

大數據行銷研究

Big Data Marketing Research



Tamkang
University
淡江大學

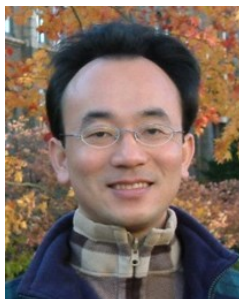
資料科學與大數據行銷

(Data Science and Big Data Marketing)

1051BDMR02

MIS EMBA (M2262) (8638)

Thu, 12,13,14 (19:20-22:10) (D409)



Min-Yuh Day

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<http://mail.tku.edu.tw/myday/>

2016-09-30



課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
1	2016/09/16	中秋節 (調整放假一天) (Mid-Autumn Festival Holiday)(Day off)
2	2016/09/23	大數據行銷研究課程介紹 (Course Orientation for Big Data Marketing Research)
3	2016/09/30	資料科學與大數據行銷 (Data Science and Big Data Marketing)
4	2016/10/07	大數據行銷分析與研究 (Big Data Marketing Analytics and Research)
5	2016/10/14	測量構念 (Measuring the Construct)
6	2016/10/21	測量與量表 (Measurement and Scaling)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
7	2016/10/28	大數據行銷個案分析 I (Case Study on Big Data Marketing I)
8	2016/11/04	探索性因素分析 (Exploratory Factor Analysis)
9	2016/11/11	確認性因素分析 (Confirmatory Factor Analysis)
10	2016/11/18	期中報告 (Midterm Presentation)
11	2016/11/25	社群運算與大數據分析 (Social Computing and Big Data Analytics)
12	2016/12/02	社會網路分析 (Social Network Analysis)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
13	2016/12/09	大數據行銷個案分析 II (Case Study on Big Data Marketing II)
14	2016/12/16	社會網絡分析量測與實務 (Measurements and Practices of Social Network Analysis)
15	2016/12/23	大數據情感分析 (Big Data Sentiment Analysis)
16	2016/12/30	金融科技行銷研究 (FinTech Marketing Research)
17	2017/01/06	期末報告 I (Term Project Presentation I)
18	2017/01/13	期末報告 II (Term Project Presentation II)

Outline

- Data Science
- Big Data Marketing

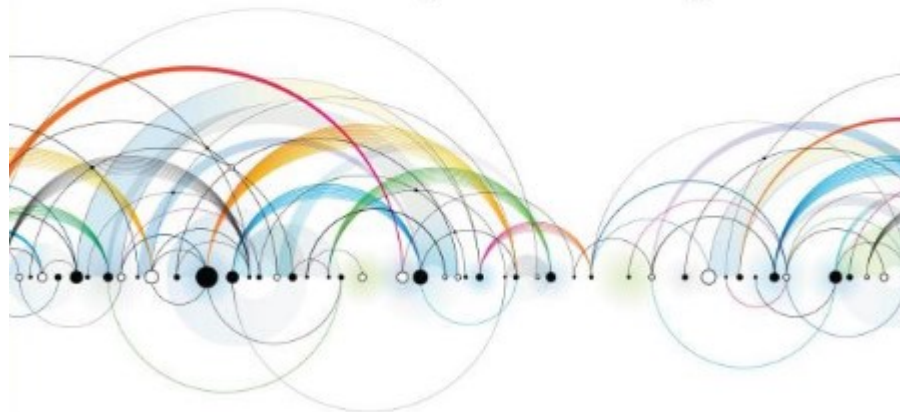
Data Science

Data Science for Business: What you need to know about data mining and data-analytic thinking, Foster Provost and Tom Fawcett, O'Reilly, 2013

"A must-read resource for anyone who is serious about embracing the opportunity of big data."
—Craig Vaughan, Global Vice President, SAP

Data Science *for* Business

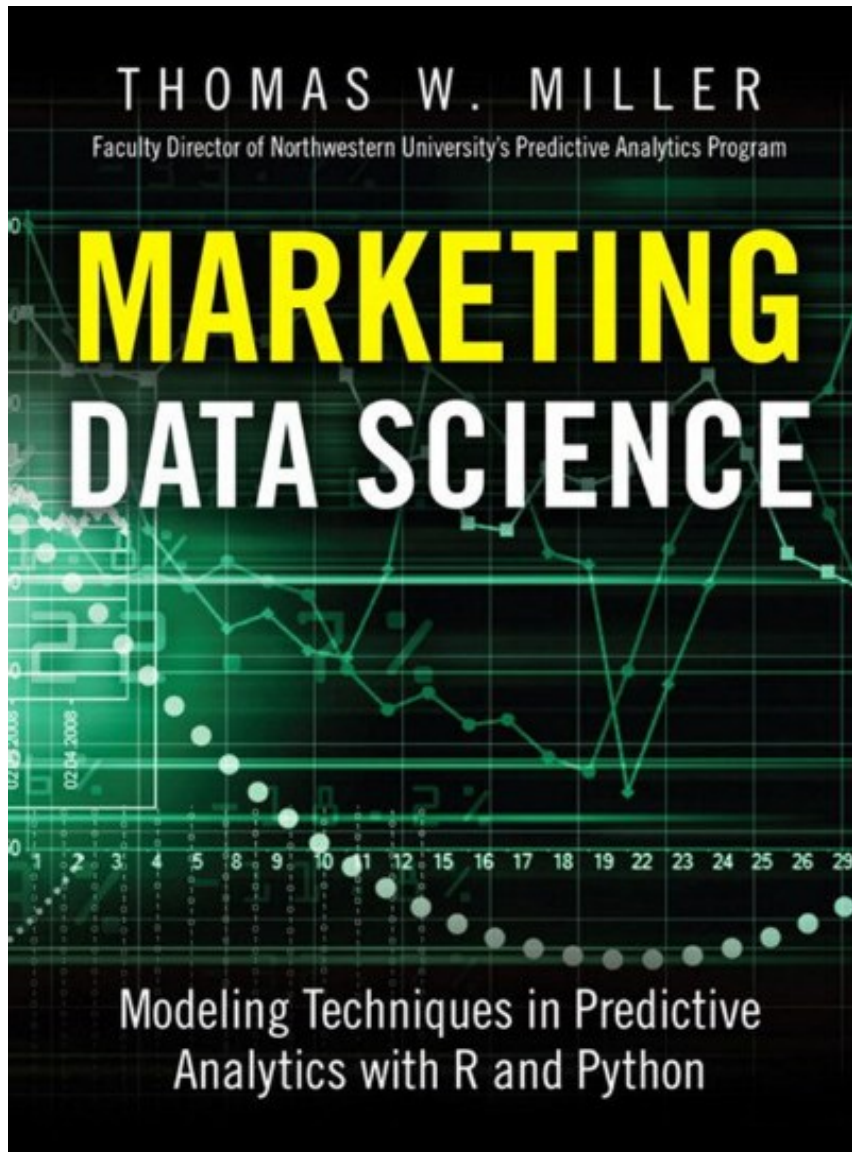
What You Need to Know
About Data Mining and
Data-Analytic Thinking



