



Impact of Big Data in Oil & Gas Industry



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04 Feb 15, DEJ, Mumbai, India.

New Age Information



2.92 billions Internet Users in 2014



Twitter processes 7 terabytes of data every day



Facebook processes 500 terabytes of data every day



UPS supports largest known peak database workload of 1.1 Billion SQL statements per hour



74 Terabytes UK Land Registry - Largest known transaction processing DB



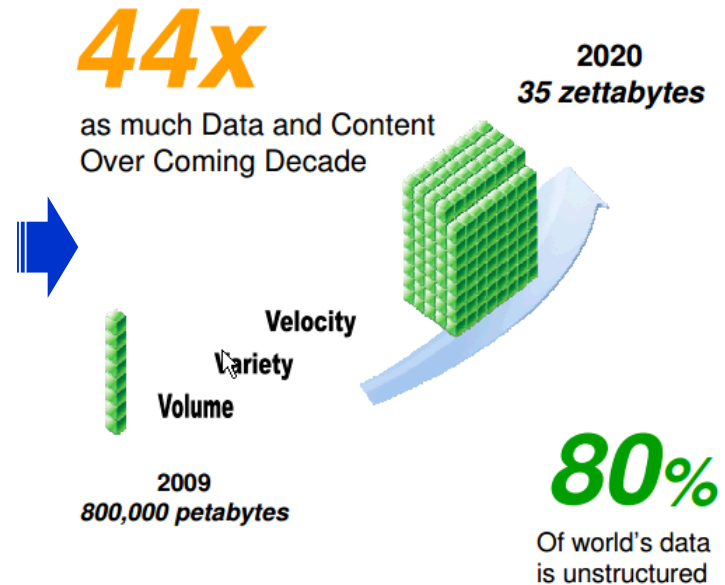
+4.6 Billion Mobile Phones World Wide



World Data Centre for Climate

1736 TB of Web data

9 Petabytes of additional data



Apart from these...Super Collider data, Astronomy Images, **Geoscientific data** are contributing much to **Unstructured** data formats



Sources: Guardian, IDC, IBM

www.statista.com/statistics/.../number-of-internet-users-worldwide

Takeaway



Corporate Strategy



Industry “Speaks”



- **Mr. David Vennergrund, the Director of Predictive Analytics and Data Science in Salient’s Data Analytics Center of Excellence**

“The ability to assemble, analyze, and derive insight from enterprise data has never been easier. The growth of predictive analytics in decision-making increases business value as we focus on showing our customers compelling proof of positive mission impacts and increased return of investment.”

- **Jake Porway, Host of The National Geography Channel**

“IT USED TO BE TOP DOWN, where companies will go out and conduct survey and collect DATA. Now we are walking around with devices that Log everything we like, Picture we take, Store we visit.

**YOU Don’t have to go out and find data.
Now it is coming to US...”**

Why we talk about data?

