

Big Data: Data Wrangling Boot Camp
Big Data Vs

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Focusing on BD Vs

*“What is Big Data?
A meme and a
marketing term, for
sure, but also shorthand
for advancing trends in
technology that open
the door to a new
approach to
understanding the world
and making decisions.”*

Lohr [15]

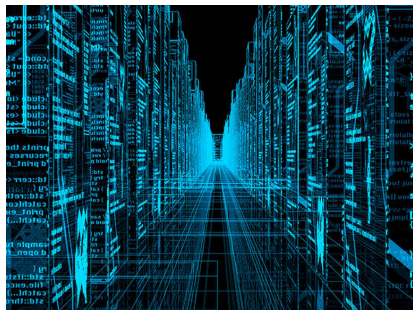


Image from [6].

Doug Laney, META Group

The origin of “Big Data” ideas and definitions.

- Started in the e-commerce Mergers and Acquisitions arena
- Used to explain why traditional Relational Database Management Systems (RDMS) wouldn't scale
- Intended audience was non-technical management

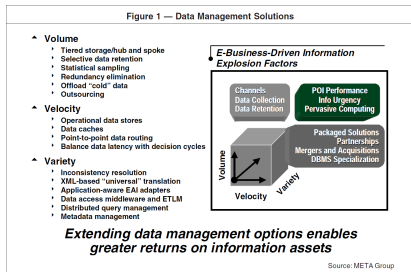


Image from [12].

Take away: traditional RDMS don't/won't scale and different approaches are needed.

Laney's original BD Vs

Figure 1 — Data Management Solutions

▲ Volume

- ▶ Tiered storage/hub and spoke
- ▶ Selective data retention
- ▶ Statistical sampling
- ▶ Redundancy elimination
- ▶ Offload “cold” data
- ▶ Outsourcing

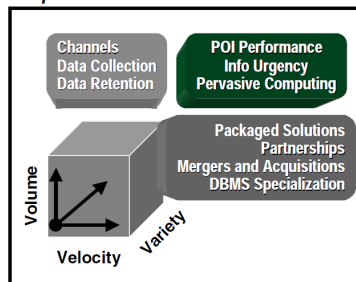
▲ Velocity

- ▶ Operational data stores
- ▶ Data caches
- ▶ Point-to-point data routing
- ▶ Balance data latency with decision cycles

▲ Variety

- ▶ Inconsistency resolution
- ▶ XML-based “universal” translation
- ▶ Application-aware EAI adapters
- ▶ Data access middleware and ETLM
- ▶ Distributed query management
- ▶ Metadata management

E-Business-Driven Information Explosion Factors



Extending data management options enables greater returns on information assets

Laney's Vs recapped

1 Velocity

- Frequency of data generation/delivery
- Think of data from a device, or sensor, robots, clicklogs
- Real-time analysis is small (9%) [19].
- Most Big Data analytics is batch

2 Variety

- Data from a multitude of different sources.
- Not all data is useful.

- Data is lost during “normalization”
- Hopefully not important data, when in doubt: keep it somehow
- Gets away from relational databases

3 Volume

- Store relational records?
- Store transactional records?
- How long to keep data available?
- How to access data?
- How to migrate data?

Volume — what does it mean for Big Data?

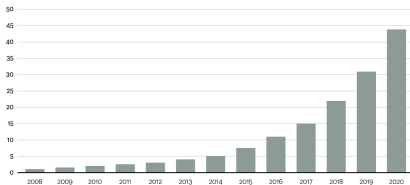
How much is there? And, how do we store it?

- Store relational records?
- Store transactional records?
- How long to keep data available?
- How to access data?
- How to migrate data?

Figure 1

Data is growing at a 40 percent compound annual rate, reaching nearly 45 ZB by 2020

Data in zettabytes (ZB)



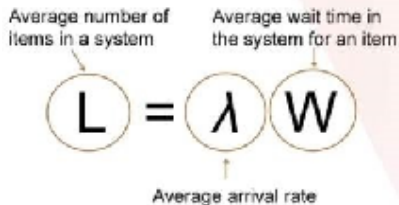
Source: Oracle, 2012

Image from [10].

