



**Actuaries  
Institute**

# Big Data, Data Analytics and Actuaries

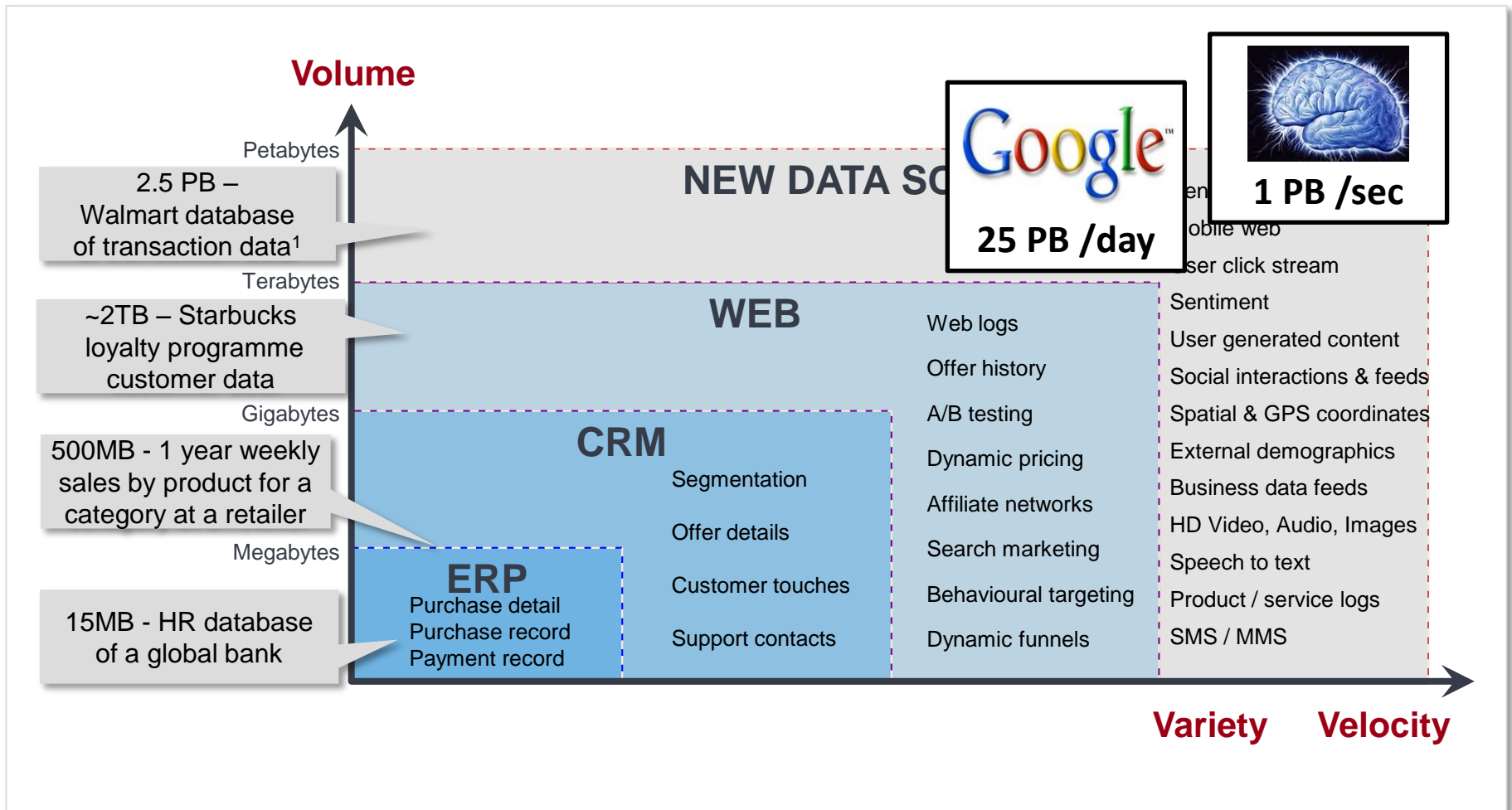
# Adam Driussi, Quantum



# Companies are collecting data like never before

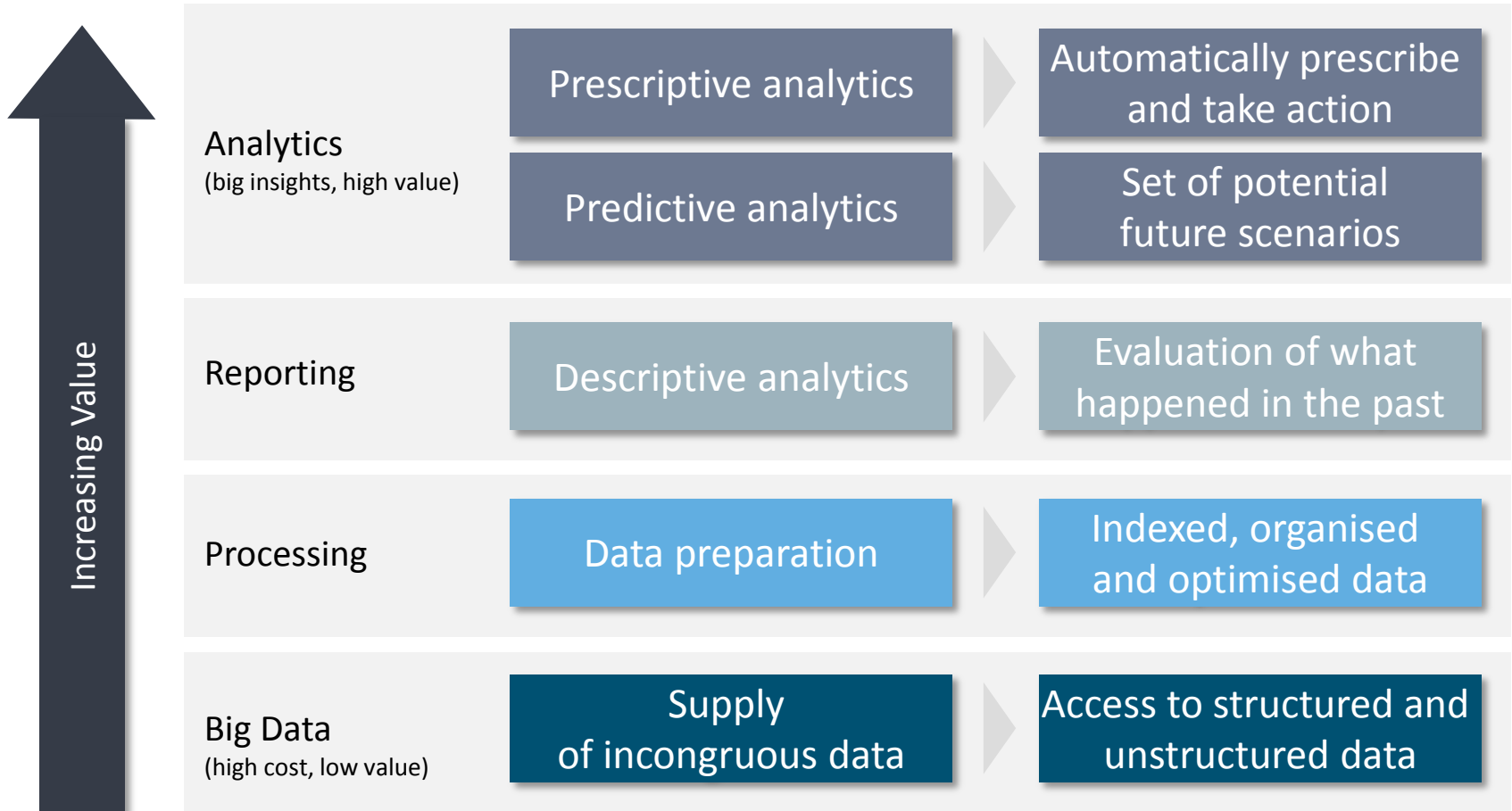


# Leading to massive volumes of data for analysis



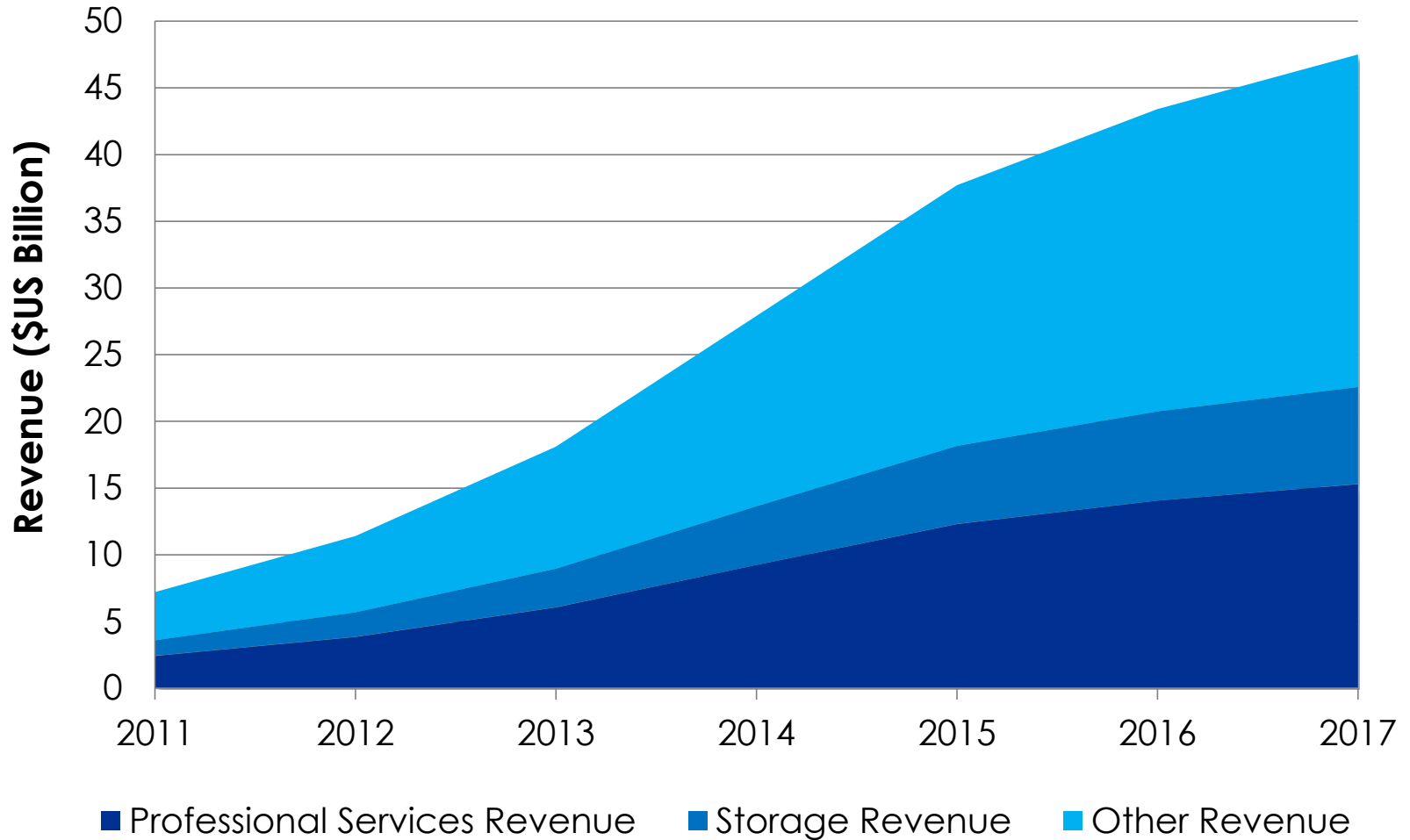
# ... however data alone doesn't deliver value

The Analytics Value Chain



# Big Data = Big Business

**Big Data Market Forecast by Component**



# Leading to huge numbers of analytical job opportunities

- Some commentators have described big data as “one of the most hyper-growth niches of employment in a century”
- In 2011, McKinsey estimated that the US alone faces a shortage of up to:
  - 190,000 people with deep analytical skills
  - 1.5 million managers and analysts to analyse data and make decisions based on their findings
- Some sources predict that big data will create 1.9 million new jobs by 2015 in the U.S. alone

Increasingly the business community is dubbing experts in making sense of big data as ‘Data Scientists’

# “Data Scientist : Sexiest Job of the 21st Century”



“Think of big data as an epic wave gathering now, starting to crest. If you want to catch it, you need people who can surf”