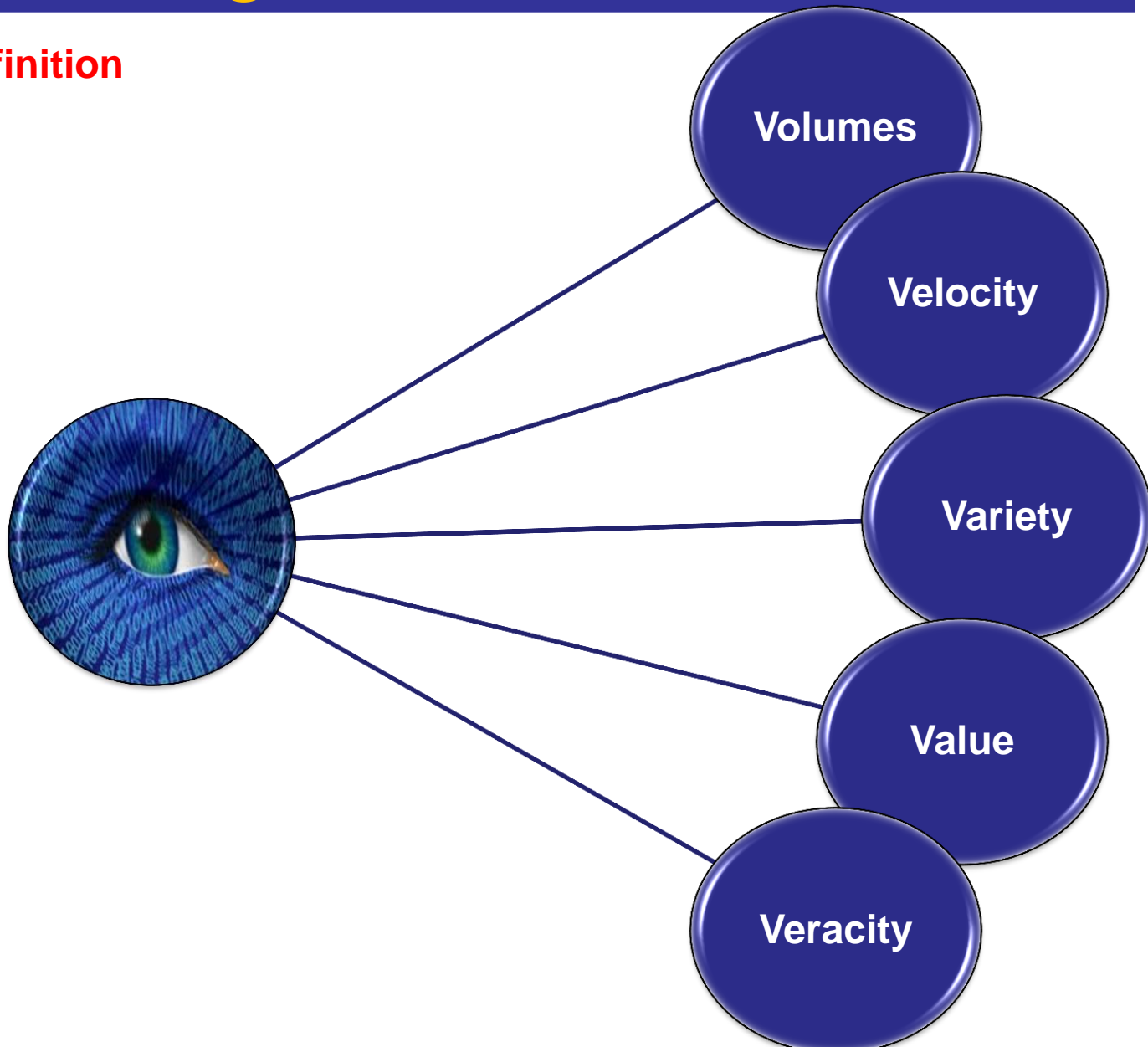


- The data has always been the backbone of decision making process.
- Business thrives or dies on quality of decisions made at various level in any industry.
- Decisions, be it of investment, technical, human and social, market, efficiency, productivity or safety, need to be well informed, sound and equally important is timely decisions.
- We struggle to manage and extract value from the growing volume and variety of data and need to unify information across federated sources.

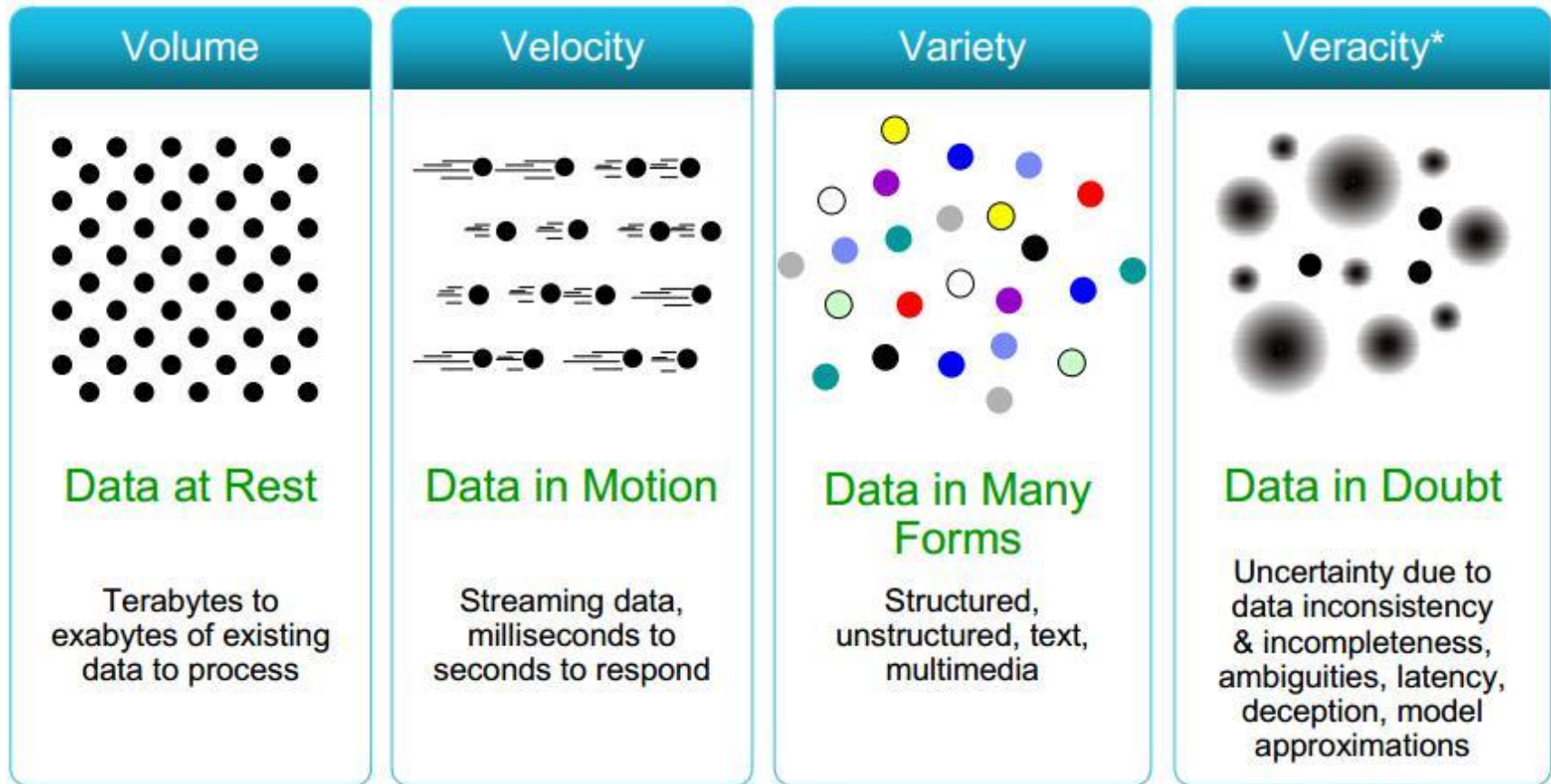
What's Big Data?