Foster Provost & Tom Fawcett

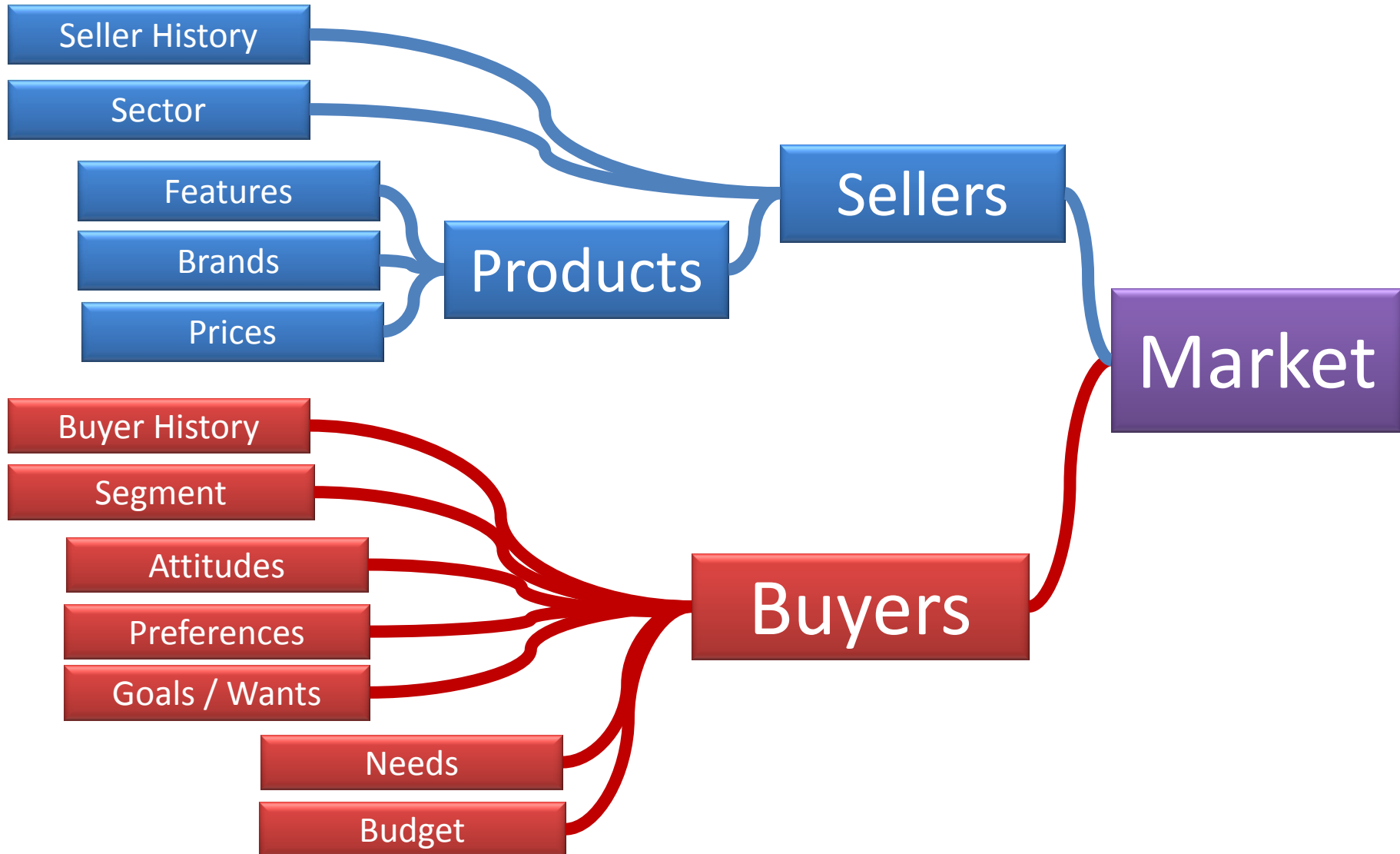
Copyrighted Material

Marketing Data Science: Modeling Techniques in Predictive Analytics with R and Python,
Thomas W. Miller, Pearson FT Press, 2015

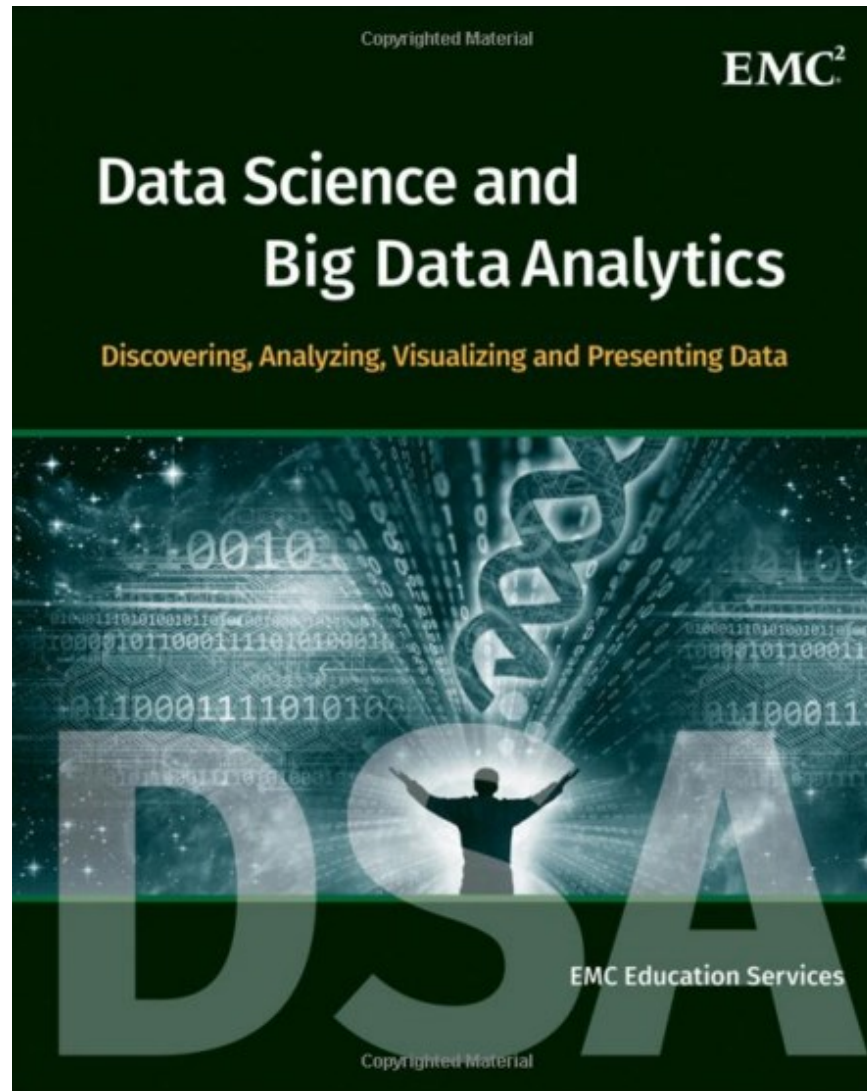


The Market:

A Meeting Place for Buyers and Sellers



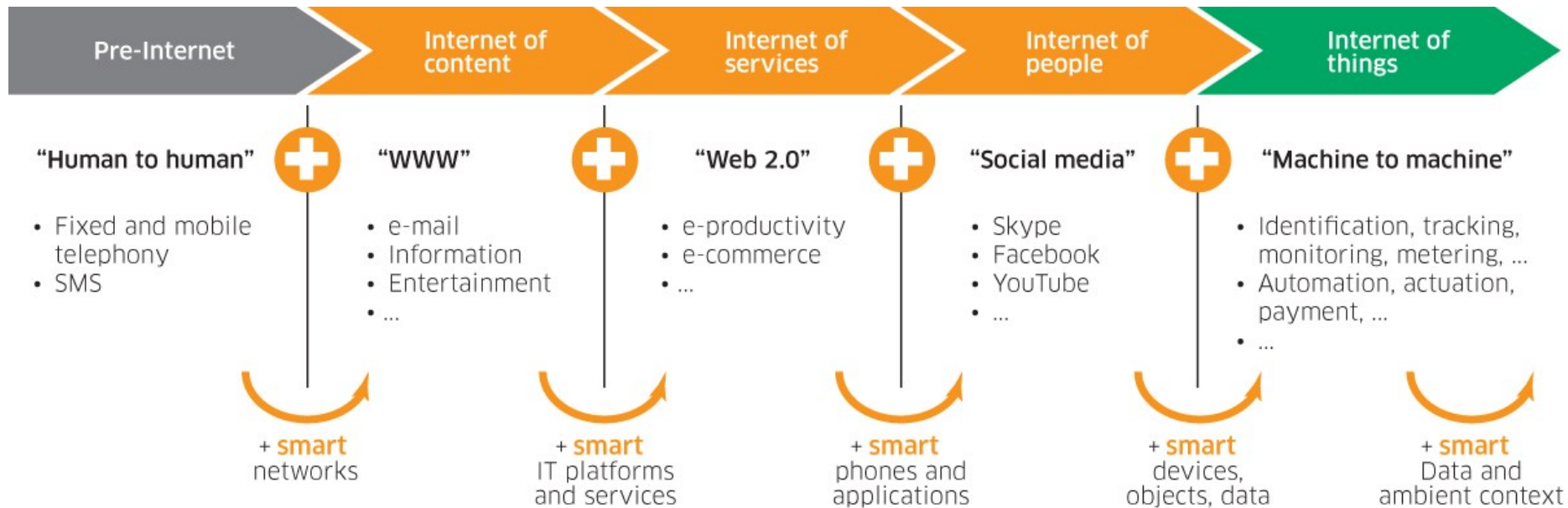
**EMC Education Services,
Data Science and Big Data Analytics:
Discovering, Analyzing, Visualizing and Presenting Data,
Wiley, 2015**



