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Big Data: Big Opportunity or Big Risk for Actuaries?

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07 March 2016

Why are we talking about (Big) Data?

The world (and insurance) is going digital

Data is a strategic asset

Owning data bring new risks

Actuaries have to understand the world around us

Data is an Actuary's lifeblood

Actuaries manage risks

Actuaries help our employers to capitalise on opportunities

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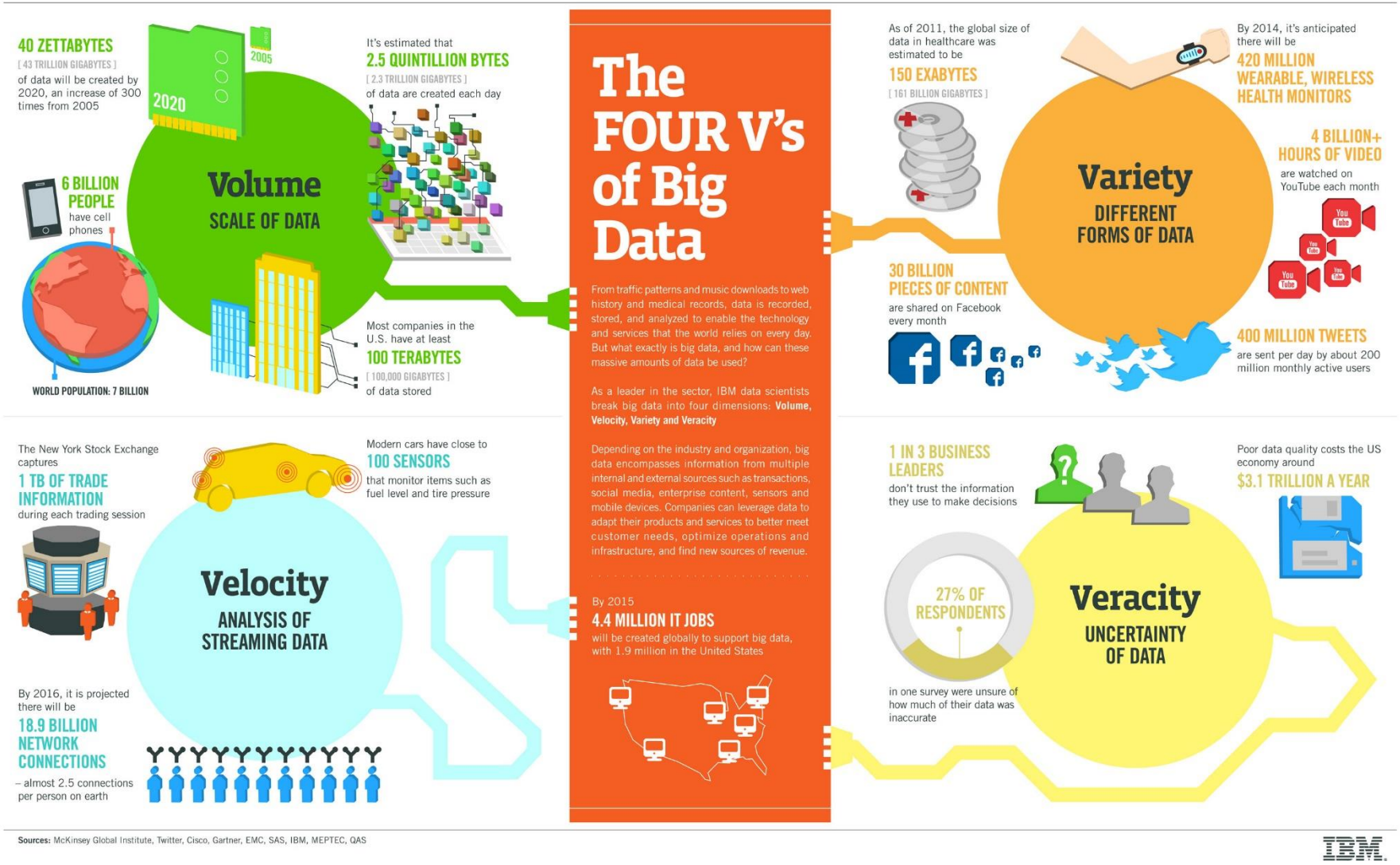
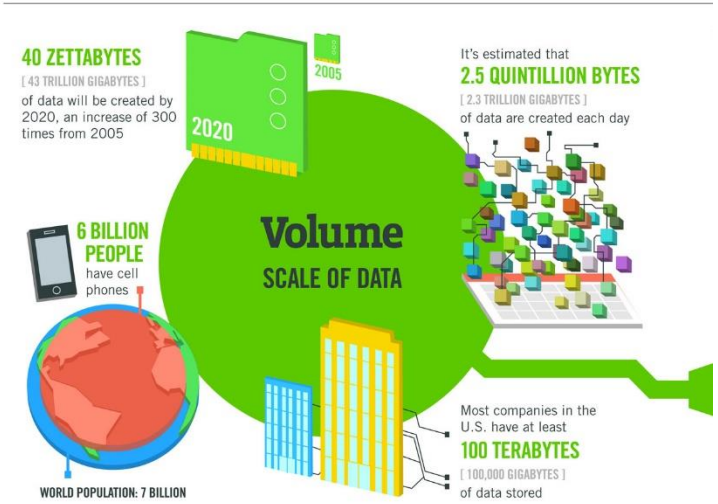
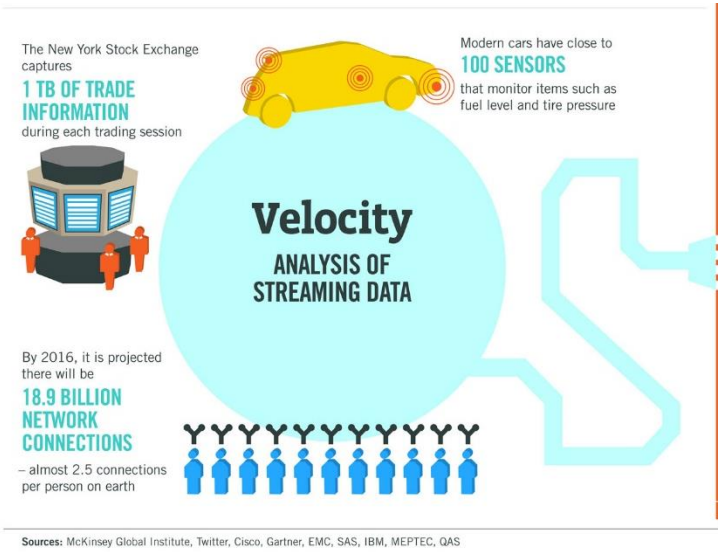
Context Setting

