BACE 2015

Big Data Creation in Telematics

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Director

April 8, 2015

TOWERS WATSON

Agenda

- What is Big Data
- Tackling the problem
- UBI Case Study

What is Big Data?

- **‘We are drowning in information and starving for knowledge’**
  - **Rutherford D. Roger - 1985**

- ‘the multitude of books, the shortness of time, and the slipperiness of memory do not allow all things which are written to be equally retained in the mind’
  - Vincent of Beauvais - 1255

- **‘The abundance of books is a distraction’**
  - **Seneca- 100 AD**

- ‘Big data is like teenage sex: everyone talks about it, nobody really knows how to do it, everyone thinks everyone else is doing it, so everyone claims they are doing it’
  - Dan Ariely - 2013

What is Big Data?

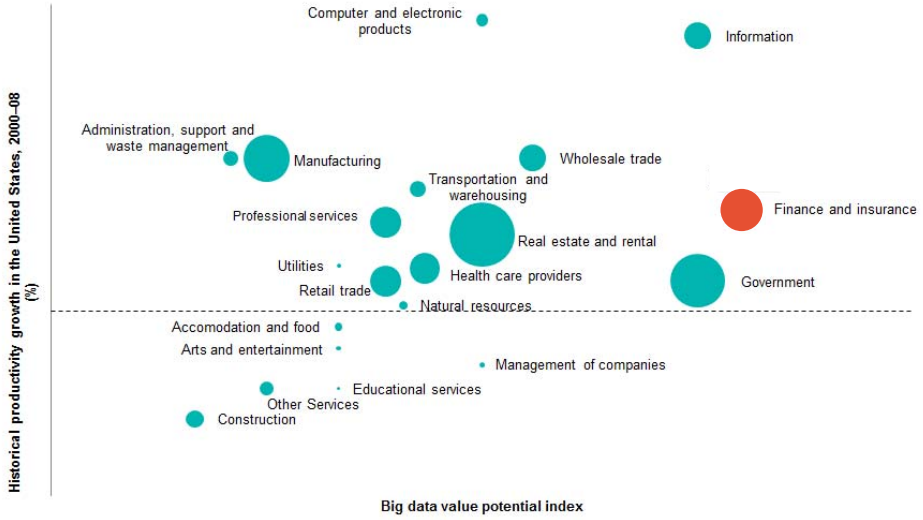
- 2000+ petabytes (> 2 * 10^{12} megabytes) of information is generated every day.
- 90% of the data available today have been created in the last 2 years.
- Increasing variety of sources
- Only 5% of available information is used by companies: so much room to generate new insights

Source: IBM, Google, McKinsey Research Institute, Gartner, Wikibon

The Data world is changing, creating many new opportunities and challenges

Big Data within the Insurance Industry…

A favorable environment	The right skills	Some hurdles to overcome
• Insurance is data intensive • Applications involving pricing and marketing	• Insurance holds leading analytical talent • Actuaries have skills to be Big Data scientists	• Change of mind-set to drive innovation with Big Data • An evolution of IT is required



Source: US Bureau of Labour Statistics; McKinsey Global Institute analysis
Size of bubble represents relative sizes of GDP
1- Productivity growth rate not at scale for computer and electronics products due to significantly highest growth observed.

Insurance possesses one of the highest potentials for Big Data value

Big Data Innovation

Big Data is on the Insurers' Executive agenda

- **15-20%** of insurers are planning to move to Big Data solutions within the next 12 months[1]
- **>25%** of insurers are using or plan to use Internet clickstreams, audio data, mobile geospatial data, telematics and social media[1]

[1] Novarica / Tata Consulting survey: big data and analytics in Insurance, 9 August 2012

Example of Insurers' Big Data initiatives (press and public information)

RSA

- Unveiled a new Marketing Centre of Excellence for Customer Analytics and Proposition Development, supporting UK and overseas markets

Source: RSA Centre of Excellence website - http://www.rsacentreofexcellence.com/

AXA

- The AXA Business Intelligence and Analytics function is a research and analytics center of excellence operating across Life and P&C markets

Source: AXA Business Services website

AVIVA

- Investing in predictive analytics across personal and commercial lines
- Developing centers of excellence in this area to improve performance across the Group.

Source: Aviva Group plc – 2012 Report & Accounts

AIG

- Created Data Science Team focusing on analytics to enable science-driven decisions about their strategy across underwriting, product innovation, pricing, distribution, marketing, claims and customer experience.
- Created position of Chief Science Officer reporting to the CEO

Source: AIG website – 11 December 2012

MetLife

- Relocating 2,600 to new U.S. Retail Business and Global Technology & Operations hubs

Source: MetLife website –, 7 March 2013

GENERALI assurances

- Generali Assurances (France) are currently running Proofs Of Concept to explore the value of Big Data

Source: L'Argus de L'assurance – September 2013

Big Data innovation is a key driver for growth and innovation in both Insurance and professional service organizations

Big Data Applications

- Next best action (sales, servicing, claims)
- Real time offers based on customer profile

- Persistency management
- Campaign optimization
- Personalized customer experience

- Workforce forecast
- Workforce allocation, and resource optimization

- Leads value analysis
- Otimization per sales channel

- Fraud detection / investigation

- Risk selection optimization
- Granular profitability assessment

- Claim triage optimization
- Claims performance analysis

Big Data hubs serve initiatives across insurance organizations

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TACKLING THE PROBLEM

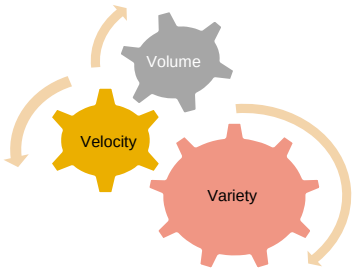
Tackling Big Data

- Curating information is part of the human condition
- Information age has changed the tools but not the core principles
- A librarian's functional skill set
  - Storing
  - Sorting
  - Selecting and Summarizing

Storing Data

Data

Data Sources

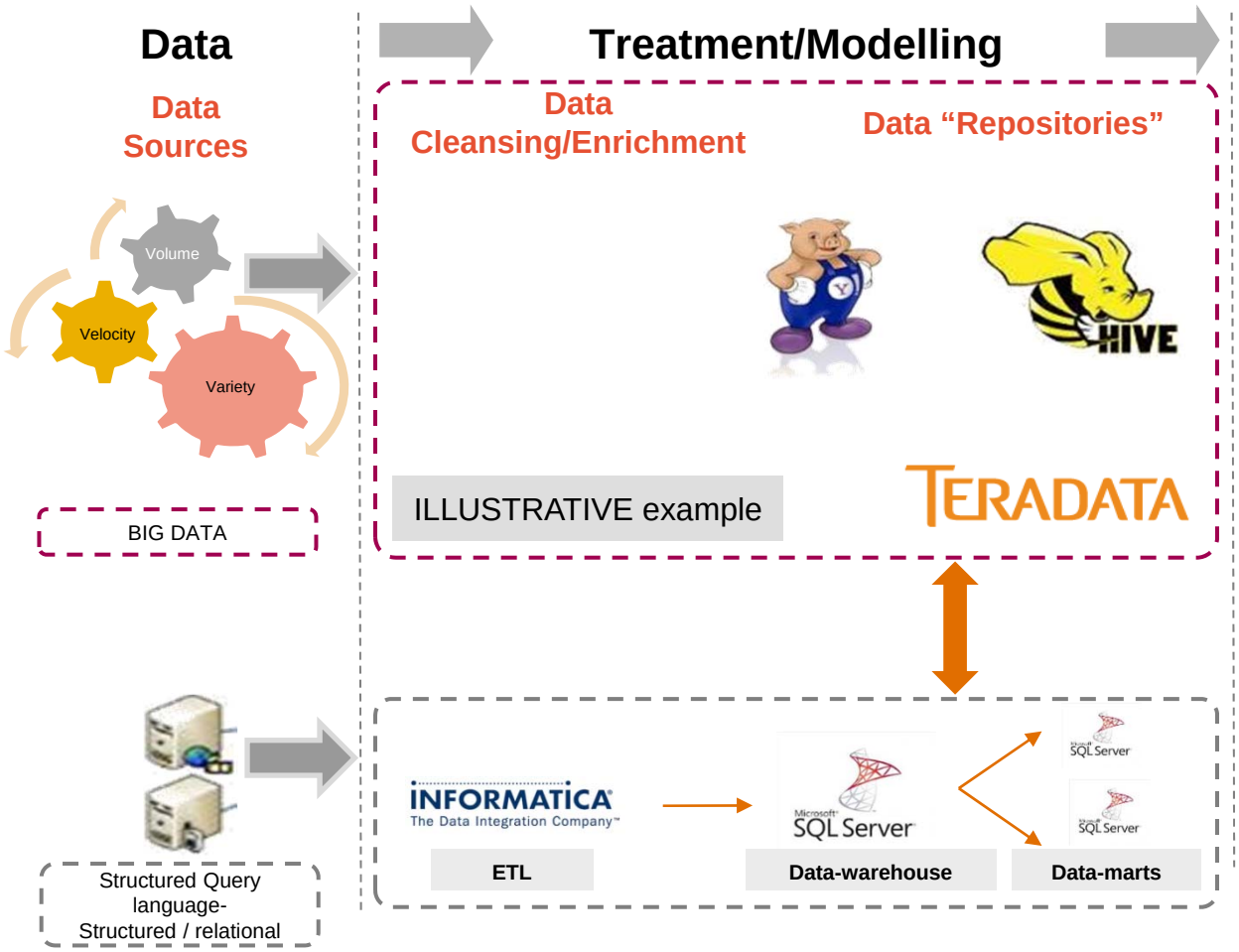


BIG DATA

Structured Query language- Structured / relational

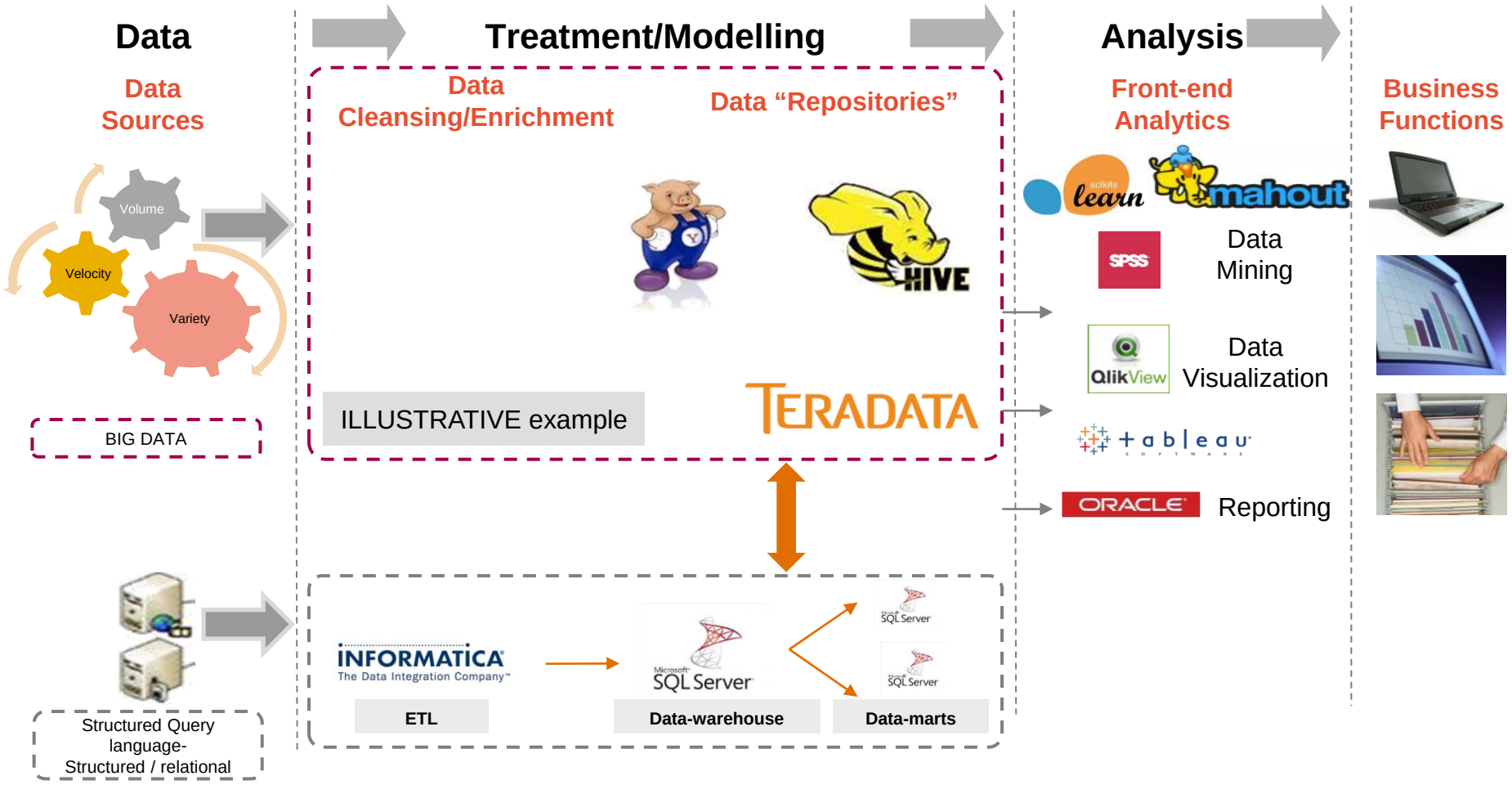
- IBM's 'V' s
  - Volume
  - Velocity
  - Variety
- 'Modern' architecture relies on a clean structural format (e.g. star schema)
- Variety of new data comes from an unstructured environment