- **IDC Definition**



Characteristics of Big Data



Exponential increase in collected data

Any abnormal measurements require immediate reaction

To extract knowledge → all these types of data need to be linked together

Heterogeneity

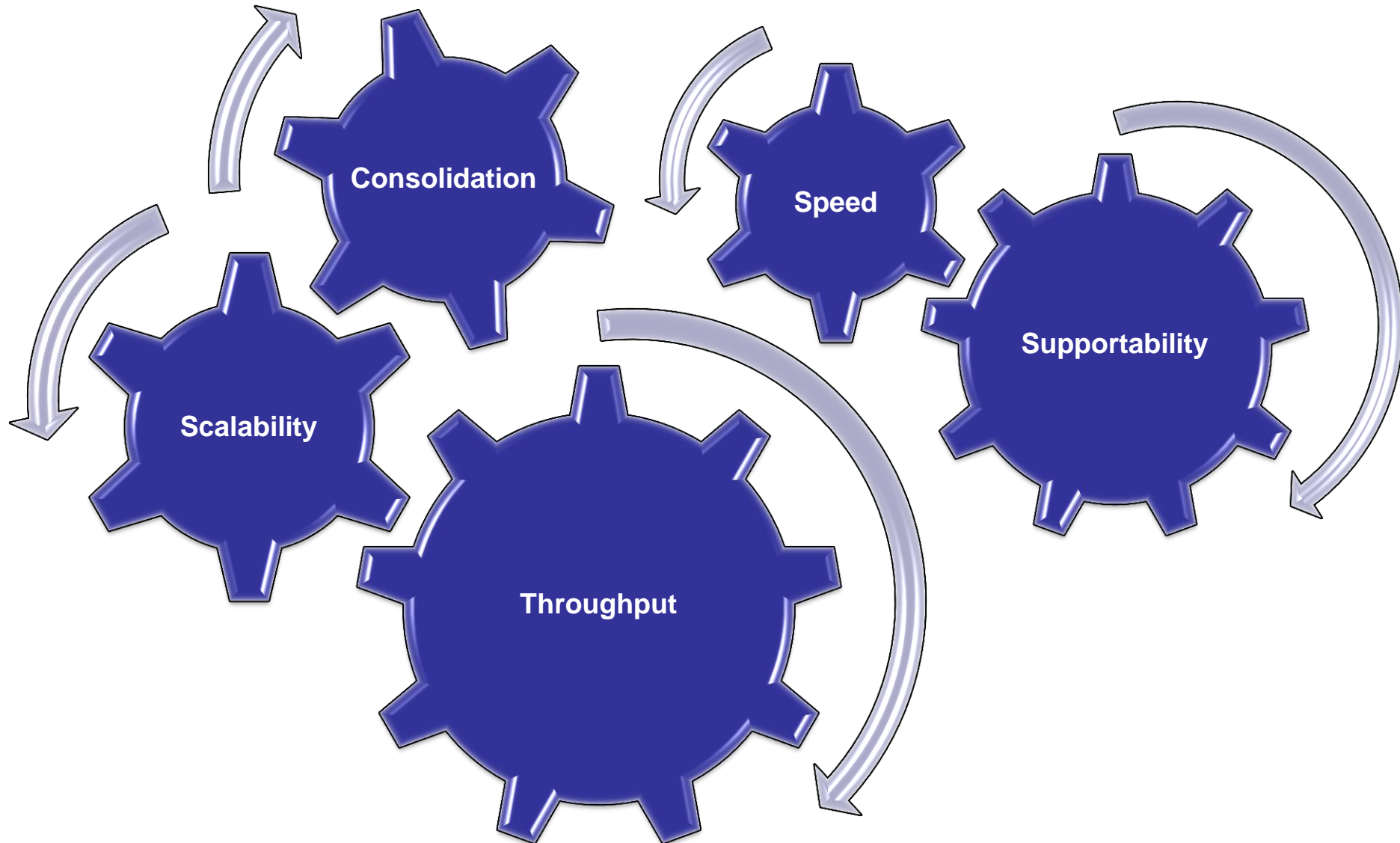
Why Big Data?



