed to forge a partnership with CarSmart in China last year. What is coming out of it?

We are in the process of forming a joint venture with U**nited Electronics Group**, parent of CarSmart, one of the China's largest system integrators with a market capitalisation of almost 3 billion euros.

We are contributing our scoring technology, app technology and expertise with insurance companies worldwide and our partner is providing the data centre infrastructure and adapting our app to cater to Chinese customers. We have already built the joint platform and are starting our first pilot, effectively from today, with one of China's largest insurers.

What do you expect from your participation to the MOVE project with Jaguar Land Rover and Direct Line in the UK?

This project is the largest UK government funded initiative for research in autonomous driving. It is a great platform for us because it gives the opportunity to collaborate with organisations of the calibre of Bosch, Direct Line Group and Jaguar Land Rover amongst others. It has offered our team a very clear perspective of what our role as a TSP will be in a future of increasingly autonomous vehicles.



So how relevant do you think telematics and analytics will become in the autonomous age?

The challenge for an insurer in the world of autonomous vehicles is to price the risk of a journey where the vehicle governance is outsourced to a system. To overcome this challenge, you need a **new generation of risk models** that inform on the probability of something going wrong. You need to be able to monitor the vehicle operating in context whether driven by a human being or by a system. That is a core capability at The Floow. We are equipping ourselves to support vehicle manufacturers, tier-1 suppliers and insurers to deal with the new categories of risk that will arise from autonomous vehicles.

Interview performed on 1st September 2016 by Frederic Bruneteau

INTERVIEW WITH

JONATHAN HEWETT

GLOBAL CHIEF MARKETING OFFICER

OCTO TELEMATICS

Jonathan, could you please tell us briefly about where Octo stands?

Our mission at Octo is to help transform how insurers understand risk, manage and pay claims and help them to have better relationships with their customers.

We believe that giving choice of enabling technology and devices is important; whether it is smartphone app, OBD II, black box, or connected vehicle.

The real value for all stakeholders is in the data and the ability to understand and interpret that data and turn it into actionable insight.

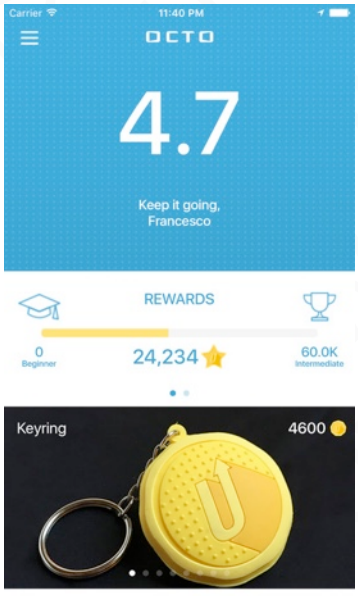
We have 14 years of operating history, and have very significant datasets that allow us to continually improve our algorithms and our outputs.

We have **4.4 million connected users**, which means billions of miles of driving data as well as **data on more than 340,000 collisions**.

When we talk about analytics at Octo, we span the entire insurance value chain. It isn't just about risk.

It is about understanding when a crash is a crash, understanding the dynamics around that crash which increases the claims.

It is also about analysing the data to help insurers improve their relationships with their end customers. It is also a differentiating point in the US market for Octo.



We say regularly that telematics should be a financially based game for the insurance companies. It is a combination of risk pricing and managing and paying claims to drive down the combined ratio, which is ultimately the success factor for what we do.

We put substantial financial investment in growing our capabilities in analytics.

We see ourselves as a business who is at the forefront of transforming auto insurance through behavioural, contextual and driving analytics. This is the heart and soul of what we do.

Today are you positioning yourself as a TSP or as an analytics provider? How do you differentiate from others?

We are the pioneer in this industry as an **end-to-end data and analytics provider** for insurance companies. We have always been able to stay ahead of the curve, ahead of our competitors.

When the market was reliant on device technology, we were there with many different form factors. We have been able to substantiate the cost to increase the address of the market.

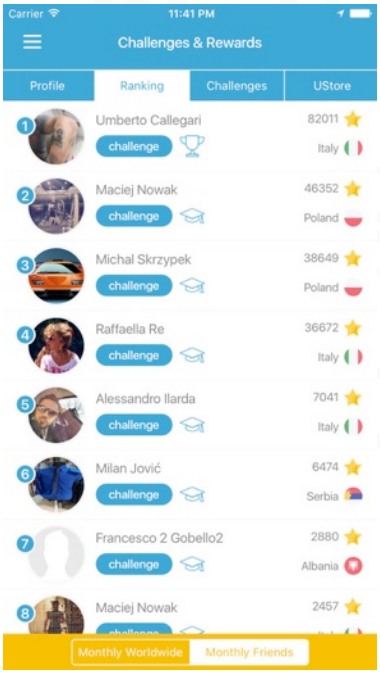
Directional travel wise, we believe that now is the age of analytics. We are interested in data purely in terms of accuracy and context that allow us to provide analytics services to our customers.

We also see this happening in the area of car manufacturing and

insurance where OEMs and insurers are increasingly looking for partners to drive and increase value out of data analytics.

This is what Octo is able to provide based on the highest possible quality of data.

The key advantage that we have over our competitors is our combination of analytical skills, big data platform, knowledge of the different geographical markets along with the capability to combine and use driving behaviour data and crash data, which is used in scoring, pricing and predictive models.



Do you expect all markets to become analytics-driven like the UK market? Will that come to Italy for example?

Yes. I think it is on the C-level agenda now to understand how data science or data analytics can help improve insurers financial results.

From an insurer's perspective, data is a great opportunity to transform the business, increase shareholders' value, delight and retain customers. Then it is about partnering with people who can support them in this journey.

And, **this is a global game**. We see this happening in all the markets, whether it is US, EU or East Asia. All insurers are interested in data analytics. Then, of course comes the local market dynamics. **Depending on the problem that you have, be it reducing frauds, improving claims process, or expanding an underwriting footprint, the answer is in the data analytics.**

I think, Italy is one of the countries where telematics insurance is the most mature, yet most of the programmes are related to mileage. But, this is going to change very rapidly as we are observing an increase in insurance companies interests for new driving behaviour methods and more complex solutions.

How efficient are your driving scores in predicting losses? To what extend are you able to calibrate your scoring with real claims losses?

This is confidential between our individual partners and us but it is delivering material benefits because we have a mix of capabilities in analytics and data. Our scoring algorithm is not just based on customer profile; it is based on predictive modelling technique.

Event-counting and thresholds are now often described as insufficient. What is your recommended approach to rating driving behaviour?

Our approach is not only based on event-counting and thresholds but also on a combination of different metrics. We take into account different contextual information: which can include weather condition, traffic, road condition, risk classification condition and vehicle classification information. We calibrate the rating on the type of vehicle.

What are the biggest analytics-related challenges that you are facing today?

One big challenge is to **move** insurance partners and the insurance industry **from a world of static data and reactive processes to a world, which is informed by dynamic data**.

That could be in terms of raising capabilities around driving behaviour analytics, where the provider like Octo could do the heavy lifting for the insurer but also in terms of processes. For example, the process of determining the type of contact to be made with the customer from understanding the business rules and seriousness of a crash was historically a reactive process. But now, it is becoming a proactive process by guiding the end customer to the repair shop or providing roadside assistance.

However, these things are of varying levels of complexity and the point of moving from static to dynamic data is where analytics players need to gain experience and capabilities to help insurers make the change.

One challenge will also be **managing video analytics**, whether it is for crashes, pricing or contextual data. However, to do that, you don't just need to have the right analytics skills but also to have a right platform to manage that data.

Some statistics show that driver distraction is the number one factor in fatal car accidents. What are your thoughts and plans to address this problem?

If we look at it fundamentally, what do insurance companies want? They want customers to have fewer accidents. Anything that helps ensure this and makes drivers focused on their driving instead of using their smartphones is a good take.

It is a question we get quite often from the insurance companies and of course we bring them the right insights. But, I think this is really something that would come with the cars of the future.

Trying to understand what mode the car was in, the operation of any safety factors from advanced devices such as those monitoring the blink rate of a driver would be key challenges in the next 5 years. And, the move from static to dynamic data is the main topic in the insurance community now.

To what extent is your claims proposition tied to your analytics proposition?

The impact and benefit of analytics for the insurance companies is in 2 kinds of verticals. One is in terms of operations, and the other is in terms of the quality of potential claims detection and anti-fraud detection systems.

For now, crash information is very useful for the insurance company to assess the right level of probability of a claim, to speed up the assessment of the claims. Currently, 80-85% of the claims managed by the insurance companies are attritional claims and should be paid in a short time. So, the speedier the insurers are in paying the claims in a correct way, the more efficient they would be.

However, in the future when the car is connected and equipped with active safety functions such as emergency braking assistance, it will be possible to identify the real time risk of a driver having an incident.

But it will depend on many factors. The claims management is not only a matter of what the insurance company can decide by itself. It is also driven by the legislative factors that are different from one country to another.

Several insurance companies such as Allstate, Generali and Unipol have recently indicated their willingness to build their own driving scoring algorithm. What would you tell insurers who are tempted to do the same?

They should be aware that they would be doing the analysis on a reduced dataset and would lack the depth and breadth of experience compared to the analytics providers.

Insurers want to make decisions on the best available data, in terms of discount, acquisition or renewal, or making premium calculations. And the provision of that best available data is our job. We don't see our job as calculating the price of the premium.This is the role of insurance companies instead of determining the driving algorithm. The driver score is just one input into the calculation.

Would you say that your Octo U app can provide as reliable data as your black boxes and OBD dongles?

Yes. Our app solution collects data itself based on GPS positioning. In this sense it is likely equivalent to any other device you can manage based on GPS positioning.

However, in terms of deriving and analysing, in a different way, the driving behaviour we need accelerator and gyroscopic information, which is something that is not implemented within any app solution. This may be done in the future. We really believe that smartphone with telematics in combination with other kind of solution will be the next future.

Could you please explain Octo's value proposition to OEMs and to what extent it involves analytics?

In last couple of years, OEMs have become more open in sharing and combining their data in a mixed way together with the information they get from Octo. The data that OEMs are currently collecting is not properly refined. Nevertheless, they want to have a place in the analytics industry in the next few years when the car is connected.

Meanwhile, Octo acts as an accelerator for them to improve their data collection and data usage in a risk oriented way. We merge our expertise together in order to provide benefits, not only to insurers but also to OEMs in terms of assessing the warranties, asset value of the fleet manager or contextual usage of the car, combining together the diagnostic and failure data.

Interview performed on 31st August 2016 by Frederic Bruneteau

INTERVIEW WITH

MIKE BROCKMAN

GROUP CEO

INSURETHEBOX

Dear Mike, could you please tell us about your new position and how it relates to analytics?

Since the acquisition by Aioi Nissay Dowa Insurance Europe (ANDIE), I am CEO of our Group company, Box Innovation Group Limited (BIGL). The BIGL Group includes both Insurethebox, a Managing General Agent (MGA), which means, in our case, a direct end-to-end insurance provider, and BIG Telematics, our in-house telematics service provider.

Analytics has two components for us. We are both a user of telematics data at Insurethebox and involved with analytics across the ANDIE group.

Thus we have teams of data scientists and actuaries both within BIG Telematics and Insure thebox.

Within BIG Telematics we make partnerships with long term third party strategic partners such as Tesco Bank. We give them access to our own system and white label our proposition for them. So we do not wish to replicate the Octo model and choose to partner only with selected external entities.

How did you decide to create Insurethebox?