Sorting Data



- Transforming unstructured data requires a range of solutions
  - IT issues
  - Analytical
- Search engine functionality is phenomenal but still need cataloguers and indexers

Selecting and Summarizing



Selecting and Summarizing

Data scientist would undertake innovative approaches such as:

- Supervised learning
  - Predict a variable using other independent signals (via scoring functions, regression, classification)
- Time series
  - Predict one time-dependent variable using its history and other variables
- Graph analysis
  - Analyze relationships between nodes and edges of the graph (clusters, centroids)
- Unsupervised learning
  - Create groups of observations with the same characteristics (users, products, and features)
- Exploratory analysis
  - Identify underlying patterns and correlations within one or several datasets
- Sequence analysis
  - Identify items that are frequently associated within a transaction/events flow, with a particular order

Actuaries possess an ideal profile to become data scientists
They would need training to new technologies and adapt to an entrepreneurial environment, experimentation-friendly ambiance

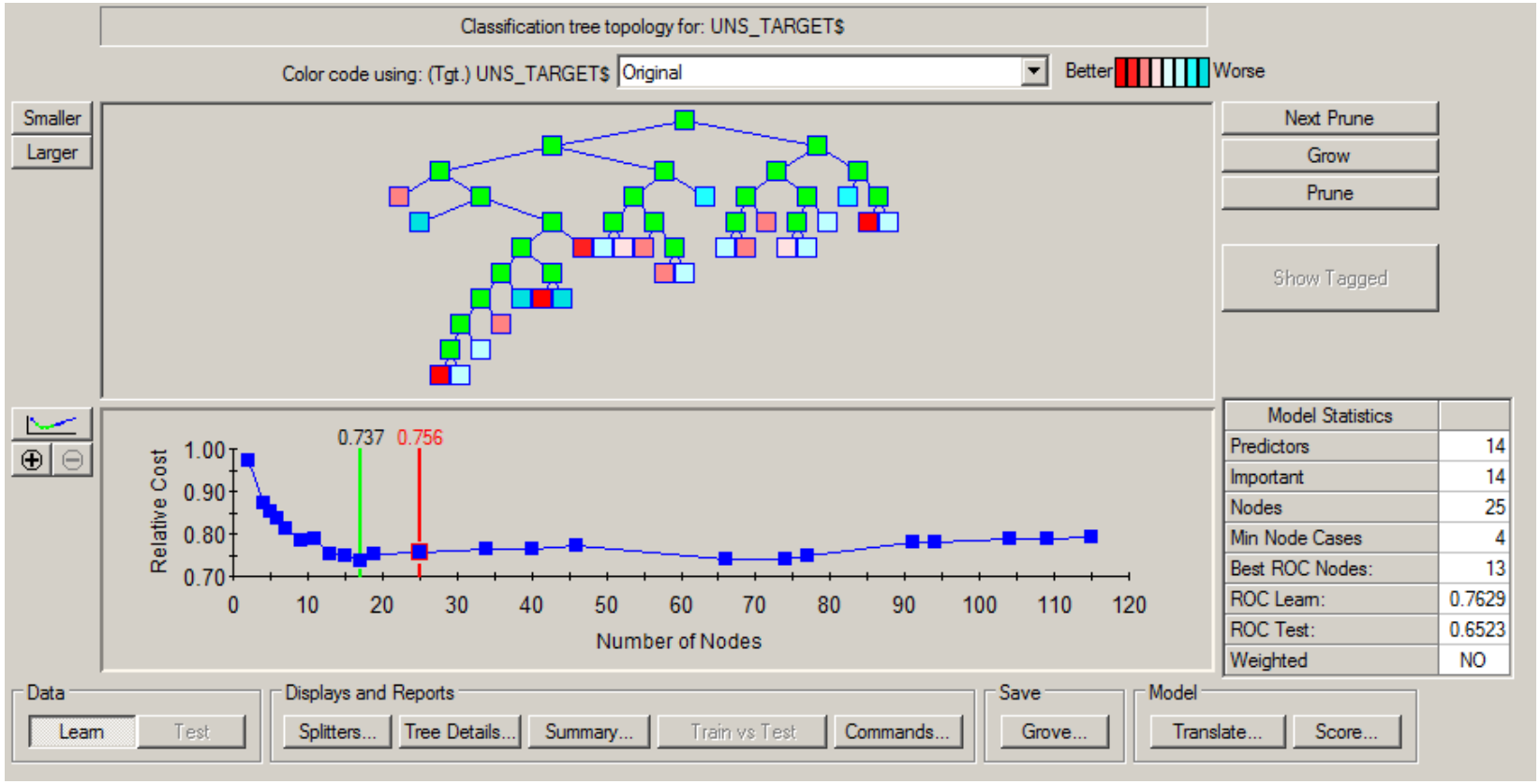
Selecting and Summarizing

- Alternate techniques are needed for unstructured data

Word clouds are useful in identifying particular patterns in unstructured text data

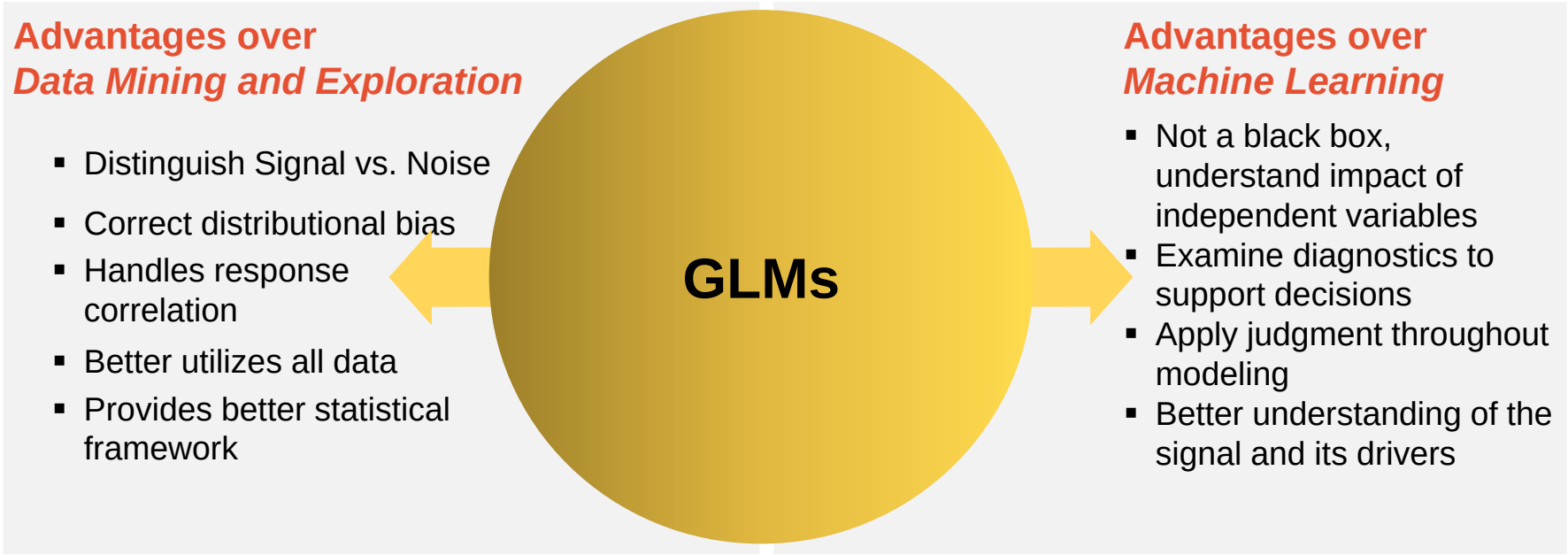
Selecting and Summarizing

- Decision trees are invaluable tools in unsupervised sequence analysis



Selecting and Summarizing

- GLMs are the current industry standard in quantifying relationships



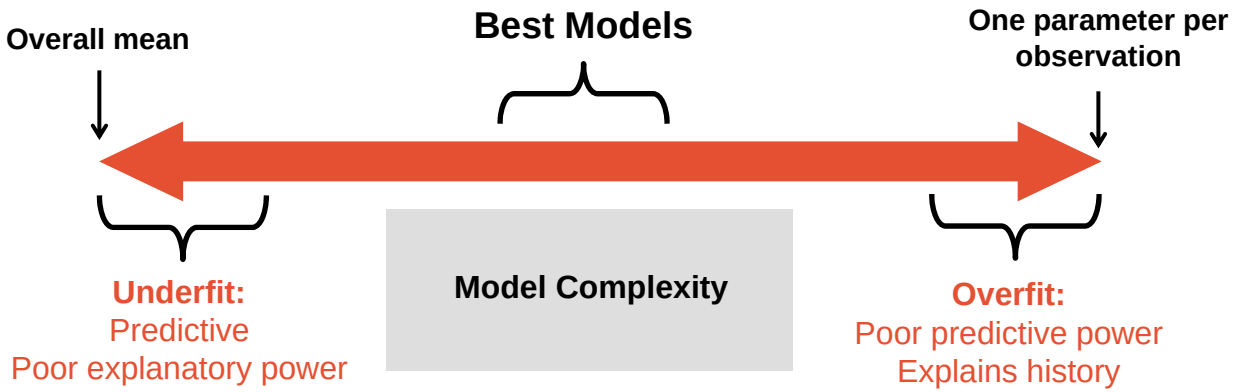
Principle of Selecting and Summarizing

- The goal is to produce a sensible model that explains recent historical experience and is likely to be predictive of future experience

1. Separate the signal from the noise

Response Variable = **Systematic Component** + **Unsystematic Component**

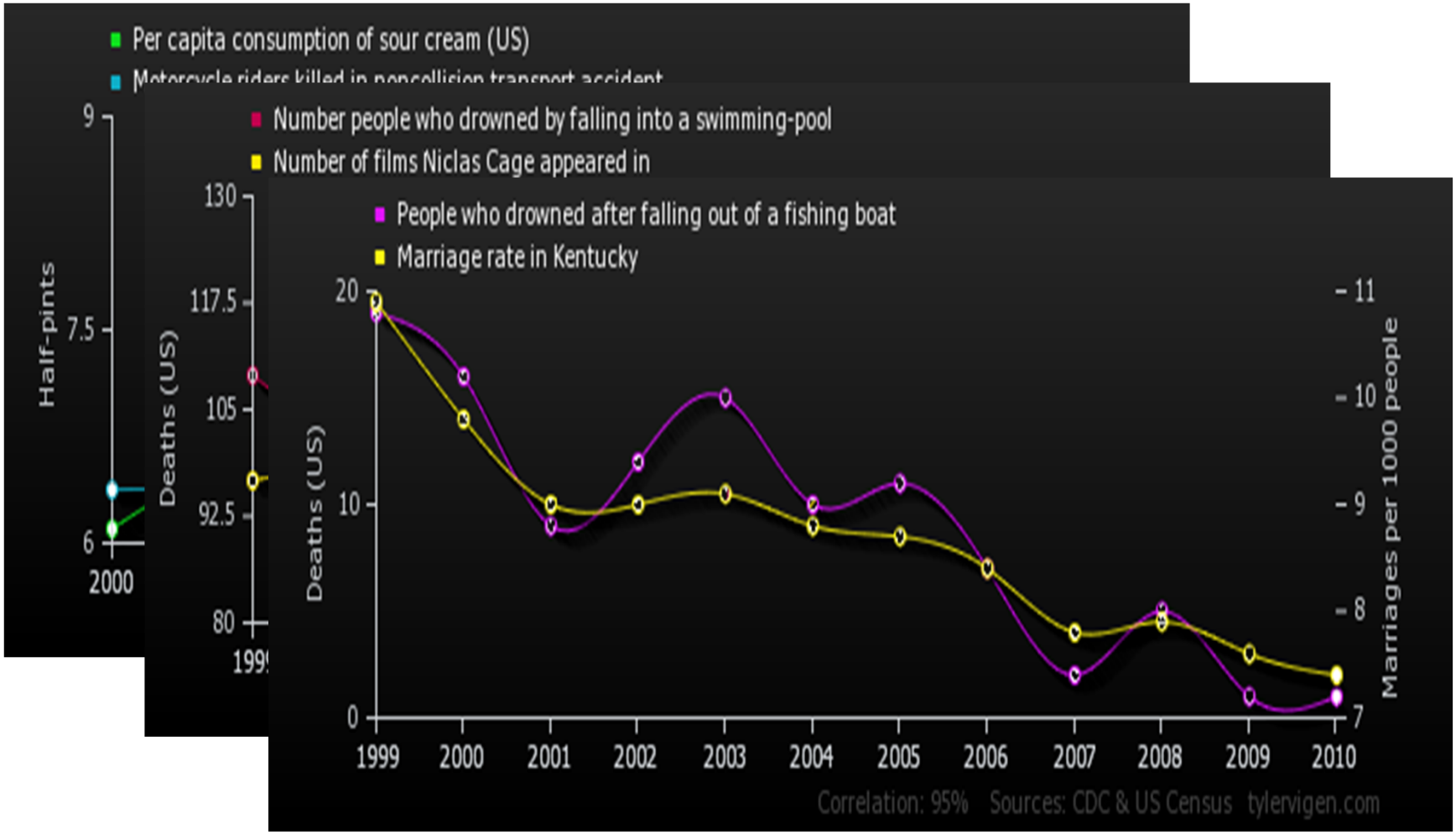
2. Balance predictive and explanatory effects