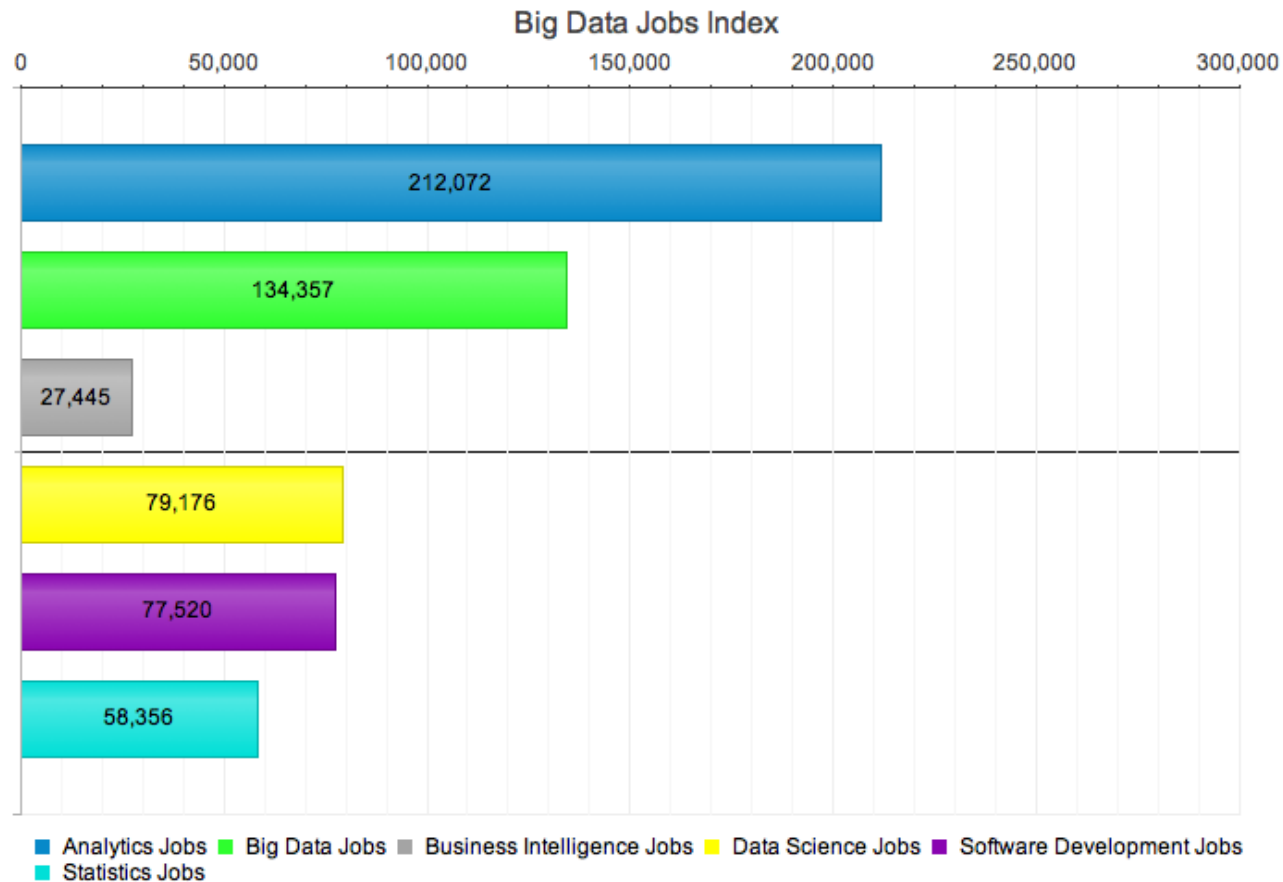


# Skill Set of a “Data Scientist” – sound familiar?

- Make discoveries while swimming in data
- Have an intense curiosity to go beneath the surface of a problem, find the questions at heart, and distill them into a very clear set of hypotheses that can be tested
- Able to bring structure to large quantities of formless data and make analysis possible
- Can join together rich data sources, clean the data, and confidently work with incomplete data
- Creative in displaying information visually and in making the patterns they find clear and compelling
- Advise executives and product managers on the implications of the data for products, processes and decisions

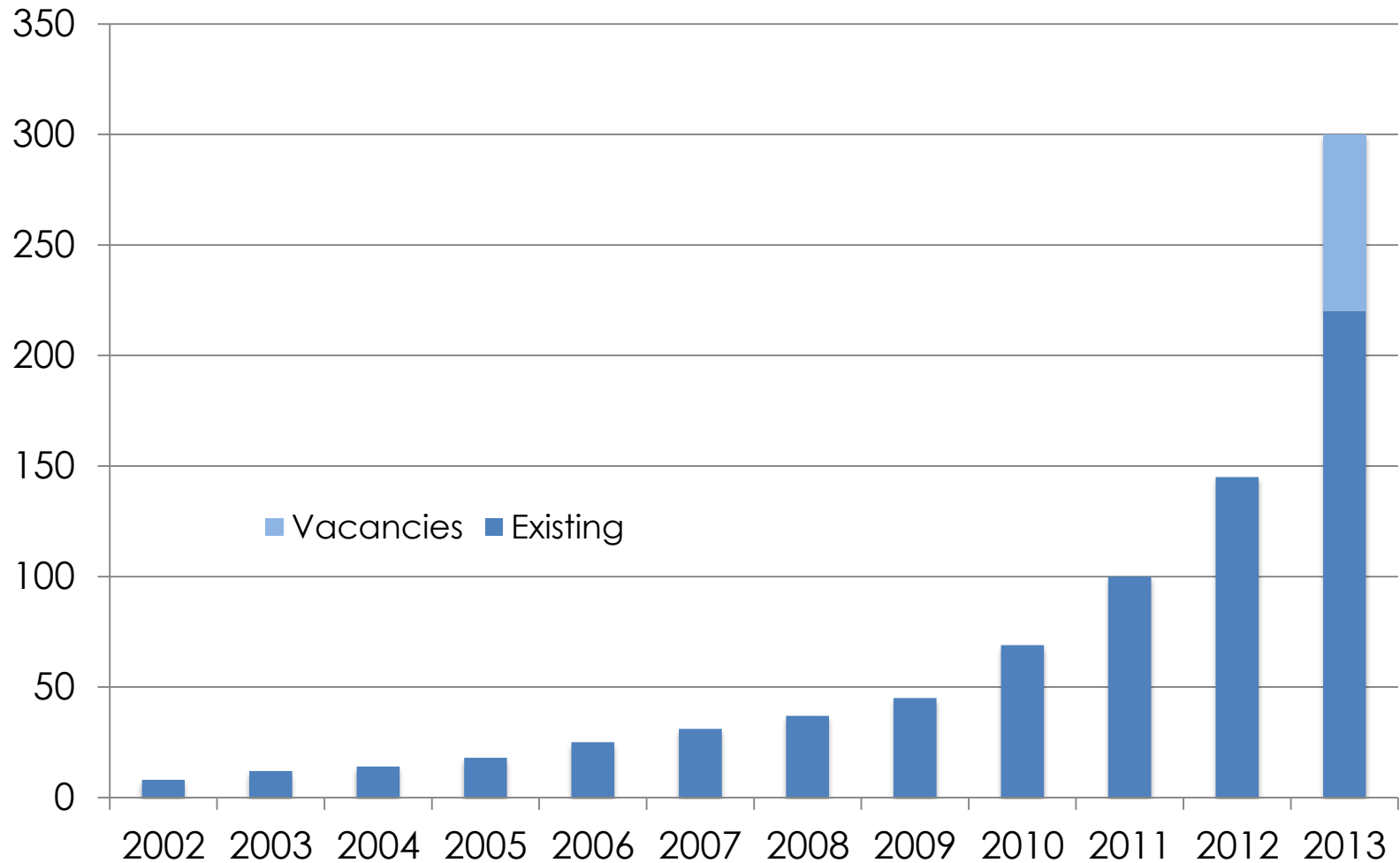
# 600,000 current 'big data' related job opportunities in the US alone