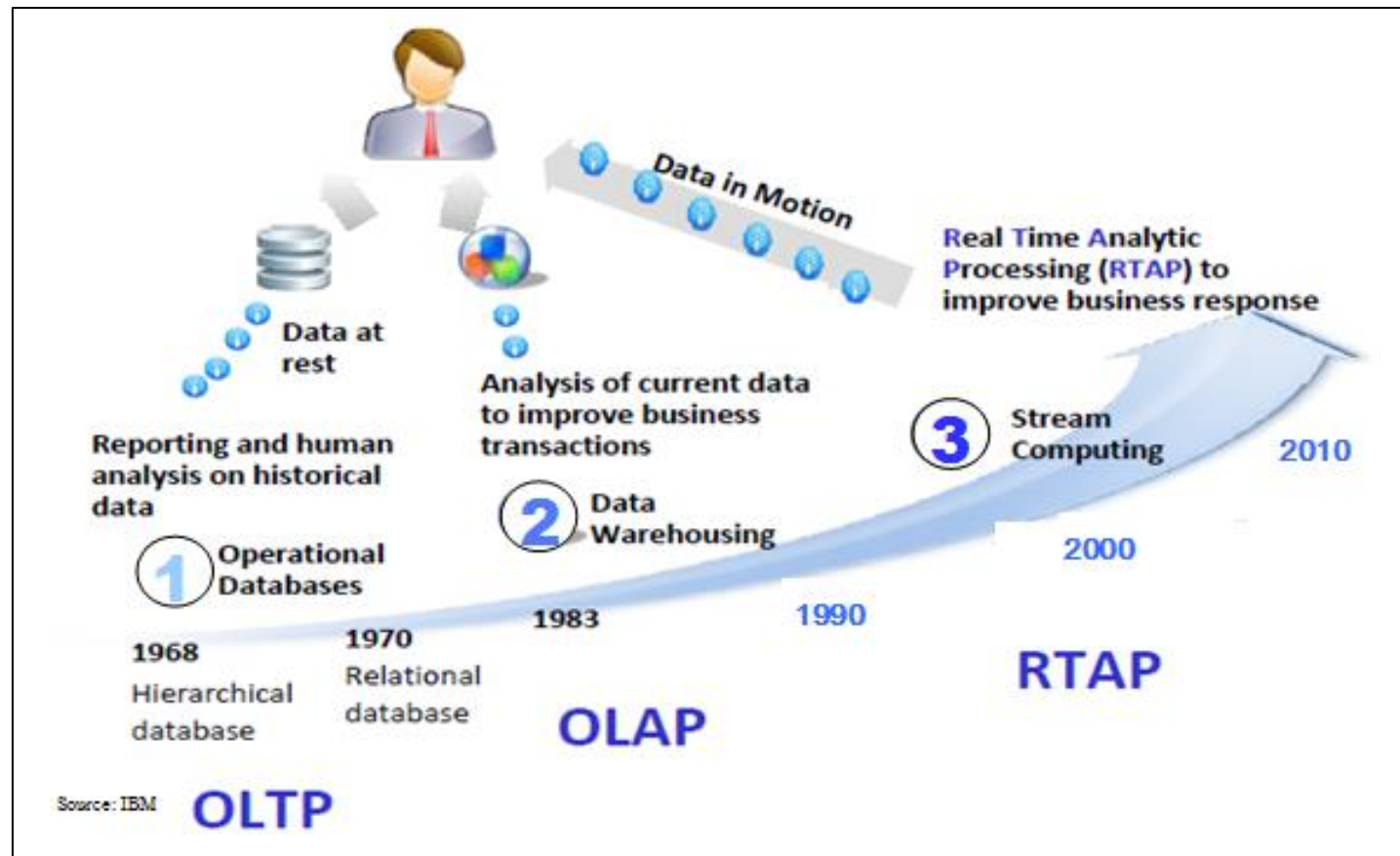
- Remain competitive throughout planning, exploration, production and field development
- Maximize production with regard to maintenance and forecasting
- Reduce time to first oil/gas, lower operating costs and improve the productivity of assets across the life cycle
- Ensuring the seamless, automated availability of right information to the workforce at right time

Develop new business models with increased market presence and revenue. As a result we can say Big Data is equal to Big Return on Investment (ROI)

Big Data Enables



Harnessing Big Data



- **OLTP:** Online Transaction Processing (DBMSs)
- **OLAP:** Online Analytical Processing (Data Warehousing)
- **RTAP:** Real-Time Analytics Processing (Big Data Architecture & technology)

The Model Has Changed...



