Big Data: The next frontier for innovation, competition, and productivity

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McKinsey&Company

Data storage has grown significantly – shifting markedly from analog to digital after 2000

Global installed, optimally compressed, storage

Data storage, exabytes

Digital

Analog

1986 · 1993 · 2000 · 2007

Everyone, everything, every interaction generates "exhaust" data
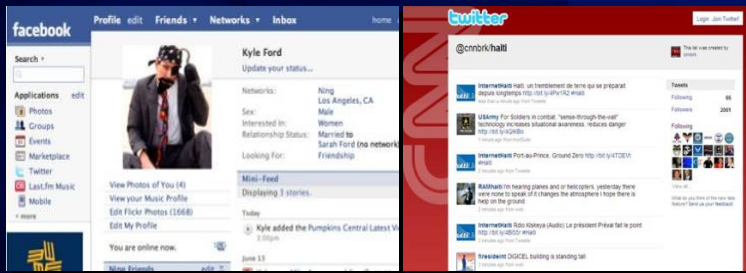
Transactions

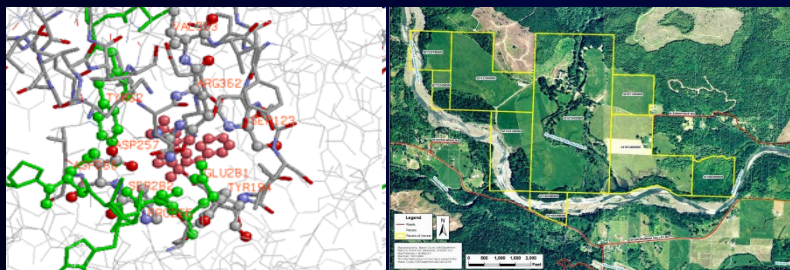**Mobile**

Social

Audio/video

Scientific/engineering

'Internet of things'