Internet Evolution

Internet of People (IoP): Social Media

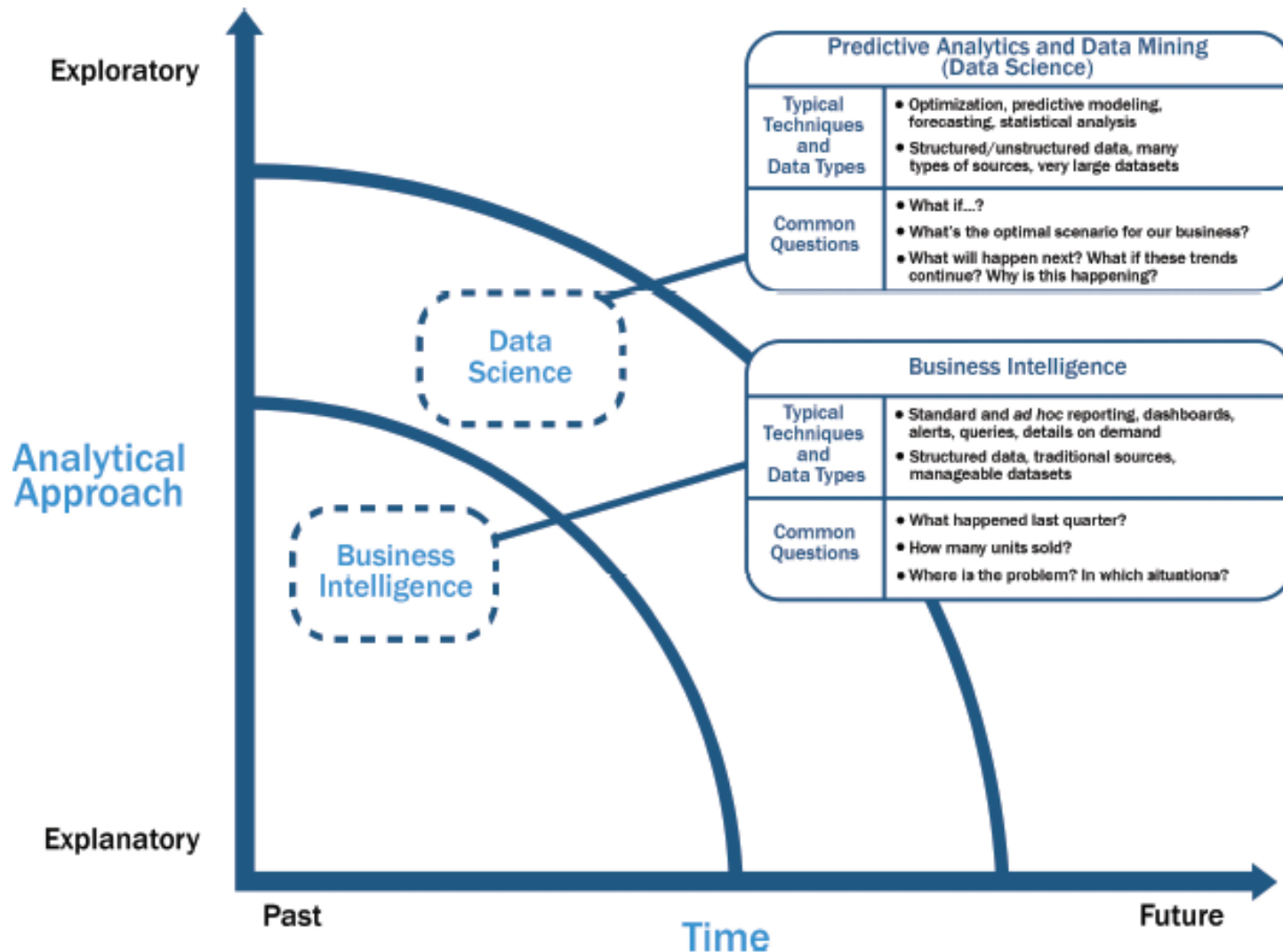
Internet of Things (IoT): Machine to Machine



Source: Marc Jadoul (2015), The IoT: The next step in internet evolution, March 11, 2015

<http://www2.alcatel-lucent.com/techzine/iot-internet-of-things-next-step-evolution/>

Data Science and Business Intelligence



Data Scientist:

The Sexiest Job of the 21st Century

**Meet the people who
can coax treasure out of
messy, unstructured data.**

*by Thomas H. Davenport
and D.J. Patil*

When Jonathan Goldman arrived for work in June 2006 at LinkedIn, the business networking site, the place still felt like a start-up. The company had just under 8 million accounts, and the number was growing quickly as existing members invited their friends and colleagues to join. But users weren't seeking out connections with the people who were already on the site at the rate executives had expected. Something was apparently missing in the social experience. As one LinkedIn manager put it, "It was like arriving at a conference reception and realizing you don't know anyone. So you just stand in the corner sipping your drink—and you probably leave early."