- **The Model of Generating/Consuming Data has Changed**

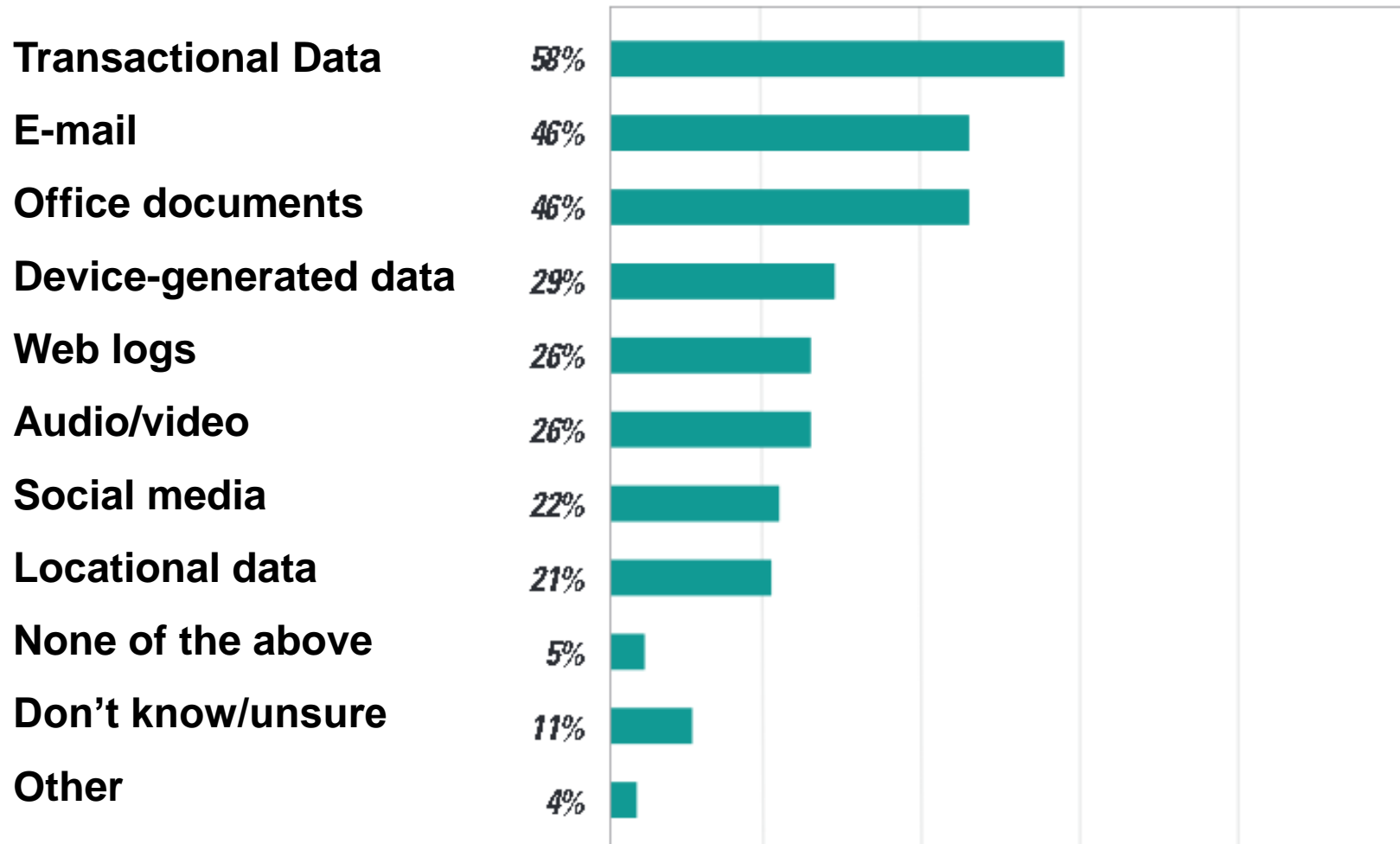
Old Model: Few companies are generating data, all others are consuming data



New Model: All of us are generating data, and all of us are consuming data



Drivers behind the change



“Unstructured data constitutes about 80% of overall Data Volume...”