What is big data? The 4 V's



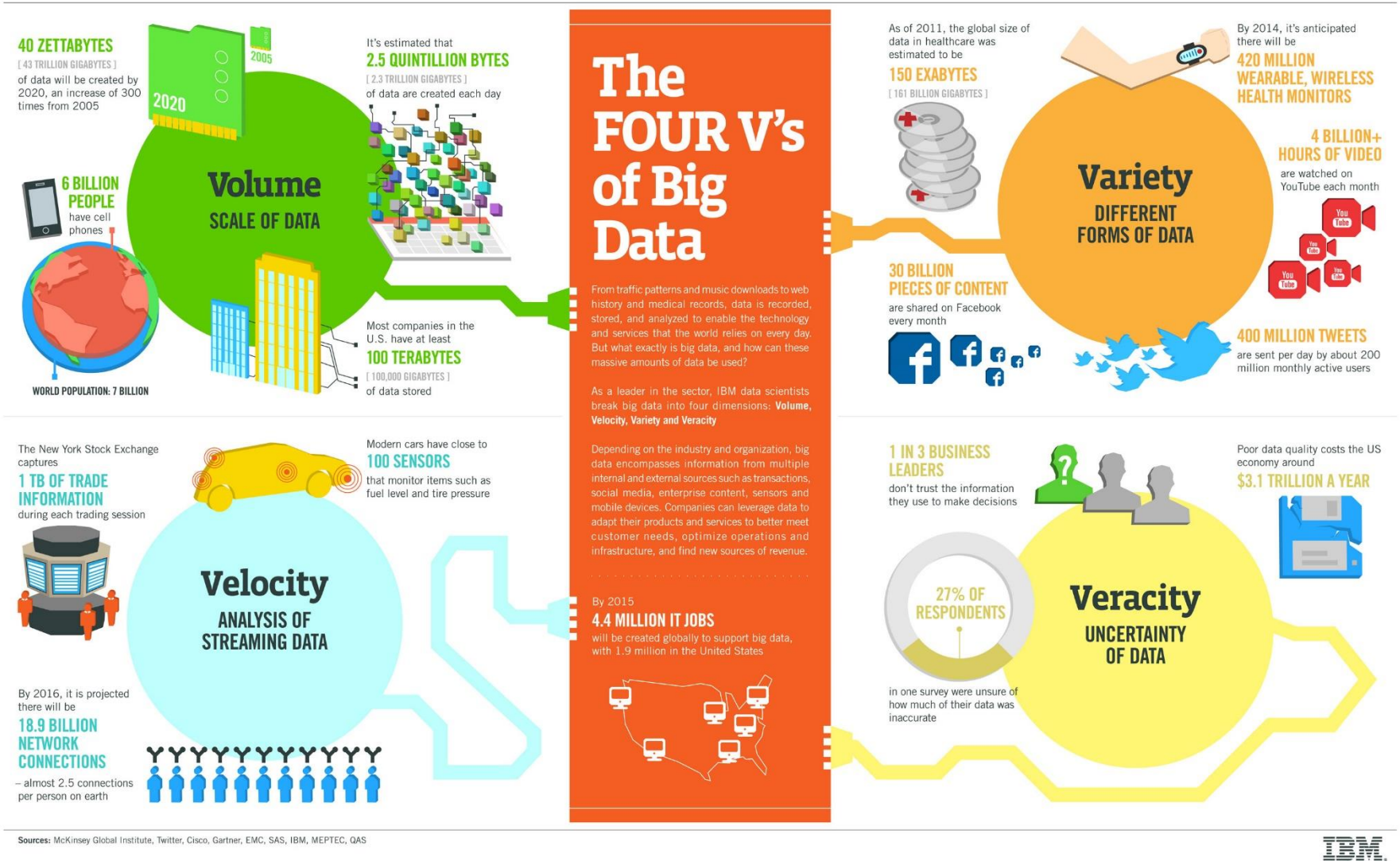


Organization	Amount of data stored
Google	15,000 PB
NSA	10,000 PB
Baidu	2,000 PB
Facebook	300 PB
Sanger	22 PB
Spotify	10 PB



Organization	Amount of data processed per day
Google	100 PB
Baidu	10-100 PB
NSA	29 PB
Facebook	600 TB
Twitter	100 TB
Spotify	2.2 TB
Sanger	1.7 TB

What is big data? The 4 V's



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The world (and insurance) is going digital

ertise
onsorship
Thought leadership
Progress
Community
Sessional Meetings
Education
Working parties
Volunteering
Research
Shaping the future
Networking
Professional support
Enterprise and risk
Learned society
Opportunity
International profile
Journals
Suppor

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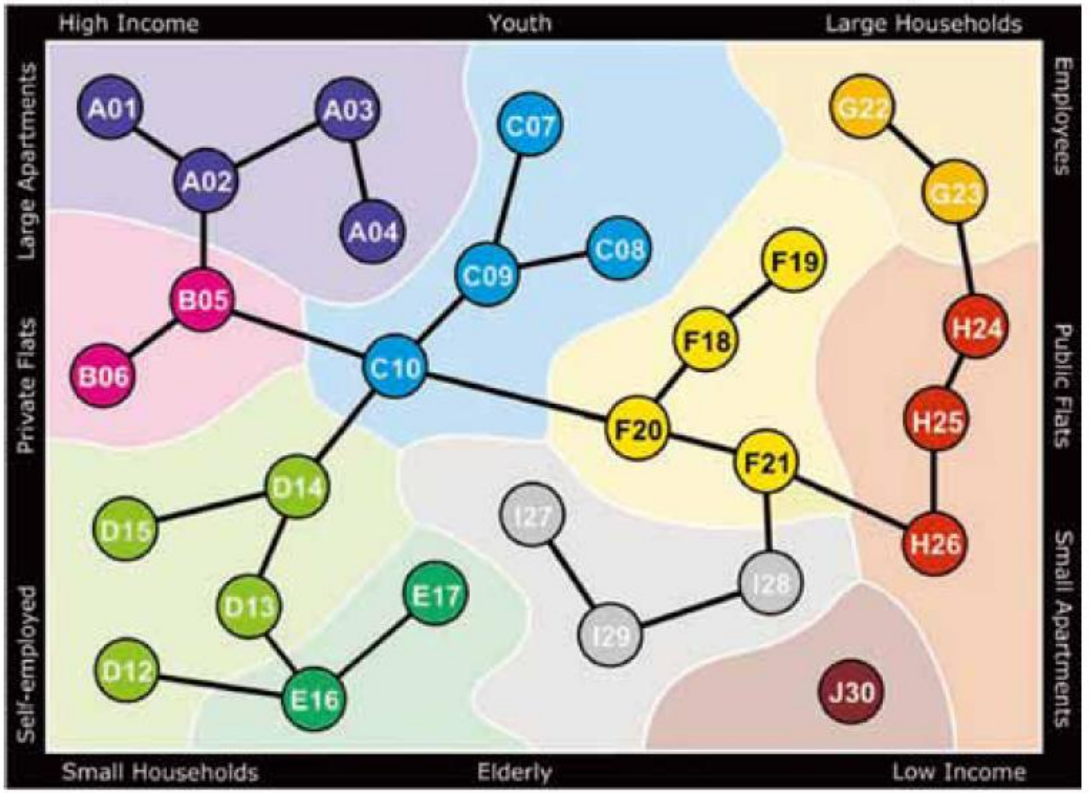
Digital gives you the data and the ability to segment and deliver personalised solutions