Big Data



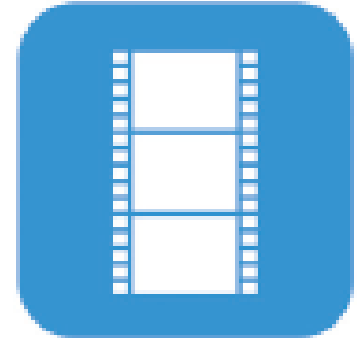
**Mobile
Sensors**



**Social
Media**



**Video
Surveillance**



**Video
Rendering**



**Smart
Grids**



**Geophysical
Exploration**

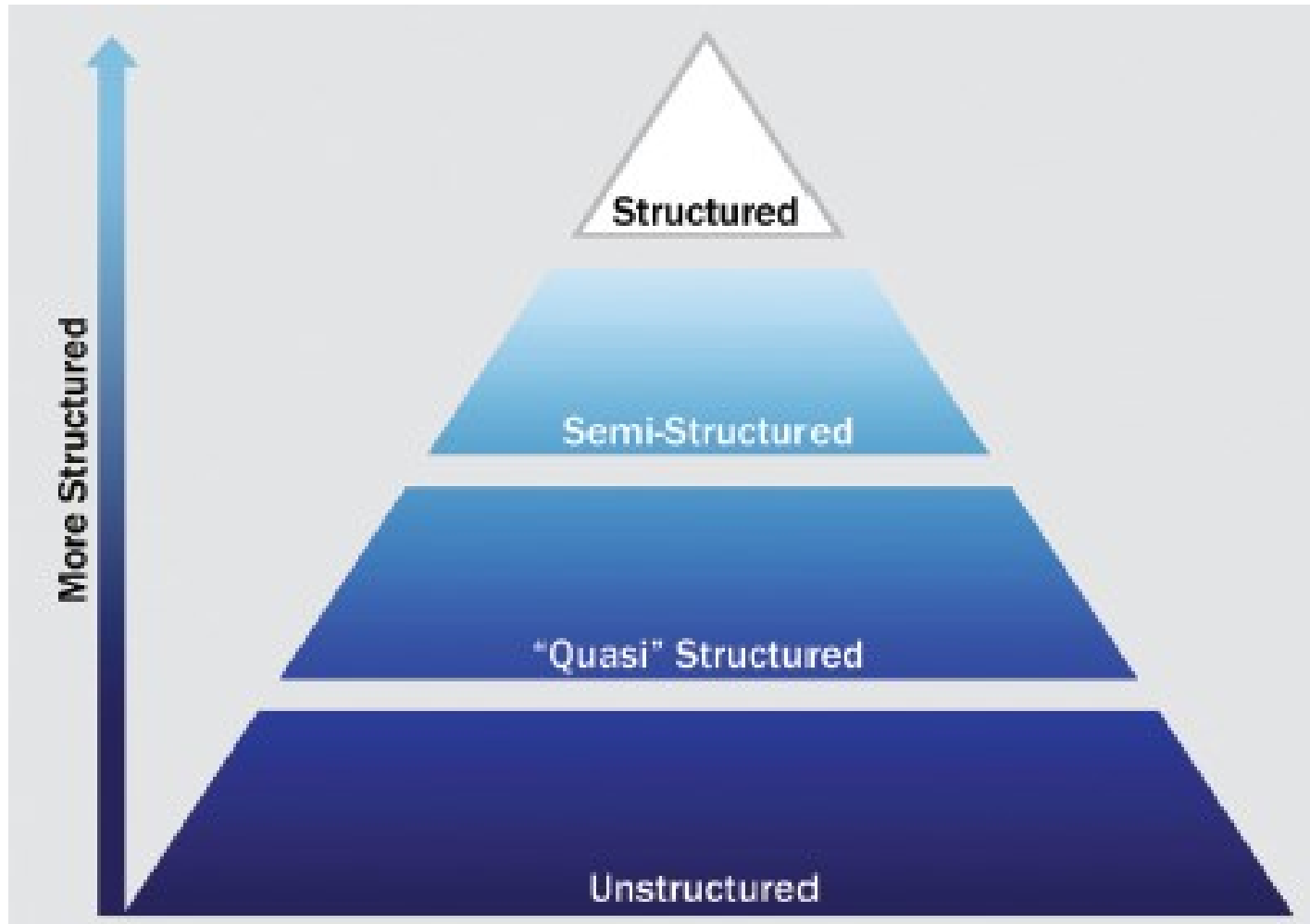


**Medical
Imaging**

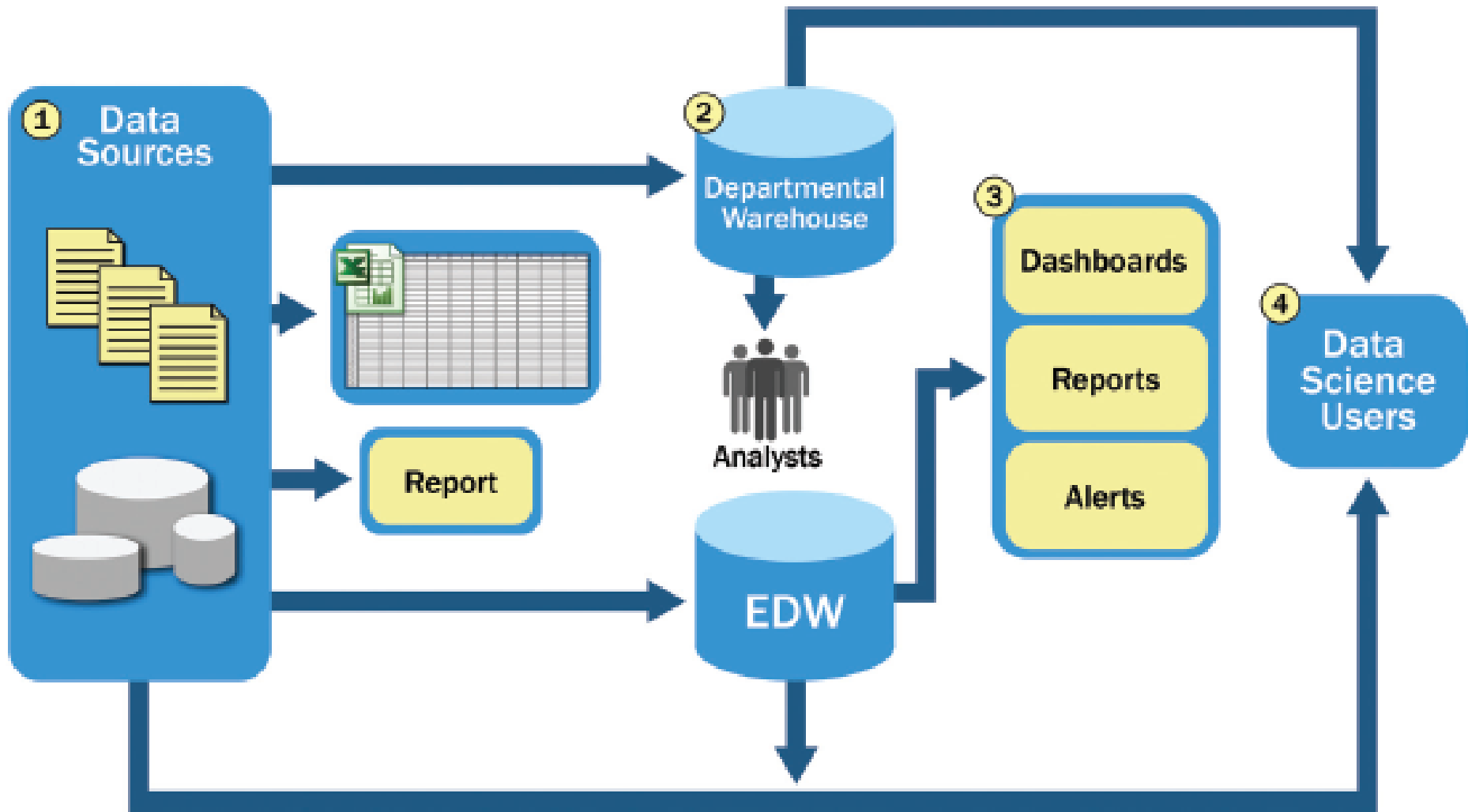


**Gene
Sequencing**

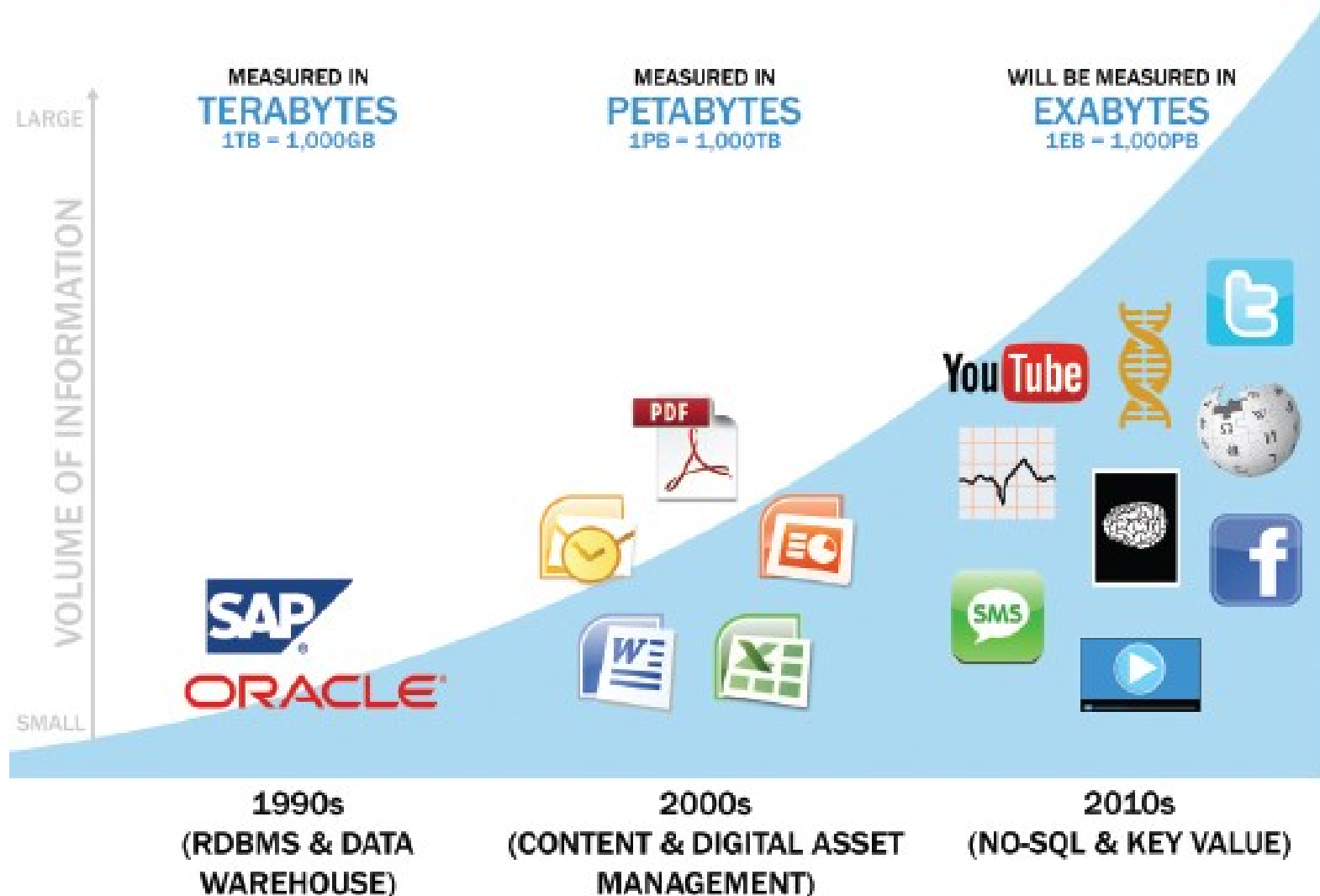
Big Data Growth is increasingly **unstructured**