- The risk in not using big data is to miss signal whereas the risk in using big data is to highlight the noise

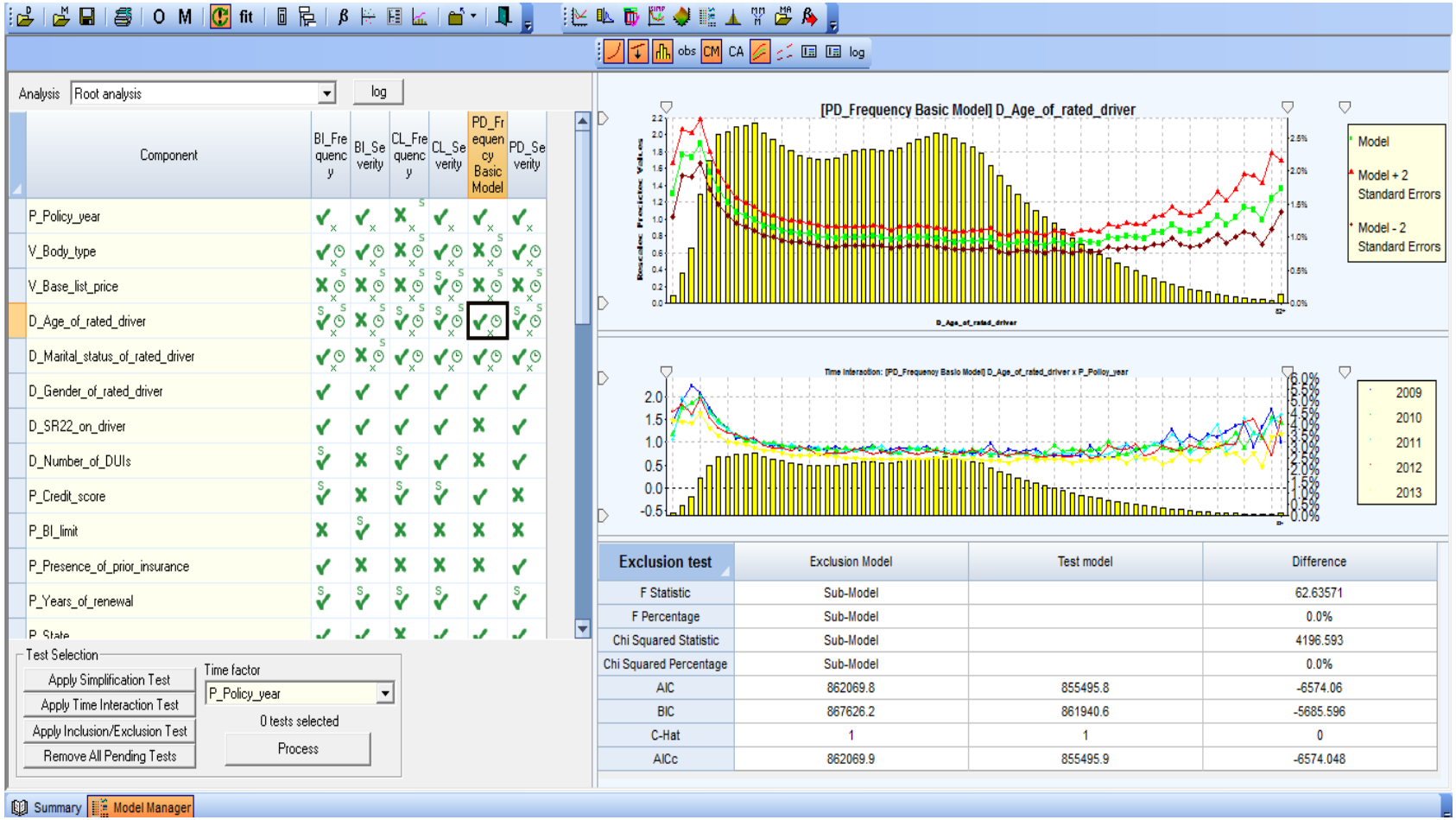
Principles of Selecting and Summarizing

- Methods applied to big data identify and control for correlative effects.



Principles of Selecting and Summarizing

- A library of statistics integrated with subject matter expertise is required to interpret patterns in data



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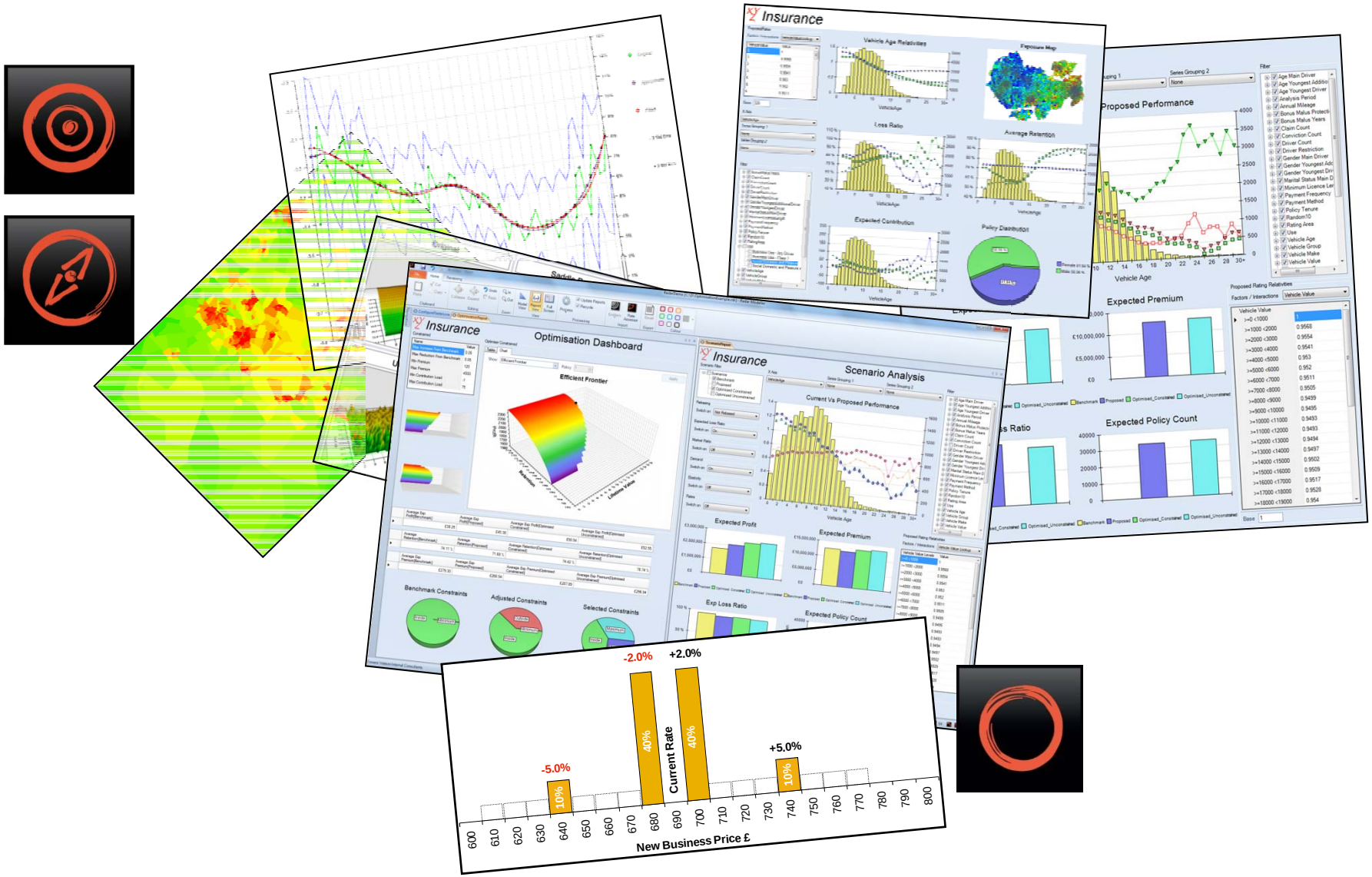
CASE STUDY