- Traditionally marketing segmentations street level granularity – now household or person level
- Potentially hundreds of fields of collected or modelled data available for purchase



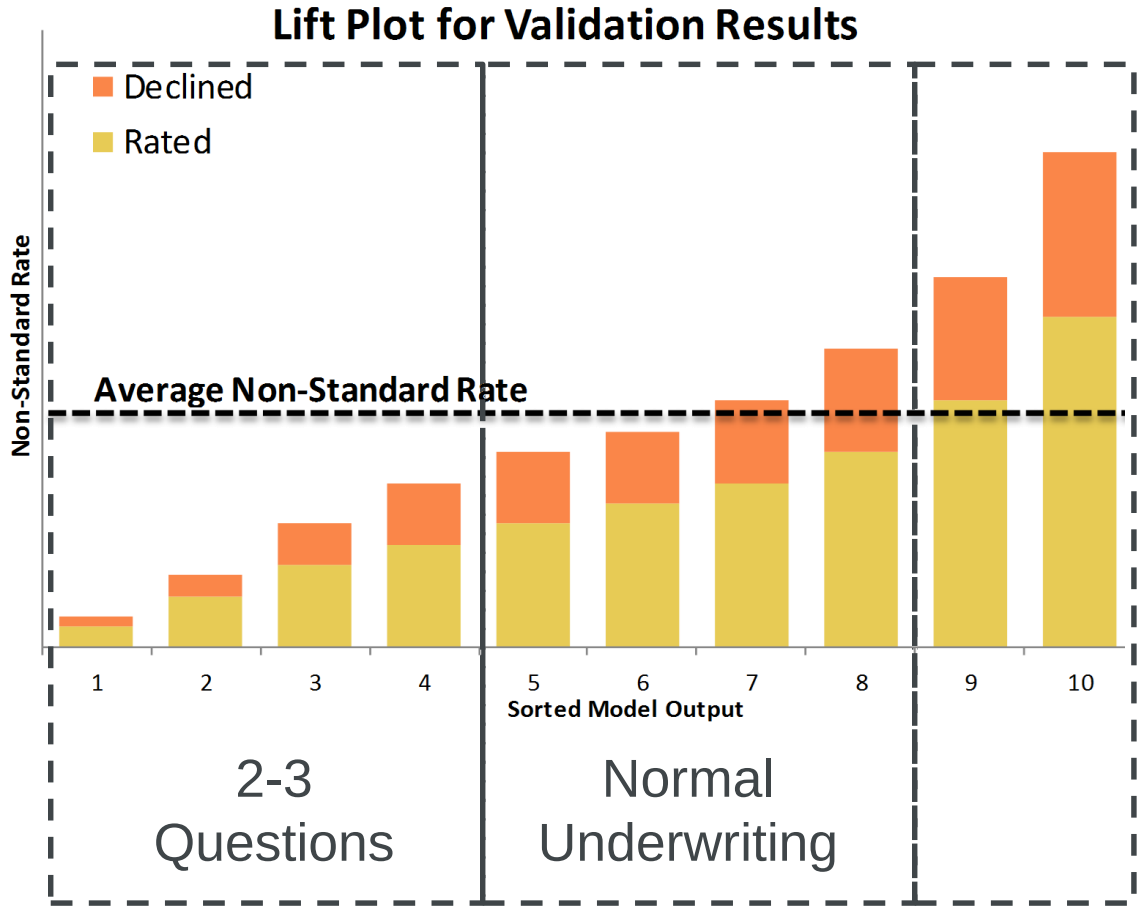
Source: Experian's Mosaic HK Brochure. http://www.experian.com.hk/assets/mosaic/mosaic-brochure-hong-kong.pdf Accessed 22 June 2015

Example: Zhong An launched more than 200 online insurance products for specific needs

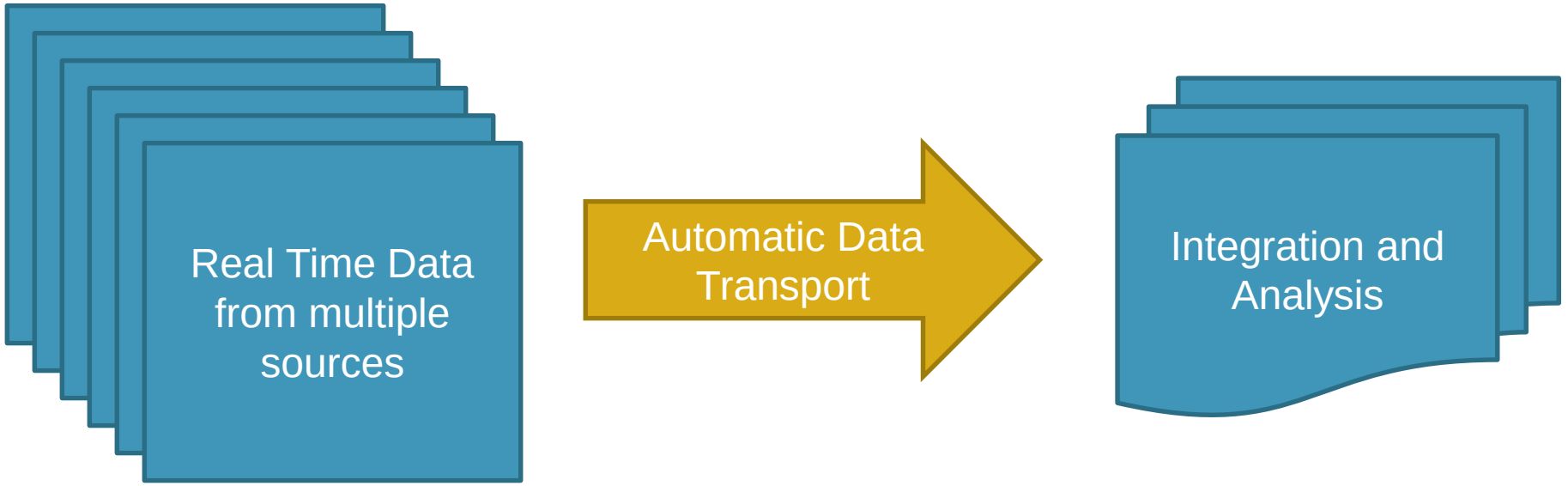
银行卡盗刷资金损失保险 	个人法律费用补偿保险 	多轴飞行器责任保险 	小米手机意外保 
途虎轮胎险 	乳腺癌基因检测保障计划 	营运交通工具意外伤害保险	航空意外保险 
公共交通场所安全意外险	私家车意外险 	亲子旅行意外伤害保险 	驴友旅行意外伤害保险
成年人重大疾病保险 	未成年人重大疾病保险 	女性特定疾病保险 	儿童齿科医疗保险 