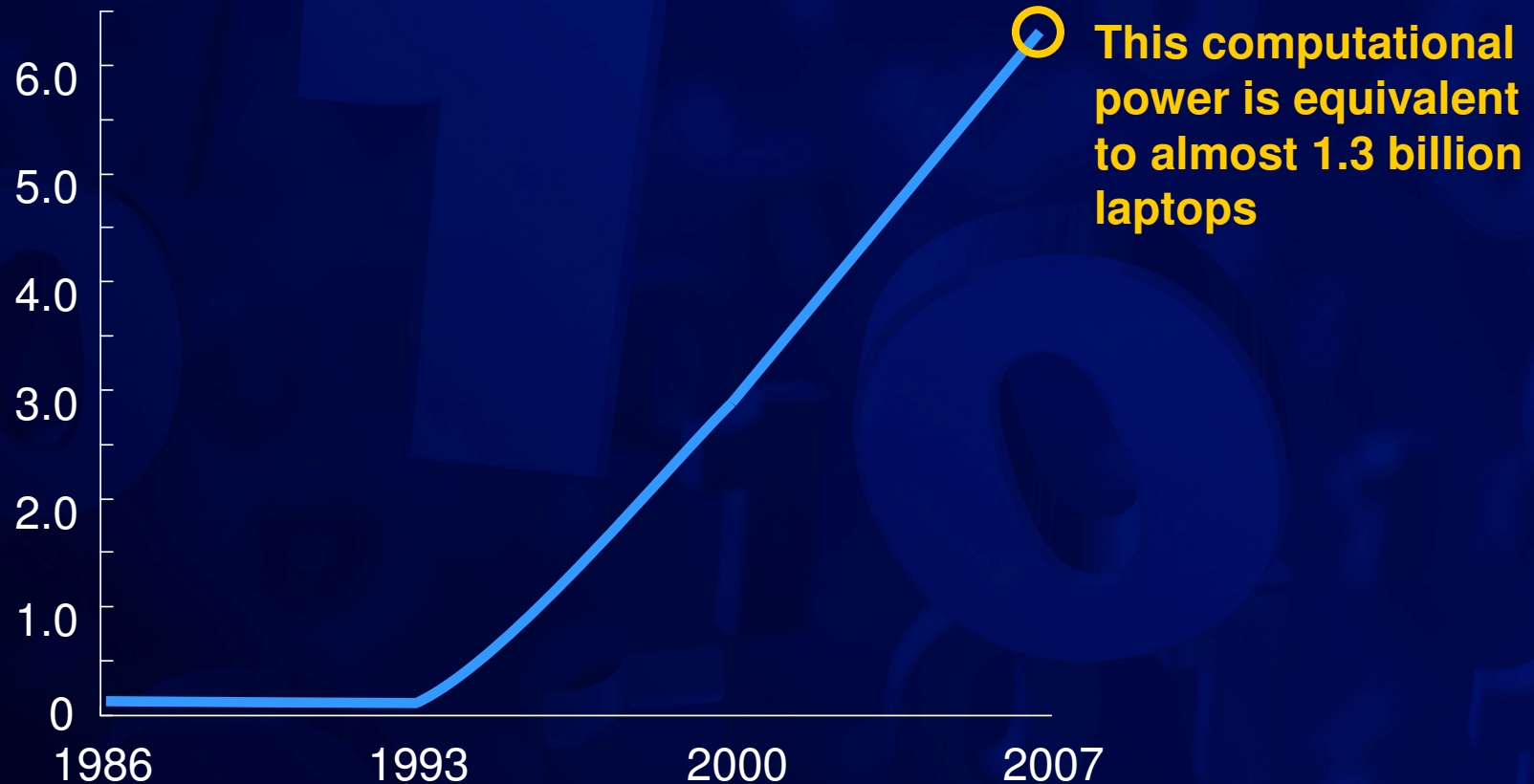# Computation capacity has risen sharply

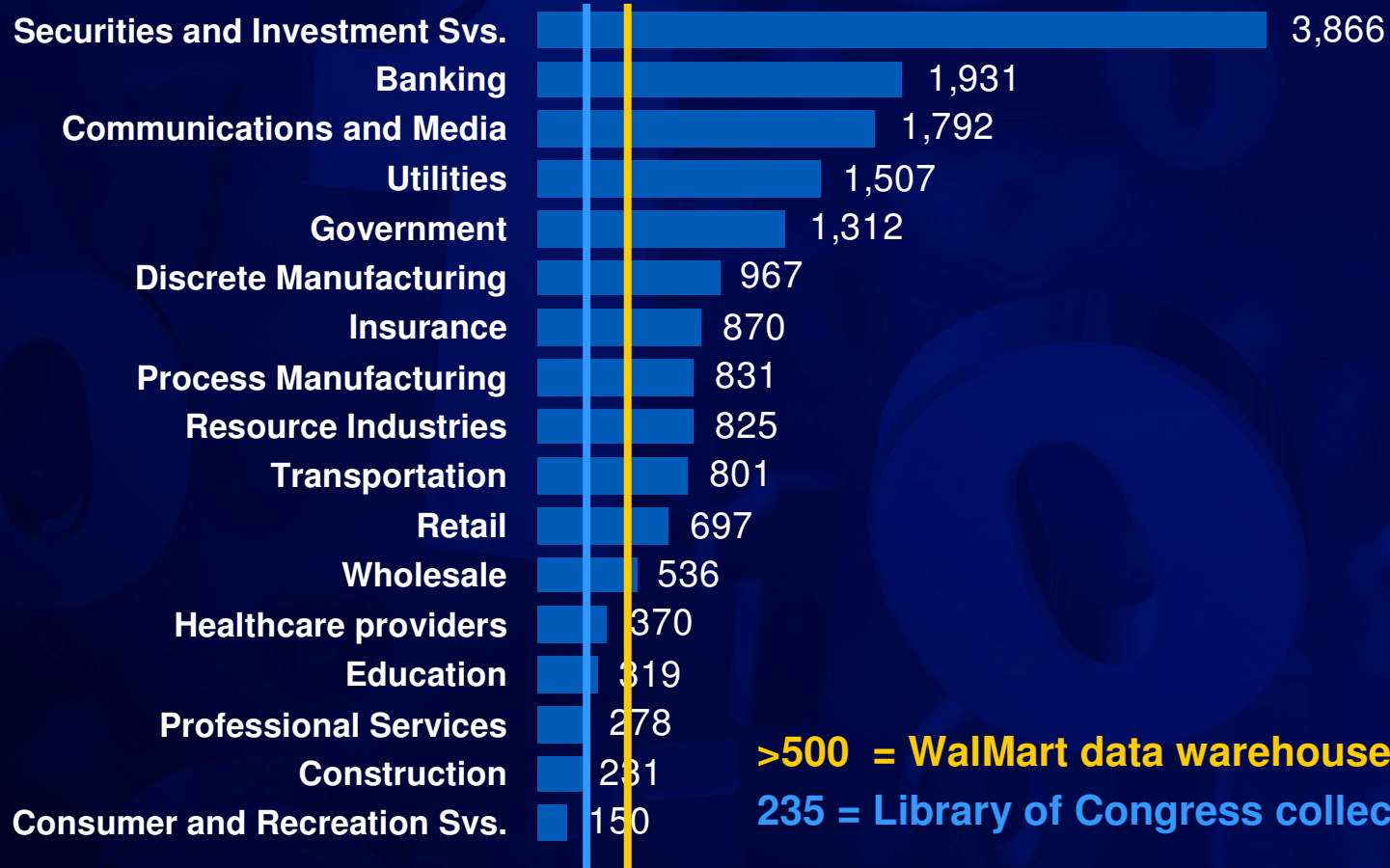Global installed computation to handle information

Overall

10^{12} million instructions per second

This computational power is equivalent to almost 1.3 billion laptops

Companies in all sectors have at least 100 terabytes of stored data in the United States; many have more than 1 petabyte

Average stored data per firm with more than 1,000 employees, 2009, terabytes

Sector	Value
Securities and Investment Svs.	3,866
Banking	1,931
Communications and Media	1,792
Utilities	1,507
