Business School
UNIVERSITY OF COLORADO DENVER

Information Systems Program

Module 5
Physical Design and Governance of Data Warehouses

Lesson 3: Big data issues

Lesson Objectives

- Provide definitions of big data
- Discuss dimensions of big data
- Define units of big data with examples
- Reflect on value areas for big data

Big Data Definitions

- Doug Laney (2001)

  "E-commerce, in particular, has exploded data management challenges along three dimensions: volume, velocity and variety."

- McKinsey Global Institute (2011)

  "datasets whose size is beyond the typical ability of database software to capture, store, and analyze"

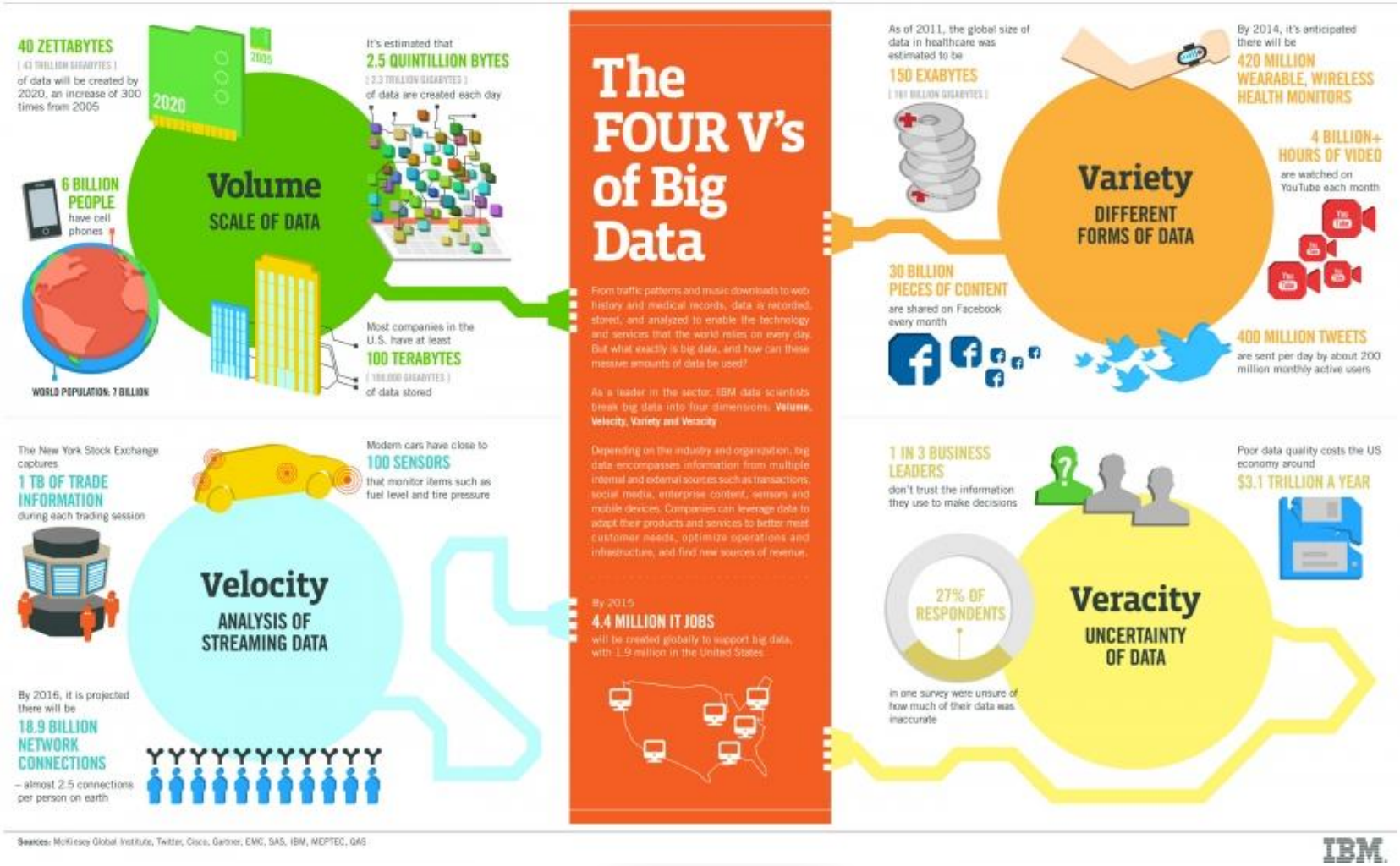
- John Akred, Founder, Silicon Valley Data Science

  " "Big Data" refers to a combination of an approach to informing decision making with analytical insight derived from data, and a set of enabling technologies that enable that insight to be economically derived from at times very large, diverse sources of data."

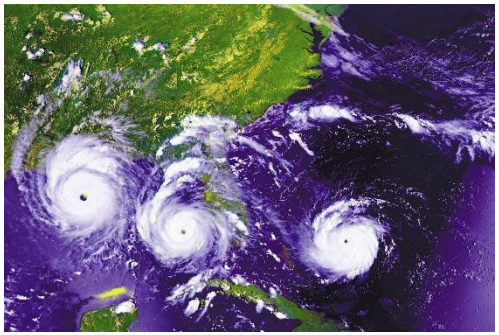
Big Data Timeline

- NASA paper
  - 1997
- How much information?
  - 2000
- Laney report
  - 2001
- How much information?
  - 2003
- Google MapReduce
  - 2004
- Hadoop
  - 2005
- Government funding essay
  - 2008
- Hadoop 2
  - 2013

IBM Big Data Dimensions



Sources of Big Data



Data Unit Sizes

- Units
  - Kilobyte: 1,024 bytes or 1,000 bytes
  - Megabyte: 1,024 (1,000) KB
  - Gigabyte: 1,024 (1,000) MB
  - Terabyte: 1,024 (1,000) GB
  - Petabyte: 1,024 (1,000) TB
  - Exabyte: 1,024 (1,000) PB
  - Zettabyte: 1,024 (1,000) EB
  - Yottabyte: 1,024 (1,000) ZB
- Confusion between base 2 and base 10 units

Examples of Big Data Units

Data Unit	Big Data Example
Terabyte (TB) 1,024 (1,000) GB	Typical hard drive capacity on a personal computers
Petabyte (PB) 1,024 (1,000) TB	Teradata Database 14 capacity of 50 PB
Exabyte (EB) 1,024 (1,000) PB	Estimate of global IP traffic in 2021 by Cisco: 278 EB/month
Zettabyte (ZB) 1,024 (1,000) EB	Cisco estimate of total volume of IP traffic in 2021: 3.3 ZB. IDC estimate of digital universe in 2020: 40 ZB.
Yottabyte (YB) 1,024 (1,000) ZB	Estimate storage capacity of U.S. National Security data center capacity is 1.0 YB; High definition video of all human activity: 100 YB

Big Data Trends and Examples

- 40 percent data growth projected by IDC in 2014
  - 1.7 megabytes per second per individual by 2020
  - 4.4 zettabytes to 44 zettabytes by 2020
- 3.5 billion queries per day using Google
- 60 billion messages per day and 64 billion video views per day on Facebook

Big Data Value Areas

Promotions

Risk management

Inventory management

Surveillance

Military

Entertainment

Summary

- Much hype but also substantial importance about big data
- Know data units
- Relative concept partially dependent on organization
- Understand drivers of big data and opportunities