The embryonic idea came to me in 2008, during my consulting at EMB, which I had co-founded and co-ran for 16 years.

My background has been in motor insurance since 1980! I have been an actuary, a data analyst and a consultant for 20 years.

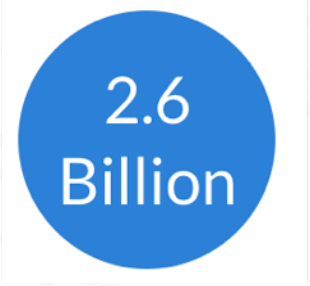
So I created Insurethebox on 8 November 2008.

Immediately everyone told me I was nuts! "No consumer would want a box in a car!" How to make money by paying for a box in a motor market that was already losing money overall?

We launched our first policy in June 2010 on MoneySupermarket.com. We were aided by the fact that British consumers are the biggest buyers of financial services online and credit card purchases have been readily adopted. Today 65% of new motor policies are sold through Price Comparison Websites in the UK. This gives us access to millions of customers but makes the market driven to the lowest price denominator!

In fact, telematics proved 10 or 20 times more difficult than I thought it would be! This is also why it is also much more difficult for others and it represents a barrier to entry.

Being a first mover represents a big advantage for our brand but we are still learning today.



The number of miles since 2010

So what were your objectives when joining with Aioi Nissay Dowa Insurance Europe?

I had built Insurethebox from scratch with no extra funding. I persuaded Catlin, a Lloyds syndicate, to provide us underwriting capacity. Catlin and then Munich Re became then a "binding authority" for us.

Catlin eventually became a shareholder by providing loan capital. This helped us fund the investment required, i.e. both the cost of the technology and the in-house platform. This was a huge investment for us, which was much beyond my personal means. But it was required and similar to what insurtech startups are doing now.

Catlin and Munich Re backed us up with faith in our long-term model.

At the same time, I was feeling that automotive OEMs could become a threat to us in the long-term. Embedded technology could allow them to take pole position in the future and I thought alliances would make sense.

Simultaneously, Catlin chose to focus again on its insurance / re-insurance business and join with the XL Group.

The total number of Bonus Miles earned by customers

How has the acquisition changed your strategy?

We are technically part of Aioi Nissay Dowa Insurance Europe (ANDIE). Aioi is the captive insurer of the Toyota Group and provide to Toyota's insurance needs worldwide. Before the acquisition, ANDIE was relatively small because Toyota is smaller in Europe than in Japan and the US.

However, MS&AD Holdings, the parent company of ANDIE, is the 8th largest insurance company in the world.

So ANDIE is now our underwriter and provides corporate governance. This leaves **Insure thebox to focus on developing B2C relationships based on our telematics capabilities.** Insurethe box management still have a minority shareholding of the company.

The average number of Bonus Miles earned in April 2016

The extreme B2C character of our activities is often misunderstood. **We are what I call "super-direct"**. Thanks to telematics, we interact with our customers on a 24/7 basis. This completely changes the insurance business model, and OEMs have even less expertise in this than insurers.

Our business model has changed. Before the acquisition, I wanted to create one of the largest insurers in the UK. We still need a credible amount of customers but **now we are attempting to build a group-wide telematics operation,** and the UK based Insurethebox entity is more of a showcase for best practice. We have projects in the US, in Europe, in Japan and in the Far East.

The UK has been a disappointing market for UBI in the last 2 years, as it seems to plateau at around 4-500,000 policies.

How can analytics help insurers go to the mass market?

One could say this is due to the use of the black box technology but this is not the case. **We are still wedded to black box technology.**

I am not concerned about the cost of the device, which is not the main cost today. We have seen a **rapid fall in the price of black boxes**: from £140 in 2009 to £40 today. And new devices are much better than the older ones!

In any case, **I don't think smartphone apps will be the solution** because you cannot provide the breadth of services.

We will go gradually from young drivers towards customers with lower average premiums. However, one must be aware of the obstacles.

Firstly, there are wider discrepancies in the driving style of young drivers compared with more mature drivers, and thus telematics allows you benefit from the wider **self-selection** effect inherent in this demographic.

Similarly, the behavioural change is stronger: youngsters generally respond better to requests to change their driving style than older drivers.

Finally, given their high market premiums, young customers are highly sensitive to better prices and will work to reduce their risk

to get the best price. Price dominates for young drivers while more mature drivers buy on both the price and the proposition.

Insurethebox have learned a lot about telematics business over the last six years, for example in claims management. We have learned how to fully leverage the benefits of telematics for claims management and this takes several years to do.

I would say: **watch this space! We are in our 7th year of operation. We know a lot more now and are looking at other propositions.**

How predictive your driving scores are in predicting losses?

Insurethebox have become very good at it! In the wider telematics market, different business models mean sometimes you don't need to be very good at this but sometimes you have to.

For example, with Try-Before-You-Buy (TBYB) apps, there is a strong level of self-selection so your score does not need to be very accurate. The same thing goes for Progressive's *Snapshot* model, as they install the device only for a short period. The customers you select will be better than the average anyway.

However, if you use your score to give away premium, the score must be much better.

In our case, we put a box in a car permanently and we have to extract value from that. So we use the score to reward our policyholders, at renewal and to risk manage our drivers with incentives and our portfolio.

Equally, claims forecasting is fully part of our brief. I expect that one

day, our algorithm will be able to forecast a claim event.

We have developed our models based on pure telematics data and **we have now reached a pretty excellent correlation with loss frequency.** We're getting close to the combination of traditional classification factors.

When we start to combine with these factors, we can extract a lot more from telematics data.

What are the biggest analytics-related challenges that you are facing today?

Each extra year of data makes the picture clearer for us.

At the beginning, we did not have data so I made it up based on 35 years of experience.

We have now collected almost 3 billion miles of data and all of the claims that come with it. We know the severity rate by type of claim. **We have the best database in the world** and we believe we have become pretty good in driver scoring.

The challenge is the next step: what to do with it? Do you have the infrastructure to use these scores. **The challenge is to deliver the right message to the right driver at the right time!**

In other words, we are now excellent in static analysis and the next step is the dynamic, real-time nature of messages. You want to offer a specific message to encourage drivers, to give them a warning, to inform them about an accident hotspot, etc.

You need to **tap into the customer's psychology.** To achieve this, **you need an IT system that can process Big Data in real time and with very limited delays**. For example, we have kept our algorithm static for 18 months to build more efficiency in our front line systems!

Event-counting and thresholds are now often described as insufficient. What is your recommended approach to rating driving behaviour?

Counts are easy to implement. I prefer counting events but there are many ways to count events.

The signature of behaviours is what we are looking for. These

can be breaking, taking brakes, etc. We count these behaviours as events.

For example, how are you braking hard? We look at the pattern before, i.e. the sequence of events. And then we are looking for repeating signatures.

In any statistical model, you want to avoid over-parameterisation. The model has to make sense. We use our knowledge and import it into the model.

I don't really like data mining. You can't fish well unless you know what you are fishing for.

You don't believe in machine learning and artificial intelligence (AI)?

Of course it is important to keep up with the ability to extract Big Data with as many variables as possible. But there is no substitute for the injection of common sense in my view.

Even in machine learning, interpretation is required.

In the meantime, you must be able to explain your reward mechanism to the driver for them to drive better. The model has to be understandable by the customer and the customer care agent, which means it must be simple enough.

If you don't, there is a risk that customers will send complaints to the regulator.

What is the best compromise between the understandability of your policy by customers and the predictiveness of your score?

I think we are touching on the limits of telematics here. We know that you need to adapt your model. It may vary from country to country, and even gender to gender.

For example, certain types of roads do not exist in certain countries or you do not have road types with post codes. As this element is missing, you must find a proxy such as the speed limit on the road or something else.

You need to be very adaptive: **there can't be a one-size-fits-all approach**. The UK is a great market for that, as we have the least constraints in the world. So we have a very large dataset to apply.

What would be your concluding words?

I spoke about the future before dozens of new starters at Toyota on their first day of work in Japan.

I told them: "You are the luckiest people in the world", as we are experiencing a step change in technology development.

The next 20-25 years will see an explosion of real-time information and **telematics is the first real experience of the Internet of Things**.

The explosion of collected data will impact many domains: autonomous vehicles, autonomous hoovers, etc. Airbus has announced that it is working on flying taxis. There is an infinity of possibilities.

Interview performed on 18th October 2016 by Frederic Bruneteau

FROM BIG TO SMART DATA

We are now living in a **remarkable period in history, the age of data.**

Inevitably, this period has generated new (buzz) words: Big Data, clean data, smart data, the Internet of Things (IoT), public/hybrid cloud storage, Platform as a Service (PAAS), Infrastructure as a Service (IAAS), data science, predictive/real-time/mobile/personal analytics, visualisation, and visual business intelligence.

Rather than offering clarity, these terms could simply confuse non-specialist audiences. To avoid this common pitfall, we will propose a clear terminology.

As a first step, we analysed the most frequently used words in this report. As shown in the figure below, **the top 5 most repeated words are data, driving, telematics, insurance and analytics.** The word cloud below helps to provide an overall view of major keywords and topics covered, with word sizes based on their frequency of occurrence in the report.

Fig. I: Word frequency analysis of PTOLEMUS Connected Insurance Analytics Report 2016

Source: PTOLEMUS

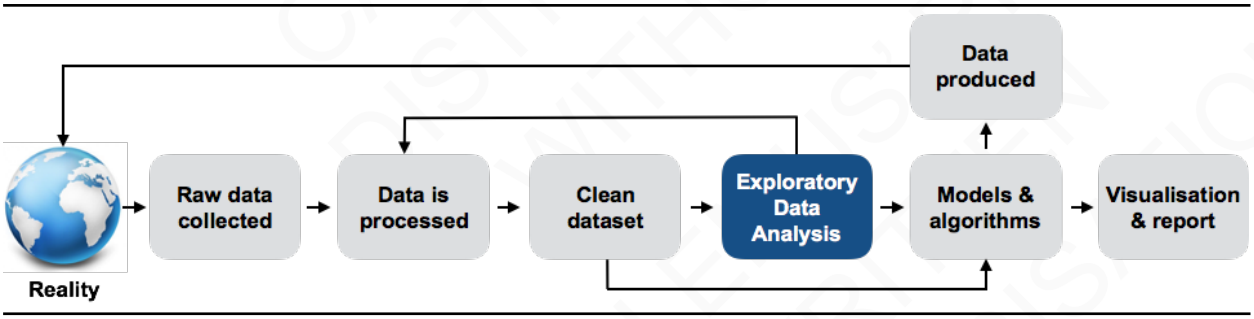
In UBI analytics, we are mostly dealing with telematics **data points –** a set of one or more measurements of an individual driving parameter. A collection of data points would give you a **dataset**. For example, speed dataset means a collection of driving speed data points of an individual driver which is presented in a table format (time and speed).

We can consider each policyholder's information, including his driving data, as a set of tables. When these tables are organised and structured so they can be easily accessed, managed, and updated, then we can say we are dealing with **database**(s).

Obviously, these databases also need to be managed and organised; after all, the whole purpose of having these databases is to make queries to them and to simplify the administration task. The **database management system** (DBMS) is a software application that facilitates this process. To this day, DBMS is a great way of handling and retaining information.

Then we reach the point when traditional methods of handling, processing and managing data become inadequate. This can be due to the speed at which the data is streamed (dynamic data) and the variety of formats and sources it comes from. The combination of both high speed and widely diverse data brings massively large datasets. These ever expanding datasets (or **Big Data**) become so complex to process and so large to handle that new ways of thinking are required.