Government	1,312
Discrete Manufacturing	967
Insurance	870
Process Manufacturing	831
Resource Industries	825
Transportation	801
Retail	697
Wholesale	536
Healthcare providers	370
Education	319
Professional Services	278
Construction	231
Consumer and Recreation Svs.	150

>500 = WalMart data warehouse in 2004

235 = Library of Congress collection in 2011

This data has gone from being highly macro…

Americans burn **1,800** calories per day
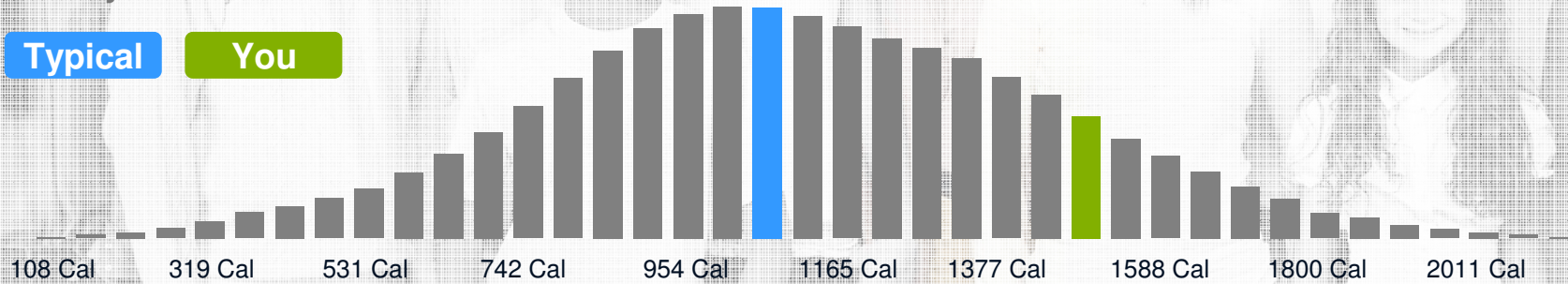
Five ways for big data to create transformational value
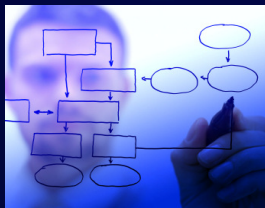
 1 **Create transparency**