- 63% increase on 2012



# Our own experience...

## Quantum staff numbers by year



# Opportunity or threat for the actuarial profession?

## Opportunity

- Huge potential growth area
- Emerging profession of 'data scientists' looking for a home
- Opportunity to take leadership role

## Threat

- How do we continue to attract the best analytical talent?
- Current actuarial syllabus is outdated
- Education focus is very narrow

Three key areas need to be addressed for the actuarial profession to take the lead in providing the data scientists of tomorrow: education, advocacy and marketing.

# Data analytics case examples

- Banking – NAB
- Retail – Woolworths
- Media – FOXTEL
- Industrial Gases – Linde & BOC Gases
- Sport – Canterbury Bulldogs NRL

# Case Example: Banking



Bank data reveals rich information about customer behaviour & preferences

Shops online

High value entertainment  
customer

Prefers premium  
brands

Low price  
sensitivity

Overseas traveller –  
Canada, USA, Tahiti

Cinema buff

Skiing enthusiast

Apple enthusiast

High value grocery  
customer

Family with kids

Online poker player

Frequents Chatswood Westfield  
and Chatswood Chase

Luxury car owner

Sports enthusiast

Transaction details					
Date processed	Date of transaction	Card No	Details	Amount A\$	
11/02/13					
11/02/13					
11/02/13					
12/02/13					
13/02/13					
18/02/13	11/02/13	07/02/13	Vo118 APPLE ITUNES STORE SYDNEY	3.88	
18/02/13	12/02/13	10/02/13	Vo118 THOMAS GROCER 1445 CROWS NEST	40.20	
18/02/13	12/02/13	11/02/13	Vo118 RTA ETOLL PH 131865 PARRAMATTA	160.00	
18/02/13	13/02/13	07/02/13	Vo118 HOYTS ONLINE TICKETING MERRYLANDS	16.00	
18/02/13	18/02/13	12/02/13	Vo118 QUAYTHERAPY SYDNEY	65.00	
18/02/13	18/02/13	13/02/13	Vo118 EVERYDAY HERO DONATION SPRING HILL	200.00	
18/02/13	18/02/13	16/02/13	Vo118 WOOLWORTHS 1157 NEUTRAL BAY	6.69	
18/02/13	18/02/13	17/02/13	Vo118 HARRIS FARM MARKETS CAMMERAY	14.97	
18/02/13	18/02/13	15/02/13	Vo118 PAYPAL *PNP SANTA 4029357733 QC	13.98	
19/02/13	18/02/13	15/02/13	Vo118 NAB INTNL TRAN FEE - (SC)	0.32	
19/02/13	18/02/13	17/02/13	Vo118 HARRIS FARM MARKETS CAMMERAY	10.49	
20/02/13	18/02/13	16/02/13	Vo118 COLES EXPR CAMMERAY NSW	89.43	
20/02/13	18/02/13	17/02/13	Vo118 Pattison's Cammeray Cammeray	68.00	
21/02/13	19/02/13	15/02/13	Vo118 STARLIGHT CHILDRENS FOUND ST LEONARDS	50.00	
21/02/13	20/02/13	17/02/13	Vo118 HUDSON MEATS CAMMERAY	216.53	
25/02/13	20/02/13	17/02/13	Vo118 APPLE ITUNES STORE SYDNEY	25.47	
27/02/13	21/02/13	17/02/13	Vo118 APPLE ITUNES STORE SYDNEY	16.99	
28/02/13	21/02/13	20/02/13	Vo118 QUAYTHERAPY SYDNEY	65.00	
01/03/13	25/02/13	19/02/13	Vo118 PAYPAL *ALEXANDRIAS 4029357733	58.75	
04/03/13	27/02/13	19/02/13	Vo118 RTA ETOLL PH 131865 PARRAMATTA	160.00	
04/03/13	28/02/13	21/02/13	Vo118 DIRECT DEBIT PAYMENT	56.58 CR	
04/03/13	01/03/13	23/02/13	Vo118 WOOLWORTHS 1157 NEUTRAL BAY	63.22	
04/03/13	04/03/13	26/02/13	Vo118 TICKETEX SYDNEY	1,320.58	
04/03/13	04/03/13	26/02/13	Vo118 VAPOR MEDIA DOCKLANDS	19.95	
04/03/13	04/03/13	28/02/13	Vo118 HOYTS ONLINE TICKETING MERRYLANDS	70.00	
04/03/13	04/03/13	01/03/13	Vo118 PAYPAL *NRLSCTALK 4029357733	5.95	
04/03/13	04/03/13	02/03/13	Vo118 BWS CAMMERAY 1452 CAMMERAY	30.00	
04/03/13	04/03/13	03/03/13	Vo118 NATIQUE PTY LTD CHATSWOOD	28.00	
04/03/13	04/03/13	01/03/13	Vo118 THE HOYTS CORPORATIO MOORE PARK	27.68	
04/03/13	04/03/13	04/03/13	Vo118 HUDSON MEATS CAMMERAY	22.64	
04/03/13	04/03/13	28/02/13	Vo118 APPLE ITUNES STORE SYDNEY	10.98	
04/03/13	04/03/13	03/03/13	Vo118 WESTFIELD S/C CHATSWOOD	10.00	
04/03/13	04/03/13	03/03/13	Vo118 COLES EXPR CAMMERAY NSW	87.13	
04/03/13	04/03/13	03/03/13	Vo118 JB HI FI CHATSWOOD	66.91	