See http://en.wikipedia.org/wiki/Metric_prefix for list of prefixes.

Velocity — what does it mean for Big Data?

- Frequency of data generation/delivery
- Think of data from a device, or sensor, robots, clicklogs
- Real-time analysis is small (9%) [19].
- Most Big Data analytics is batch



Known as “Little’s Law” [13]

Take away: data is generated at a high speed, it must be analyzed before the next set of data is delivered.

Variety — what does it mean for Big Data?

Not all data is the same.

- Data from a multitude of different sources.
- Not all data is useful.
- Data is lost during “normalization”
- Hopefully not important data, when in doubt: keep it somehow
- Gets away from relational databases



The original Vs have been expanded

Lots more Vs.

- | | | |
|---------------|----------------|------------------|
| 1 Vagueness | 8 Veracity | 15 Visualization |
| 2 Validity | 9 Viability | 16 Vitality |
| 3 Value | 10 Vincularity | 17 Vocabulary |
| 4 Variability | 11 Virility | 18 Volatility |
| 5 Variety | 12 Viscosity | 19 Volume |
| 6 Velocity | 13 Visibility | |
| 7 Venue | 14 Visible | |

We'll delve into these now.

Big Data as 4 Vs

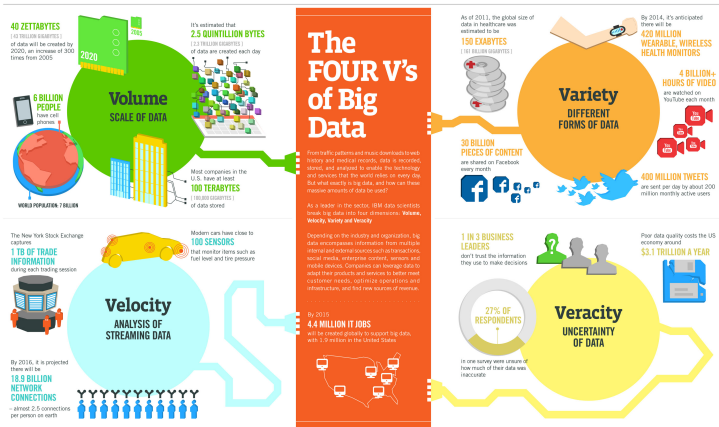


Image from [23].



Big Data as 5 Vs

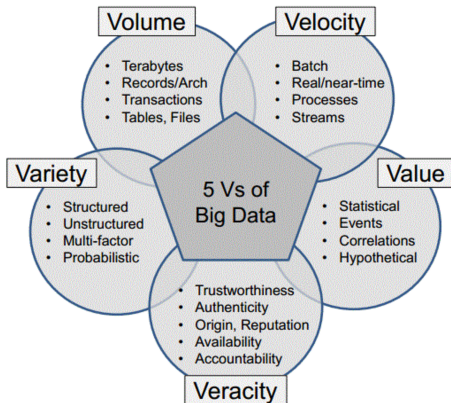


Image from [3].



Big Data as 6 Vs

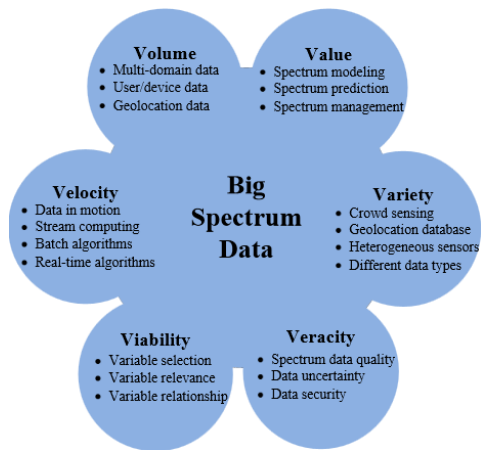


Image from [24].