 2 **Expose variability and enable experimentation**

 3 **Segment populations to customize actions**

 4 **Replace/support human decision-making with automated algorithms**
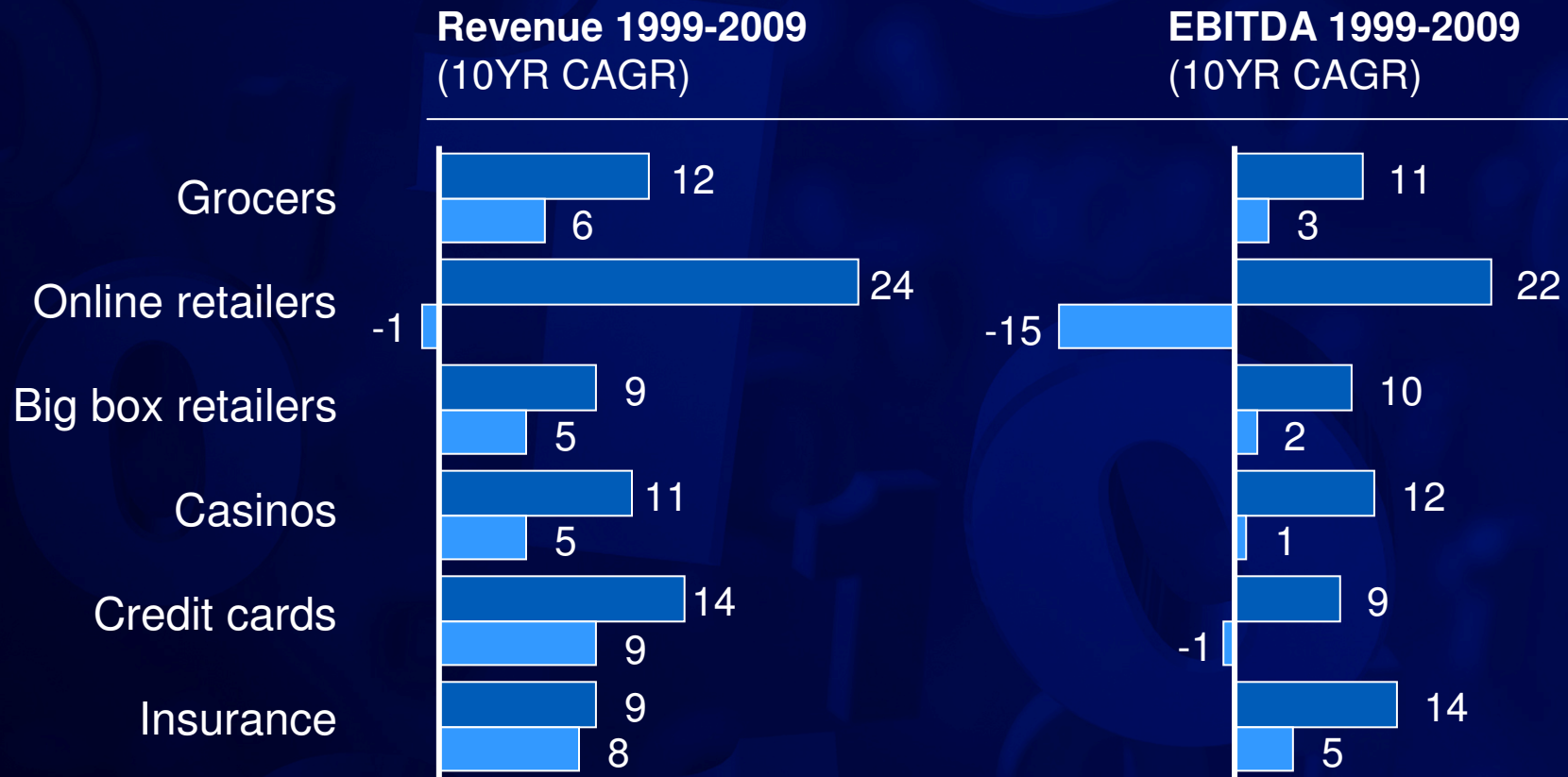
 5 **Innovate new business models, products, and services**