Pricing is a prime example of big data integration



Use Case:
Pricing: More Accurate Assessment

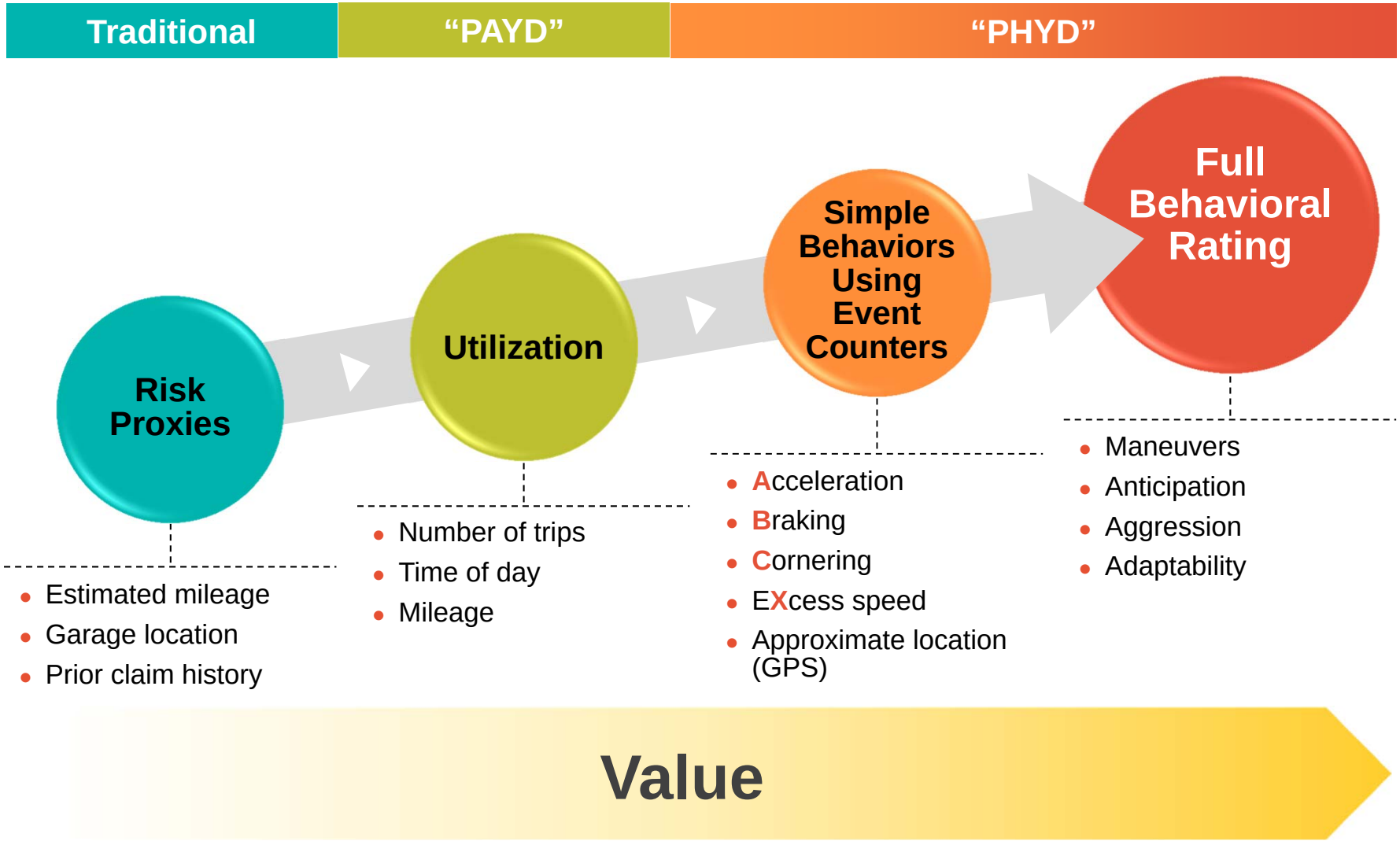
Proposed analysis

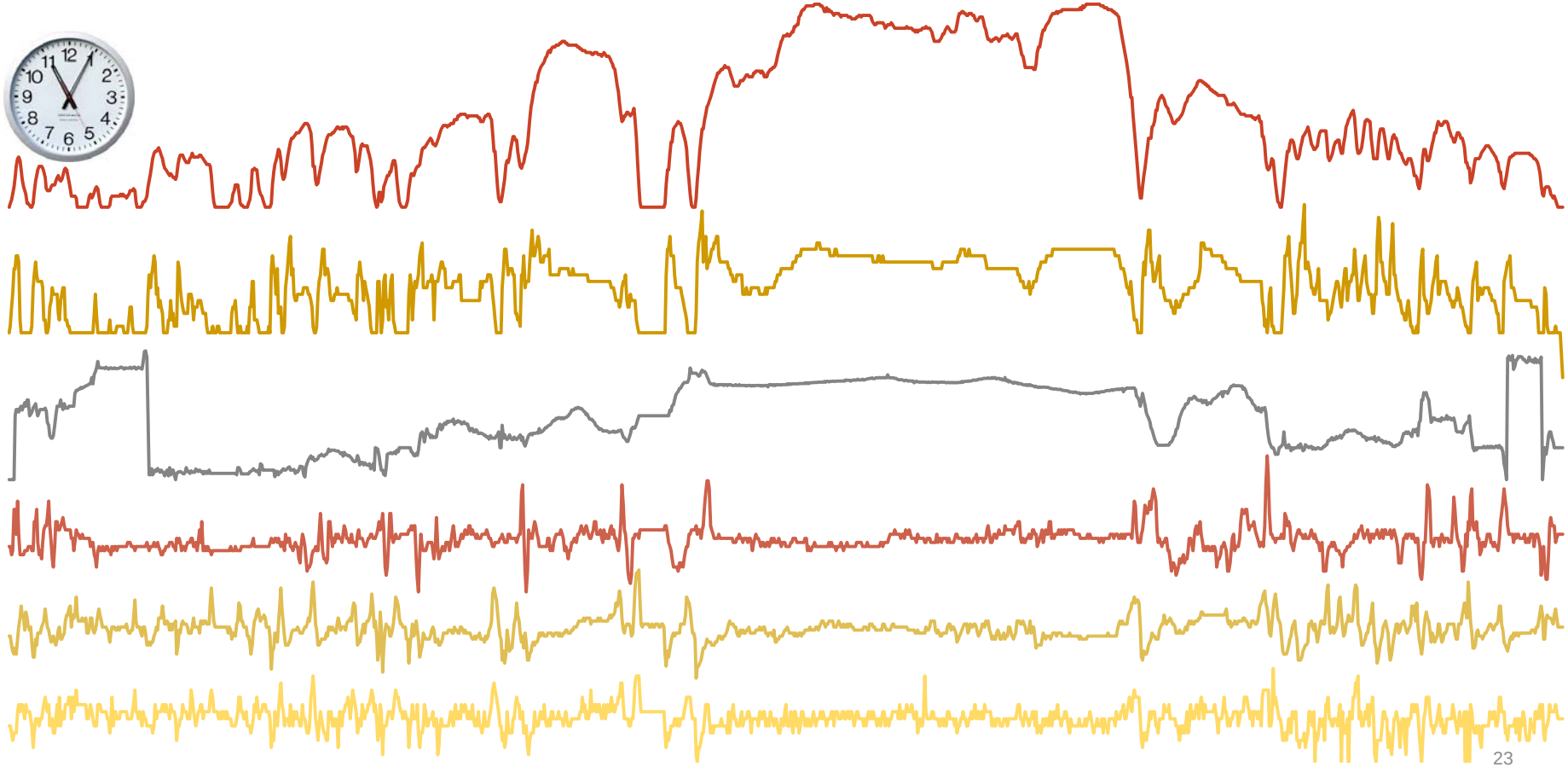
1. Accurate risk assessment is a key to appropriately categorize and rate auto insureds. Currently, the majority of characteristics in use today are proxies and/or are unverifiable
   - How much is the vehicle being operated? (estimated miles, household composition)
   - Is the vehicle really away at school? (insured's declaration)
   - Is the vehicle being operated safely? (prior accident/conviction record, class plan, etc.)
2. Telematics devices provide accurate information about where, when, and how the vehicle is actually being operated
3. Combine insurance data, telematics data, and external data to determine an accurate risk assessment for insured vehicles

Key data sources to be considered

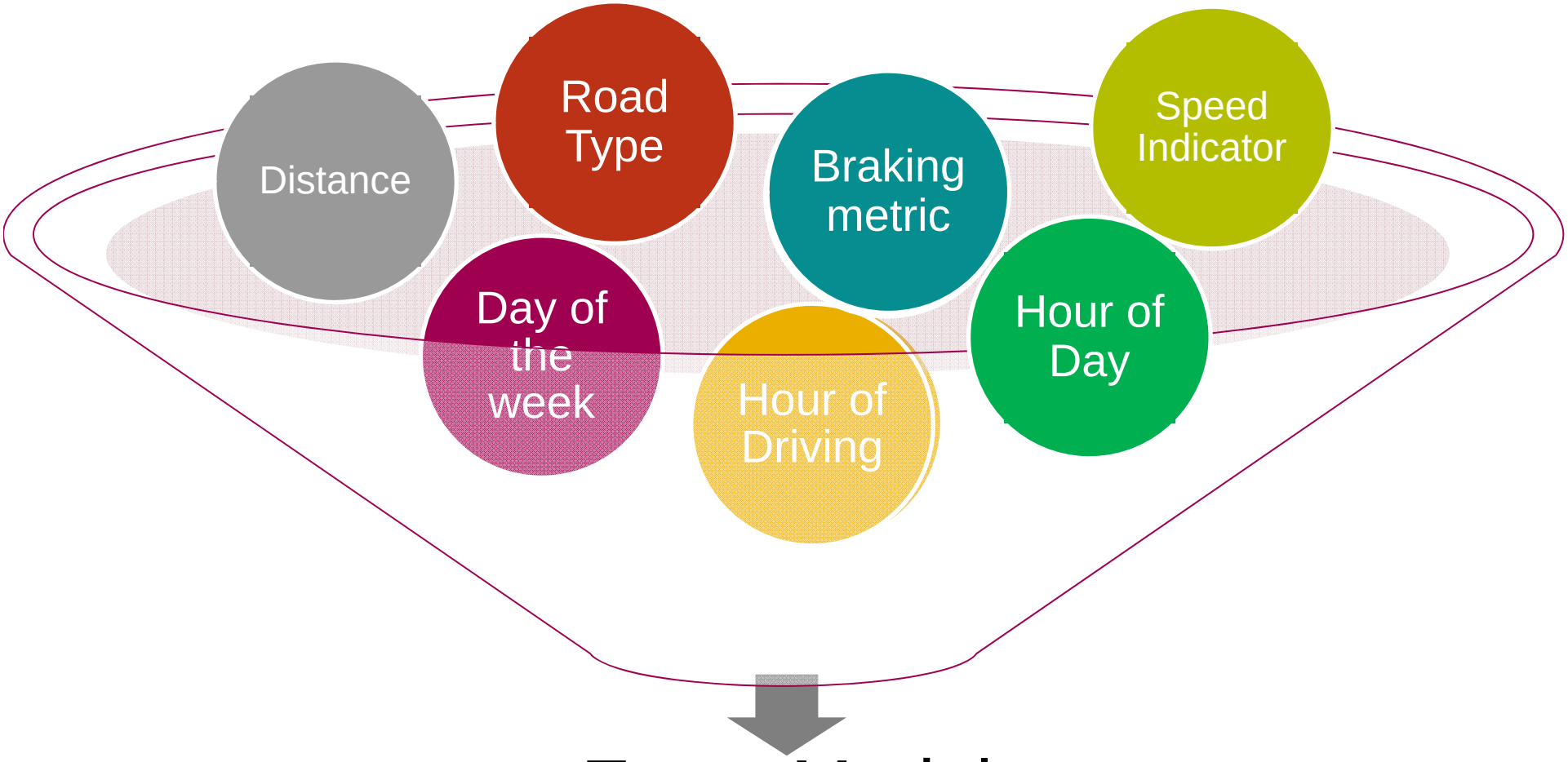
1. Current insurance characteristics
2. Telematics data collected at least second-by-second, ideally including GPS
3. External data sources (e.g., road type, speed limit, traffic, weather)

Data granularity and the consumer proposition

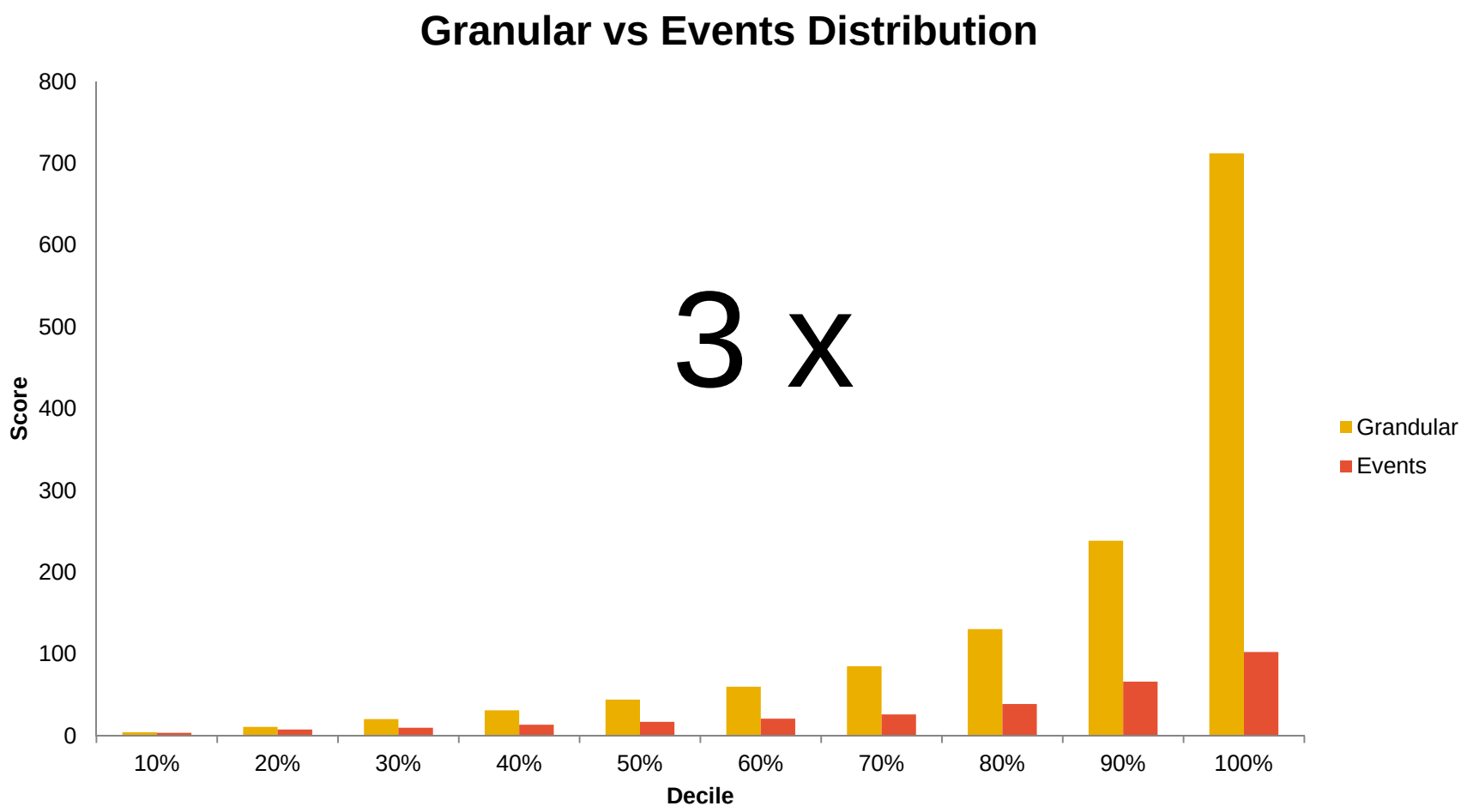




Risk of an accident (Events vs Granular)