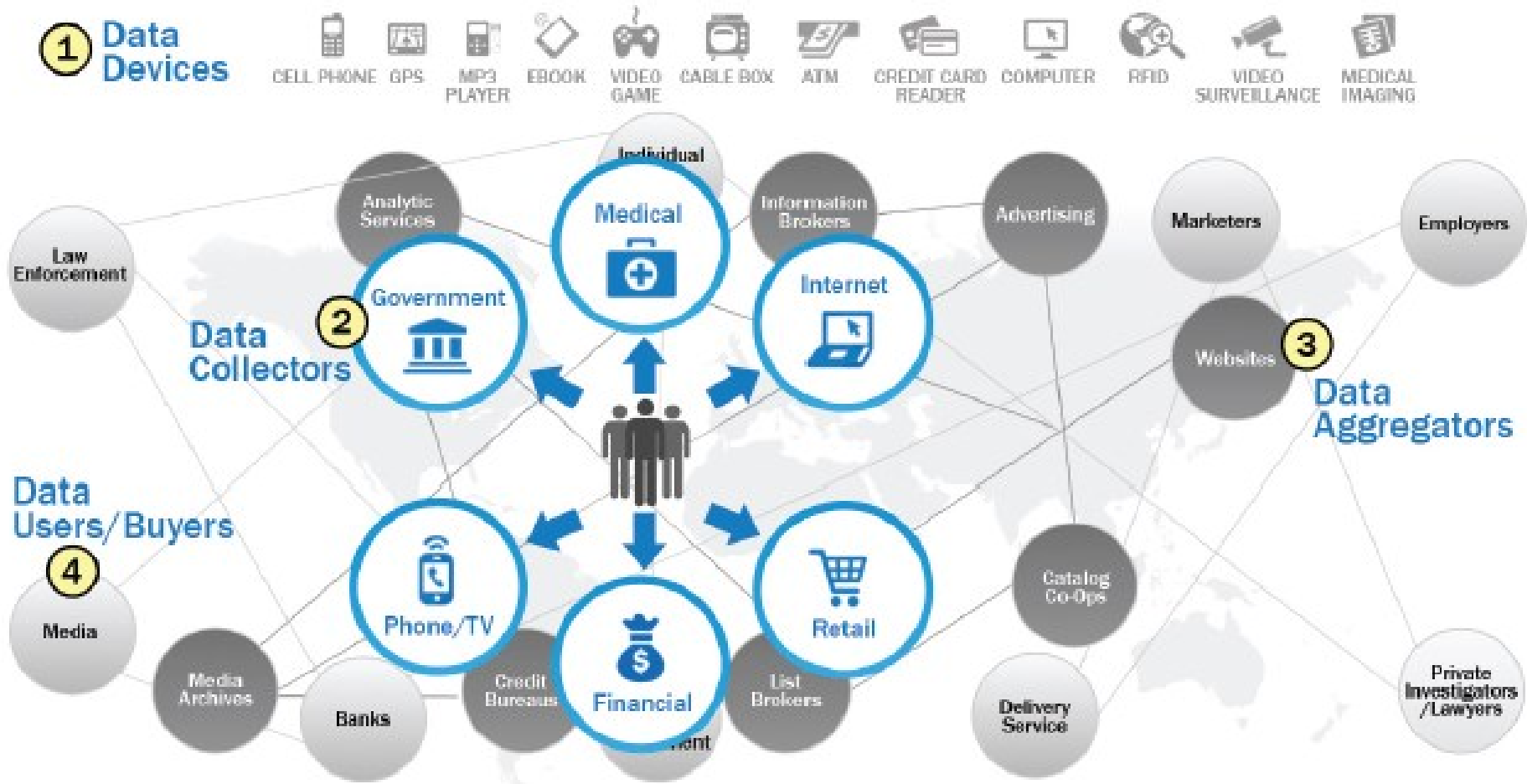
Typical Analytic Architecture



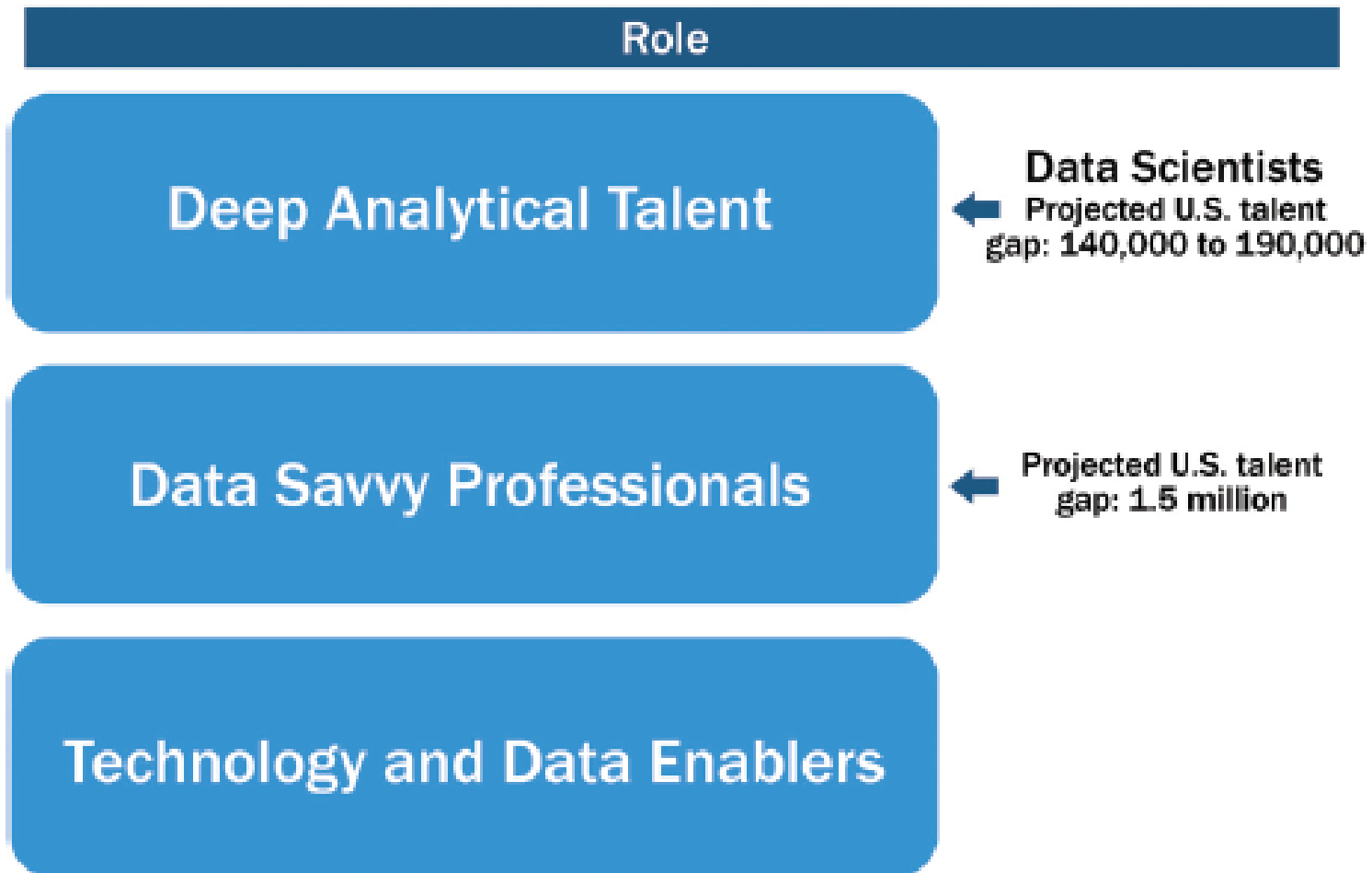
Data Evolution and the Rise of Big Data Sources