Big Data companies have outperformed their respective markets and have created competitive advantage

Percent

Legend:
- Big data leaders (dark blue)
- Other competitors (light blue)

Revenue 1999-2009 (10YR CAGR)

Category	Big data leaders	Other competitors
Grocers	12	6
Online retailers	24	-1
Big box retailers	9	5
Casinos	11	5
Credit cards	14	9
Insurance	9	8

EBITDA 1999-2009 (10YR CAGR)

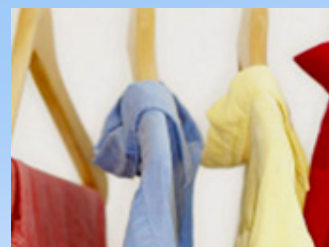| Category	Big data leaders	Other competitors
Grocers	11	3
Online retailers	22	-15
Big box retailers	10	2
Casinos	12	1
Credit cards	9	-1
Insurance	14	5

Big data is already driving productivity and innovation

US health care
- $300 billion value per year
- ~0.7 percent annual productivity growth

US retail
- 60+% increase in net margin possible
- 0.5–1.0 percent annual productivity growth

Europe public sector administration
- €250 billion value per year
- ~0.5 percent annual productivity growth

Manufacturing
- Up to 50 percent decrease in product development, assembly costs
- Up to 7% reduction in working capital

Global personal location data
- $100 billion+ revenue for service providers
- Up to $700 billion value to end users

Impact of using big data to drive innovation and productivity is order of magnitude larger than revenue from providing big data services

Global personal location data

$100 billion to telcos

$600+ billion in using for fuel savings, logistics, local targeting

Real world healthcare data

$10 billion to data service providers

$300 billion in shifts profit pool shifts payers, providers, pharma

To fully capture this opportunity several major issues must be addressed

Description

Data policies

- Privacy concerns
- Data security issues
- Intellectual ownership and liability issues

Technology & techniques

- Deployment of technologies
- Legacy system or inconsistent data formats
- Ongoing innovation

Access to data

- Access to "foreign" data
- Integrating with own proprietary data

Organizational change & talent

- Shortage of talent
- Leadership that understands big data
- Aligned workflows and incentives

Three types of talent are needed to capture value from big data

Talent needed	Potential gap by 2018
Deep analytical ▪ Actuaries ▪ Mathematicians ▪ Statisticians	**~150K**
Big data savvy ▪ Business managers ▪ Financial analysts ▪ Engineers	**~1.5M**
Supporting technology ▪ Computer programmers ▪ Computer software engineers ▪ Computer system analysts	**~300K**

Implications for organization leaders

1 Inventory data assets, proprietary, public and purchased

2 Identify potential value creation opportunities and threats

3 Build internal capabilities to create a data-driven organization

4 Address data policy issues

5 Demonstrate value

5 Architect data-driven transformation