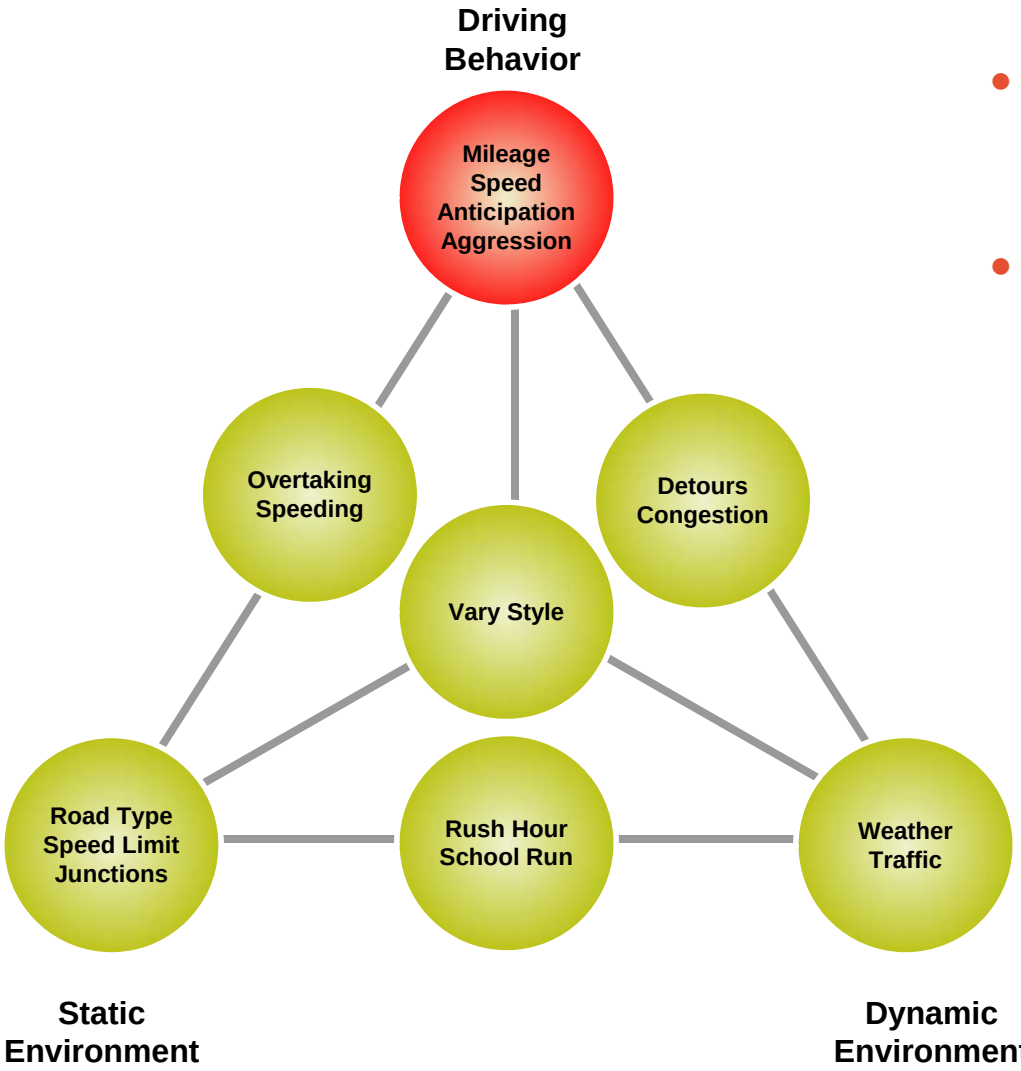
Distribution (Granular vs Events)



Powerful new contextual rating factors

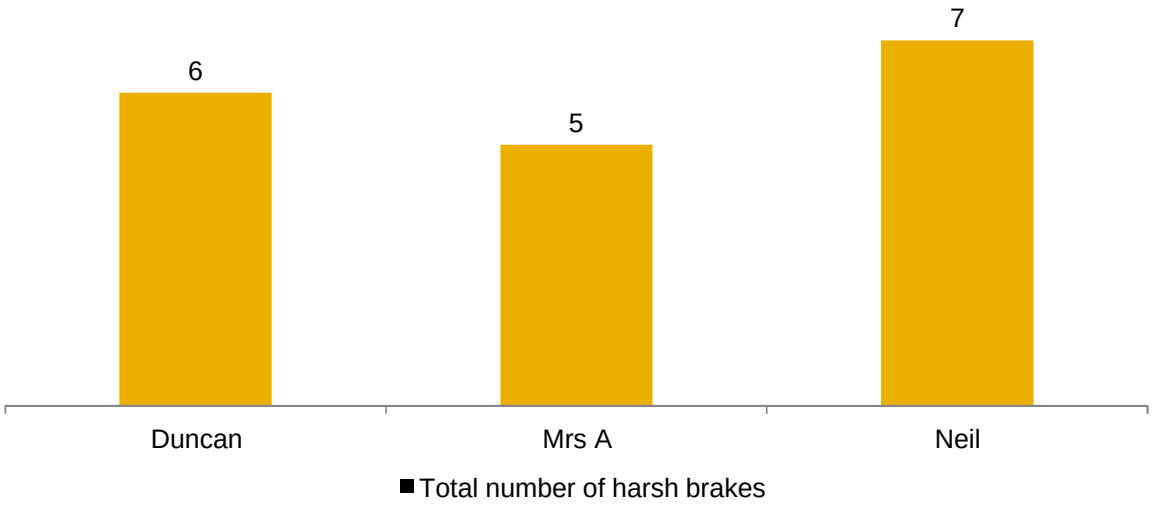
- Effectiveness depends on granularity and timing of data
- Per second data (or more frequently) significantly increases effectiveness:
  - Driving behavior cannot be observed effectively in minute/hourly intervals
  - "Average" driving over policy quarter/year does not pinpoint risky behavior
  - Risk factors can be created from raw journey data in context

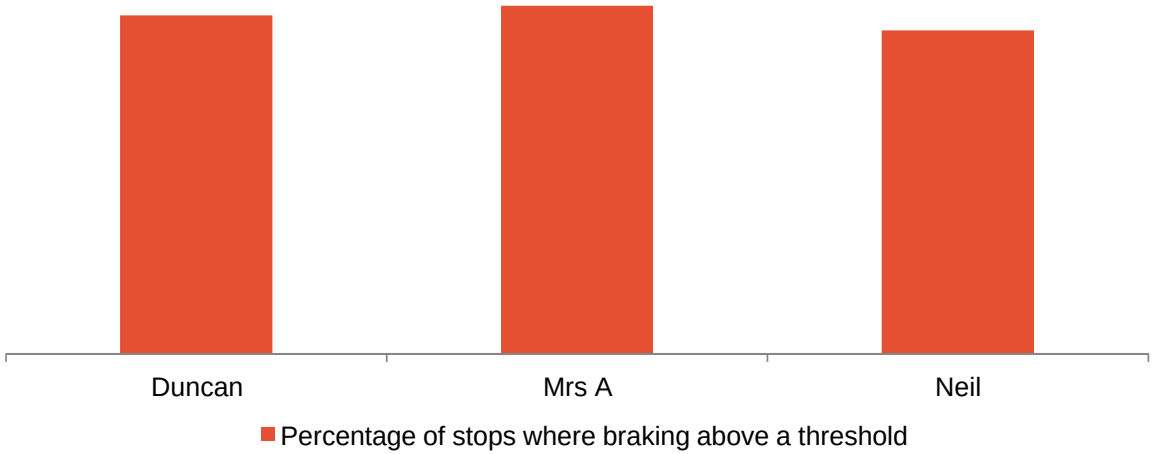
Powerful new contextual rating factors



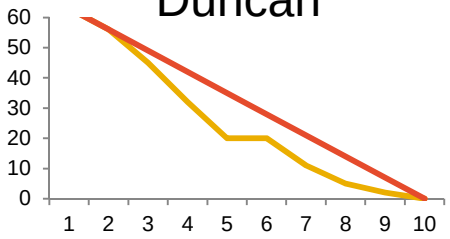
- Key data comes from devices connected to or carried in the vehicle
- Similar data collected at tolls, road junctions, safety checks, satellites, etc.