# Using the data to create consumer facing tools such as UBank's People Like U

**PeopleLikeU**  
The World's First Ecography Tool

**UBank**  
backed by nab

## PEOPLE LIKE U

A place to compare your spending habits locally & across Australia

[▶ GET STARTED NOW](#)

**PEOPLE IN PERTH SPEND**  
27% MORE ON FLIGHTS THAN THE REST OF AUS

**PeopleLikeU**  
The World's First Ecography Tool

**UBank**

### GROCERIES

**People Like You Spend \$779 Per Month**

**People Like You Make 109 Purchases Per Year**

	POPULAR:	PREFERRED:	EMERGING:
<b>Brand Info</b> Popular Brands are the favourites - where people like you make the most purchases.  Preferred Brands are those that people like you tend to be more fond of than most - even if you don't shop there all the time.  And Emerging Brands are those that people like you are enjoying more and more - so they must be doing something right!	<b>1. Woolworths</b> Average Spend Per Visit <b>\$95</b>	<b>1. Forestway Fresh</b> Average Spend Per Visit <b>\$107</b>	<b>1. Deli Fresco</b> Average Spend Per Visit <b>\$31</b>
	<b>2. Coles</b> Average Spend Per Visit <b>\$81</b>	<b>2. Deli Fresco</b> Average Spend Per Visit <b>\$31</b>	<b>2. Purely Organic</b> Average Spend Per Visit <b>\$121</b>
	<b>3. Harris Farm</b> Average Spend Per Visit <b>\$61</b>	<b>3. Antico's Northbridge</b> Average Spend Per Visit <b>\$58</b>	<b>3. Red Lea Chickens</b> Average Spend Per Visit <b>\$16</b>

**UBank**

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**PeopleLikeU**  
The World's First Ecography Tool

### ENTERTAINMENT

**People Like You Spend \$226 Per Month**

**DISCOVER** **COMPARE**

Average monthly spend on Entertainment

People Like You All of Australia

**YEARLY FREQUENCY**  
**SPEND PER SHOP**  
**MONTHLY SPEND**

**SHARE MODE:**

Category	People Like You	All of Australia
Music, DVDs, Books	\$48	\$27
Cinema	\$19	\$16
Tickets	\$71	\$67
The Arts	\$87	\$58

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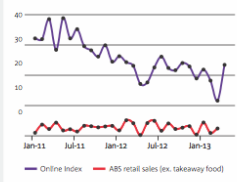
# Using the data to create PR material

more give, less take

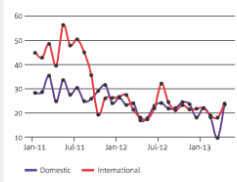
## NAB Online Retail Sales Index Indepth report – April 2013



**Chart 1: Growth in online sales vs. retail sales (% yoy)**



**Chart 2: Growth in online sales by retail location (% yoy)**



**Table 1: Key online retail statistics**

	Index points			yoy growth (%)		
	Feb 13	Mar 13	Apr 13	Feb 13	Mar 13	Apr 13
Online index	193.5	208.5	209.4	18.2	11.6	23.4
Domestic sales	187.7	200.8	201.1	17.9	9.4	23.2
International sales	211.3	232.5	234.8	18.8	17.8	23.7

All data is non-seasonally adjusted (real with a leap year adjustment made for February 2012). Online sales data is produced by Quantum. Traditional retail sales data is sourced from the Australian Bureau of Statistics (ABS).

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■ For the year to April 2013, Australians spent \$13.5 billion online – a level that is equivalent to around 6.0% of traditional retail sales.

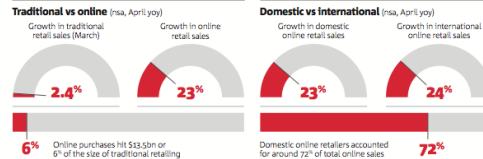
Online retail sales are growing at a rate that is faster than the traditional retail sector. Back up to 2011, the strongest growth was in Fashion, Daily Spending and traditionally the key demo have remained per capita spend (particularly in Northern Territory). This quarter, v Online Retail. The aim is to about this rap I hope you en

■ It was also among retail environment, growing at 23.12% year-on-year. It's no surprise spend continue for the year to traditional retail. While we're still by developing storefront, gro However, encl \$2 billion in the more sophisticated. The future of lending into ti were made to number of sul from five to si clarity and ins market than e

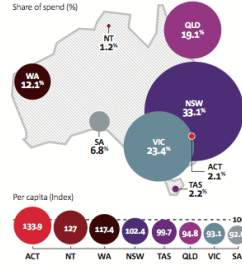
– Tiernan White

### NAB Online Retail Sales Index

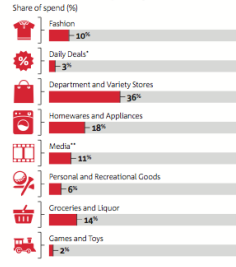
#### At a glance



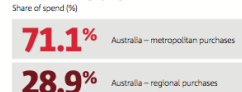
#### Share of spending by state



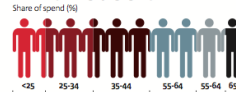
#### Share of total online spend by sector



#### Share of spending by region



#### Share of spending by age group



\*Daily Deal sites release for sale a single product or range of products every day. \*\*Media comprises Movies, Books and Music.

23 October 2012

## Charitable Giving Index – July 2012

Economic commentary, Featured

By Robert De Iure

Share f t in g+



The first NAB Charitable Giving Index shows that charitable giving is growing, despite a softening domestic economy, flat employment growth and persistent consumer cautiousness.