Using data to improve the customer journey Example – Life Insurance

- Ask the fewest possible questions while managing risk
  - Replace actual disclosures with surrogates
- Higher conversion rates because of easier process
  - Use in conjunction with marketing segmentations



The Internet of Things (IoT) makes it economical to monitor just about anything



Telematics in Motor Insurance

Insurance Applications Across the Value Chain	Lots of data and potential for engineered features

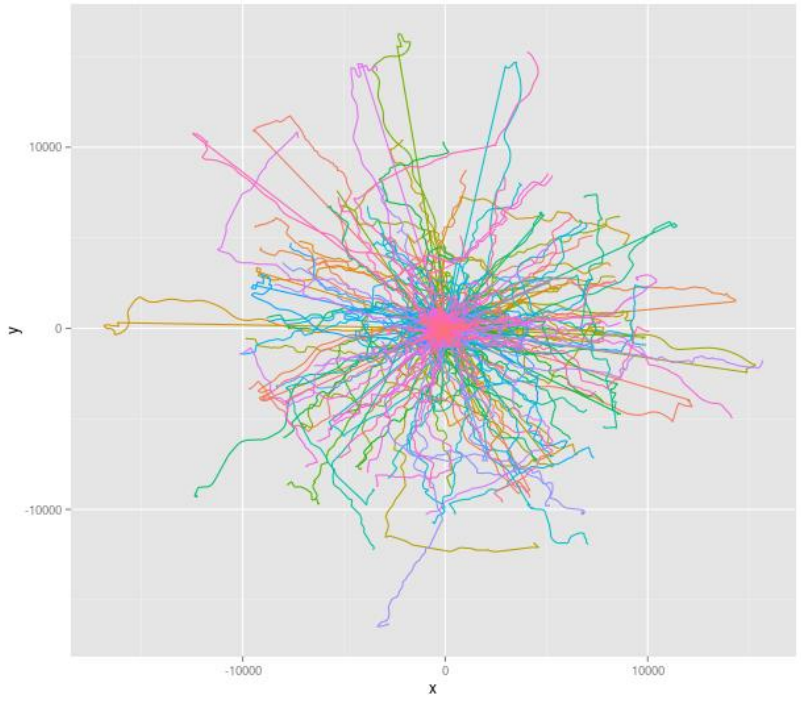
Customer Segmentations
Product Design (e.g. PAYD->PHYD)
Self-Selection Bias
Risk Reduction (behaviour change)
More refined pricing
Risk Reduction (behaviour change)
Accident and Claims Management
Fraud detection
	• Motor Telematic Data
	  • Braking and acceleration
	  • Cornering
	  • Speed
	  • GPS information
	  • Number of passengers
	  • etc
	• External Context
	  • Type of road
	  • Points of interest
	  • Weather
	  • Traffic density
	  • Known road issues e.g. Potholes,
	• Lifestyle data

Data collected for one purpose will find multiple applications

Motor vehicle records indicate relative risk

Source: Rushing and Rozar. An Analysis of Motor Vehicle Records and All-Cause Mortality. RGA 2012.

Telematic data to identify a driver signature



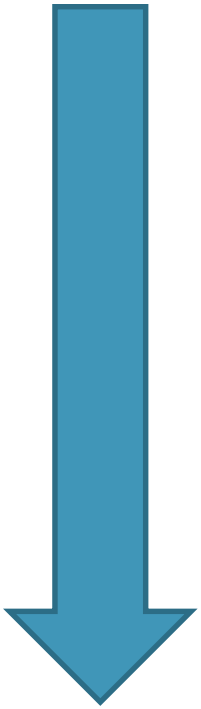
Source: Axa sponsored competition on Kaggle.

Wearables for Life and Health Insurance

Parallels with Motor Telematics

- Many applications in insurance but uptake largely limited to those self-selecting
- Highly relevant contextual data and need for feature engineering
- Need for partners
  - Data management potentially through data intermediaries
  - Do insurers want to provide the technology?

Future tech promises more useful data



- Steps
- Sleep (sleep phases)
- Heart Rate

- Stress
- Temperature
- Heart Rate Variability
- ECG
- Breathing Rate
- Sleep Apnea detection
- VO_2 and VO_2 Max
- Mood
- Blood Pressure
- ….

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Data is a strategic asset

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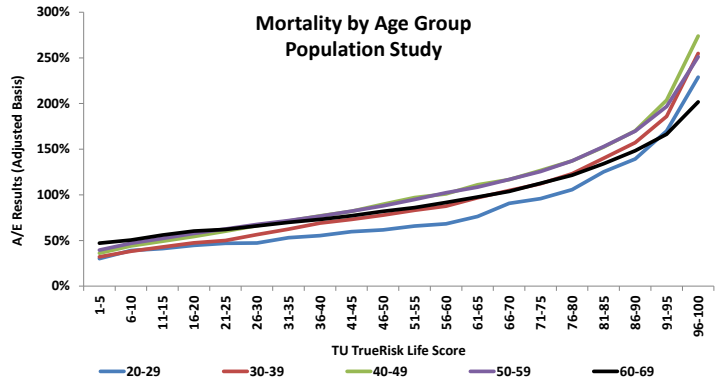
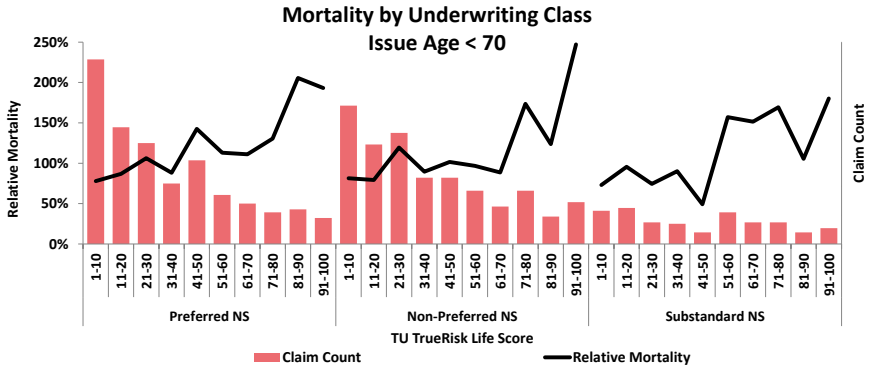
Is your company making the most of your data? What other data can you use?