Fig. II: Data science process flowchart



Source: PTOLEMUS, OiNeill & Schutt

Data processing means any operation that has to performed, including collecting raw data, exploring raw data and applying analytics with the purpose of drawing conclusions about that data and extracting meaningful information from it.

The general procedure to produce meaningful information is as follows: the real-world data collected, since it has not been processed, is called **raw data.** This raw data is then processed, which includes indexing, structuring and tabulating appropriately. Next unwanted data is removed and filtered to prepare the data for further analysis.

Then the data either feeds directly to existing models and algorithms, or goes through EDA. Although some EDA techniques, including finding average, maximum, minimum, median and standard deviation values, are statistics parameters, the objective of EDA goes beyond just calculating these parameters.

At the EDA stage, the aim is to find the overall characteristics of data collection, in order to, firstly, hypothesise about why certain observations have been recorded, and secondly, to clarify what would be the best approach to analyse and model data for further investigation.

Processing Big Data requires a framework and architecture that is specifically designed to address hardware, software and the processes necessary to deal with it. Moreover, when it comes to the analysis of Big Data, the complexity of analysis demands the use of advanced analytics methods – methods that all aim to provide profound insights through **autonomous or semi-autonomous algorithms**, programmes and software.

Within advanced analytics methods, **predictive analytics** are the most sought after solutions. This is because predictive methods use various data mining, statistics and machine learning methods to provide foresight about what might happen in the near future.

Therefore, the quality of data that insurers have at the beginning, which they then start using to build predictive methods, determines the accuracy of these models. **You would only get meaningful results if you feed the model with meaningful information.** Therefore, to realise a better outcome, it is essential to have better and, more importantly, smart data to start with.

Smart data brings the highest value and generates the best insight because it comes with useful semantics. In our view, **smart UBI data** is data that is:

- Accurately collected
- Adequately cleaned and filtered
- Properly enriched with contextual data

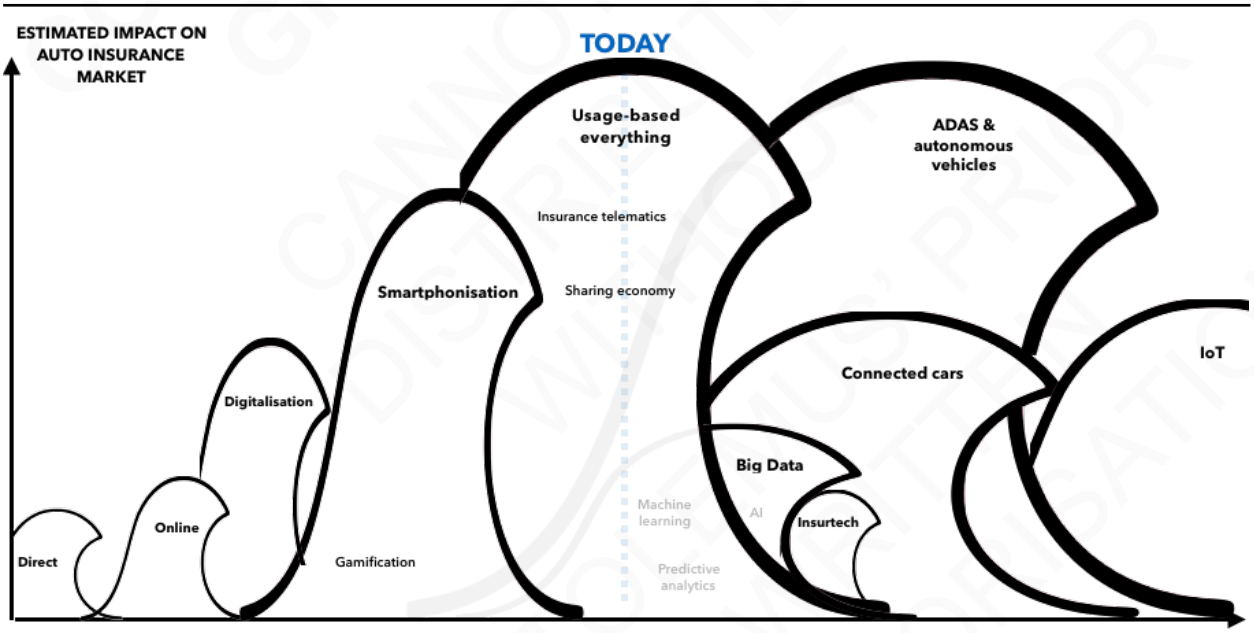
However, in order to **reach a competitive UBI analytics solution, insurers need both smart data and the knowledge and expertise to leverage that data.**

WHY NOW

The insurance sector is facing a numerous waves of disruption. Depending on their geographical market(s) and maturity, a number of insurers have already gone through the "smartphonisation" wave which has effectively forced them to refocus their entire communication and sales strategy on the smartphone. The graph below shows "Today" for Europe and the US only. That wave came because of the previous waves of digitalisation and direct insurance channels.

With direct and recurrent access to the insured, underwriters are now competing to improve pricing based on the analysis of driver and vehicle data. Chiefly, insurers are able to extract and analyse an actual, personal, real-time, driving risk assessment from telematics devices.

Fig III: The waves of disruption - Impact of major trends on auto insurance business



Source: PTOLEMUS

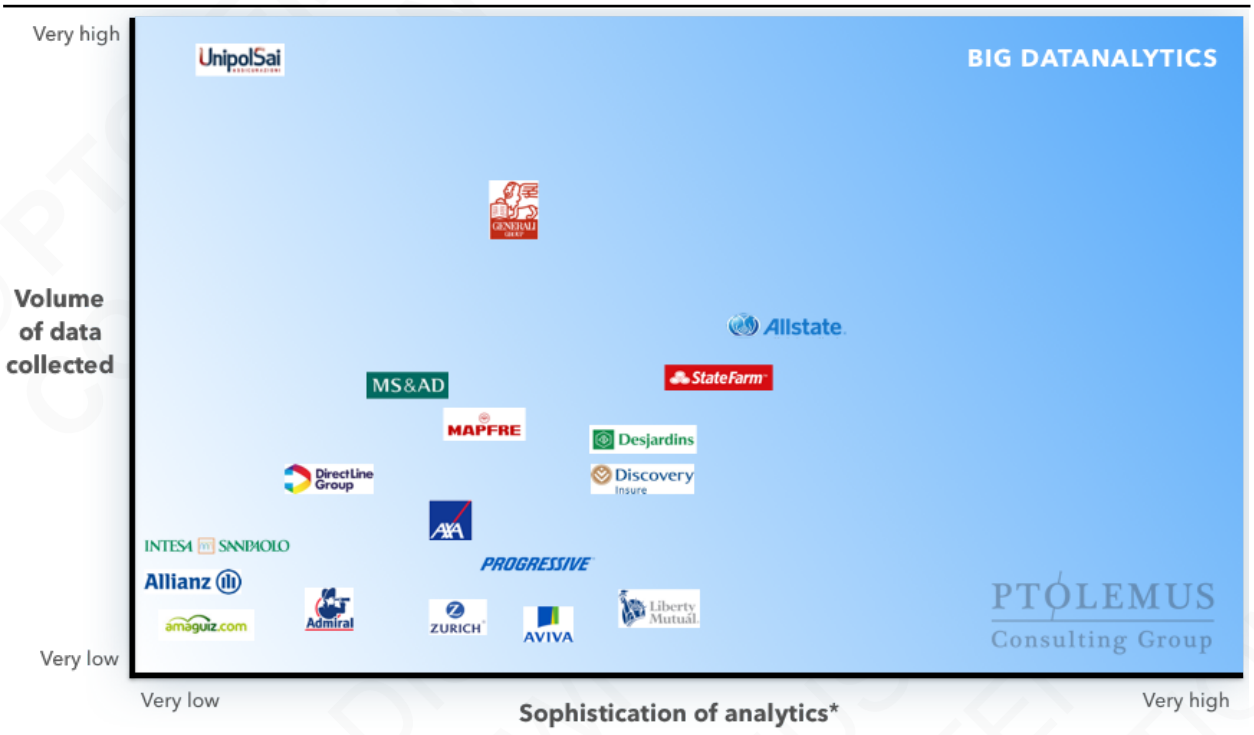
Following on from smartphonisation, the **usage-based everything** wave is having far more of an impact and will last longer than any others. It is a consequence of the previous waves and will directly influence subsequent ones, primarily, connected and, soon, autonomous vehicles.

Some insurers have already understood the importance of changing the way they rate their drivers and by that, the way they use data extracted from the vehicle - and elsewhere. Still, the

race is very much on and, based on our research and interviews, we have organised the insurers by volume of data collected and advancement in analytics.

This demonstrates not only that some insurers are way in front of others just starting, but also that the quantity of data collected is not directly proportional to the quality of the analytics.

Fig IV: The race towards Big Data Analytics has just started



Source: PTOLEMUS

How this report is organised

Section I covers the basics of telematics technology and the impact of future vehicles and smart cars on the insurance sector. In this section, we also review the current status of 3 different market segments: young and teen drivers, the so-called "middle market" and the senior driver segment.

In **Section II**, **we narrow our focus to telematics data itself**. We explore the key challenges organisations face when they deal with telematics data. To address these, we developed a framework and a roadmap to deal with them.

In our framework, we explain how to clean and filter data, and how to choose a suitable data system capable of processing large scale fast paced data.

After the data cleansing process, we turn our attention to the telematics data enrichment process, where we discuss the importance of adding layers of additional information such as speed limits, traffic conditions and weather on top of the telematics data.

Finally, we provide a roadmap on how advanced analytics works. We explain the differences between exploring data, descriptive analytics, predictive analytics and prescriptive analytics.

In our in-depth assessment of data analytics methods, we present case studies on how predictive analytics can help insurers to provide fair driving scores and competitive UBI services. **By the end of this section, you will have a clear understanding of advanced analytics**, whether you need to use machine learning algorithms, and, if you did, what the benefits would be.

In **Section III**, we review the current role of telematics data analytics in the all important claims management process. We investigate 5 impacts that telematics programmes have on claims today, as well as 5 ways in which telematics can reduce insurers' cost of claims management.

I. THE FIRST STEPS TOWARDS BIG DATA ANALYTICS

A. How telematics influences the insurance market

1. European perspective on Usage-Based Insurance

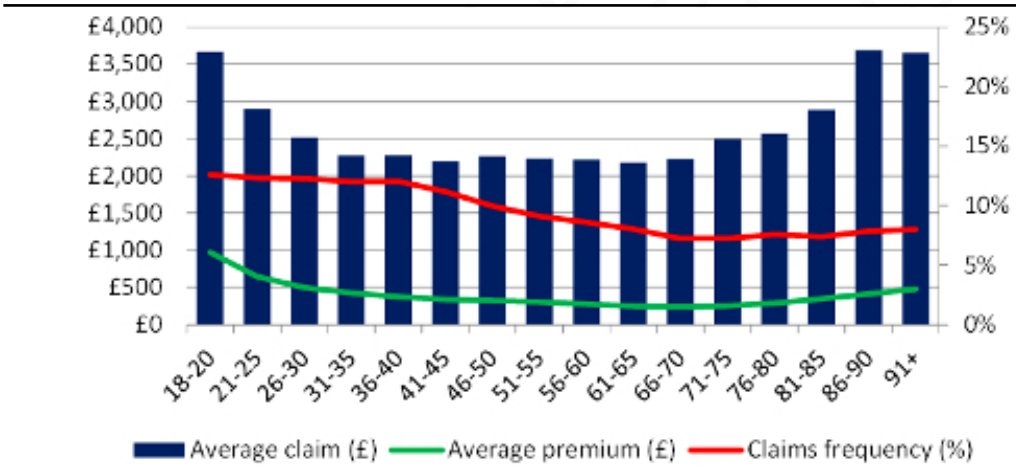
As of November 2015, there were **4.4 million telematics insurance customers in Europe** vs. 2.1 million in July 2013 with the majority of them concentrated in Italy, the UK, Spain and France.