NAB and data analytics firm Quantum reviewed donations made by credit card, BPAY and EFTPOS to develop the index and gain a picture on giving across the nation.

#### Key findings:

- During the first seven months of 2012, the NAB Charitable Giving Index increased by 4.7% y/y, exceeding inflation and up slightly from 4.6% y/y in the same period of 2011.
- Giving to Other charities (16.1%) experienced the fastest growth in January-July 2012, followed by Medical Research & Services (13.9%), Cancer (8.3%) and Health & Disability (8%). Humanitarian Services (-2%) charities were the only category to record lower donations.
- Humanitarian Services accounted for the lion's share of giving in the year to July with 32% of total donations. Animals & Environment and Cancer had the smallest share at 7% and 8% respectively.
- Average annual donation size per donor increased 0.7% to \$292 in the year to July 2012. Humanitarian services have the largest average donation size (\$354), much higher than Medical Research & Services (\$207) the second biggest recipient. Average giving was lowest for Cancer (\$115) and Health & Disability (\$119).



# Using the data to deliver value to NAB's business bank customers



Online Business Assistant

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Your business, Your customers, Your market, Your Bank

By giving big business tools to your small business, making important decisions just got a little bit easier

About


Understand Your Business

Understand Your Customers

Understand Your Market

Other NAB Small Business Tools

Watch a 5 Minute Overview



Filter Results

Days of Week

Customer Age

Customer Gender

NAB Transaction Banking

Fast access to your business fund

Find out more

What is NAB Online Business Assistant?

NAB Online Business Assistant gives you the essential information you need to set up, manage and grow a small business. Using actual data from your business and its customers, NAB Online Business Assistant gives you amazing insights on the way your customers interact with you and your competition.

Start now

NAB Transaction Banking

Fast access to your business fund

Find out more


Live Business

Speak to a live banker or Call 13 10 12

Let's chat now

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Dashboard

Understand Your Business

Understand Your Customers

Understand Your Market

Other NAB Small Business Tools

Market Share

Competitor Comparison


Market Trends

Market Segments

Your Local Area

Where your customers live

competitors' customers




NAB Transaction Banking

Fast access to your business fund

Find out more

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Dashboard

Understand Your Business

Understand Your Customers

Understand Your Market

Other NAB Small Business Tools

Customer Value

Location

Segments

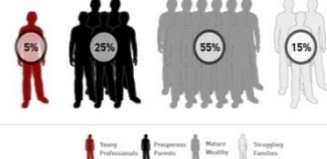
Local

Shopping Habits

Shopping Frequency

Segments

The chart below shows the breakdown of your customers based on their customer behaviour segment



Filter Results

You / Competition

Your Customers

Customer Age

All Ages

Customer Value

Highest Value Customers


NAB Short Term Finance

A cash injection for your business

Find out more

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Dashboard

Understand Your Business

Understand Your Customers

Understand Your Market

Other NAB Small Business Tools

Day of Week

Time of Day

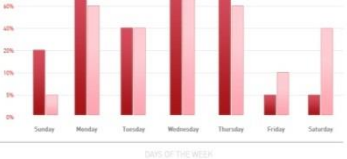
First Traffic

Second Site

Sales Volume

Store Comparison

Spending by Day of Week



Filter Results

Days of Week

All Ages

Customer Age

16-25 Years Old

Customer Gender

All Gender

NAB Transaction Banking

Fast access to your business fund

Find out more

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# Case Example: Retail

Your supermarket trolley provides rich insight into your profile and preferences

Prefers organic /ethical products

Prefers mainstream brands

Has a young family

Is promotionally sensitive

Redeems promotional coupons

Drives 4km to store, past 2 competitors

Switches between brands in selected categories

Regularly buys catalogue featured promos

Weekend main shopper, mid-week top-ups

Regular, high value customer

Woolworths the fresh food people			
PORTABELLO MSH 2 @	£0.99	1.98	1.98
DUCHY ORG BRD		1.59	1.59
ORG CHICKEN		4.82	4.82
MOZZARELLA		0.65	0.65
CEREAL BARS		1.89	1.89
CEREAL BARS		1.89	1.89
LOOSE LEMONS		0.19	0.65
FINEST STREAKY		2.98	1.89
BIN LINERS *		0.74	1.89
SWEET POTATOES		1.99	0.19
TWININGS TEA		0.91	2.98
BOURBIN		1.57	0.74
TEABAGS		0.91	1.99
BROCC P. SPROUT.		1.68	0.91
MAGAZINES		1.00	1.57
CHOCOLATE *		1.48	0.91
ORGANIC POTATO		1.19	1.68
MINT		0.69	1.00
BLK SDELESS GRA		0.32	1.48
0.350 kg @ £2.49/ kg		0.30	1.19
BEANS P. 300G		1.68	0.69
BROCC P. SPROUT.		1.13	1.32
TURMERIC		1.00	1.30
ITALIAN SALAD		1.09	1.68
INACH		1.76	1.13
ORG W/S/R		1.59	1.00
ROCKET SALAD		1.39	1.09
VINE TOMATOES		0.61	1.59
ONION RED LSE		0.61	1.59
0.715 kg @ £0.85/ kg		0.61	1.59
AUBERGINES		0.565 kg @	1.75
0.565 kg @ £2.99/ kg		0.79	0.61
ORGANIC EGGS		0.77	1.75
TOMATO JUICE *		0.77	1.75
LOCAL CHOICE		5.10	1.79
TOMATOES		5.10	1.79
2 @	£2.55	5.10	1.79
SUB-TOTAL		51.52	5.10
MULTIBUY SAVINGS			
RYVITA CEREAL BARS BOGOF	-1.89	1.52	1.52
FINEST PSB 2 FOR £2.50	-0.86	---	5.10
TWININGS T/BAGS 20S	-0.42	---	1.89
TOTAL SAVINGS	-3.17	0.86	1.52
TOTAL TO PAY		48.35	0.42
FRESH CHW PTNS		0.06	1.89
VINE TOMATOES		0.63	0.86
REDUCED PRICE		0.63	0.42
TOTAL		52.04	3.17
BAG RE-USE *		0.63	3.06
4 @	£0.00	0.00	3.06
TOTAL		52.04	0.63
COUPON		6.00	0.00
MASTERCARD		46.04	2.04
28/09/07 16:58 2653 010 1120 5649		2.04	0.00
28/09/07 16:58 2653 010 1120 5649		6.04	2.04
28/09/07 16:58 2653 010 1120 5649		2.04	5.00
28/09/07 16:58 2653 010 1120 5649		6.04	9.04

# The dangers of using big data inappropriately...

## Target in the US



“As Target's computers crawled through the data, they were able to identify about 25 products that, when analysed together, allowed them to assign each shopper a ‘pregnancy prediction’ score.