Change Enablers



■ Four Pillars that IT Provides



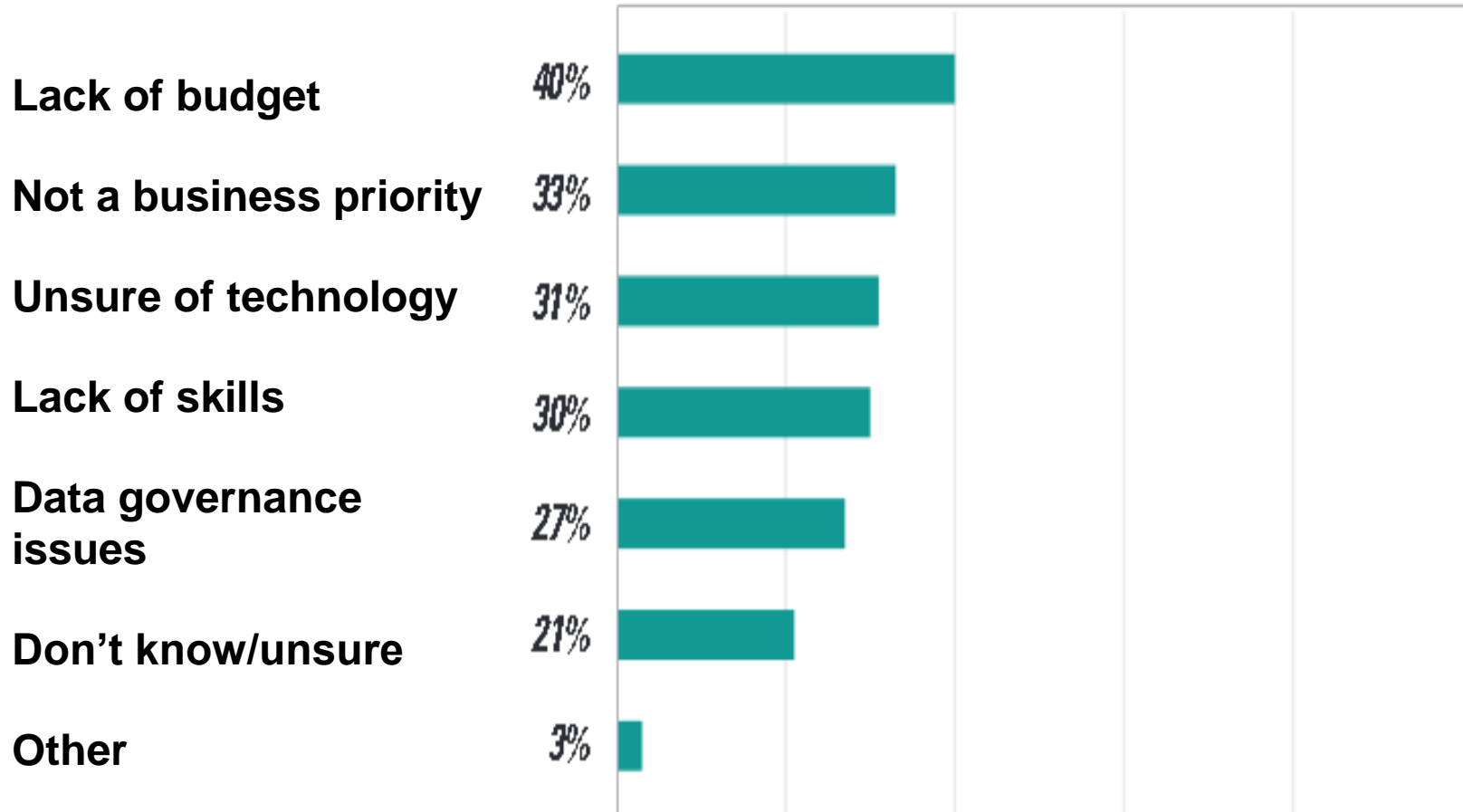
**Density
Optimized
Servers**

**Leading Edge
Coprocessors**

Accelerators

**Open
Source
Software**

Barriers to Change

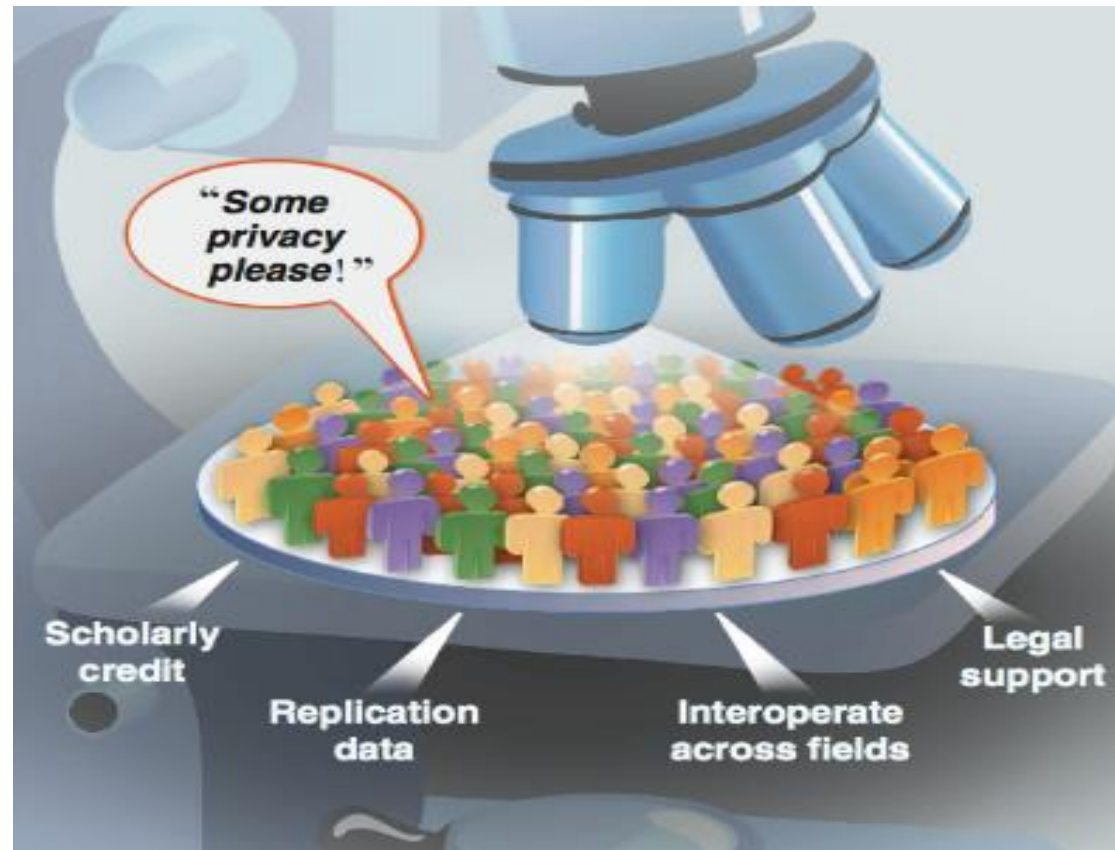


Sources: Independent Oracle User Group

Additional Challenges



- Privacy,
- Legal Support,
- Data Replication,
- Interoperability across various domains



Sources: "Ensuring the Data-Rich Future of the Social Sciences".
Science Magazine

Our Industry – How it sees?



■ **Barriers in Adopting New Technologies**

Cost of Technology and Infrastructure

Lack of Technology Knowledge / Adoption

Deciding on the Relevant Data

Getting Big Data from here to there

- Communications bandwidth limitations
- National restrictions on data “leaving the country”

Getting access to Big Data

- Operators can see data on screens but it isn't stored
- Oil field service firms store data but don't provide access

Big Data is not just raw data

- Raw data requires processing to be useful
- Multiple steps in the processing workflow
- Big Data applicable to some (but not all) steps



Industry looking solutions for



- **Production**

- Detect well problems before they become serious – slugging, WAG gas break through
- Rapid optimization for maximizing the output

- **Data Management**

- Astronomical data volumes needing Big data techniques
- Data size preventing Real time and after-the-fact analysis
- Preserving Real time data

Data Transaction at a glance

Internal Data : 1.4TB per day/500 TB per annum

External Data : 1.1 TB per day/400 TB per annum

Real Time Data : .03 TB per annum

...Industry looking solutions for



- **Reservoir Characterization**

- Exponential size increase – seismic logs
- Management of exploding interpretation and simulation models
- Need to Integrate Real time data into earth model on rig and in office