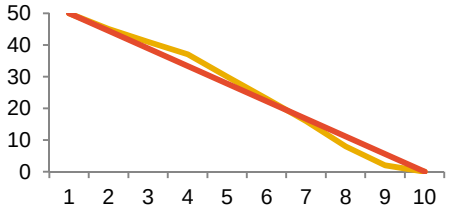
Simple braking metrics

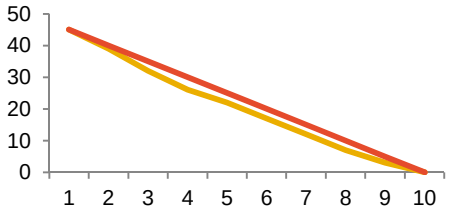


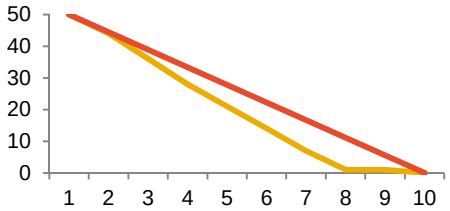


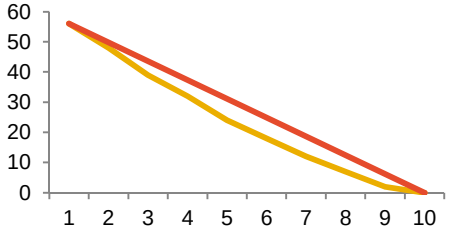
Duncan



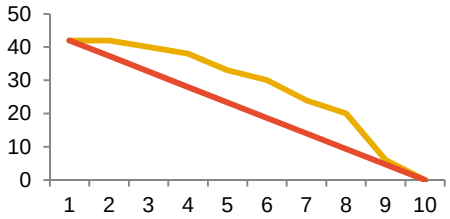


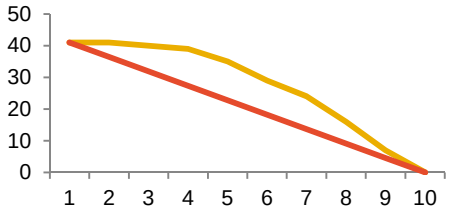


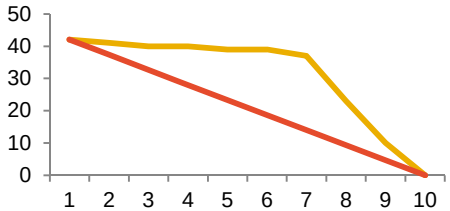


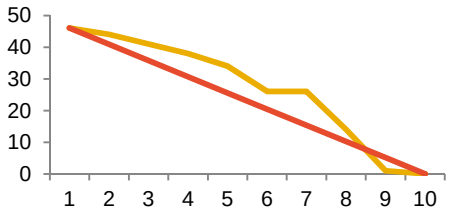


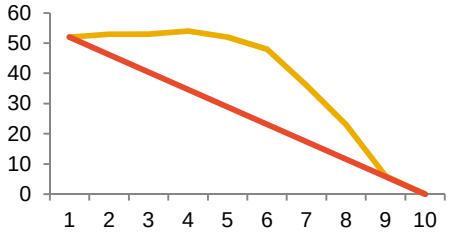
Mrs A



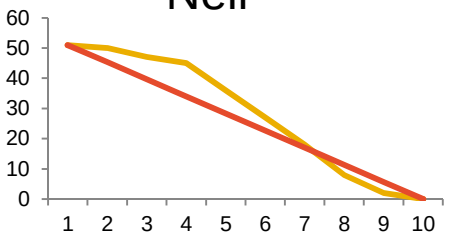


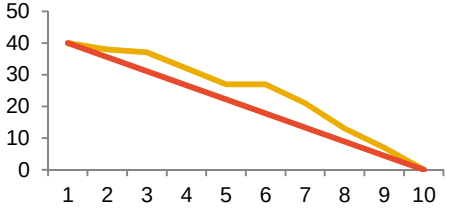


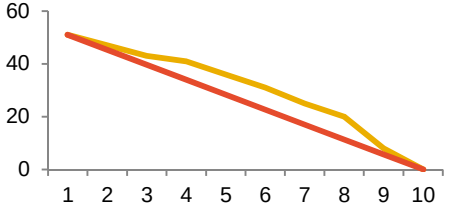


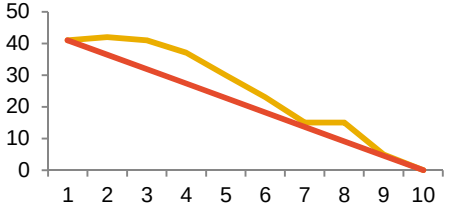


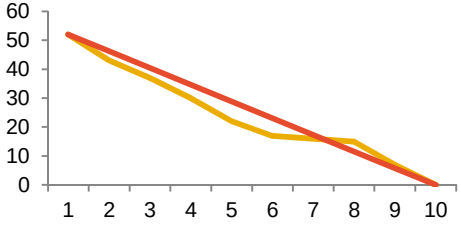
Neil

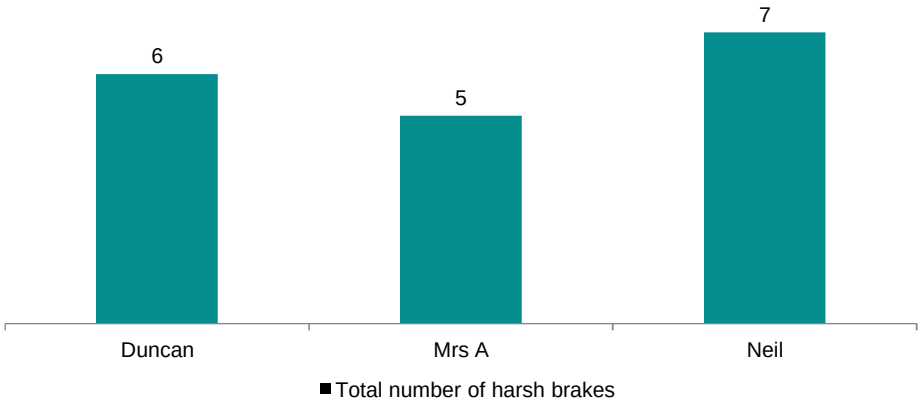