Emerging Big Data Ecosystem



Key Roles for the New Big Data Ecosystem

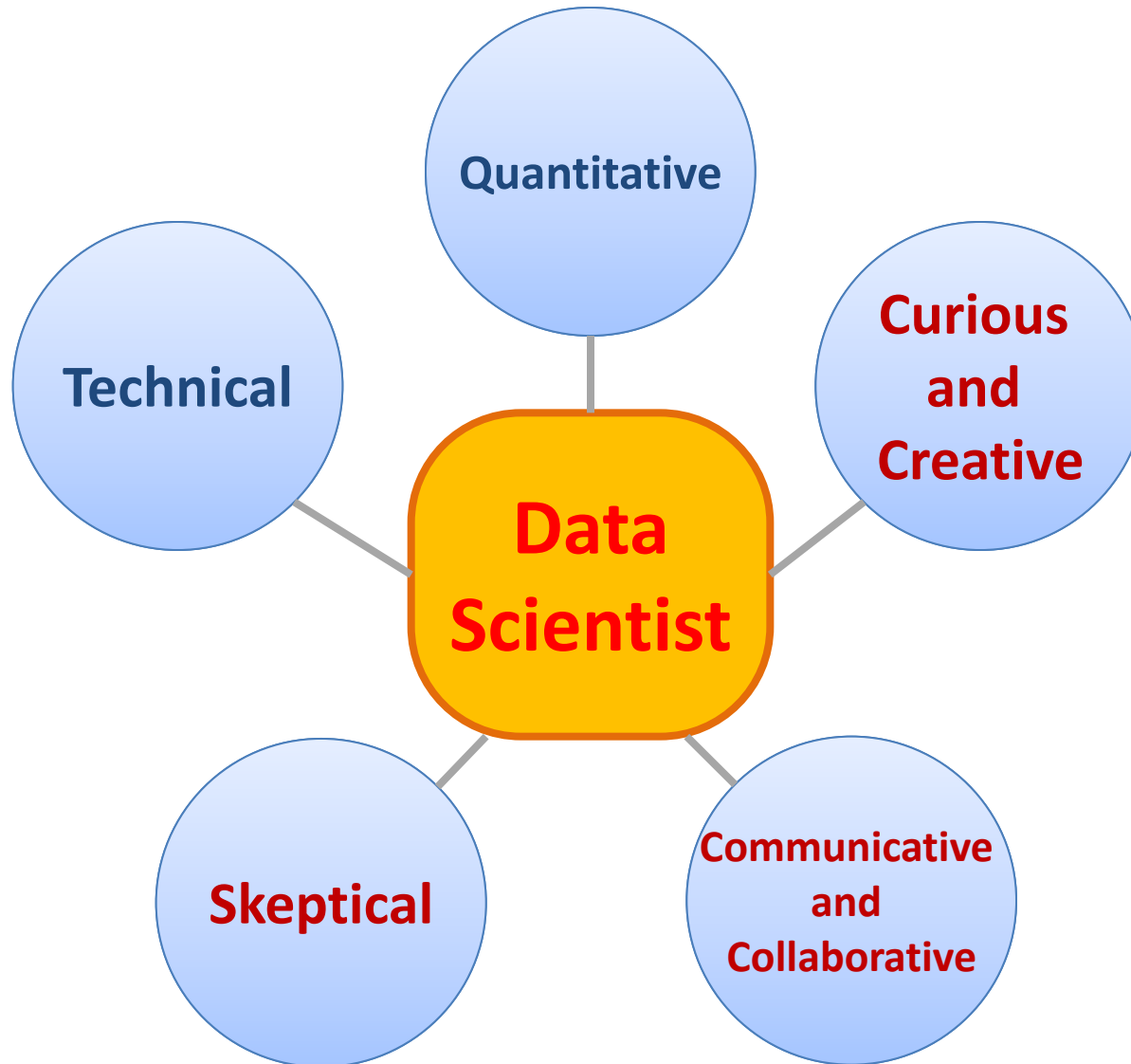


Note: Figures above reflect a projected talent gap in US in 2018, as shown in McKinsey May 2011 article "Big Data: The Next Frontier for Innovation, Competition, and Productivity"

Profile of a Data Scientist

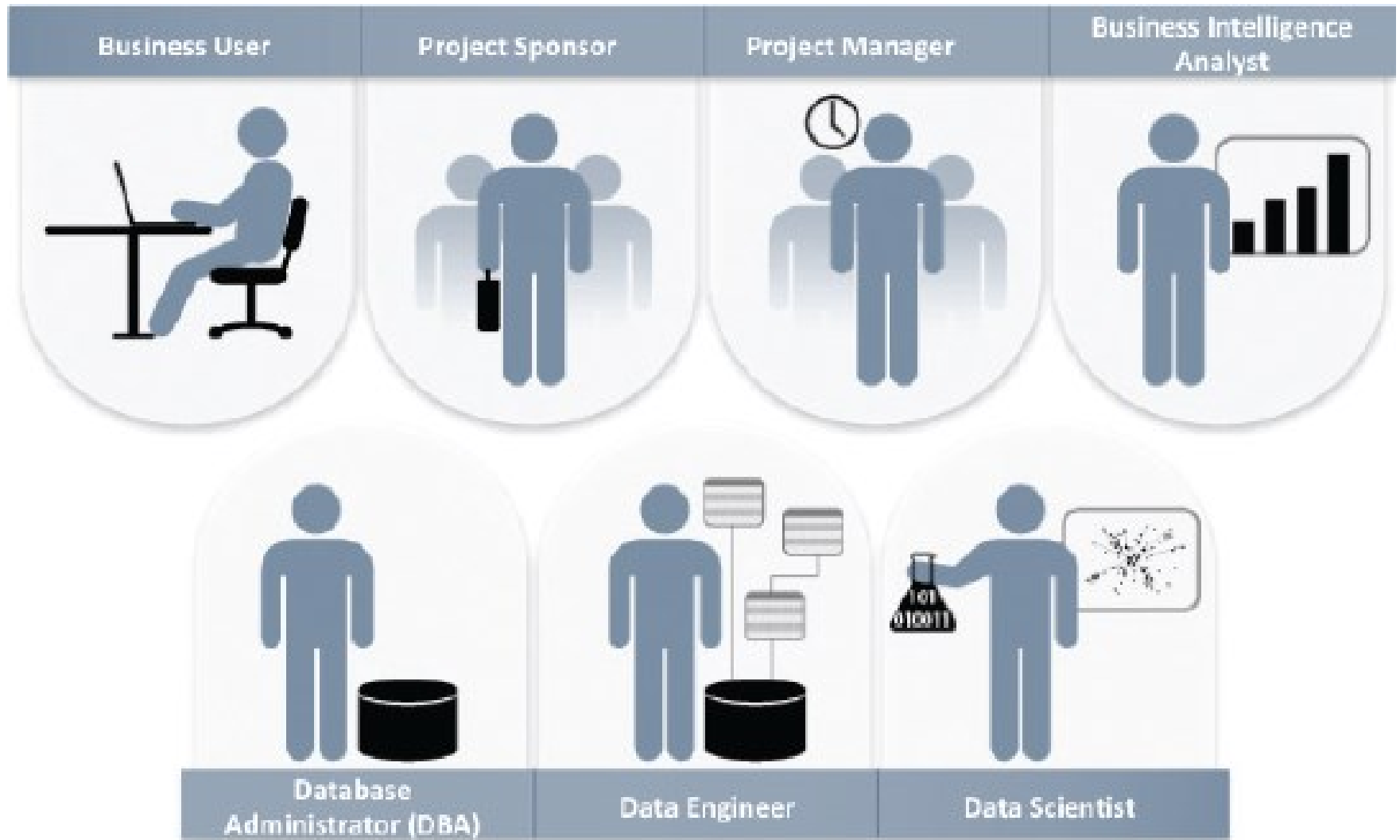
- **Quantitative**
 - mathematics or statistics
- **Technical**
 - software engineering, machine learning, and programming skills
- **Skeptical mind-set** and **critical thinking**
- **Curious** and **creative**
- **Communicative** and **collaborative**