- Monetizing and maximizing the value of data
  - Growth of Chief Data/Digital Officer Roles
- Modern analytic techniques make more data available for analysis
  - Unstructured Data
  - Labelled and Unlabeled Data
  - Missing values
- Data Linkage internally and externally
- Unlinked “Useful” datasets for insight generation

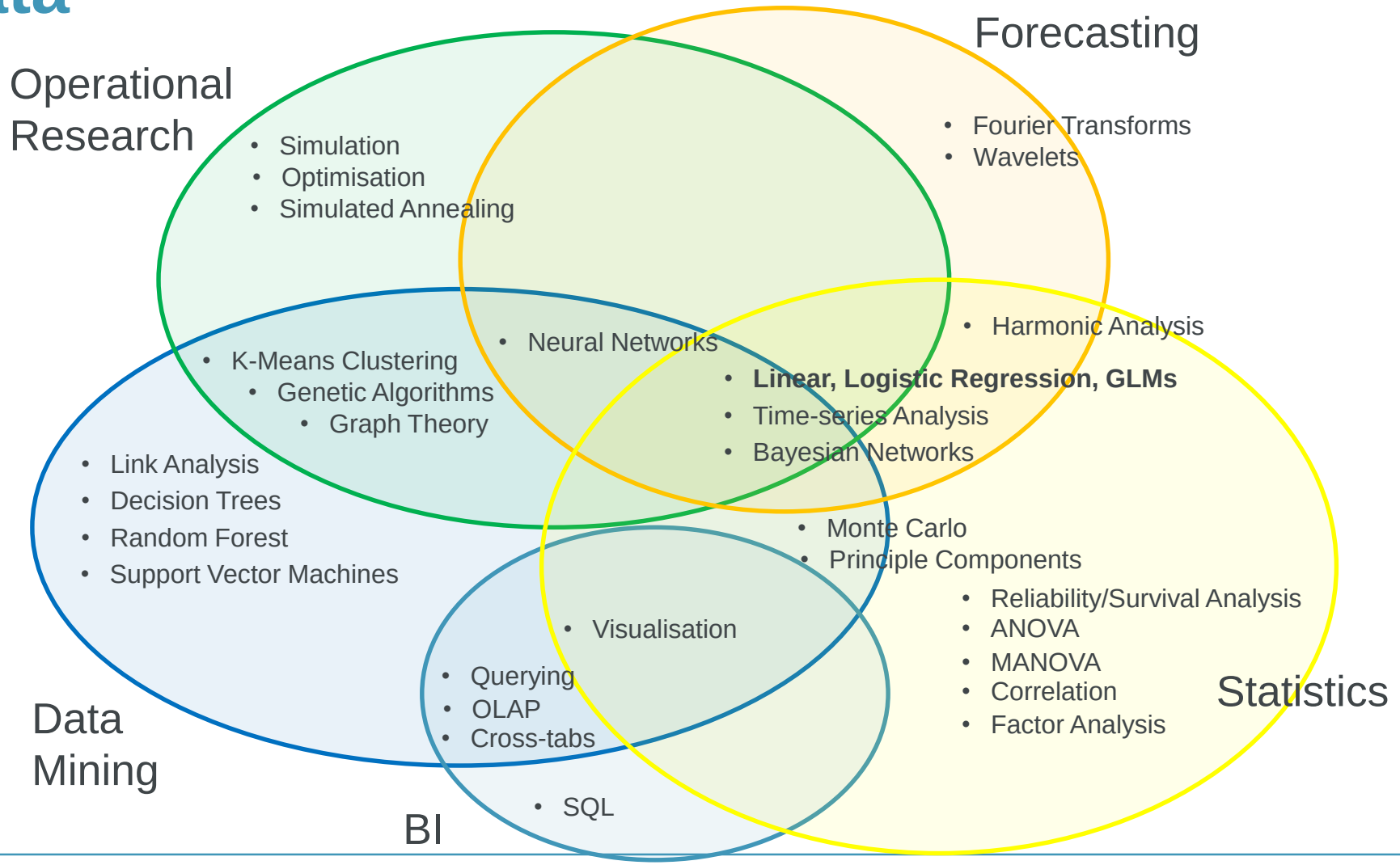
Credit data is used in Non-life insurance and now also in Life Insurance

- Use of Credit Data to differentiate mortality risk
- Differentials between best and worst:
  - 5x in general population
  - 2x within preferred underwriting classes
- Specific data availability in US makes this possible
- Multiple applications to life insurance