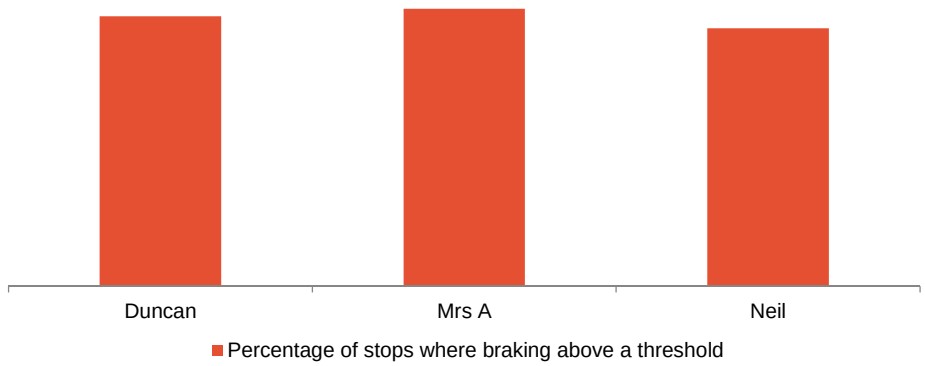


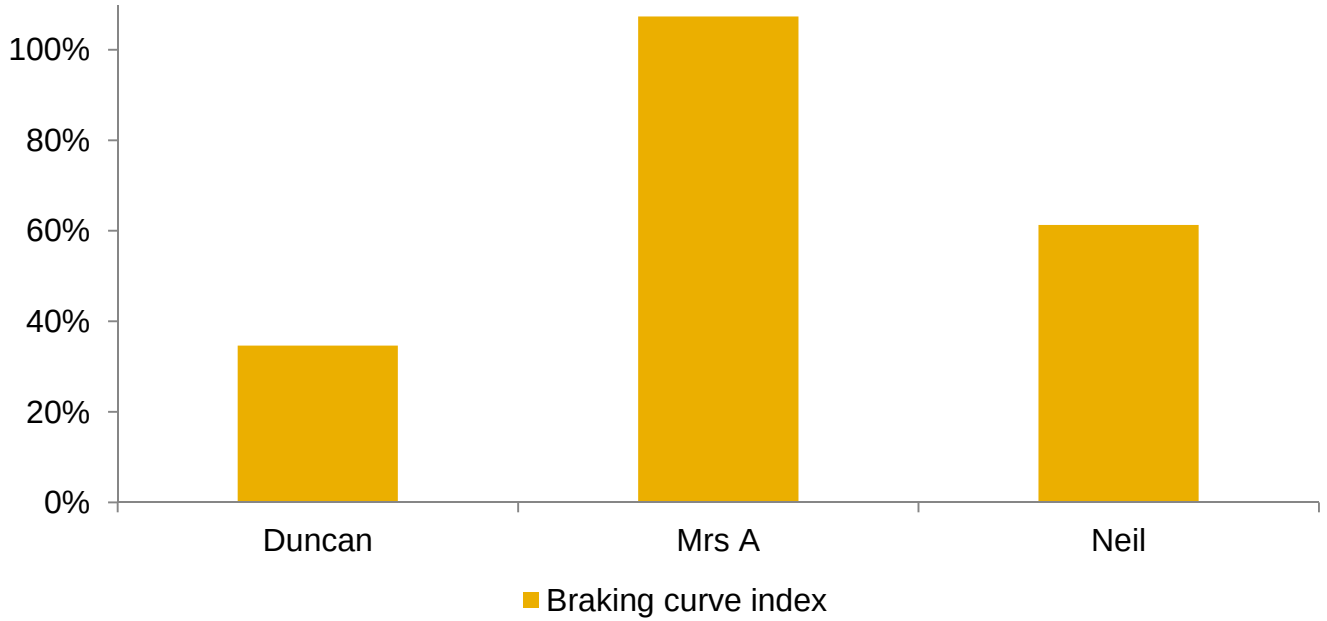




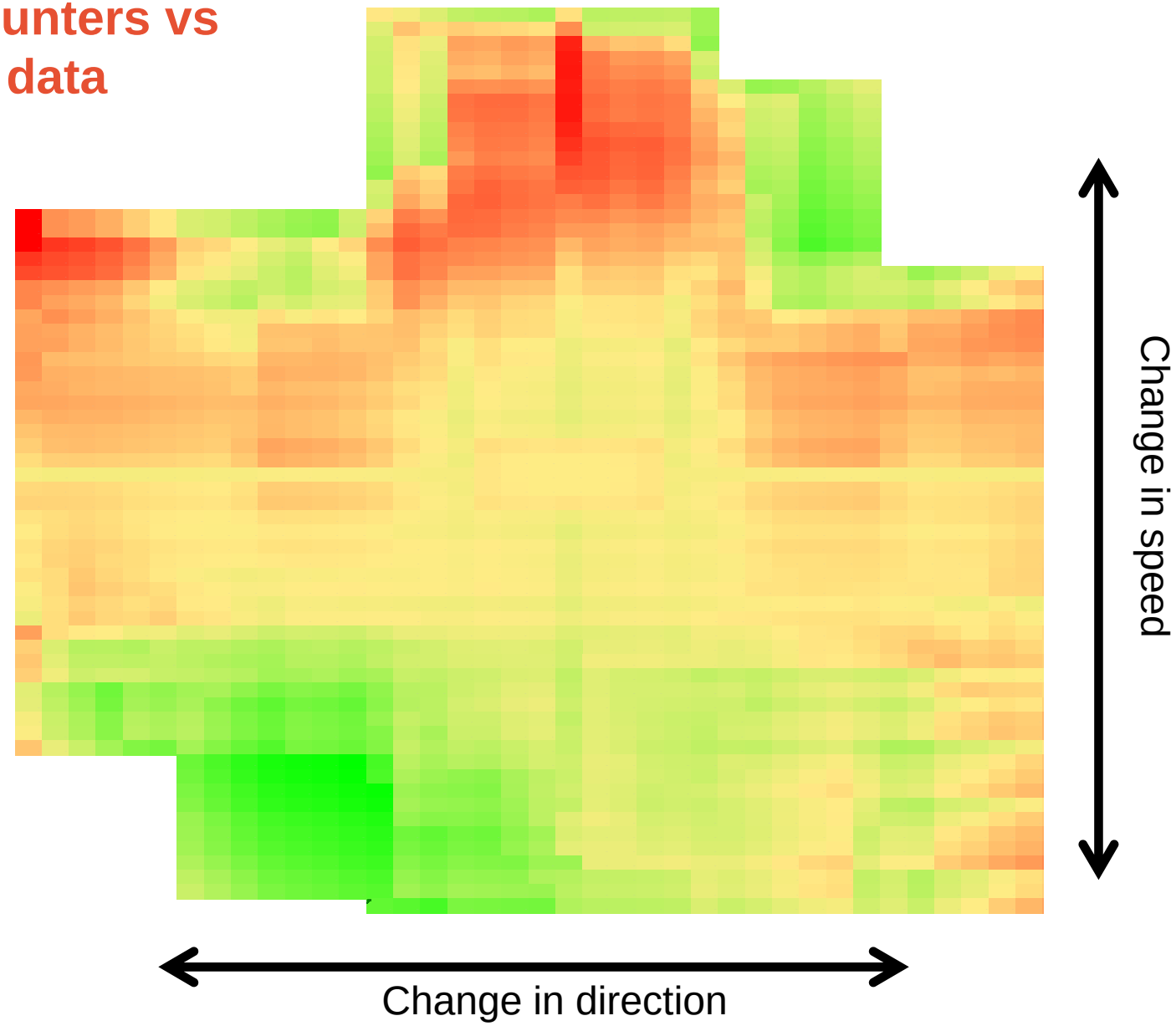




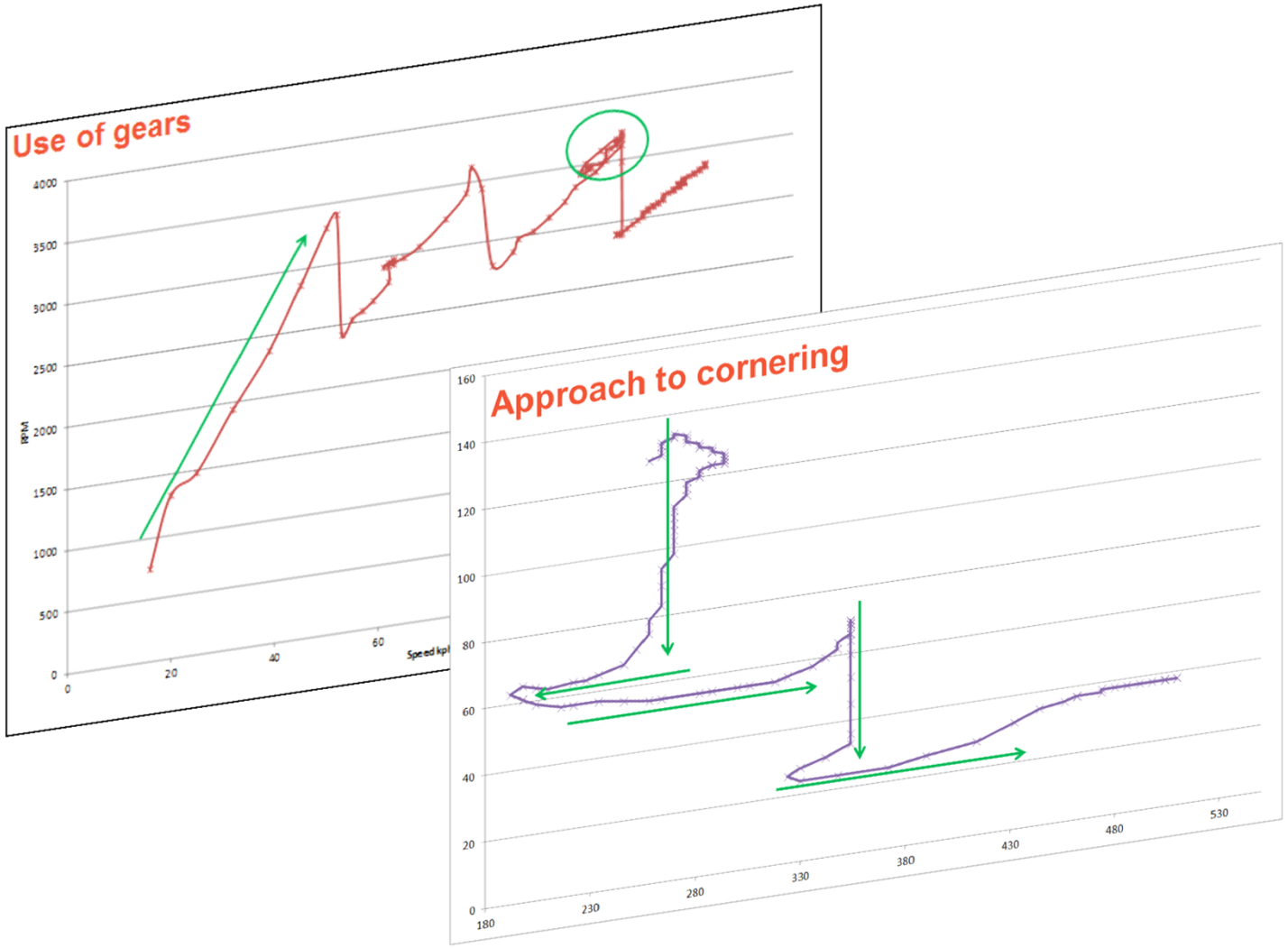




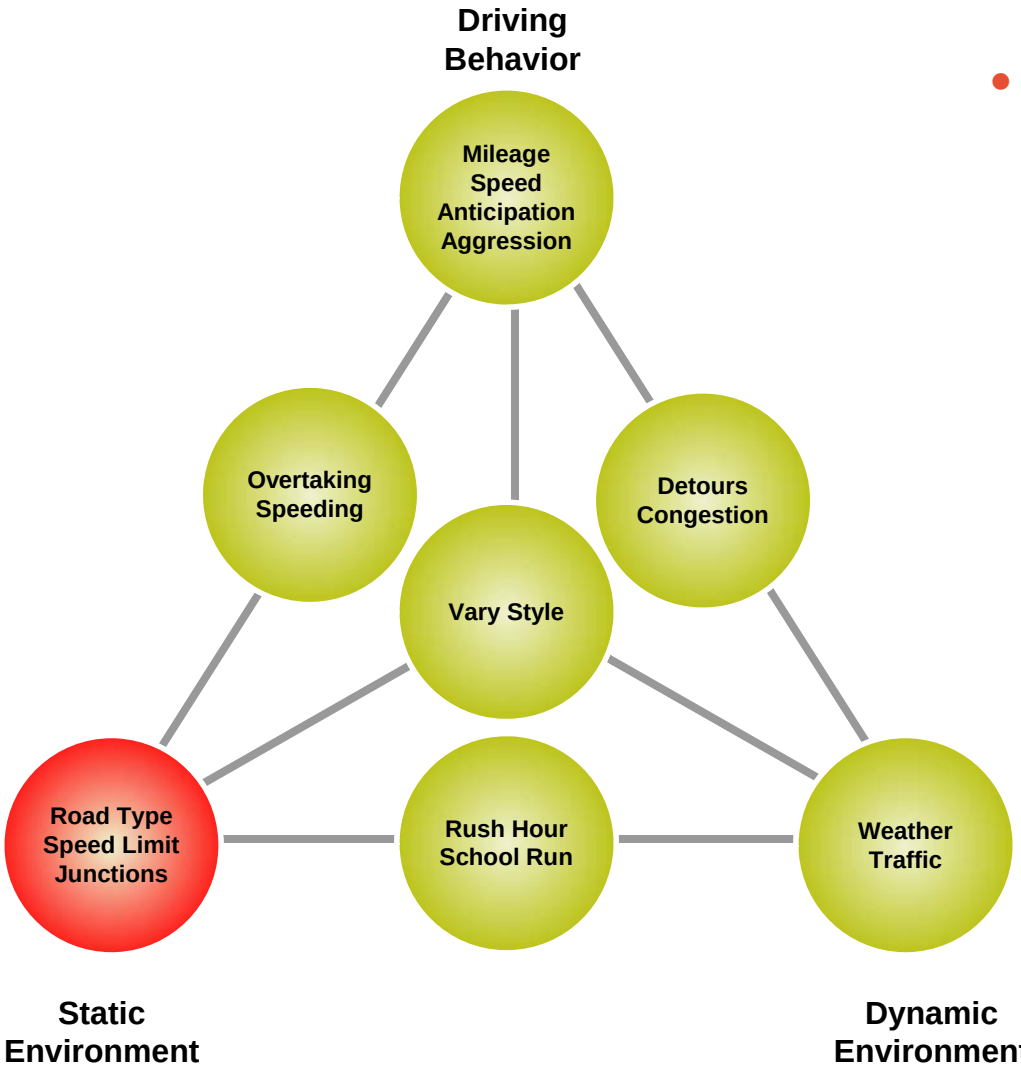
Event counters vs granular data



Other examples

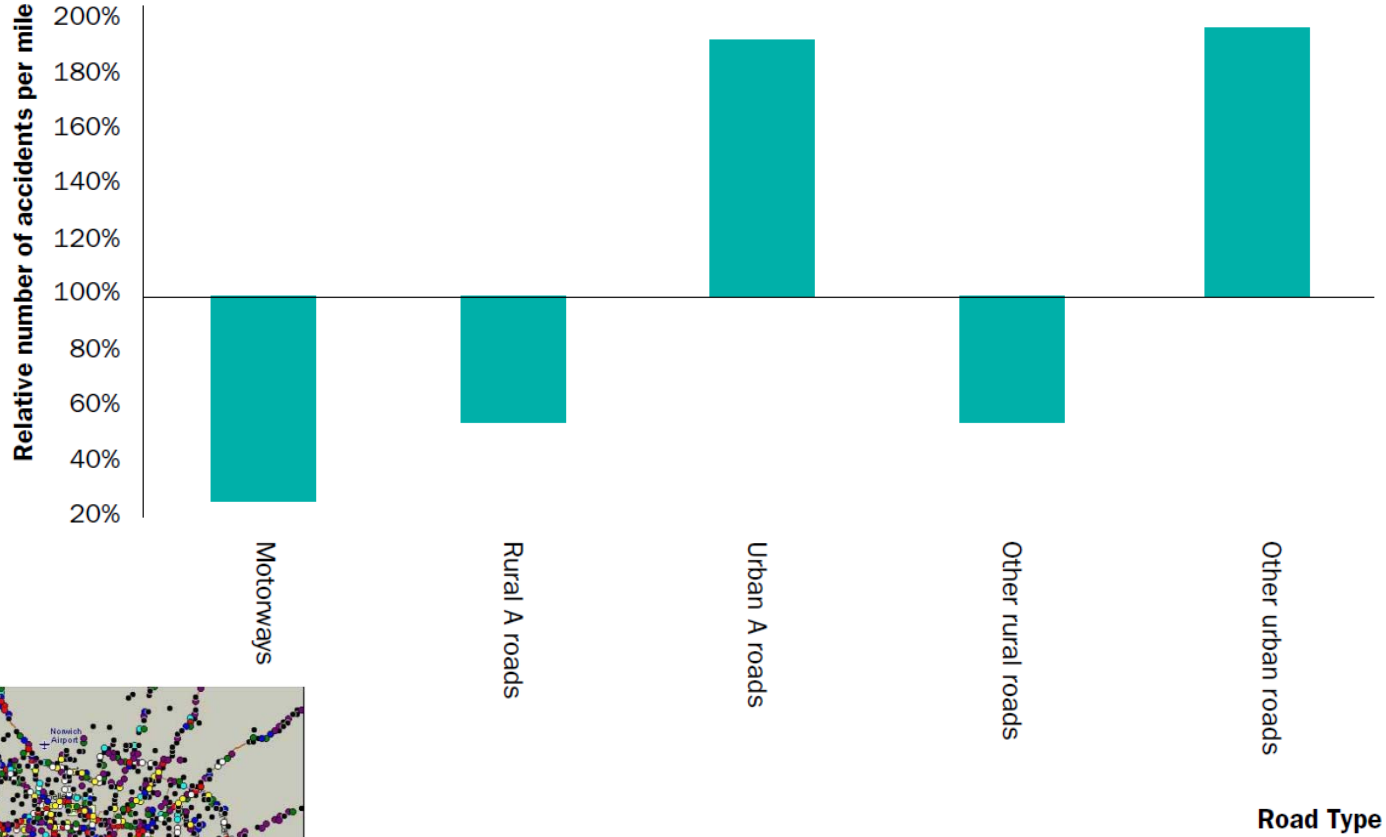


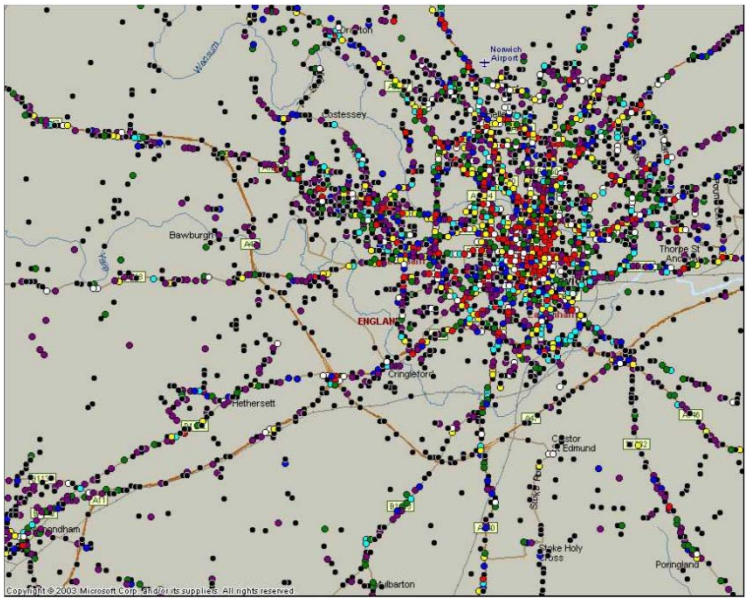
Powerful new contextual rating factors



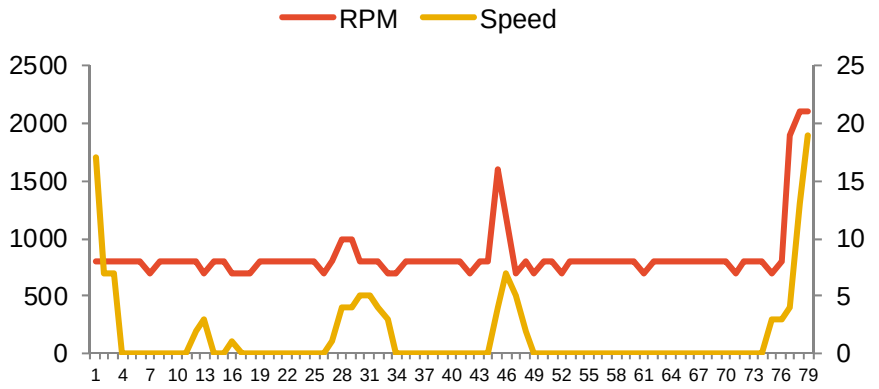
- Information around static conditions informs the context of the driving

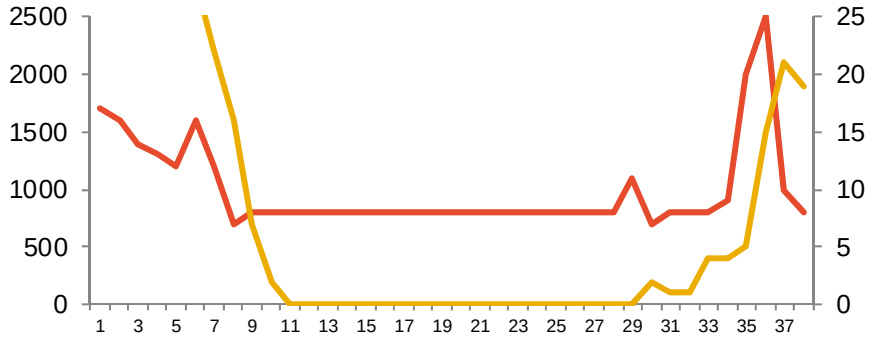
Road type

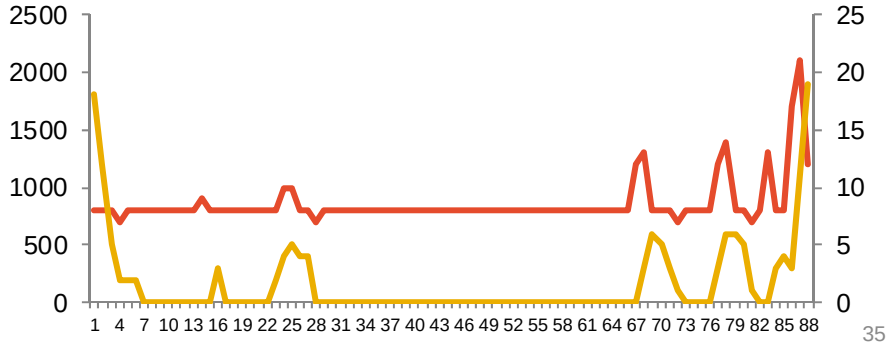




Junctions







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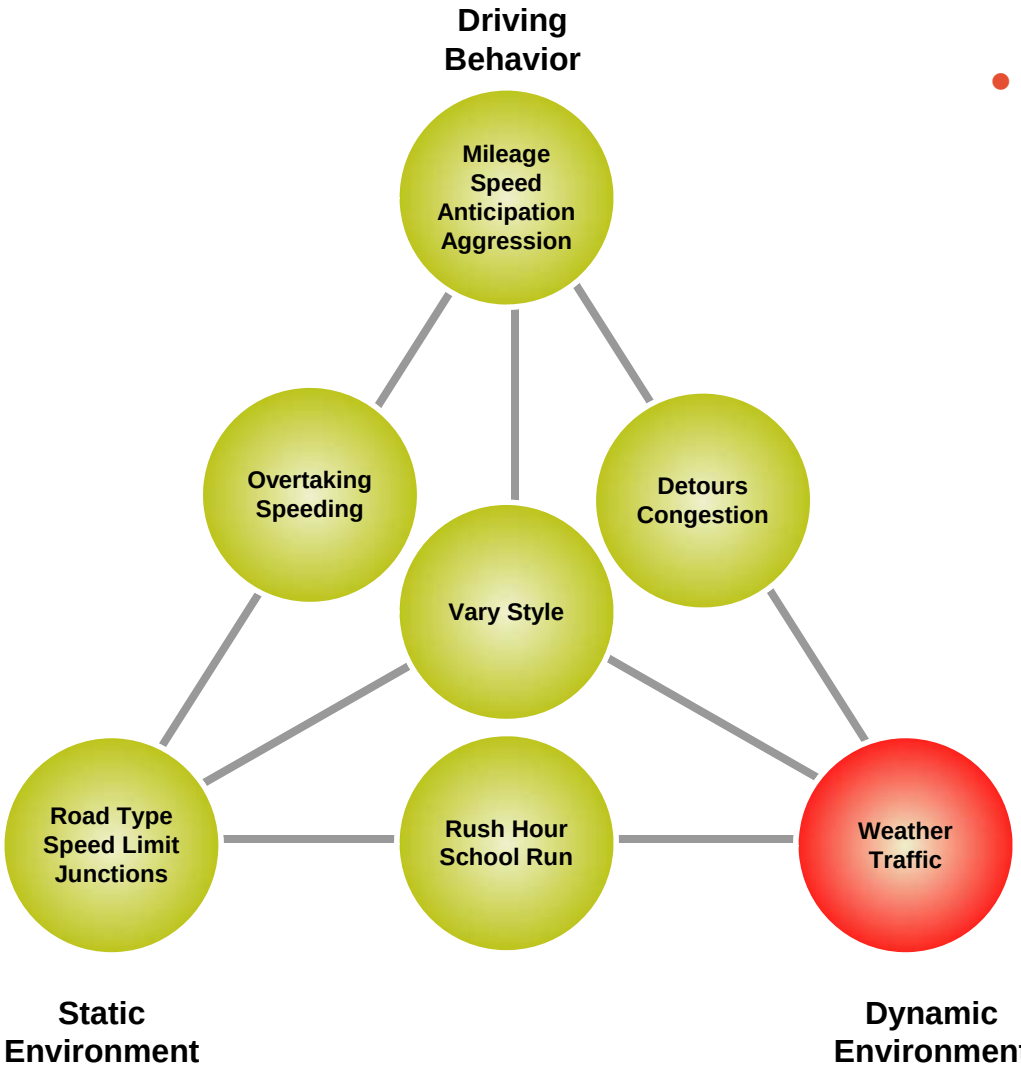