More important, they could also estimate her due date to within a small window, so Target could send coupons timed to very specific stages of her pregnancy.”

# Analytics can help inform a wide range of business decisions within a retail environment

Product Ranging

Brand Loyalty /  
Substitutes

Price Optimisation

Promotions

Store Locations

Store Layout

Supply Chain

Supplier/Media  
Insights

Targeted Marketing

# Example – Optimised Shelf Merchandising

Which stock keeping units (SKUs) should we stock?

How many bays should be dedicated to soft drinks?

Should this vary for more price sensitive stores?



How much shelf space should each SKU receive?

Which SKUs should be on which shelves?

Should Diet Coke be near Coke or other diet drinks?



# Data insights to execution...helping retailers and suppliers target the right customers



# Case Example: Media



FOXTEL analyses TV viewing data in order to offer highly targeted advertising

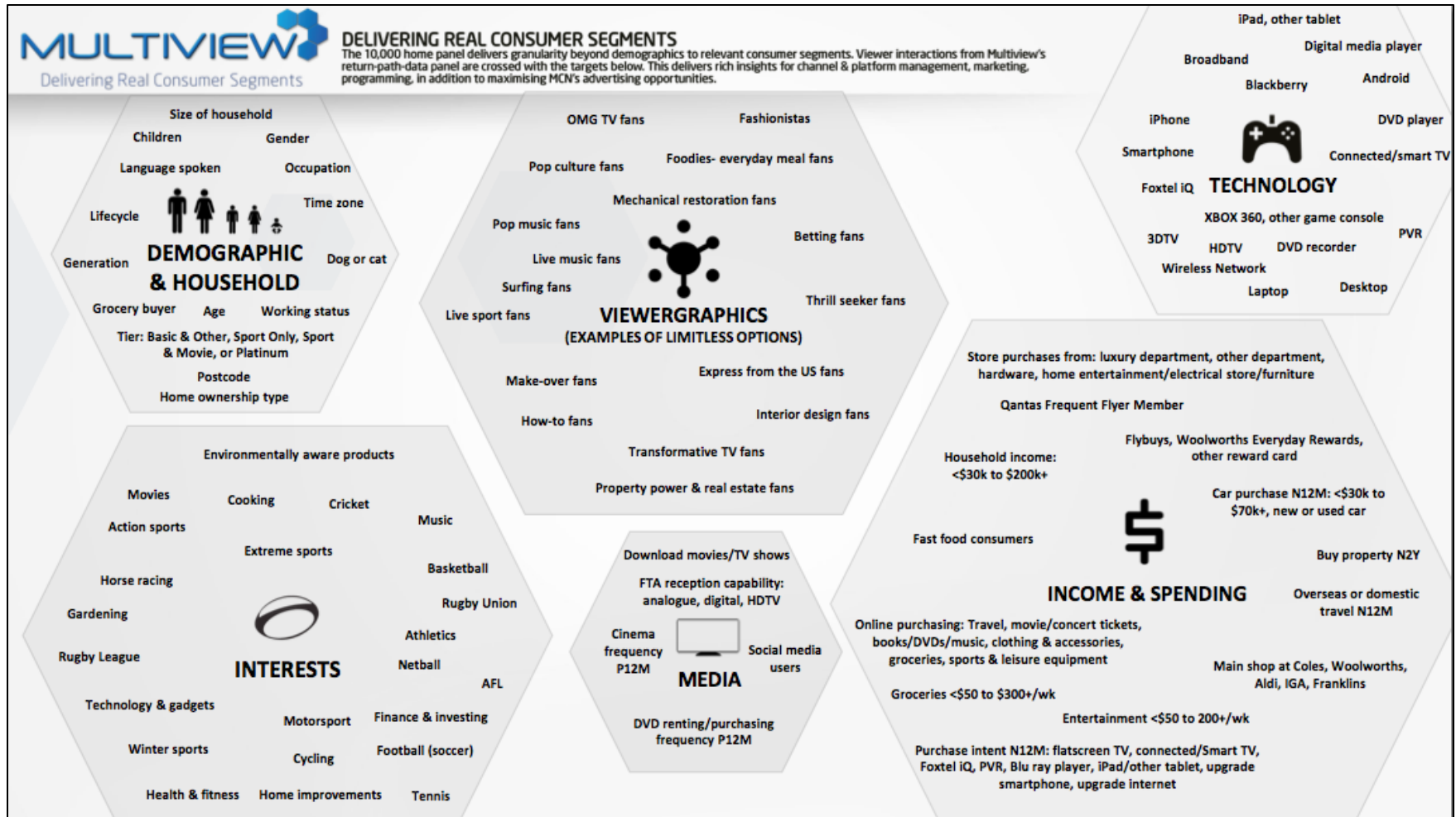


❑ Every second of every day, set top box viewing & user interactions are being captured in Multiview's 10,000 strong return path data panel.

❑ When crossed with detailed demographic, income, consumer behavior & product usage data from the recruitment survey, Multiview generates highly granular TV viewing data across a multitude of real consumer segments.

❑ Multiview delivers insights for sponsorships, interactive advertising and segments beyond demographics enabling advertisers to connect to their core audiences.