Indeed, Europe has become **the most important market for insurance telematics** and is becoming an experimentation field for the entire industry.

A number of **innovative business models** have emerged and an increasing level of consumer acceptance is being witnessed. This is particularly visible in the **young driver segment** where numerous trials and nationwide launches have been focusing on. Young drivers are the perfect target since they pay more, have more accidents and care less about privacy.

In January 2009, **Wunelli**, a telematics service provider now fully owned by LexisNexis, launched the **Coverbox** panel in the UK in partnership with a number of leading insurance companies including Allianz, Groupama, The Co-operative Insurance, Sabre and Markerstudy *'to prove to the insurance industry that telematics can work effectively with motor insurance and assist in reducing risk.'*

Fig. 1.1: Motor insurance premiums by age in the UK



Source: ABI, 2014

The generic problem to solve was the endemic rate of accidents among young British drivers and the related high price of insurance, often pricing young drivers out completely. The premiums have by and large decreased in the UK in the last 5 years but as we see below from the Association of British Insurers, young drivers still have to expect to **pay a thousand pounds per year for car insurance**.

In that context, **Insurethebox**, a provider of telematics insurance in the UK now owned by MS&AD partnered with brands such as Marks & Spencer, The Carphone Warehouse, B&Q and Dixon's etc. to offer young driver specific insurance tariffs based on behaviour at the wheel and powered by customers 'Reward Miles' (i.e. discounts on their motor insurance) when they shop online through its **dedicated portal** (pictured).

MONTH	TOTAL TIME	TOTAL DISTANCE	AVG. DISTANCE	AVG. SPEED	AVG. TIME	RUSH HOUR %	NIGHT %	WEEKEND %	MOTORWAY	URBAN	RURAL	% PAYED
October	1h 42	124	34	60mph	32m	80	2	10				76
November	6h 24	300	35	48mph	28m	67	4	15				89
December	2h 56	432	38	31mph	14m	92	8	4				95
January	1h 32	13	33	21mph	38m	14	1	50				76
February	1h 14	28	21	37mph	33m	88	0	43				98
TOTAL	14h 53	693 Miles	134 M	63mph	9h 32m	67%	12%	20%	11%	80%	9%	
AVERAGE	12h 32	400 Miles	54 M	43mph	8hr 01m	32%	44%	56%	5%	90%	2%	75%

The high level of activity and innovation in the last 5 years demonstrate how difficult it is to make a profit in motor insurance and how complicated it is to create a sustainable UBI offering.

In **Italy**, the success story is more evident: in December 2015, Generali indicated that it had reached **800,000 telematics policies**. It sold 145,000 new policies in 2014 alone, representing **33% of the new business that year**.

In addition, it has reached interesting progress in its operational KPIs:

- A reduction of 5 percentage point on its average loss ratio,
- An addition of 3 percentage point to its average retention rate.

Overall, since 2013, a very large number of insurers have started offering UBI policies. In 2013, we counted 155 active UBI programmes in 17 countries.

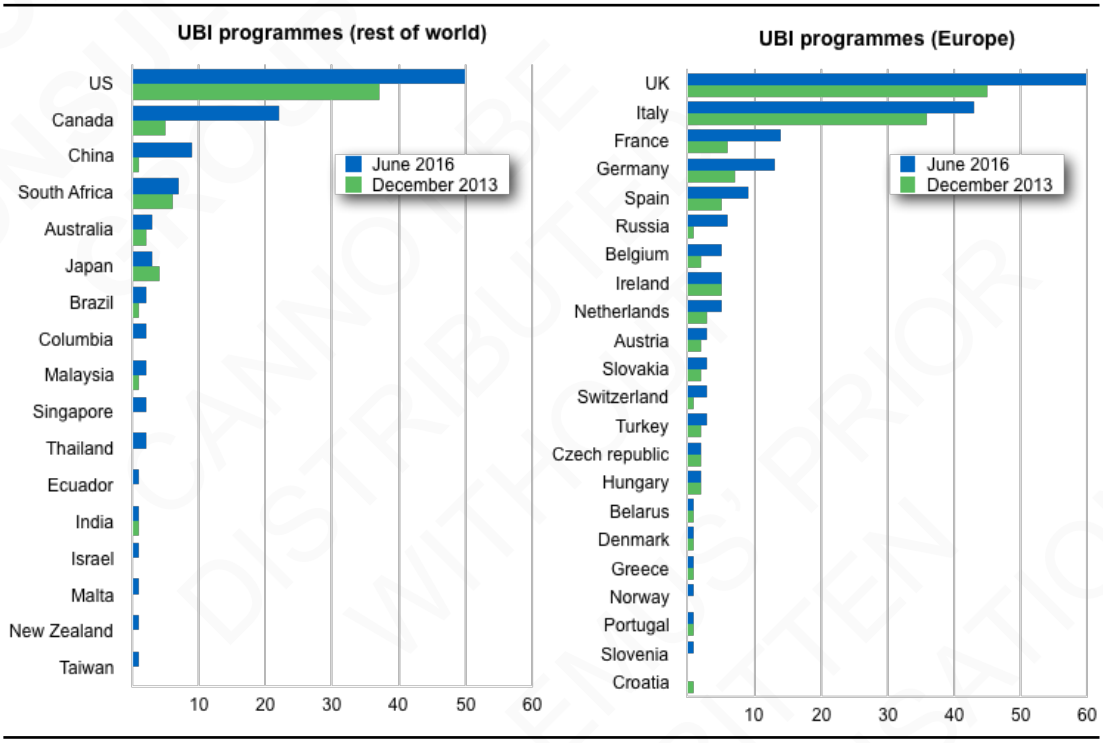
The current status of the UBI market, based on our quarterly dashboard released in June 2016, shows that there are 307 active programmes or trails currently running in 39 countries, there are 14.2 million active UBI policies globally.

We did not include Try-Before-You-Buy (TBYB) programmes but included mobile UBI apps when they are effectively used for premium pricing based on driving behaviour. Norway and Slovenia have both one programme on the market (respectively Codan from RSA and Triglav) but they are TBYB only.

As predicted, the growth is not as much on the number of programmes in mature areas but in the number of countries that are now running UBI programmes. This suggests that the bulk of the growth is yet to come.

The countries with the strongest level of activity have been the UK, the US and Canada. Numerous trials have also been launched in **China** where the regulation is being adapted to go towards a certain liberalisation of insurance tariffs. New countries have also appeared in the list such as Australia and Belgium.

Fig. 1.2: UBI trials* and launches in December 2013 and June 2016



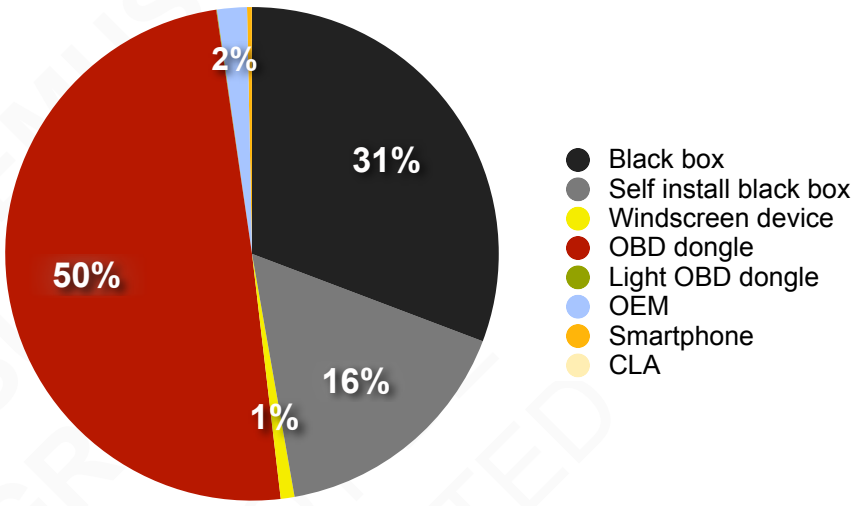
Note: * An insurer can run more than one UBI programme, using different target segments or / and different devices
Source: PTOLEMUS quarterly dashboard

By contrast, the uncertainties created by the Monti law, voted in 2013 - with its decrees still to be passed - have pushed most Italian insurance companies to wait for better clarity on the regulatory constraints. This factor, along with the already high penetration of telematics among insurers, has led to a relative stagnation in the number of programmes.

To support this international growth, insurers have relied on a wide set of devices.

In the next graph, we highlight the share of devices used globally. This is based on our quarterly record of the **307 UBI programmes in the world today**.

Fig. 1.3: Breakdown of UBI policies worldwide by device category



Source: PTOLEMUS UBI quarterly dashboard

2. The North American market's ever growing demand for UBI

In the US, the OBD-II dongle became the device of choice from the start. All vehicles produced after 1995 have an **accessible OBD-II port,** power and some diagnostic data available. The low cost, self-install solution could therefore be **aimed at the general public** and not just at specific, high premium segments.

Progressive's *Snapshot* success triggered a wave of trials from most national carriers (Geico being the notable exception).

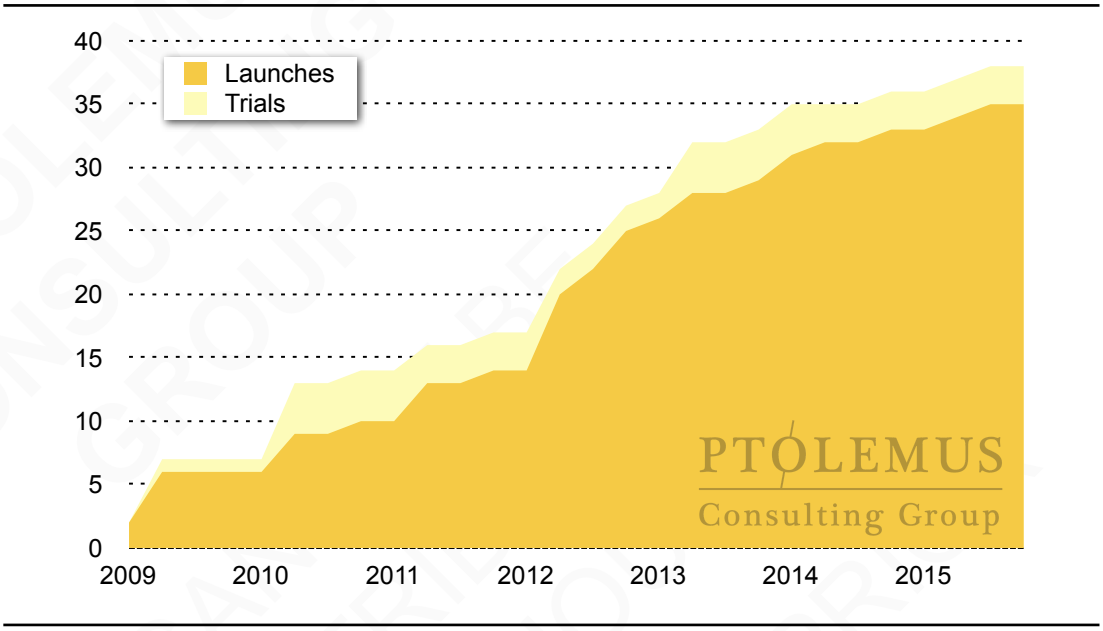
A few patterns have appeared:

- The number of test devices needed to research has been underestimated,
- The amount of devices needed for the first trials has been overestimated,
- Once the programme began, the consumer pick-up has been underestimated,
- 3 years after launch, the growth is still sustained.