- Matching dynamic conditions to the specific time and place of vehicle operation provides insight into behavior adapted to changing conditions

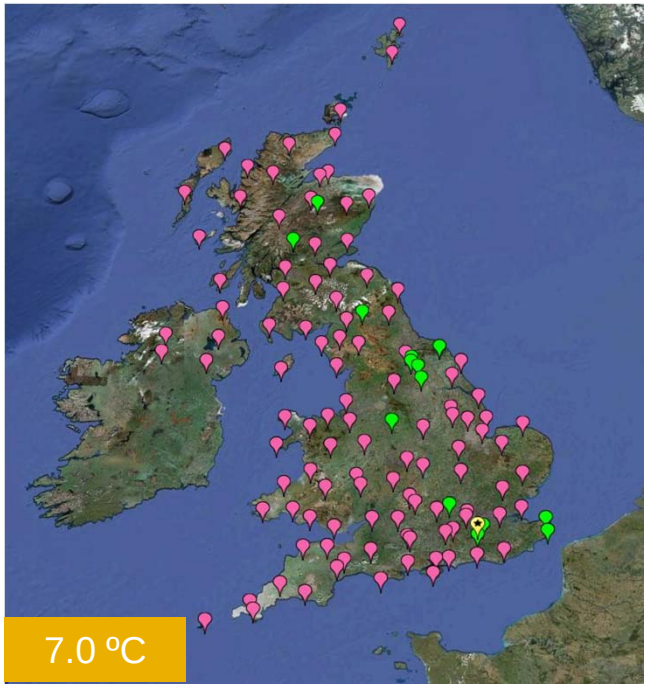
Weather

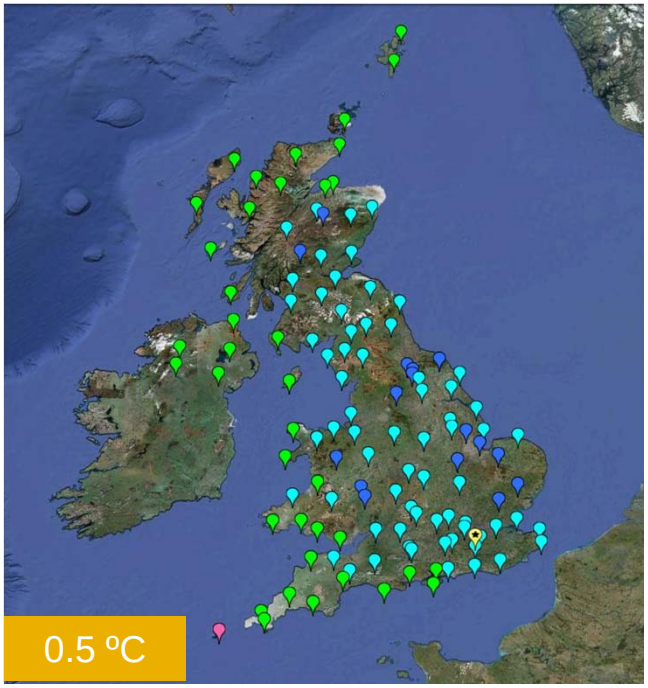
7+ ºC

+3 to +6 ºC

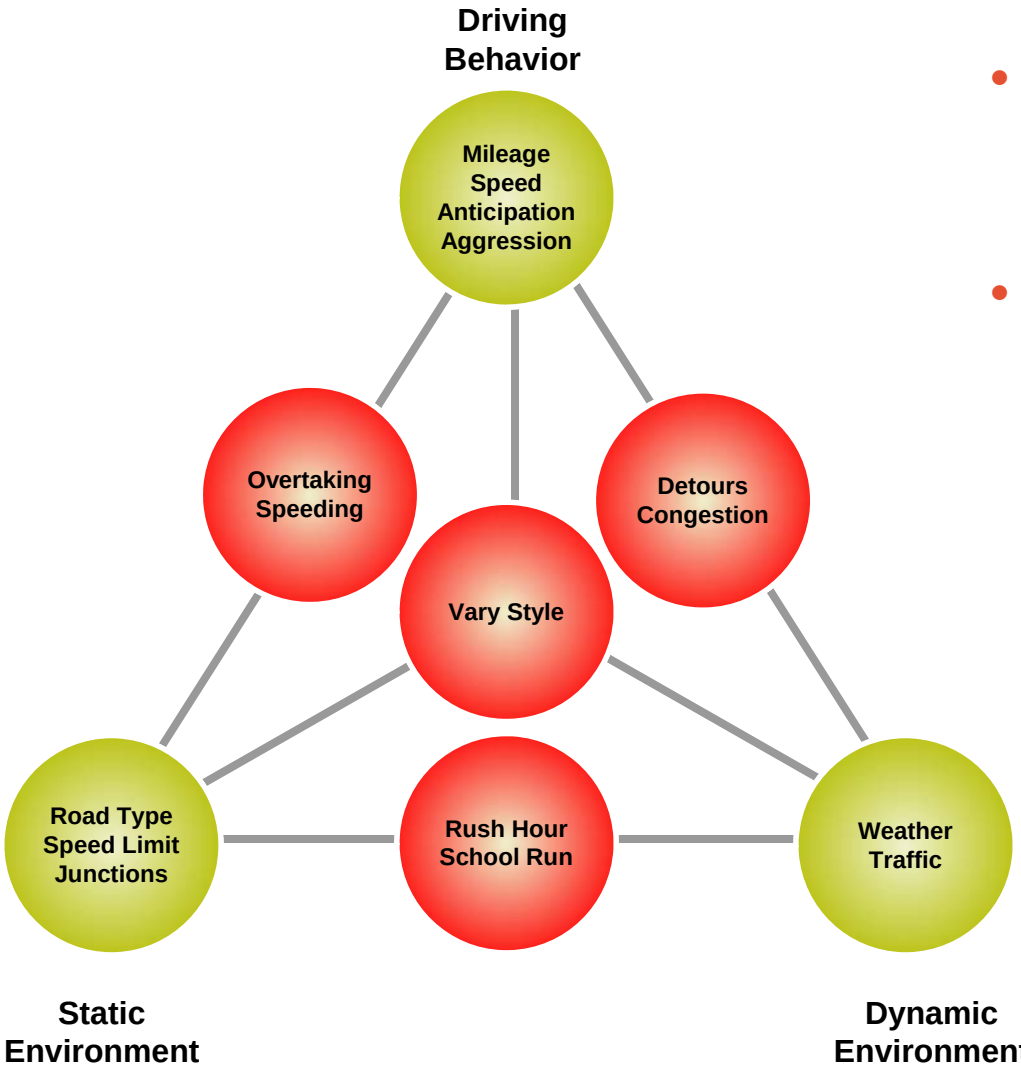
-2 to +2 ºC

-8 to -3 ºC



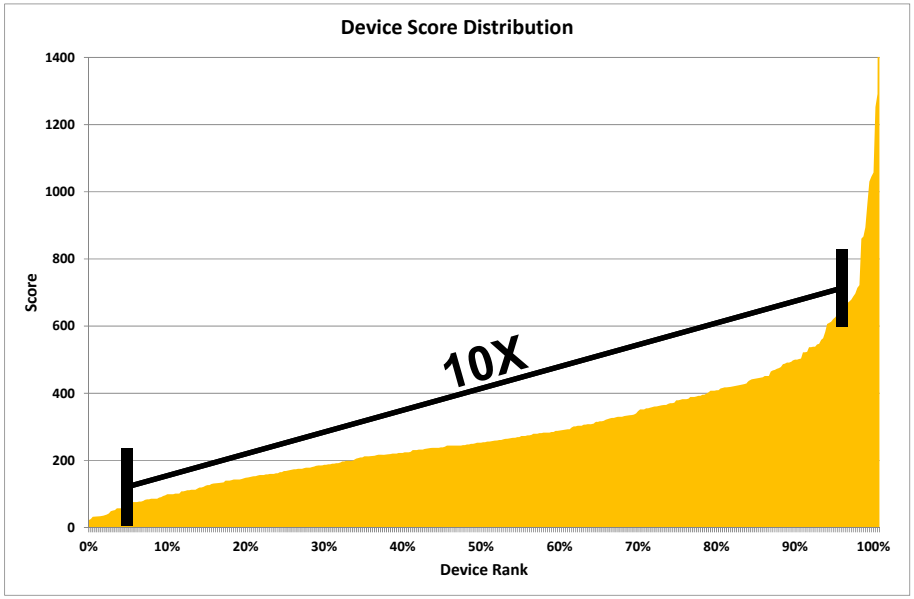


Powerful new contextual rating factors



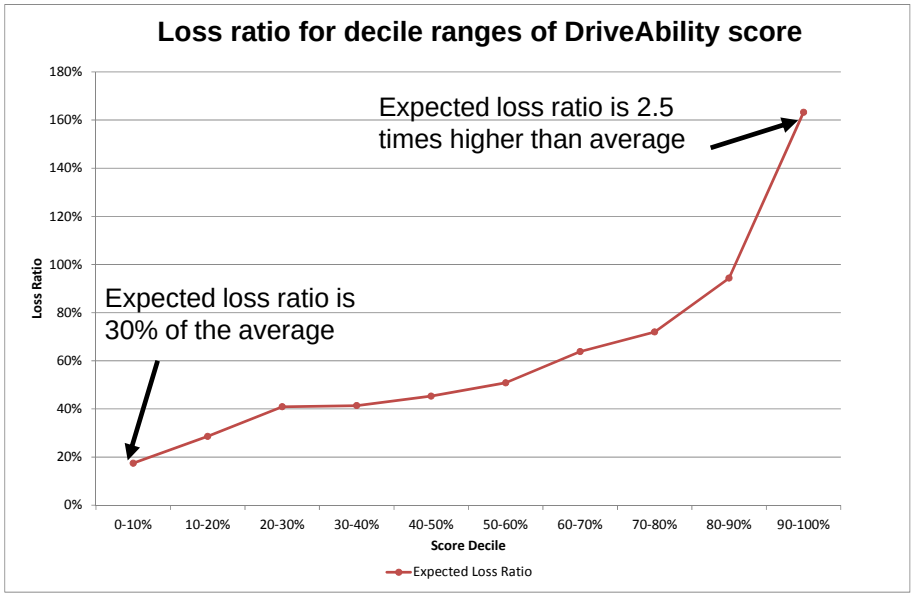
- Joining information together provides new key information not available from independent sources
- Collect additional information from social media, OEM's, navigation and other retail devices, ambient mobile phone data

How powerful is this data?



- Granular telematics data significantly enhances risk assessment
  - The highest decile of vehicles has an expected cost 10 times higher than that of the best decile
  - 2-3 times **more effective than any current rating factors**

- Provides material lift up and beyond current rating factors
  - Best decile expected loss ratio: 20%
  - Worst decile expected loss ratio: 160%



Connected car convergence with smartphones

Car manufacturers are moving away from proprietary OEM systems to in-car systems that connect to the customer's smartphone

Telcomms and Smartphone providers exploring all aspects of useful data

Individualized Behavior Analysis Not Limited to Auto Insurance

Property
Data from the Smart Home measures risk and allows for loss prevention and mitigation. Periods of vacancy, equipment maintenance and failure, and emergency detection are all observable.

Workers Compensation
Vehicle operation is already a huge portion of exposure. Fleet tracking services have direct application to risk.

Benefits, Health, Life
Some companies already offer free personal fitness trackers to employees. Healthy lifestyle choices are rewarded with credits for benefit packages.

Recommended approach to handle data sources

Make better use of your existing, accessible data	Penetrate inaccessible but rich proprietary data sources	Enrich with directly related third party information	Interrogate wider, less obvious data sources
• Get the right IT infrastructure in place • Ensure data is clean, complete and robust • Don't use "siloed" analytics	• Customer telephone conversations and e-mails • Complaints logs, general enquiries, feedback	• Credit data for pricing and underwriting analytics • Police crime data for fraud analytics	• Unstructured and structured sources • Use intelligent questioning and past experience

- Big data is not all about *social media*
- Incremental process should be used to enrich data and structure analyses
- Value can be found in linking data – silo analyses will miss important correlations
- There is value to be found across the organization - a hub approach for a "data lab" will probably work best

Q&A

Robin Harbage, FCAS MAAA
Director

Relevant Experience/Specialization

Robin leads global sales and product delivery for Towers Watson DriveAbility®, their Usage-Based Insurance (UBI) product. He has over 30 years of experience in the insurance industry. Prior to joining Towers Watson, Robin served seven years at Nationwide Insurance and twenty years in a variety of positions at Progressive Insurance, including corporate actuary, product manager and general manager with varying responsibilities in product, pricing, claims, marketing and agency sales.

Robin has had the opportunity to work with more than 50 insurance companies globally on the development and deployment of their UBI products. He has also authored a number of articles on UBI and is a frequent speaker on the topic.

Education and Credentials

Robin graduated from the College of Wooster with a Bachelors of Science in mathematics, and has an MBA from the Fisher School of Business at The Ohio State University. He is a Fellow of the Casualty Actuarial Society and a Member of the American Academy of Actuaries.

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