Data Scientist Profile

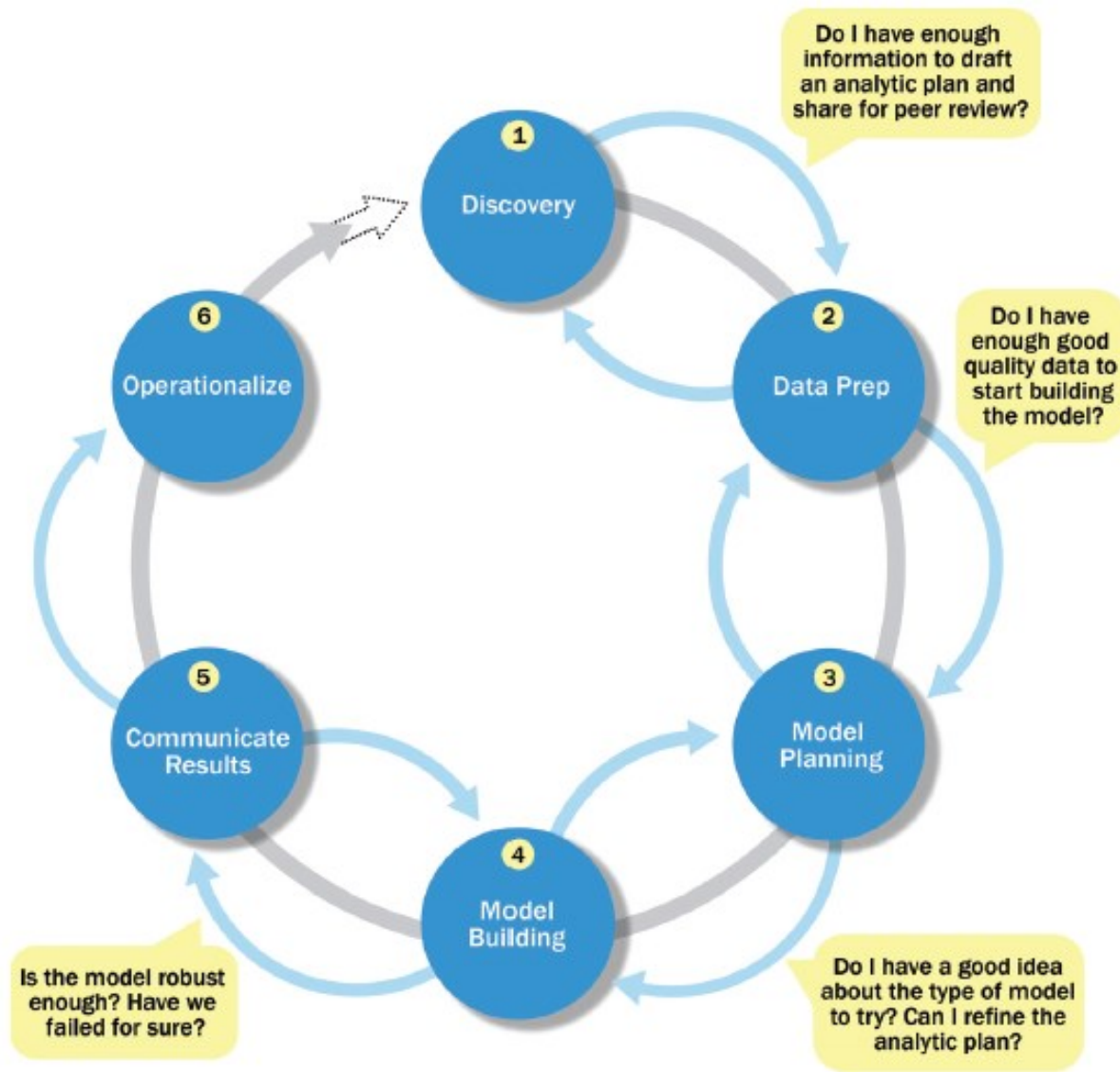


Big Data Analytics Lifecycle

Key Roles for a Successful Analytics Project



Overview of Data Analytics Lifecycle



Overview of Data Analytics Lifecycle

1. Discovery
2. Data preparation
3. Model planning
4. Model building
5. Communicate results
6. Operationalize

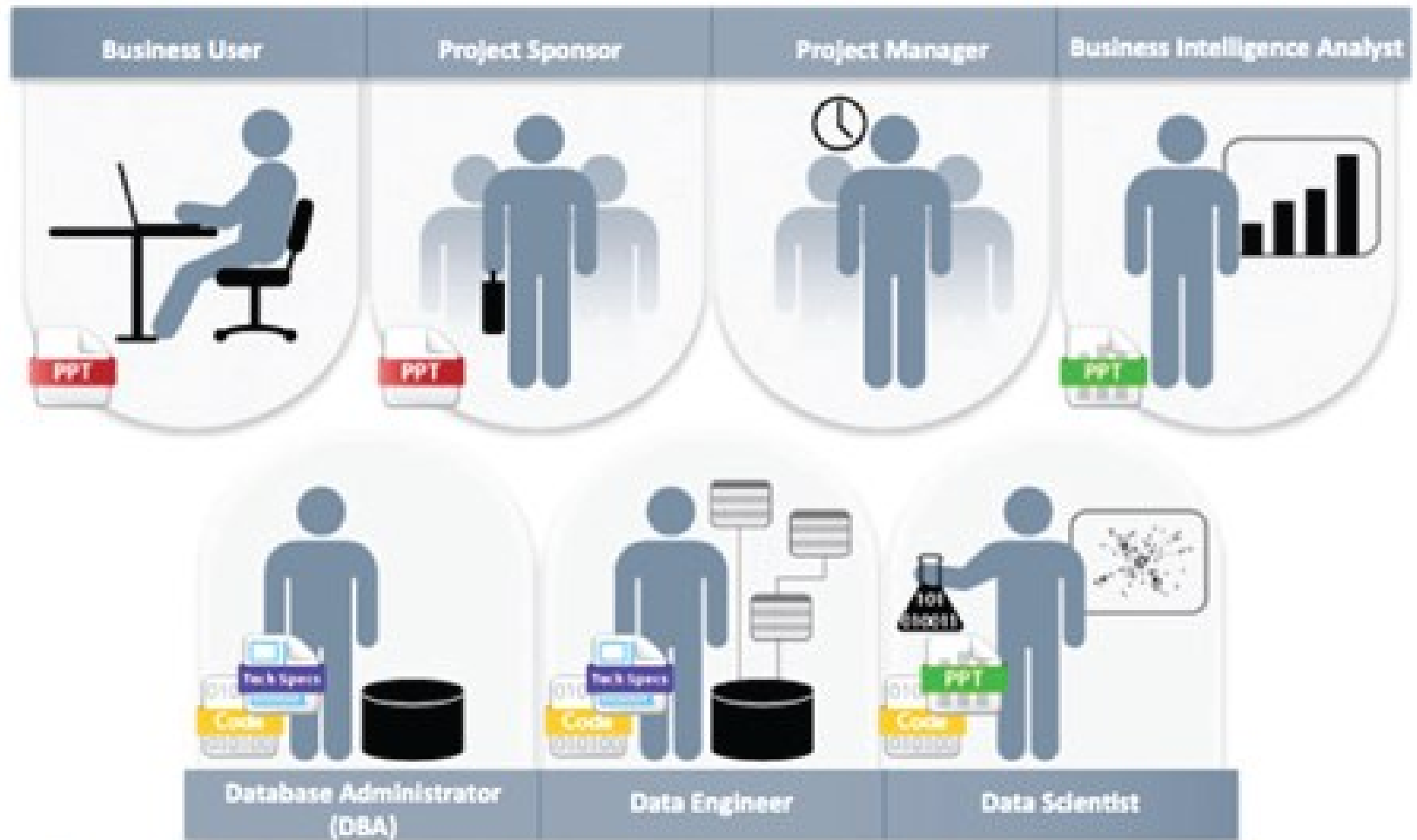
Key Outputs from a Successful Analytics Project