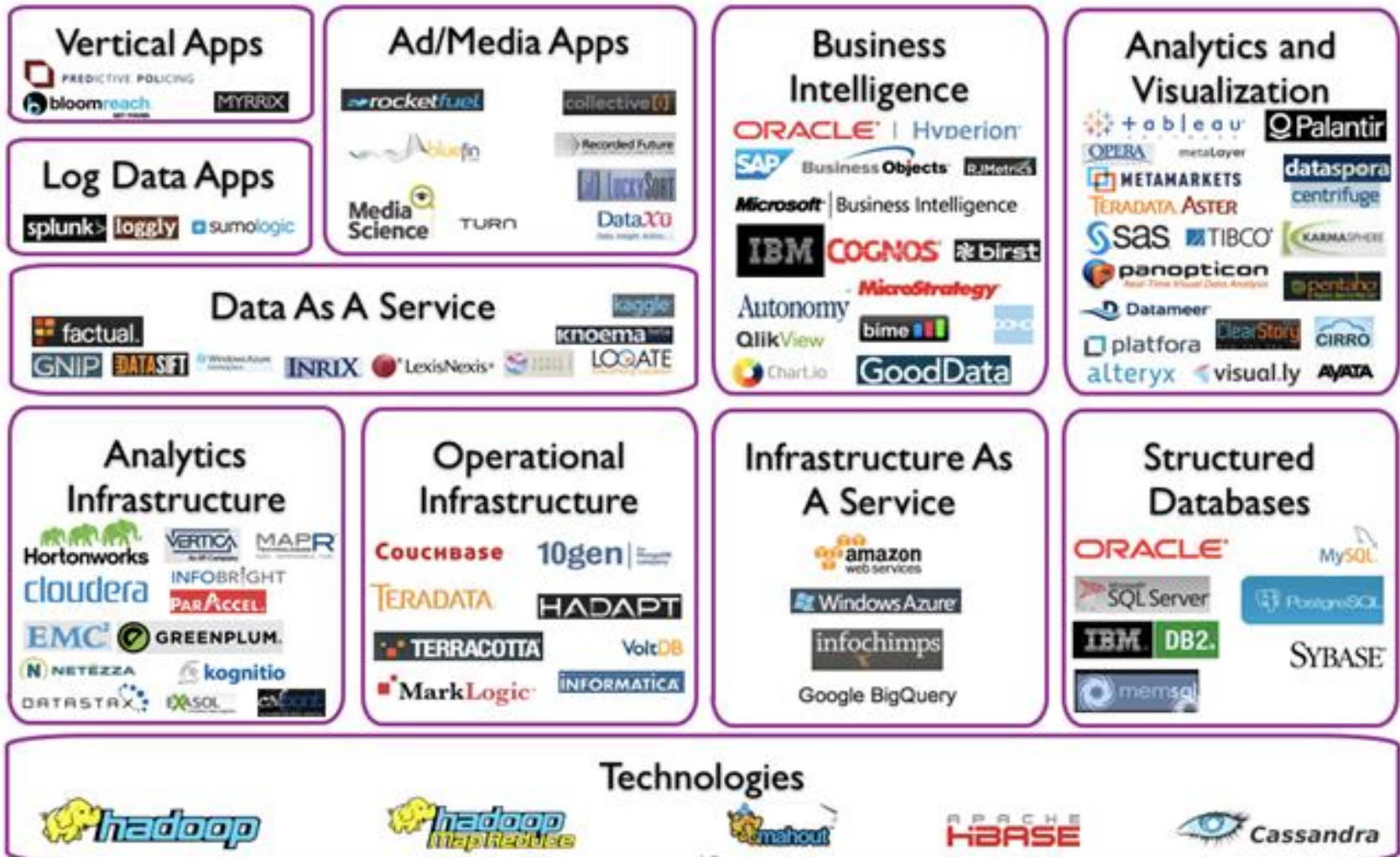
- **Drilling**

- Risks to personnel and public need to be reduced
- Need to automate real-time decision making
- Need to unlock value in real time data archive after the drilling phase is over

...Big Data Adoption



- All the Hardware, Software Vendors, Service Providers aligning toward Big Data



Big Data Industry Adoption



- **Chevron proof-of-concept using Hadoop for Seismic Data Processing**
- **Shell piloting Hadoop in Amazon Virtual Private Cloud (Amazon VPC) for seismic sensor data**
- **Cloudera Seismic Hadoop project combining Seismic Unix with Apache Hadoop**
- **PointCross Seismic Data Server and Drilling Data Server using Hadoop and NoSQL**
- **University of Stavanger data acquisition performance study using Hadoop**

Industry Scenario



■ Rig Management with Data Streams

Business Problem:

Develop a centralized clearing house of sensor data for continual analytics to improve yield and safety

- Raw data size of 2+ TB per rig per day, over centralized storage environment will be at 4 PB+ in 18 months easily
- Most rigs have ~40k sensors per rig but only uses 10% of data

Technical Challenges:

- Log on to sensor units from a central location
- Preprocess & manage large amounts of data at multiple remote sites
- Move the data from the site to a more central location often using poor communications connections
- Load the sensor data onto a server (separate from the hardware at the remote site) and determine whether they can optimize the data streams from this server to the central database
- Create a central repository where data from multiple sites can be collected and kept for a long period of time

Big Data @ RIL



Vision

- Propel & sustain monetization of data for competitive advance at RIL group
- Innovate in to top 5% of Analytically Intelligent groups by partnering internally with business segments and leveraging world class talent
- Establish unique and significant Intellectual Property for RIL group fostering leadership

Ongoing Work

- Data Quality validation for STAR BT
- CoE structuring and interaction framework
- Road Maps for the major BUs & FUs
- Project discussions initiated with :
 - Life Sciences,
 - PetChem
 - E&P and R&M

Competencies & Expertise

- Complex System Modeling & Simulation
- Linear & Non-linear optimization
- Advanced statistical modelling/estimation
- Machine Learning, Data mining, Text mining, Natural Language Processing
- Big Data processing technologies
- Symbolic time series analysis
- Stochastic dynamic modeling

Team affiliation & experience



....Big Data @ RIL



To be the Go-To division which propels and sustains Reliance group of industries among the top 5% of comparable global corporations that monetize enterprise and external Big data for competitive advantage, by partnering with business segments to architect and implement game-changing Analytics solutions and services leveraging world class talent

Teasers



- ✓ **What happens in a world of radical transparency, with data widely available?**
- ✓ **If you could test all your decisions, how would that change the way you compete?**
- ✓ **How would your business change if you used big data for widespread, real time customization?**
- ✓ **How can big data augment or even replace Management?**
- ✓ **Could you create a new business model based on data?**



Thank You