In fact, acceptance rates and (conservative) take-up estimates were **wrong sometimes by a factor of 2 or 3.** Nationwide predicted that 10% of their new sales would take up the device offer. In their initial pilots, the actual rate was nearly 30%.

Allstate found that depending on how much the agents were pushing *DriveWise*, the take up in certain states was as high as 50% of new contracts using the device. They had been expecting 10-15%.

Fig. 1.4: Insurance telematics trials and launches in the US



Source: PTOLEMUS

On the other hand, some of the carriers chose not to roll out UBI after the initial trials or restricted their public offering to specifically targeted, very narrow niches such as teen drivers or accident forgiveness. Some of these programmes, such as **USAA**'s *Young Driver Intelligence* programme never went as far as including behaviour-based pricing even after the end of the Progressive's patents trial.

In 2015, the US market has continued to accelerate due to 3 factors:

- Progressive's advertising campaign has continued to widen the understanding around the use of a telematics device. It has created a positive link between the dongle, safe driving and insurance premium discounts;
- The general **lack of concern about privacy was somewhat underestimated** - Many of the programmes now use GPS successfully and Progressive is testing the inclusion of GPS location to improve its rating algorithm;
- The **recession** has pushed people to find new ways to save money.

US insurance carriers have 3 key reasons to move towards UBI:

- **Positive selection:** the first entrants have the advantage of being able to attract the drivers who thought they are safe and are ready to prove it. Further market entries continue to place a strong emphasis on the self-selection process and the forthcoming smartphone applications that US carriers are expected to launch will emphasise that trend.
- **Customer acquisition:** the dongle is a very simple tool to demonstrate savings. A driver does not need to be insured by the programme to start using the programme. After the observatory period, the carrier can demonstrate the discount to the potential customer and underwrite the policy.
- **Customer retention:** this is often hidden from view of the public presentations but our research has shown that it is a very potent argument for US carriers. The device in the vehicle as well as the relationship created and the year-2 discount are all factors motivating the driver to stay with his/her own insurance. Since the families are often combining their assets into one insurance contract, it is competitively essential for every carrier to include a UBI programme in their portfolio.

How carriers have gone to market has also been very different than in Europe:

- **Technology exclusivity:** Technology understanding and ownership has been placed at the centre of the US carrier's strategic decision process. This has resulted in early bilateral exclusive partnerships such as those between Progressive and Xirgo.
- **Deeper involvement:** Carriers have done it by themselves first, using TSPs after the trials. Large companies have generally created programmes themselves rather than new brands or subsidiaries to provide UBI. As a result, there are very few **pure-play** telematics insurers in the US, **Metromile** being the exception.
- **Actuaries' flexibility:** rather than always looking for the best data and trusting nothing else, US carriers have started from the philosophy that "**some data is better than no data**". As a result, PAYD programmes have started based on mileage provided by the vehicle or the fleet manager. Zurich North America, Liberty Mutual and State Farm have shown examples of what is to come.
- **Channel and model experimentations:** OEM-insurance partnerships have emerged. Besides the announcement between GM and Progressive, insurance carriers have also tried partnerships with consumer-grade dongle providers such as Zubie (with limited success). "Forgiveness" has also been an interesting model that continues to grow.

Smaller and later entrants have then chosen to use Telematics Service Provider (TSP) partners to reduce their exposure to the fast service evolution and create more differentiation as the competition started to increase.

TSPs are also more adept at bearing the weight of rapid service and technology evolution and the churn resulting from supporting many and new devices.

B. Other technologies affecting the insurance market

We believe that the *smartcar* will emerge in the next 3-5 years and have a major business impact within the next 10 years. We identify 6 categories of technological advances affecting insurers.

1. Broadband connectivity to the car

2G's end of life period is expected by the end of the decade in several countries. In the US, AT&T already announced that it would cut down its GSM network by 2017.

We expect **4G/LTE to take over rapidly**, even leapfrogging 3G. Telematics service providers should consider the costs and implications of integrating 4G today. A good start would be in high-end video recording devices. Further implementation can then be reviewed for deployment after 2017 in order to provide at least **7 year device lifetime** to insurers in the aftermarket.

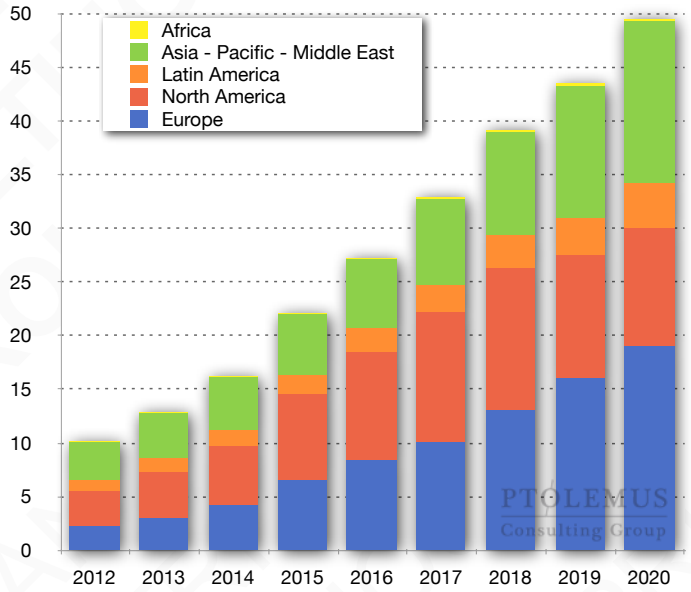
For embedded connectivity, the roll out will be much slower due to the design life cycle of the OEMs. Providing high speed connectivity to the vehicle before OEMs do is a great opportunity for value added service in the UBI portfolio of options.

2. Connected navigation / infotainment

In the last two years, Google has attempted to open the access to certain vehicle data, providing a **standardised interface to the vehicle.** Under their influence, we expect that many car manufacturers will **deploy telematics platforms and car app stores**, using Android Auto or their own solution. This already installed interface will not only facilitate the use of UBI applications by customers, it could also become the point of entry to new UBI contracts.

CarPlay & MirrorLink will be rapidly deployed and provide **standard phone access to a vehicle's display.** If nothing else, the unique Bluetooth ID of the car could be used today to **identify the driver and the car** for mobile UBI.

Fig. 1.5: New vehicles sold with embedded telematics (million)



Source: PTOLEMUS

Running in parallel, OEMs will continue to embed connectivity and services in the vehicle. As ERA Glonass and eCall are implemented in new cars, the trend will affect all types of vehicles. PTOLEMUS expects that the number of newly produced connected cars will double between 2015 and 2020 worldwide.

As more vehicles are sold connected and then retain that capability after their first owner, the options for the insurers to retrieve car data will dramatically change. For the manufacturers, new methods are emerging, which will protect customer ownership from their side.

3. Smartphonisation

As of July 2015, Android's app store recorded 1.6 million apps while Apple's App Store had reached 1.5 million.

This has impacted the automotive domain. According to Priori Data, in December 2013, 346,000 different automotive apps were counted globally, actively used by 156 million smartphone owners.

This is not only about devices. **An "app economy" is born**: as of June 2014, Apple had paid out more than $25 billion to app developers since the beginning.

According to us, the change is actually even much deeper: **the mobile economy is changing the rules of the game in all industries** including automotive and insurance.

Mobile has become the reference system and business model for many other industries. This is due to the **combination of 7 factors**:

1. The **wide range of applications**, which means that all industries are impacted;
2. The **fast speed of the smartphone renewal cycle**, typically once a year - to be compared with 3-year cycles for the car industry;
3. The **considerable volumes of smartphone sales**, nearly 1.2 billion in 2014, which means that vendors benefit from the highest economies of scale in the consumer electronics and even in the durable goods industry;
4. The **breadth of sensors** integrated in new smartphones, which make them real context sensing machines;
5. The **considerable power of smartphone leaders** - Apple is the number 1 market capitalisation in the world, Google probably the most powerful on the planet given its dominant position in the search market and Samsung is the number 1 vendor not only of smartphones but also critical components such chipsets and screens;
6. The **very high price of smartphones** enables vendors to integrate components that are actually often better than in competing electronic devices; The same is true for mobile data bundles, which are often very large, if not unlimited.
7. **Last but not least, the unique relationship we all have with our phones**, which makes powerful tool to communicate - According to Salesforce, Americans spend between 2 and 5.2 hours on our smartphones per day, depending on their age.

As a result of this real **tsunami, all companies are changing priorities.**

For example, **Bosch**, a company largely focused on the automotive sector, now reuses the accelerometers it originally produced for the mobile sector for the automotive industry. The only difference in the products consists in an even higher series of tests aimed at meeting even higher quality targets.

This is also one of the reasons why all car makers are quickly adopting common interfaces to the mobile world: Android Auto, Apple CarPlay and MirrorLink.

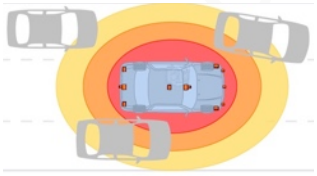
We evaluate the impacts of the smartphonisation trend on the motor insurance industry in Section IV of the study.

4. Active & passive safety & V2X

We expect new features to reach the car market within the next 3-5 years such as pedestrian detection, pre-crash detection, traffic jam assistance and braking assistance. The overall penetration of advanced safety systems will increase rapidly thanks to **legislation and standardisation**.

As an example, **brake-assist functions** (which ensure that the brakes are applied fully in cases of an emergency stop) have been mandated for all new cars and light commercial vehicles in Europe since February 2011. The result is an estimated 1,100 fatal accidents a year involving pedestrians avoided.

Braking assistance systems not only reduce the risk of injury for pedestrians, they also help prevent rear-end collisions. Research has shown that in rear-end collisions resulting in injury in Germany, a **third of drivers did not hit the brakes at all before the collision**, and half of them did not use the car's full braking capacity.



Since November 2015, commercial vehicles in Europe also have to be equipped with **advanced emergency braking systems (AEBS)** and **lane departure warning systems**.

Automatic emergency braking uses radar, lasers, and cameras to see as far as 650 feet in front of a truck; about three times the typical follow distance on highways. They first **signal a driver of upcoming obstacles** by a combination of optical, acoustic or haptic signals and, if the driver does not react, will **slow or stop the vehicle**.

EU Regulation No. 347/2012 specifies the technical requirements and test procedures for these advanced emergency braking systems (**AEBS**). One with the vehicle approaching a moving target, the other with the vehicle approaching a stationary target. The regulation specifies two "levels" of limit values on the **timing of the warnings** and on the **vehicle speed reduction** to be achieved in each of these tests, with the level 2 requirements being more stringent.

To allow time for the development of suitable systems for lighter vehicles, vehicles with hydraulic braking systems and vehicles with mechanical rear suspension systems, the level 1 limits are only applied to buses and trucks between 8 and 12 tonnes as well as trucks equipped with pneumatic or air/hydraulic braking systems and with pneumatic rear axle suspension systems.

Level 1 AEBS became mandatory in November 2013 for new types of vehicle and mandatory for all new vehicles in November 2015.

Level 2 AEBS becomes mandatory from 1st November 2016 for new types of vehicle and from 1st November 2018 for all new vehicles.

Since the **life cycle of large trucks has been markedly reduced in recent years** thanks in part to steadily rising fuel economy standards, new safety technologies such as AEBS will penetrate the commercial fleet faster than it will in the consumer vehicle market.