Big Data as 7 Vs

7V'S
FOR BIG DATA
SUCCESS

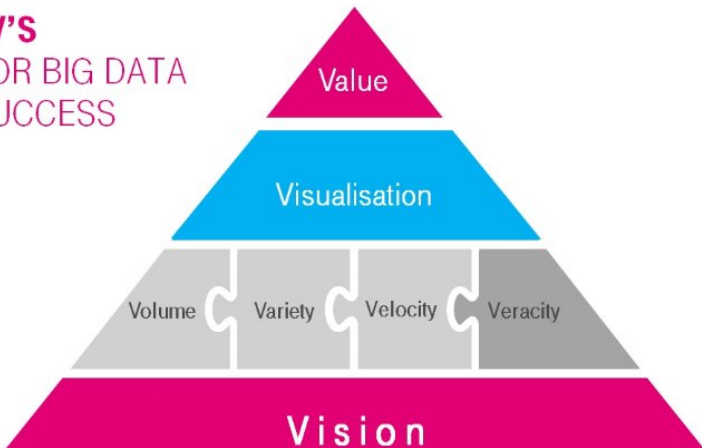


Image from [21].

Big Data as 8 Vs

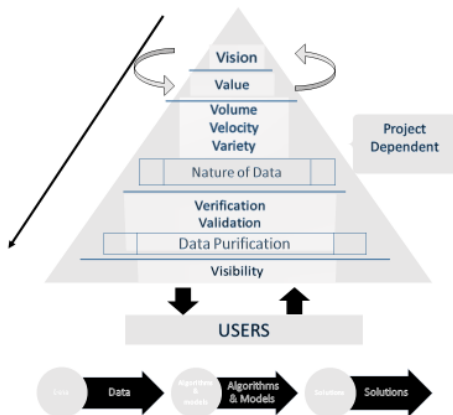


Image from [8].



A long list of Vs

Vs (part 1 of 7)

Num.	Year	V	Definition	Source
1	2001	Variety	... no greater barrier to effective data management will exist than the variety of incompatible data formats, non-aligned data structures, and inconsistent data semantics.	[12, 16]
2	2001	Velocity	E-commerce has also increased point-of-interaction (POI) speed and, consequently, the pace data used to support interactions and generated by interactions.	[12]
3	2001	Volume	E-commerce channels increase the depth/breadth of data available about a transaction (or any point of interaction).	[12]



Vs (part 2 of 7)

Num.	Year	V	Definition	Source
4	2013	Validity	...is the data correct and accurate for the intended use.	[2, 14, 16, 17, 25]
5	2013	Value	How to determine the prescriptive value of data?	[2, 7, 14, 22, 25, 26, 11, 9, 4, 1]
6	2013	Variability	Many options or variable interpretations can confuse interpretation.	[2, 7, 16, 22, 26]



A long list of Vs

Vs (part 3 of 7)

Num.	Year	V	Definition	Source
7	2013	Veracity	... to the biases, noise and abnormality in data.	[2, 7, 14, 17, 25, 26, 18, 9, 4, 5, 1]
8	2013	Viability	... can the data be analyzed in a way that makes it decision-relevant?	[7, 16]
9	2013	Virility	... Defined by some users as the rate at which the data spreads; how often it is picked up and repeated by other users or events.	[26]



A long list of Vs

Vs (part 4 of 7)

Num.	Year	V	Definition	Source
10	2013	Viscosity	... used to describe the latency or lag time in the data relative to the event being described.	[26]
11	2013	Visibility	... the state of being able to see or be seen - is implied. [14, 25, 16]	
12	2013	Visualization	Making all that vast amount of data comprehensible in a manner that is easy to understand and read. With the right analyses and visualizations, raw data can be put to use otherwise raw data remains essentially useless.	[22]



A long list of Vs

Vs (part 5 of 7)

Num.	Year	V	Definition	Source
13	2013	Volatility	...how long is data valid and how long should it be stored.	[16, 17]
14	2014	Vagueness	...confusion over the meaning of big data (Is it Hadoop? Is it something that we've always had? What's new about it? What are the tools? Which tools should I use? etc.)	[2]
15	2014	Venue	...distributed, heterogeneous data from multiple platforms, from different owners systems, with different access and formatting requirements, private vs. public cloud.	[2]



A long list of Vs

Vs (part 6 of 7)