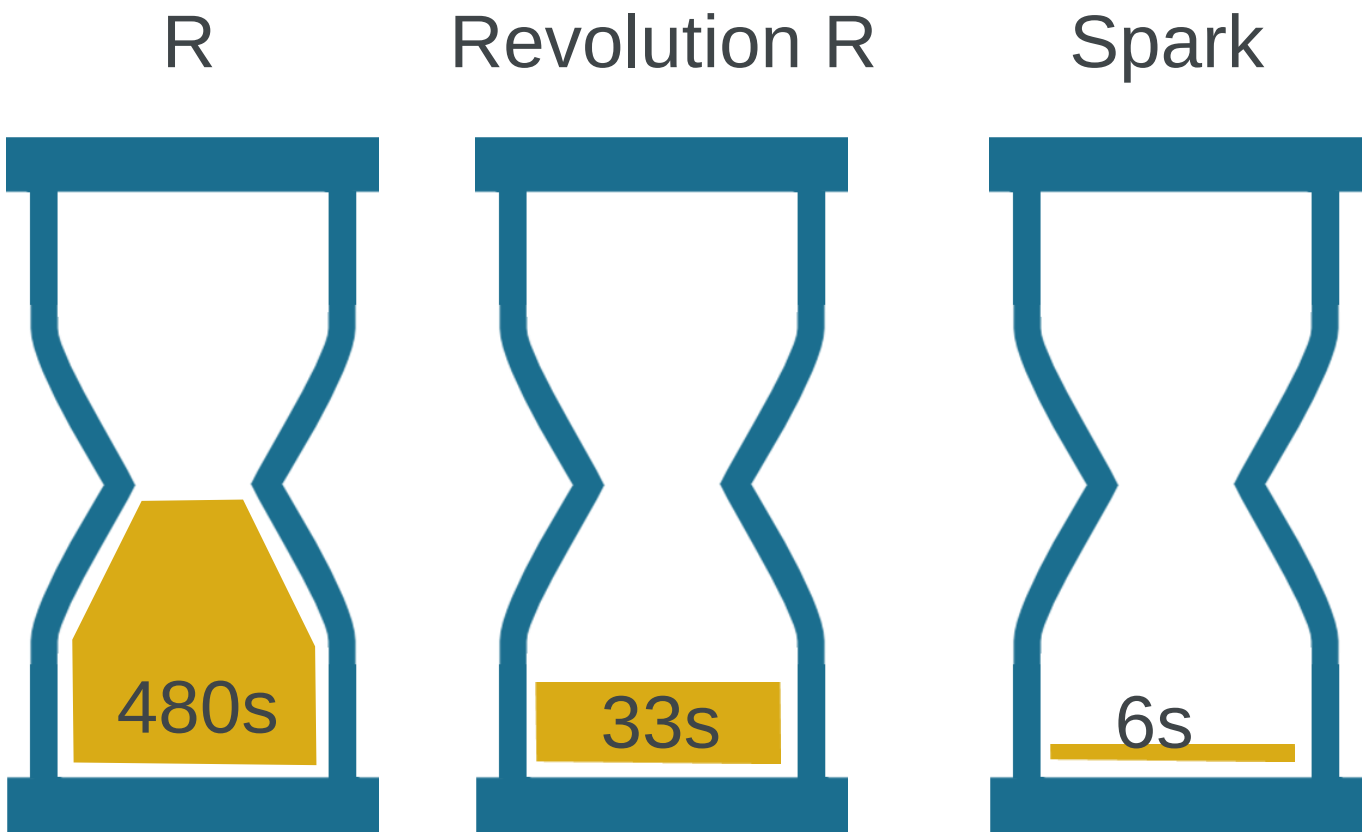
Analytics are needed to realise the value of data



Modified from a version presented by John Elder, www.datamininglab.com, 2012.

Excel just isn’t enough…

Example run times to fit a GLM to 10 million records with 50 variables



Correlation versus Causation

Cartoon used in live presentation suppressed for Copyright reasons.
The cartoon can be found here: http://dilbert.com/strip/2015-12-07

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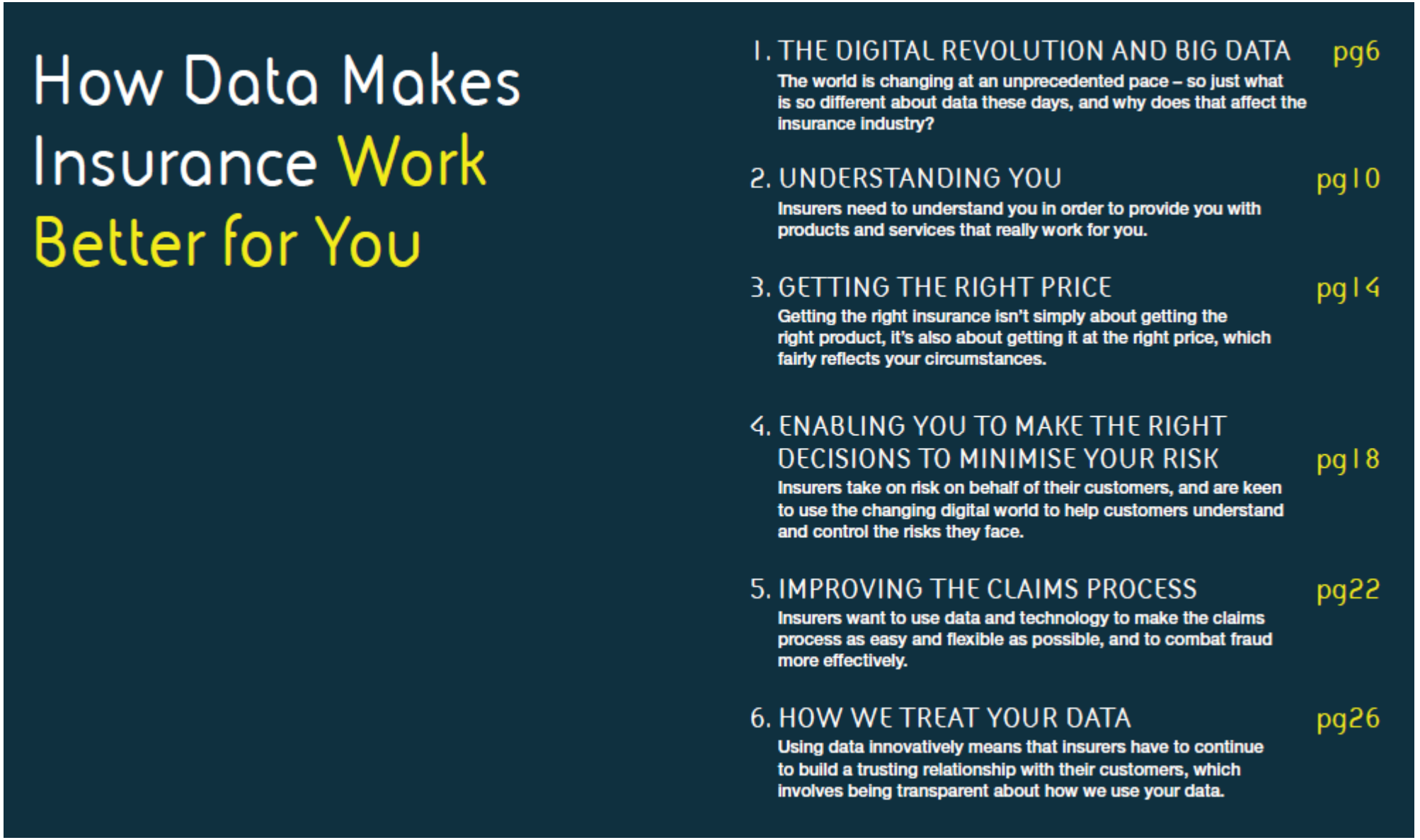
Owning data bring new risks