In the US, the past 10 years have also seen an explosion of automated systems on trucks, including **adaptive cruise control**, **lane-departure warnings** and **electronic stability control**. These are already mandated for large trucks after 2017.

The US National Highway Traffic Safety Administration (NHTSA) was also considering mandating AEBS since large commercial trucks have been the cause of an increasing number of accidents in the last five years. Instead, a voluntary agreement from US OEMs was announced whereby they all agreed to include AEB by default from 2018 onwards.

While miles traveled and the number of registered trucks has held relatively steady, the rate of accidents has increased from 29.3 fatal crashes per 100,000 trucks in 2009 to 36.9 per 100,000 in 2013. In 2013, **64% of those crashes involved frontal impacts by trucks** - Crashes that could have been prevented or mitigated by automatic braking.

Worldwide, the trend is certainly for more automation and for more vehicles involved in automation.

5. Autonomous vehicles

We anticipate that **Highly Autonomous vehicles will emerge by 2023** in the consumer market but will not be sold in high volumes before 2025, notably due to the high cost of the technology and the need for regulation at Level 4 automation.

Of course, the impact from semi-autonomous vehicles will be become rapidly transparent due to a decrease in claims.

In the case of full automation, the shift in responsibilities will have to be determined between drivers and manufacturers. We expect that the **risks of autonomous vehicles will be covered by OEMs' product liability**, as has been confirmed by a number of OEMs, insurance companies, national governments in Europe and suggested by NHTSA in the US.

Some of the risks may still be covered by insurance carriers - for example, the risk of a glass being broken or someone scratching the car's painting - but the bulk of today's premiums are likely to evaporate for these vehicles.

Since OEMs will also have eCall control and UBI data as standard by that time, the disruption on the current value chain in inevitable.

In the meantime, manufacturers are under increasing pressure to test and validate the autonomous functionalities in their vehicle. The validation process involved in autonomy is complex and will require monitoring and analytics of the machine driving in order to qualify it first, then improve it so it becomes un-distinguishable from human driving.

6. Big data analytics

Vehicles will be packed with sensors. In fact, they will become **rolling sensor platforms** generating vast amounts of data from a growing number of data-generating nodes. The number of on-board sensors in most cars is expected to jump from 60-100 today to 200 in the next 5 to 10 years.

Apart from the capability that insurers need to achieve in order to digest and understand data streams from those sensors in the near future they will also need to develop the ability to offer heterogeneous policies, regardless of the type of monitoring device from which the data is received.

On the other hand, UBI policies are becoming increasingly popular because they can provide real-time services such as:

- Live traffic updates through mobile apps,
- Feedback and driving tips provided to drivers,
- In the case of emergency, notifying emergency services immediately.

The ability to handle, process and analyse telematics information in real-time requires high **supercomputing** and **advanced analytics capabilities** to bring speed, scale and accuracy in managing and analysing streaming data.

In **Section II**, we cover UBI advanced analytics extensively by introducing a framework to clean, filter and enrich telematics data, and a roadmap on how to classify drivers and score them fairly.

C. Some of the challenges ahead

We surveyed the responses from the insurers we spoke to during the process and identified the principle motivations and pain points that will be analysed further in the report.

When looking at the motivation for launching a UBI programme, we found that **improving underwriting and risk selection** was by far the most common incentive. This was closely followed by the need to acquire profitable customers. Other gains were the perspective of loss reduction (mostly in Europe and South Africa), improvement in customer relationships and **being seen as an innovator**.

The cost of the device, data analysis and transmission is still too expensive for Russian insurers.

Even international companies that have Russian subsidiaries as Allianz, Zurich or Liberty Mutual do not believe in telematics insurance in Russia.

When looking at the key hurdles in the implementation of a UBI programme, the responders saw **reaching profitability** and **gaining customer acceptance** as most problematic. Getting the offer's pricing right and reducing cost came second. Making the technology work, collecting the right data and selling was seen as less of an issue.

In fact, the costs of the investments needed were often picked up as the main barrier to development and implementation. It was not highlighted as a prevention to doing business altogether, but as **preventing from attracting specific segments** and market.

As a response, most of the respondents where looking at or already working on **sharing those costs with external partners**. In practice we have seen this happening with

The installation cost is an issue. In Germany, installing the black box costs about €80-100

independent OBD dongle providers and to a lesser degree with car manufacturers. It is clear however that the carriers are **ready and willing to buy car and driver data** from an OEM if and when it is available.

The telematic industry is very diverse but they all try desperately to sell boxes. That does not work well with the insurance industry, the fleet industry and the clients!

Partnerships between technology and solution providers were also seen as less than perfect. While a minority were happy with the service, most insurers were looking at alternatives and constantly searching for a better deal.

The risk of becoming dependant on one supplier was generally regarded as a threat, together with the idea that a strong partner could own too much of the solution.

On the whole, however, the insurers interviewed are **happy with the predictability of the data**. There are exceptions, but most carriers are satisfied with the accuracy and reliability. It is not, however, plain sailing.

Improvements are still required on mapping, the data collection rate, analysis of the data and decoding of diagnostics fault codes.

As we identified insurers' motives for starting a UBI programme, it became clear that the biggest challenge they face is how to improve their underwriting and risk selection. To us, the answer is simple but a challenge to implement. They need to expand their **analytics proficiencies** to leverage the insights that advanced analytics could bring to them.

Insurers must gain **advanced analytics** capabilities, which will come either through partnerships with vendors capable of offering such solutions, or by developing a solution in-house.

More importantly, to leverage big driving data, insurers must change their approach by adapting to a **Big Data mindset**, which, in our view, is the change in an insurer's **vision to pursue advanced analytics methods in order to gain better and deeper insight their policyholders' needs and behaviour**.

II.MAKING ADVANCED ANALYTICS WORK FOR UBI

A. How advanced analytics will change UBI

One notable advantage that insurers have been leveraging in recent years is the ability to use analytics tools in their rate-setting practices and pricing. The basic loss ratio method using primary information, such as a driver's demographic and postcode, vehicle mark, model, and age, has now become more complex and multidimensional.

For example, many American insurers integrate in their models the FICO (Fair Isaac Corporation) scoring method, which uses the concept of creditworthiness to underwrite customers' premiums.

For the purposes of underwriting policies or risk modelling, there is now a widespread use of analytics techniques and methods within the insurance sector. The role of analytics is to facilitate the decision-making process by bringing smart and clear insight about customers. The UBI concept is bringing new dimensions to this role because UBI policies bring various types of data in large amounts.

The availability of policyholders' driving information allows insurers to **explore their customer's behaviour even further**. By using UBI data and with the help of smart analytics algorithms, insurers are capable of monitoring vehicle health, detecting crashes, identifying fraud cases, building driving scores, modifying their risk models, finding new risk segments and even helping their customers to become safe drivers by providing them with live feedback.

Of course with vast amount of data to manage and process come complex problems. Insurers often ask what driving parameters they need to look for. What is the best method to detect unsafe drivers? What is a fair and accurate scoring method? How to find hidden risk segments in their book of business?

This section aims to answer these questions by providing a framework and a roadmap to steer through big telematics data with the help of our ***Bigdatanalytics*** methodology.

1. Telematics data is the difference between UBI and traditional insurance practice

UBI has already changed the business model of traditional insurance companies, because offering such programmes means that a new set of operational tasks need to be completed. In general, the way a traditional insurance process works is shown in Fig. 2.1.

Insurers gather data to acquire customers; they underwrite the policy based on the data provided by them and then offer a policy. After the underwriting process, this information is stored until the renewal date, when there is a change in the policyholder's circumstances or when a claim is made.

Fig. 2.1: Traditional insurance process: minimal interaction with customers

Source: PTOLEMUS

By contrast, offering a UBI policy requires a completely new marketing strategy even before the data gathering stage. Prior to issuing a new policy, insurers are required to have a process already set up to provide telematics devices and fit them into customers' cars. Of course in the case of smartphone driving monitoring applications, they are required to have a capable IT infrastructure.

The policyholder acquisition stage demands a higher level of customer engagement. For instance, many insurers offer a **Try-Before-You-Buy** (TBYB) option whereby the customer has the option to decline the policy, even though the insurer is already engaged and has collected at least 300 km of the customer's driving data.

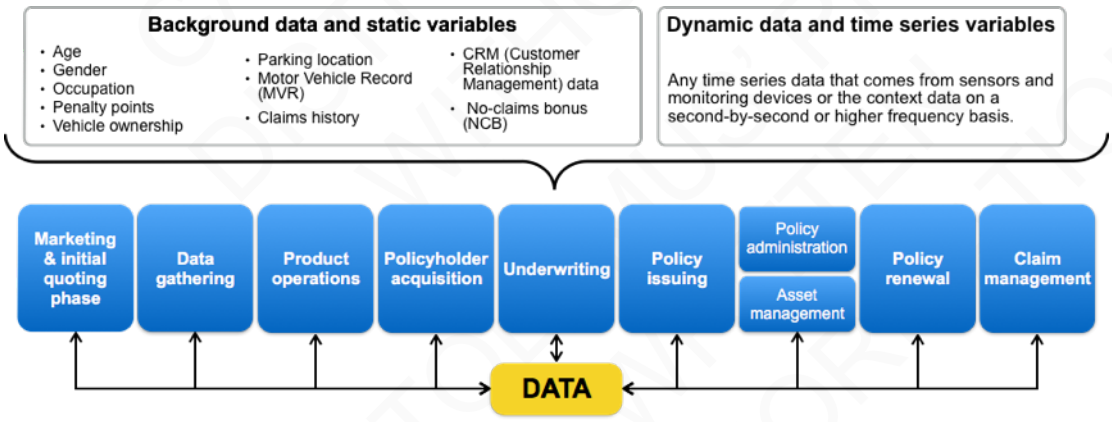
Fig. 2.2: UBI-enabled insurance process has more steps and interaction with the customers

Source: PTOLEMUS

Typically, at the underwriting stage, the insurer has accumulated more than **300 km** of driving data, at least 10 long distance driving records, as well as background information about the vehicle, the driver and his driving habits. Consequently, rate-setting with telematics data **requires a new set of skills and IT infrastructure** to combine all this information in order to offer a fair and competitive price.

The other big difference between traditional motor insurance and UBI policy is in the latter's administration of policies, which provides an opportunity for insurers to monitor and communicate with their policyholders on a constant basis. According to **Insurethebox**, their **business model contains around 200 customer touch points** for them to communicate, monitor and interact with customers.

Fig. 2.3: How can telematics be used by actuaries?



Source: PTOLEMUS

These developments not only change the way insurers engage with their customers, but also highlight how they have revolutionised the claims handling process. With traditional insurance policies, insurers do not hear about a claim until weeks after the accident has happened, whereas insurers who offer UBI programmes have the advantage of being able to immediately identify a customer who has been involved in an accident.

They can check the **severity** and the level of the impact (by knowing the G force value at the time of the crash). Within a couple of minutes, they can **identify** the **location** of the vehicle (whether it has left the accident spot or rolled over or remains on the road at the same location), **assess** the **condition** of the vehicle (ignition switched on or off) and finally, they are able to contact the driver to check on his well being and immediately alert emergency services if necessary.

We categorise **data** that is available to a UBI programme into **2 different types**, based on format and priorities.

Telematic programmes share the **background data** and static variables with traditional schemes. This group includes demographic information about the driver, driving records and vehicle information. However, UBI has an exclusive second source of data, namely, **driving data** (telematics data) that comes in a **time series format**.