Num.	Year	V	Definition	Source
16	2014	Vocabulary	... schema, data models, semantics, ontologies, taxonomies, and other content- and context-based metadata that describe the data's structure, syntax, content, and provenance.	[2]
17	2015	Vincularity	... it implies connectivity or linkage.	[16]
18	2015	Visible	We live in an increasingly visual world and the statistics of increase in the number of images and videos shared on the Internet is staggering.	[16]

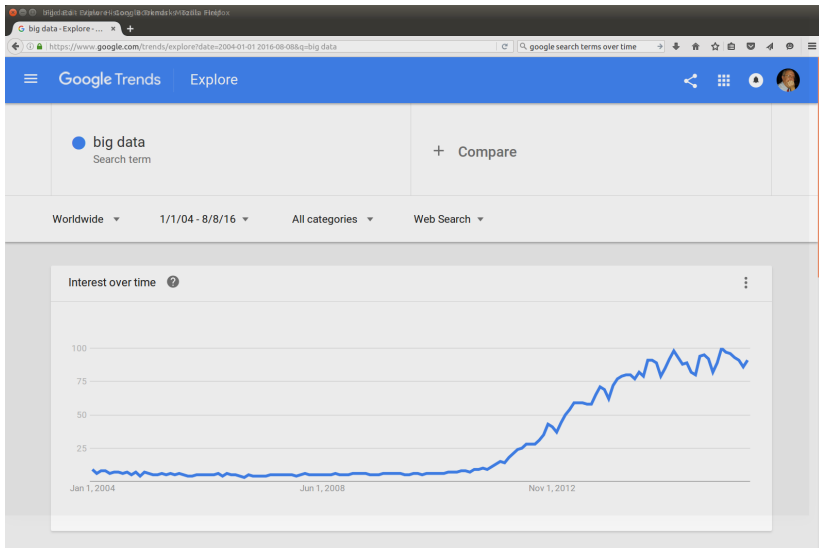


A long list of Vs

Vs (part 7 of 7)

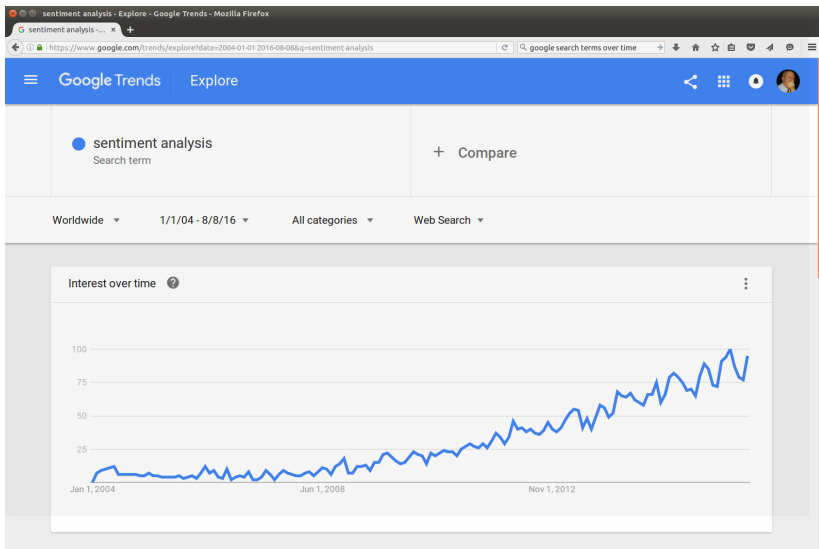
Num.	Year	V	Definition	Source
19	2015	Vitality	...criticality of the data is another concept that is crucial and is embedded in the concept of Value.	[16]

Big Data over time



Data source: Google Trends (www.google.com/trends).

Big Data over time



Data source: Google Trends (www.google.com/trends).

Q & A time.

Q: Name two families whose kids won't join the Marines.

A: The Halls of Montezuma and the Shores of Tripoli.





What have we covered?

- Big Data Vs had a specific point of origin
- The list of Big Data continues to grow
- Big Data can be a very nebulous term



Next: Publicly available sources of Big Data.

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