Holding and using Big Data – Peter's 4 R's

Regulations

- Increasing focus
- EU General Data Protection Regulation (GDPR)
- Anti-discrimination legislation
- Profiling versus Decisions



Source: How Data Makes Insurance Work Better For You, Association of British Insurers. Accessed February 2016

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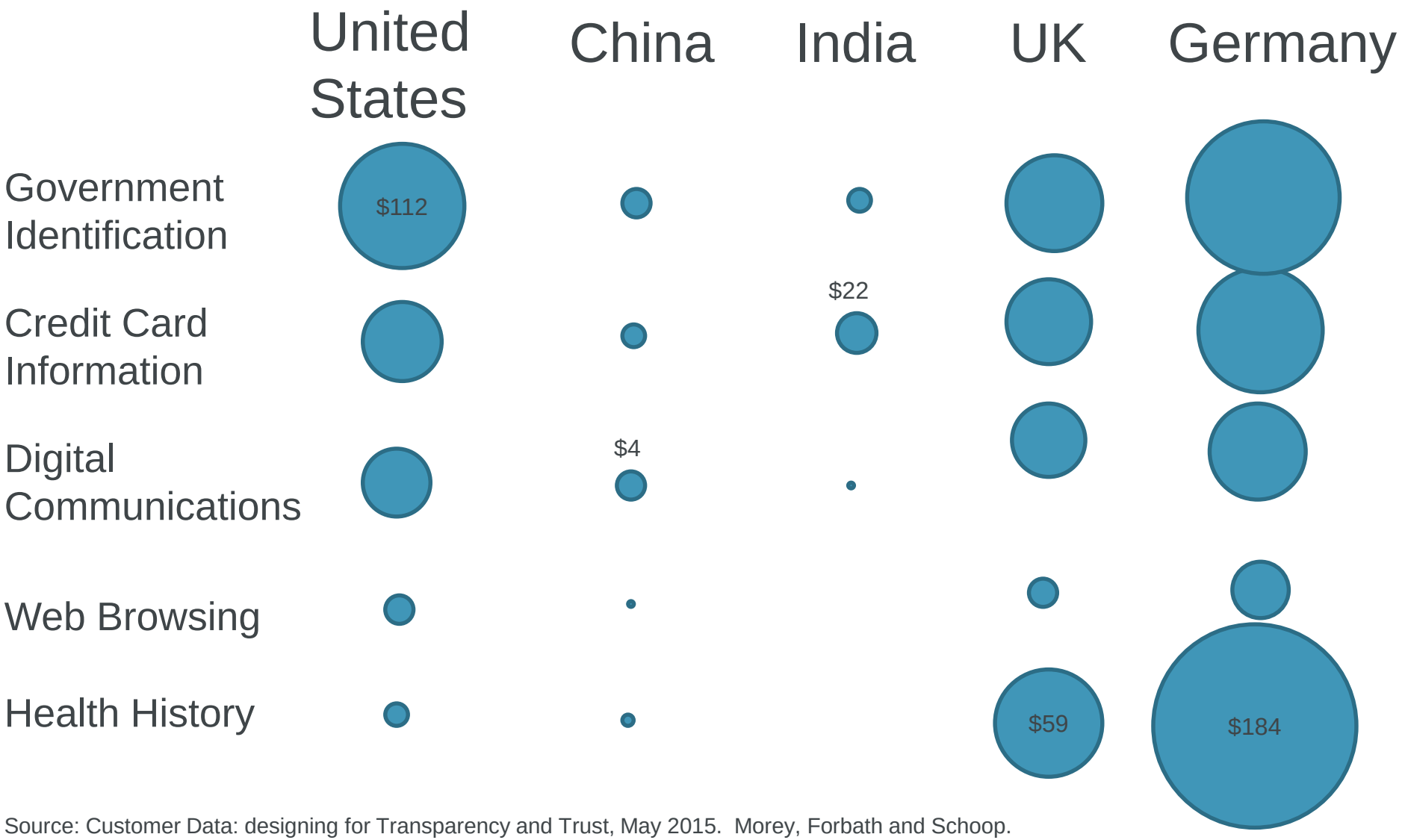
Reasonable Expectations

- Fairness
- Country Specific
- Industry and data specific
- What have you told the client
- Does it benefit the consumer?

Approximate amount people would pay to protect each data type (US$)



Source: Customer Data: designing for Transparency and Trust, May 2015. Morey, Forbath and Schoop.

Original source included other types of data, all with low amounts (e.g. search history, location, purchase history, contact information)

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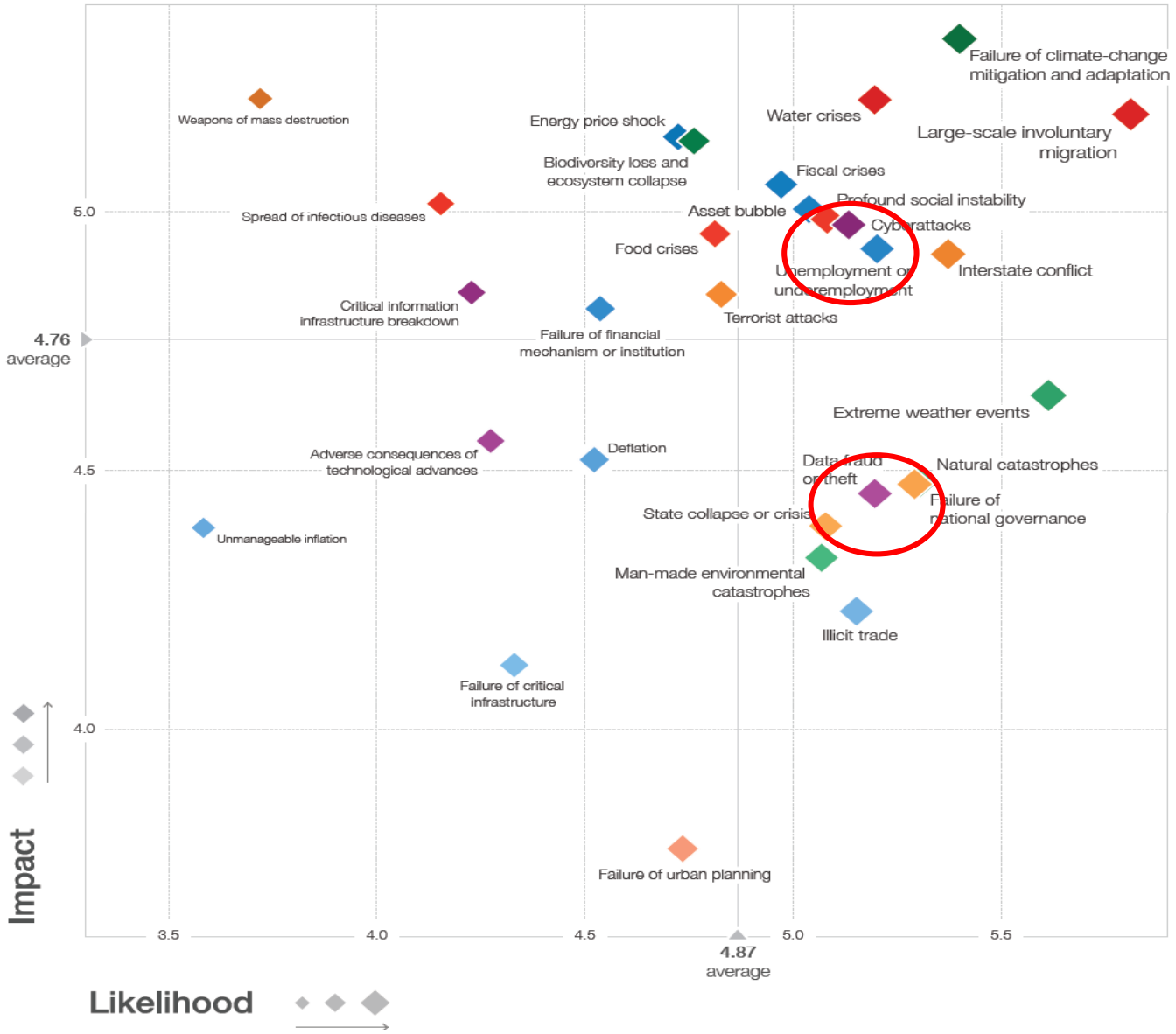
Risks