The success of usage-based insurers depends not only on static data, but also on dynamic data and how are they going to use it, since increasing amounts of data are gathered at each step of the UBI value chain. Consequently, it is important to be clear about how and which data needs to be collected, how and where it needs to be stored and, more importantly, how to use it. Leveraging the unique driving data available to a UBI programme is only possible through utilising mathematical and advanced statistical techniques – known as data analytics, and **deploying autonomous** or **semi-autonomous algorithms**. This is termed **advanced analytics**.

Telematics data makes a difference at 5 stages in the policy lifecycle

We categorise the analytics role as follows:

- During the initial quoting phase, thanks to TBYB apps or OEM-mounted devices, it is now possible to collect data and score drivers even before the underwriting process starts;
- In the **final premium setting stage**, the collected driving data enables insurers to set the premium based on the actual risk measured. For example, **Progressive Insurance** waits until the end of the data collection or observation period to quote a premium.
- **During the policy period**, insurers are able to provide relevant feedback to drivers and offer rewards based on driving performance – a practice which insurance carriers such as **Allstate** have been doing for a while now.
- **The policy renewal stage** is where advanced analytics can make a difference, and can thus provide a decent discount on a safe driver's next premium, which also increases customer retention.

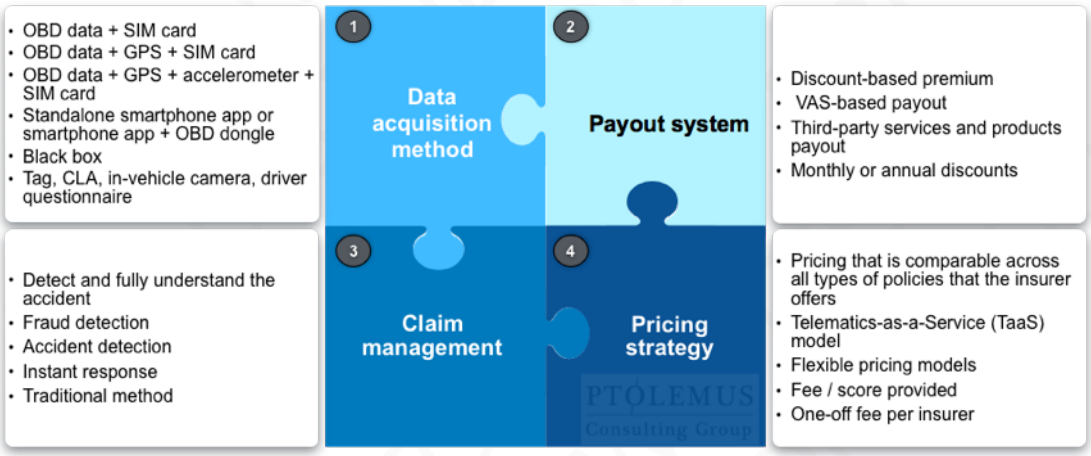
- **When a crash occurs**, this is more relevant to the claims management side of the business, when the use of advanced analytics helps to determine each party's responsibilities and to manage the First Notice of Loss (FNOL) in a timely manner.

2. The 4 pillars of UBI analytics

The four aspects of UBI analytics are the **data acquisition method**, the **pay-out system**, the interaction with the **claims management** system and the **pricing strategy**. The necessary analyses can be provided by an external telematics analytics provider or an internal insurance team dealing with the analytics side of the business.

What really ties these 4 elements together is the capacity and expertise of the company in utilising advanced analytics methods to provide a competitive, accurate and profitable solution.

Fig. 2.4: Data analytics strategy must provide a clear pathway to four activity centres



Source: PTOLEMUS

Many analytics providers we spoke to have different levels of services for their clients (insurers). For example, Intelligent Mechatronic Systems (**IMS**) and others can provide various levels of services to insurers based on the size of the insurance company and their background in using telematics data.

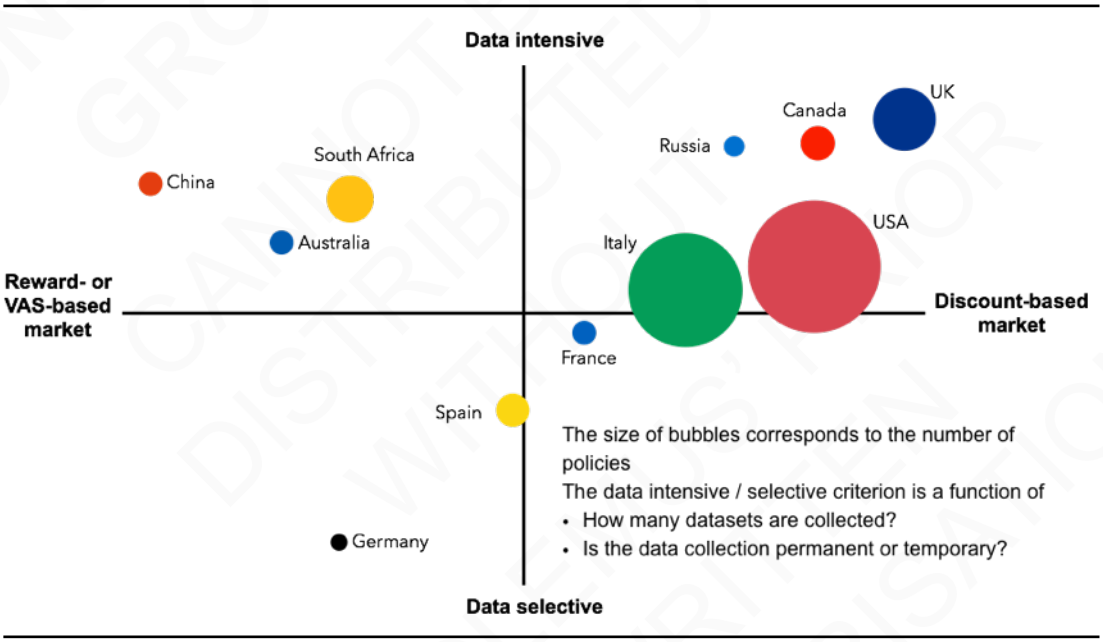
Firstly, in order to offer a high level of consistency, **analytics providers should ideally have a solution that is compatible with all devices.**

Secondly, the analytics providers must to be able to **adapt to local preferences**. Different markets and insurance providers have different priorities when it comes to dealing with telematics data.

For instance, in the UK and Canada, the motor insurance markets are focused only on price, whilst in other countries, like Germany and Spain, insurers make their customer's privacy a priority.

The payout system is regarded differently in different parts of the world, as shown in the chart below. For example, while in the current regulatory context Chinese insurers typically offer rewards or value added services, this is not true for the US market, where it is more about providing discounts to policyholders.

Fig. 2.5: Different markets have different analytics needs



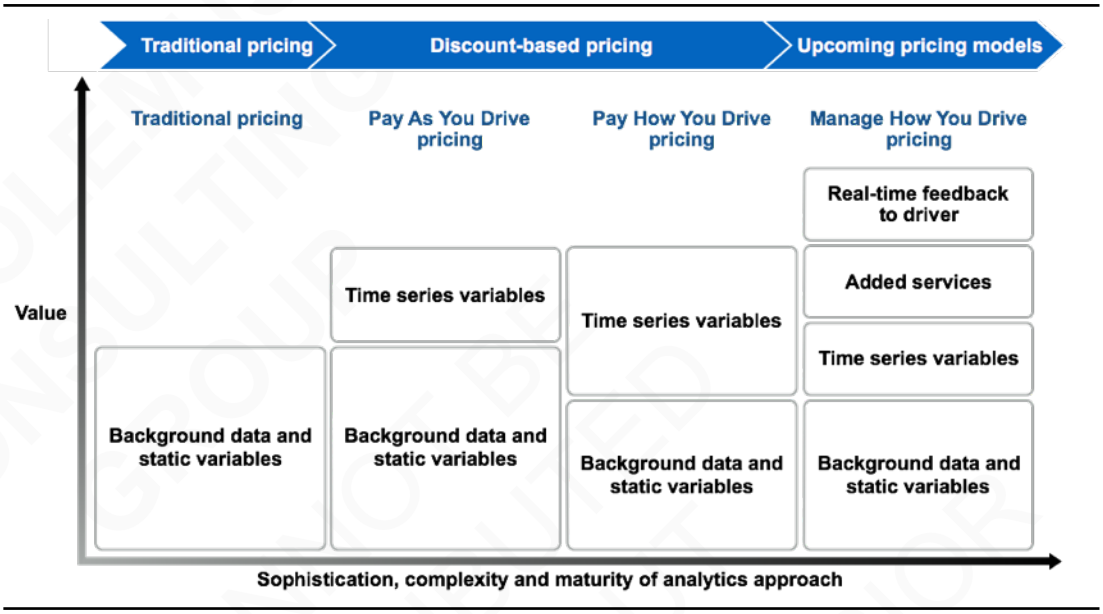
Source: PTOLEMUS, LexisNexis / Wunelli

Depending on the insurer's requirements and the data that is available to analytics providers, the pricing strategy of different insurance policies varies. The winning provider will be able to offer a competitive pricing package that is comparable across all types of policies offered by the insurer.

Thus, each type of pricing depends on the **sophistication**, **accuracy** and **complexity** of the analytics required to deliver it.

In addition, for analytics providers, **each pricing strategy requires a different level of sophistication, complexity and maturity of analytics**, as illustrated below.

Fig. 2.6: Pricing strategy based on different types of premiums



Source: PTOLEMUS

Of course, insurers prefer information that is the most representative of reality. However, in the majority of cases, there are limitations as to the type of data available for collection and how it can be used.

A good example of this pertains to the **US, where many states have some level of restriction on the use of telematics data**. This is why many of the leading analytics service providers we spoke to have already filed their scoring method and their telematics-based rating procedures to state regulators. **Verisk Analytics** and **ISO** (as licensed advisory organisations) already have 500 approved filings from state regulators for ISO-developed insurance analytics, as well as more than 75 approvals for telematics rating procedures for personal and commercial auto insurance policies.

Utilising advanced analytics methods requires a clear understanding of the nature of telematics data and how advanced analytics works.

In the next section, we will cover telematics data analytics and its required architecture.

B. Making sense of driving data

Today, motor insurers use 20 to 50 types of parameters to rate risks:

- Policy attributes, such as age, gender, value of the car, number of drivers,
- Policy-related history, such as policy and customer tenure, the customer's claims history for the policy and/or other products,
- Vehicle data, e.g. make, model, engine size, dimensions, value, etc.
- Geospatial data, notably spatial claim statistics, census data, socio-demographic segmentation, weather history, etc.

What telematics and advanced analytics bring to insurers, in addition, is a "**RAID" on customer knowledge:**

- **R**eal-time (vs. historical) data,
- **A**ctual (vs. statistical) data,
- **I**ndividual data (vs. average of a risk class),
- **D**ynamic (vs. static) data.

A prudent customer may become more aggressive in his driving style. This will be revealed by the telematic on-board unit (OBU).

The car may be used by another driver with a different behaviour. This will be identified as well.

The car may be used for professional use, contrarily to the declared usage. This will be verified too.

A very powerful car may be driven by a very prudent driver. This will also be taken into account.

Overall, a telematics-enabled model can better analyse the real behaviour of drivers, which obviously provides a powerful tool to rank new and existing customers better.

While the idea behind using telematics data to generate meaningful risk information is simple, in reality, leveraging this data is a **complex task** and requires experience.

We have reviewed all the best practices and methods in order to build a framework that can reap the full benefits of telematics data. This may involve scoring drivers and detecting collisions for example.