# Taking into account a wide range of factors for each household





# In order to profile viewers of different shows



## El News Viewers

**Reach: 1.6 million**

**El News viewers are business decision makers looking to purchase a car.**

**These viewers are also:**

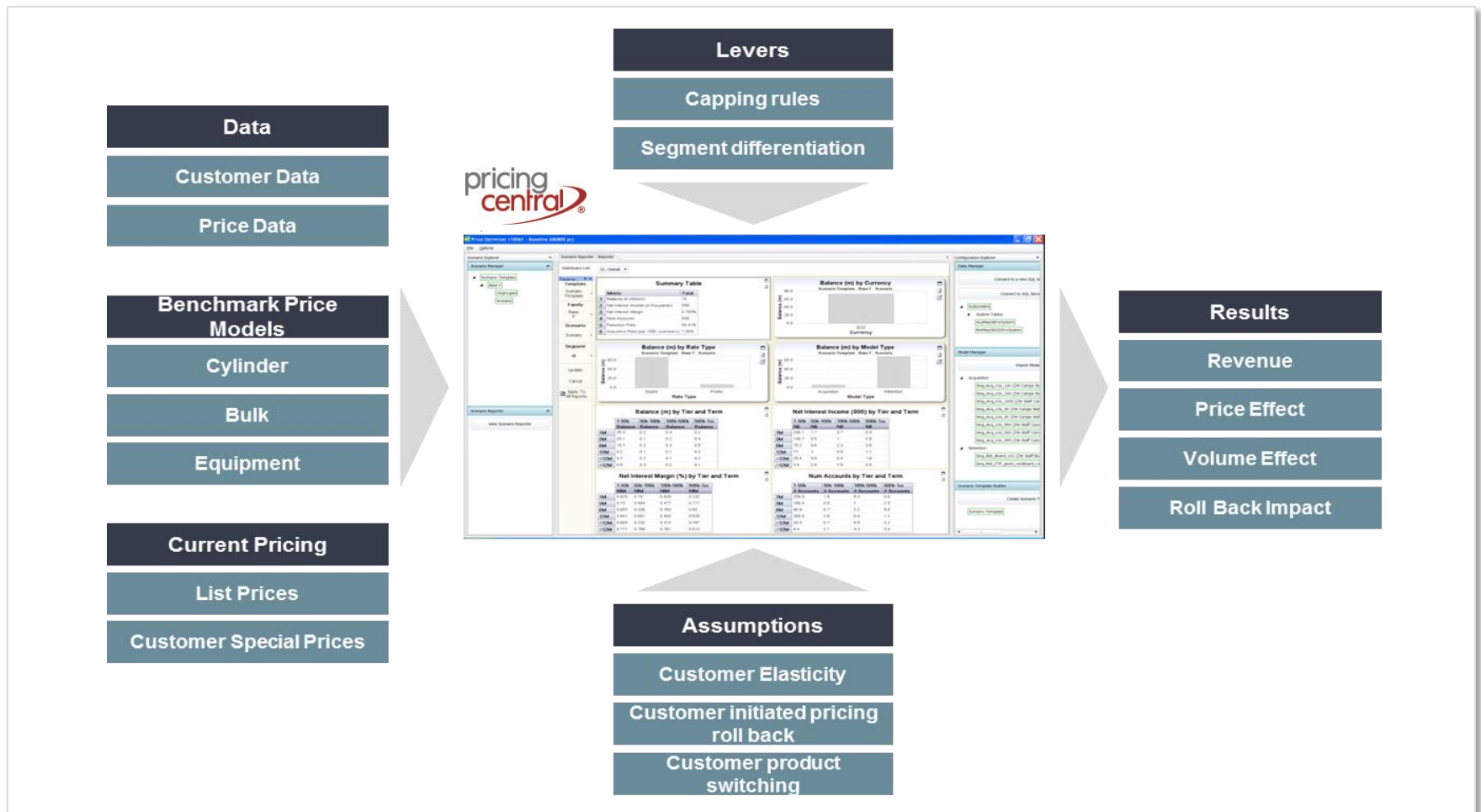
- **27% more likely to be looking to purchase an iPad/other Tablet**
- **27% more likely to be interested in Finance & investing**
- **25% more likely to Spend \$300+ on groceries pw**
- **22% more likely to buy clothes online**
- **15% more likely to be interested in Technology and gadgets**

Source: Multiview National External, 01/12/2012 - 28/02/2013, 0200-0200, S-S, Local, Total STV, Total People vs. El News Viewers, Profile, Live & Int + 28 day Playback, 18/03/2013



# Case Example: Industrial Gases

Global pricing software solution developed based on optimisation principles



# Case Example: NRL – Canterbury Bulldogs



- Time coded digital event capture data provided by NRL Stats
  - 600 event types, 10,000 match events and 2000+ games
- Supplemented by additional data tracked internally from player feedback, body language and GPS data
- 80 variables feed into a 'Contribution Value Rating' algorithm to track performance of each individual player

BULLDOGS V STORM									
THE CONTRIBUTION VALUED RATINGS									
Name	M	Mins	CVG		Name	M	Mins	CVG	
<b>BACKS</b>									
Ben Barba	26	80.3	496.68	1	Billy Slater	20	79.5	508.37	
Sam Perrett	11	80.8	307.70	2	Sisa Waga	10	80	375.26	
Josh Morris	25	80.4	392.62	3	Dane Nielsen	21	79.4	237.62	
Krisnan Inu	15	80.6	363.20	4	Will Chambers	17	77.9	374.21	
Jonathan Wright	26	80.3	255.53	5	Justin O'Neill	20	79.5	214.35	
<b>HALVES</b>									
Josh Reynolds	26	78.6	362.43	6	Gareth Widdop	25	80	305.43	
Kris Keating	20	77.3	273.91	7	Cooper Cronk	25	79.4	436.79	
<b>STARTING PACK</b>									
Aiden Tolman	26	51.2	384.53	8	Jesse Bromwich	26	43.7	276.26	
Michael Ennis	25	74.9	244.62	9	Cameron Smith	24	77.8	473.60	
Sam Kasiano	23	41.8	294.07	10	Bryan Norrie	24	38.3	242.08	
Frank Pritchard	25	64.5	302.20	11	Sika Manu	18	48.1	246.59	
Josh Jackson	11	67.3	352.88	12	Ryan Hoffman	26	74.8	399.95	
Greg Eastwood	23	42.3	260.80	13	Todd Lowrie	22	53.7	295.22	
<b>BENCH</b>									
James Graham	25	57.9	391.80	14	Ryan Hinchcliffe	26	50	273.80	
Dale Finucane	13	21.4	168.37	15	Kevin Proctor	22	48.5	250.15	
Corey Payne	26	25.2	137.51	16	Jalman Lowe	14	29	230.96	
David Stagg	26	48.4	265.18	17	Richard Fa'aoso	5	25.8	155.16	
			5254.03					5295.80	

# Analysis used to inform various decisions

- Improving individual and team performance
- Determining opposition strengths and weakness
- Ongoing recruitment
- Salary management
- Formulating game plans
- Predicting results



Questions?