- Reputational damage
- Financial Penalties
- Theft / Mis-use / Loss
- Data governance procedures and culture



Source: The Global Risks Report 2106, World Economic Forum, Switzerland, 2016

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Rewards

- Consumer
- Company
- Employee
- Regulator

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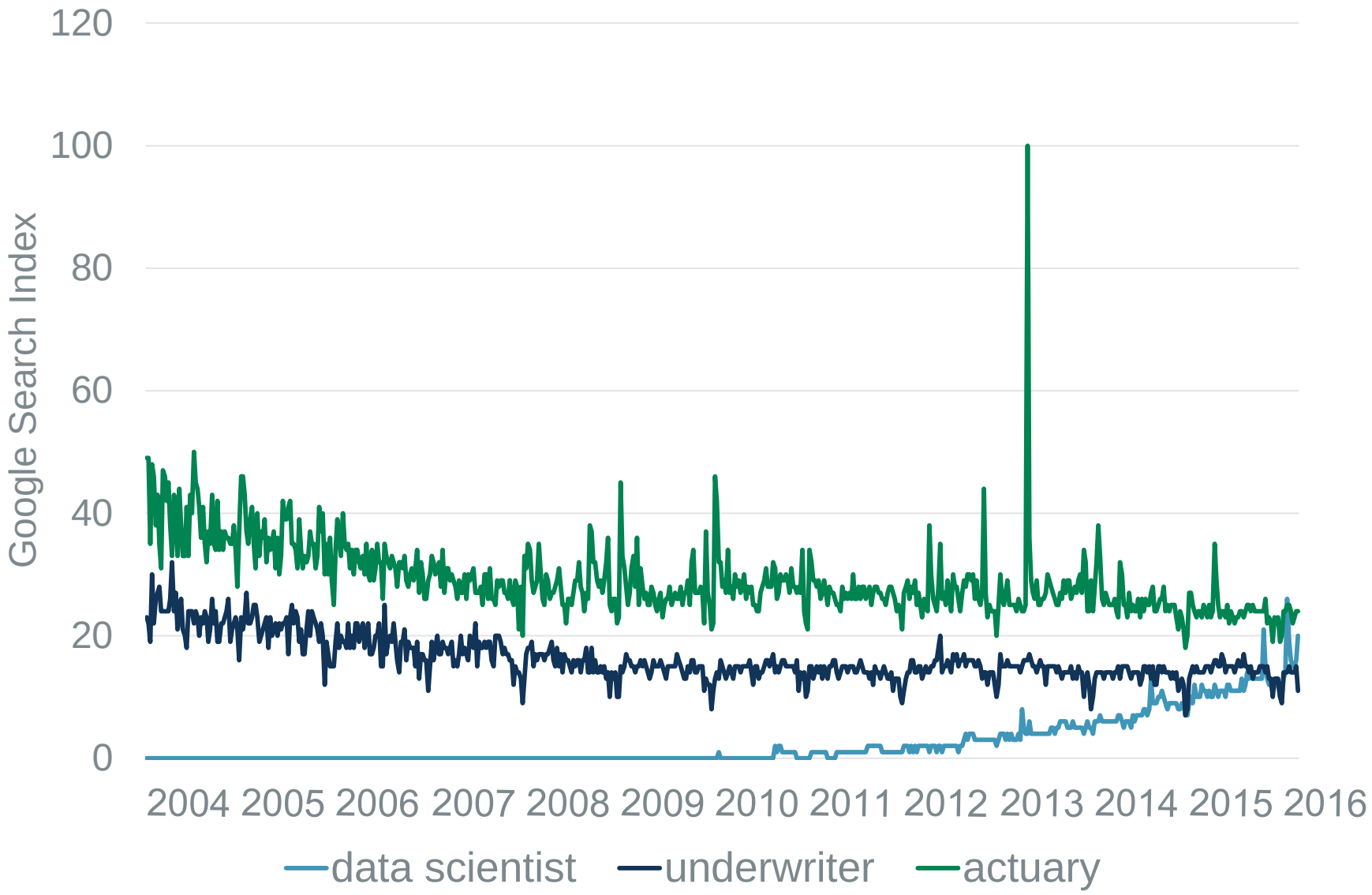
Conclusions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0
Google Search Index
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
data scientist
underwriter
actuary

Conclusions

- Digital is not just a new channel, digital is a fundamental change in the way people work and interact.
- The move to digital brings new emphasis to the power of data and analytics, presenting a world of opportunities for existing players and also disruptive new entrants
- Partnerships and multi-disciplinary working will continue to expand, particularly with other data science specialists
- Actuaries need to actively consider how to expand your skill sets to continue to grow and serve the public, your employers and the profession most effectively