1. How does an analytics machine work?

The whole process of telematics analytics can be seen as a processing machine in a factory.

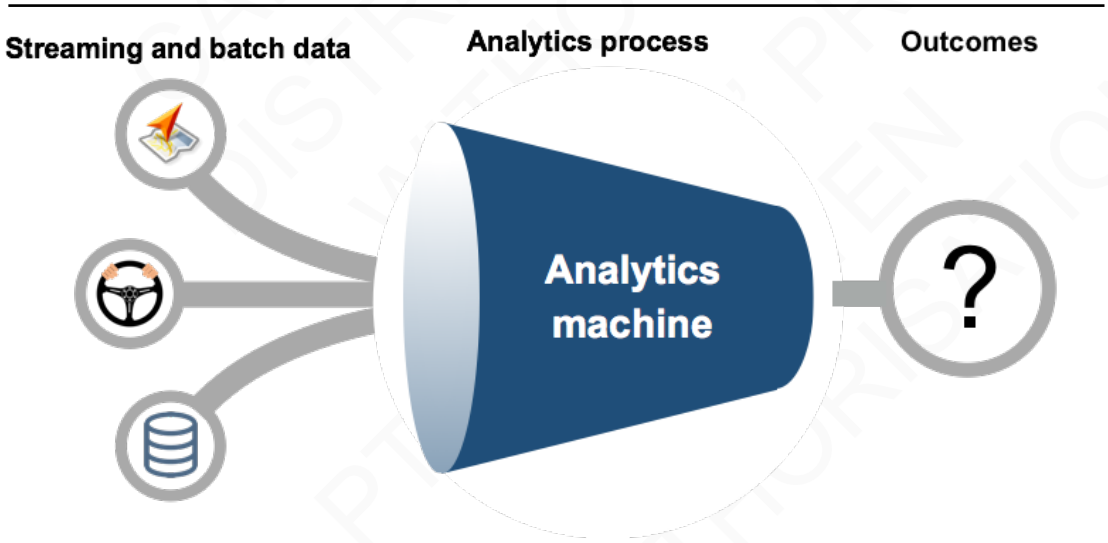
During the analytics process, the raw and unstructured data comes in first, before passing through a number of steps and stages to produce meaningful and valuable information. Much like any process, the product you receive at the end is highly dependent on the ingredients you put into the machine in the first place.

Therefore, it is crucial to start with clear **objectives** and define **specific questions** that you would like answered by using the analytics machine.

The outcome of this process (answers to what are you looking for) depends on the data you provide for your analytics process (streaming information) and the questions you have asked.

Some of the questions are common place, such as how to detect over-speeding or identify harsh acceleration and sharp braking events.

Fig. 2.7: The basic analytics process



Source: PTOLEMUS

Other questions are more specific or complex, such as the effect of weather conditions on claims or the relationship between drivers' scores and the purchasing of roadside assistance services.

Without this knowledge, it is impossible to provide clear answers to these or similar questions.

a. A large amount of highly diverse data

In telematics-enabled motor insurance, there are 3 classes of data available:

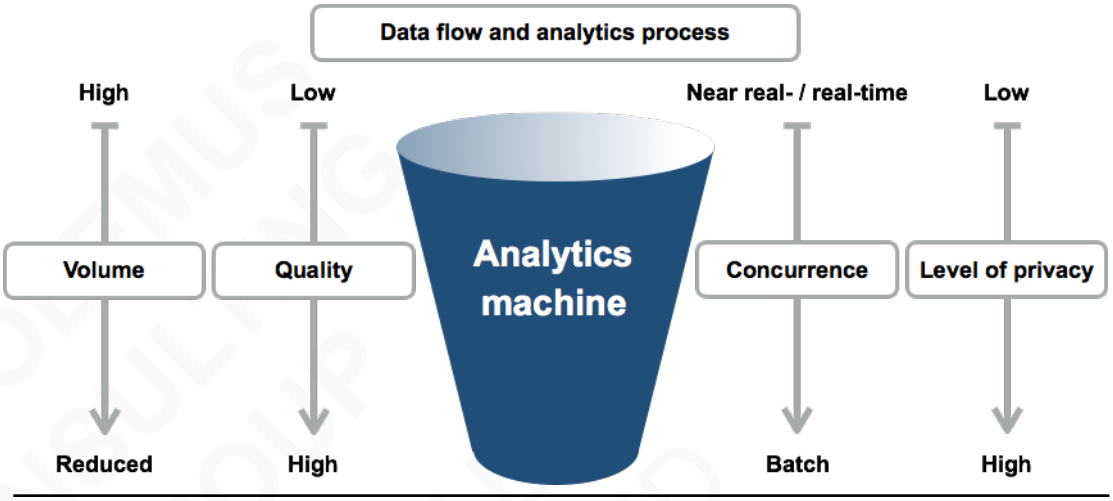
- **Trip data**: This information is collected by a combination of a GPS sensor, a compass and a gyroscope and it gives details of the trip route, start and end points, along with the direction of travel.
- **Driving data** includes the speed, the nature of manoeuvres, harsh acceleration and/or braking events, and potentially video recordings and other vehicle parameters. This information is collected via an on-board device or driver monitoring smartphone application, or a combination of both.
- **Environment and background data** include the type of roads (motorways, urban roads, etc.), traffic jams, weather data, and collision-prone locations. It can actually be any information relevant to the analytics process, for instance, the vehicle brand and model, driver's occupation, or the vehicle's primary usage. Certain insurers such as Admiral have even considered using Facebook usage data!

b. The funnel-shaped process that telematics data has to go through

We have chosen a funnel-shaped structure to present the analytics process. This is a robust metaphor for understanding the flow of telematics data, as it resembles how it moves inside the analytics machine.

- At the **top** of the funnel, a **high volume** of data is streaming continuously at a **high velocity**. The quality of data and the personal data protection is minimal.
- In the **middle**, data becomes clean and is **transformed** from the raw form into a structured table. As a result, part of the real-time or near real-time data processing transforms into batch processing.
- At the **bottom** of the funnel, the data can be exploited and analysed to **answer key questions**. By the end of the funnel, the various filtering and security measures are taken, making the level of privacy much higher than at the beginning of the process.

Fig. 2.8: Four data characters affected by the analytics process



Source: PTOLEMUS

c. The aim of the analytics machine is to answer 4 questions

The whole point of this process is to tackle questions that are otherwise impossible to answer by traditional methods. We categorise these questions into 4 classes.

Addressing each leads to an answer being provided for one specific part of a UBI business model, with each requiring a different level of analytic techniques and methods.

- **Question 1: What has happened?** This question leads to the exploration of data used to report driving performances (total mileage, highest speed points) to establish whether a vehicle requires maintenance services or whether there is a need to dispatch roadside assistance to the customer. At this level, there are common methods to choose from, which are listed as **Exploratory Data Analysis or EDA** techniques. Outcomes at this level are presented in graph and chart format as well as ad hoc reports.
- **Question 2: Why did it happen?** To answer this question, it is necessary to probe deeper into the data. This level, which is also called **descriptive analytics,** aims to 'describe' and summarise raw data to make it easier for users to interpret**.**

  For example, the answer to this question can lead to detecting crashes or determining why a crash happened (pre-crash analysis). Another example of using descriptive analysis is to identify potential cases of fraud (suspicious driving activities, such as the car being used for professional use or parked at a different location overnight, contrary to what was declared at the time of issuing

the policy). At this level, it is also possible to start ranking a driver's performance.

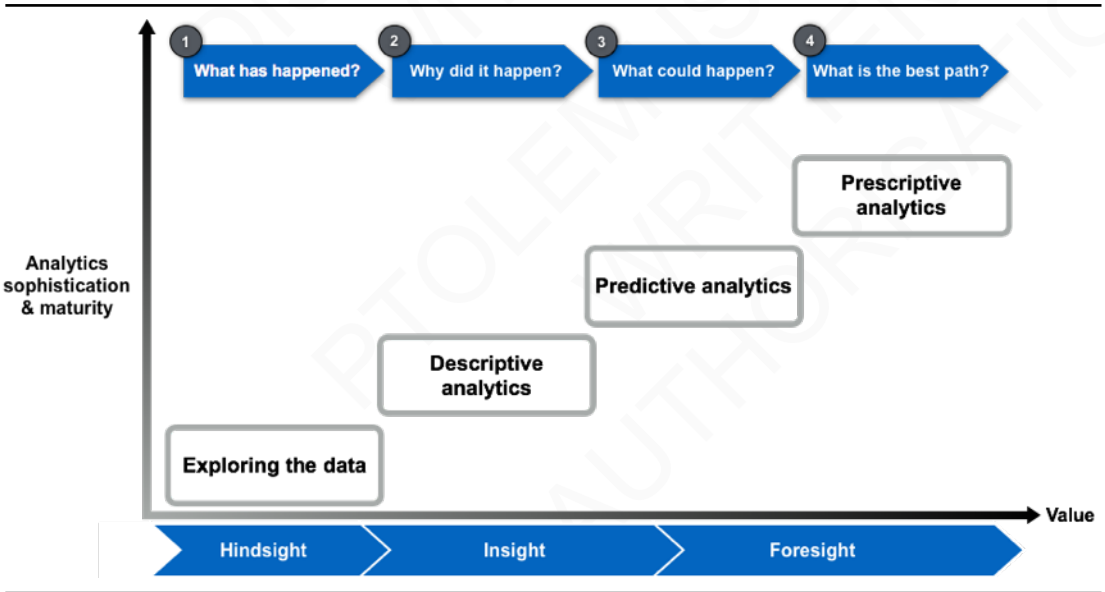
- **Question 3: What could happen?** Answering this question implies having a model to suggest (forecast) near future events. It also means **predicting** a driver's performance by building driving scores that give an overview of an individual's risk based on that individual's actual driving behaviour.

  Since most of the analysis process is done autonomously or semi-autonomously by algorithms, programmes and software, it is sometimes referred to as ***advanced predictive analytics***. At this level, predictive analytics techniques and machine learning algorithms are commonly used to find answers.

- **Question 4: What is the best path?** This question aims to find a smart solution to deal with future trends. It means looking at a customer's data beyond basic scoring models, and then associating it with other services and products. It is the deepest level of customer behaviour profiling, and is useful when the insurer wishes to renew its customer's policy or offer value added services. This level of advanced analytics is called **prescriptive analytics** and requires the highest level of competence.

We have summarised these 4 questions and they correspond with the analytics method in Fig. 2.9, which will be discussed in great detail in following sections.

Fig. 2.9: Each level of advanced analytics answers a unique question



Source: PTOLEMUS

At this point, it is important to remember that finding the answers to these questions is the outcome of the analytics machine.

Because answering each question requires different sets of data, **it is crucial to prepare the telematics data before starting to explore and exploit it.** Data preparation requires that a process is in place to handle, clean and manage information received from drivers.

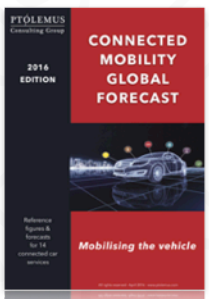
2. There are 6 steps in processing telematics data before applying analytics

The most comprehensive research on the UBI Analytics market

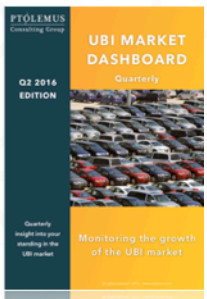
The reference report on the UBI global market

Handbook of suppliers & markets

30 insurance markets and 60 suppliers analysed



The reference report on the connected mobility services



Quarterly dashboard of the UBI market

A 100-page barometer of the global UBI industry