 Code

 Technical Specs

 Presentation for Analysts

 Presentation for Project Sponsors

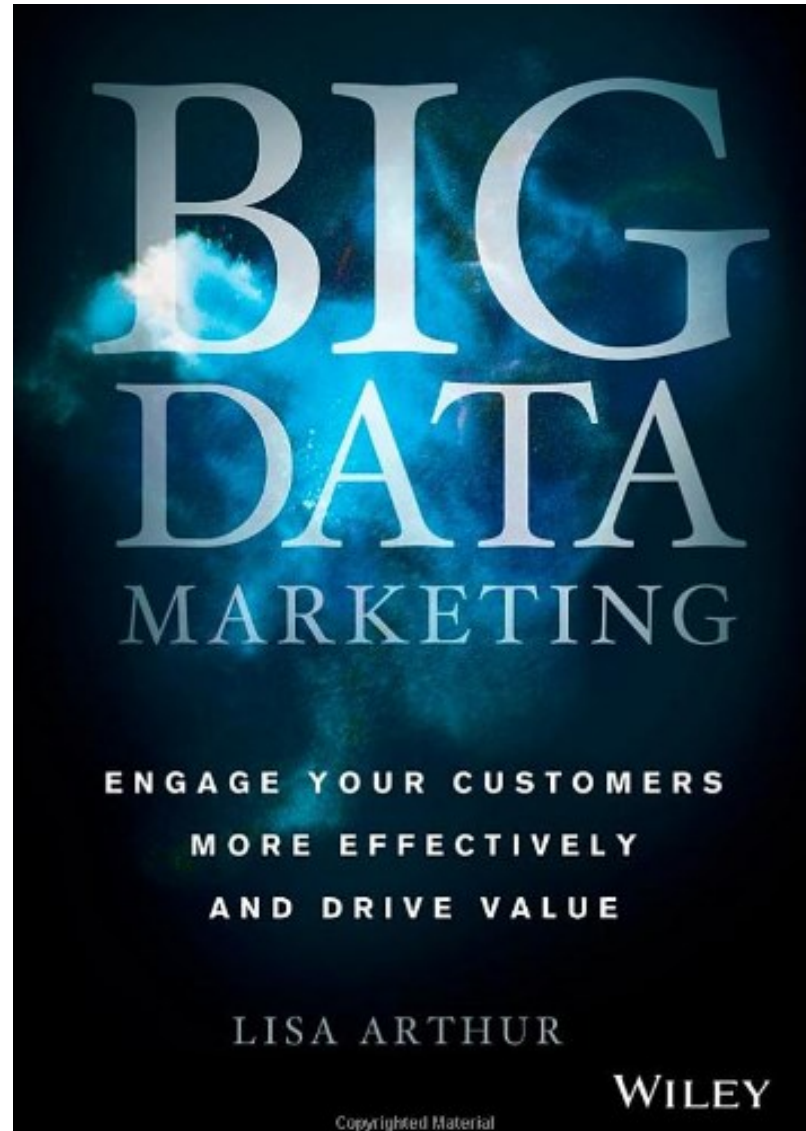


Big Data Marketing

Big Data Marketing



Big Data Marketing:
Engage Your Customers More Effectively and Drive Value,
Lisa Arthur, Wiley, 2013.



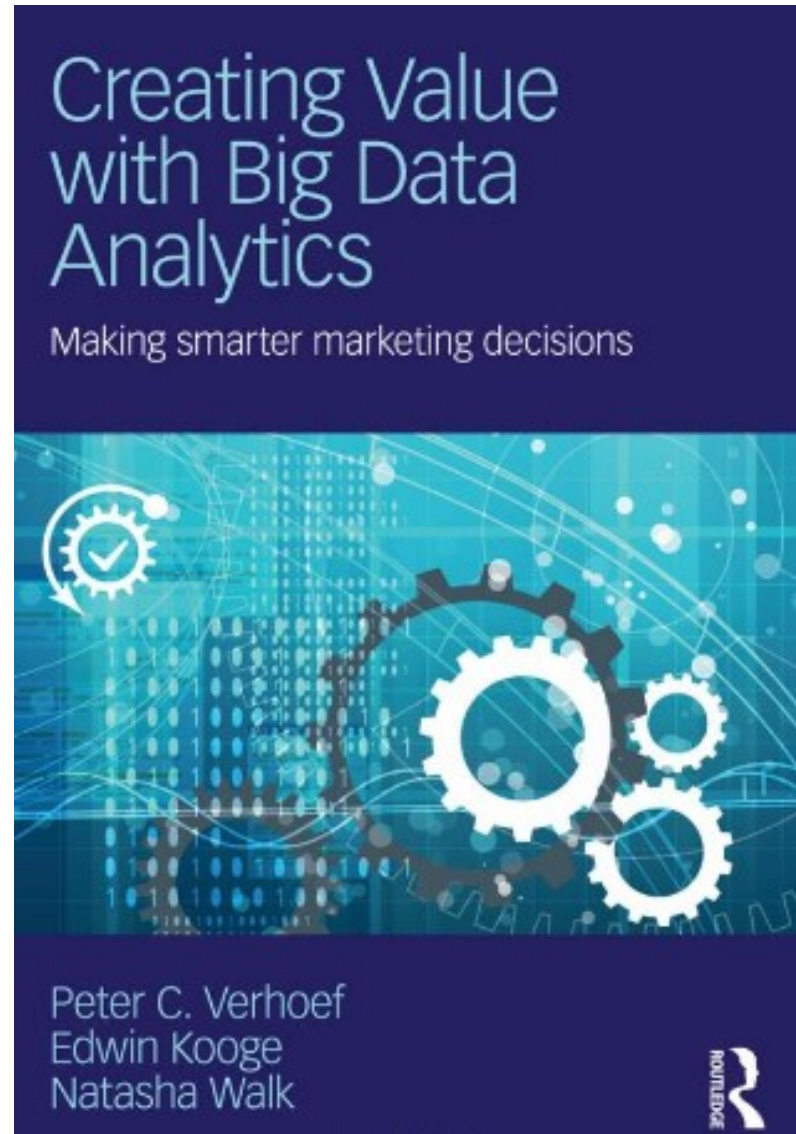
Big Data Marketing

Data-driven Marketing

Big Data Marketing

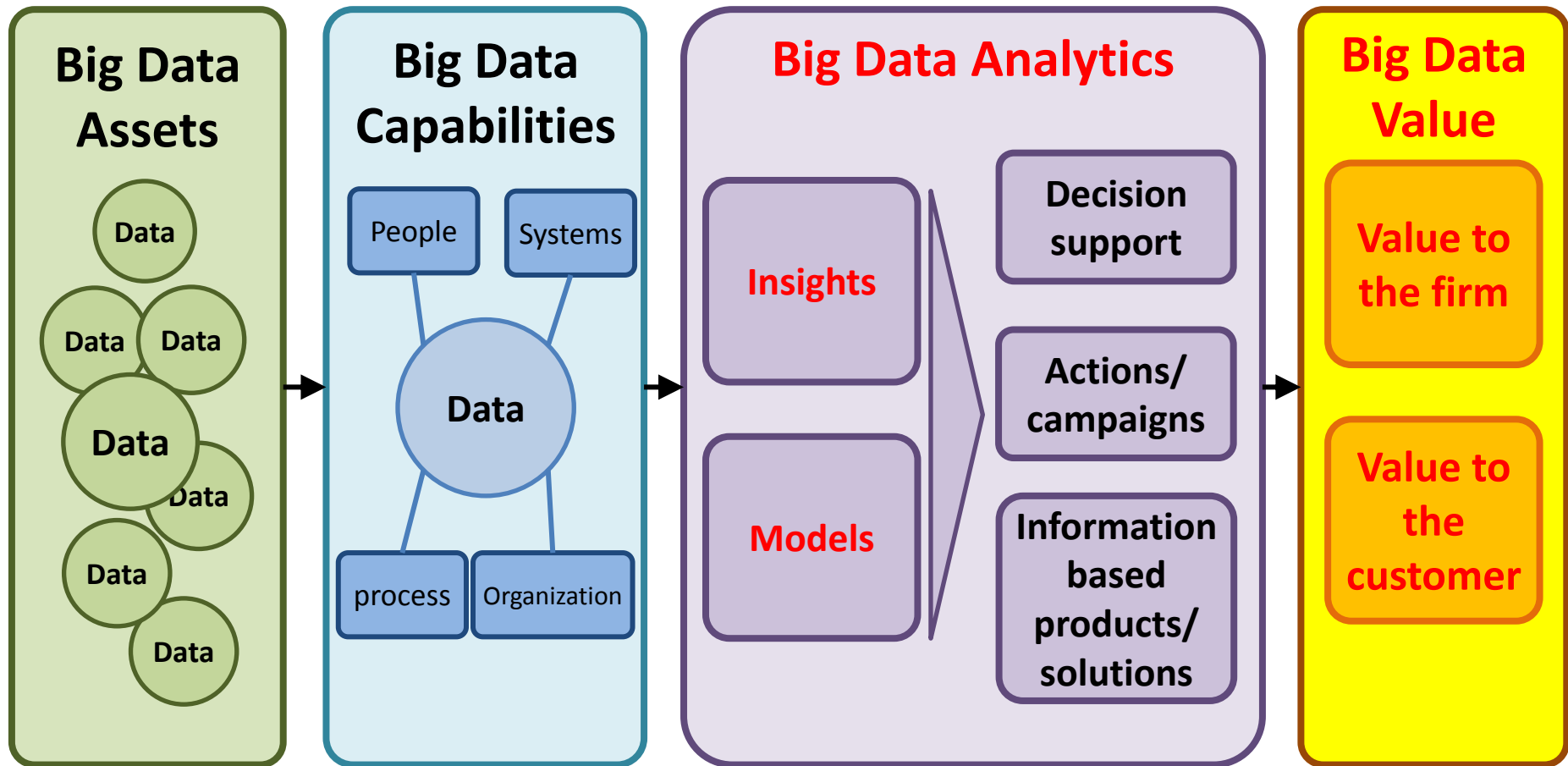
Big data marketing
is the process of
collecting, analyzing, and executing
on the **insights** you've derived from
big data to
encourage **customer engagement**
and improve **marketing results**

Creating Value with Big Data Analytics:
Making Smarter Marketing Decisions,
Peter C. Verhoef and Edwin Kooge, Routledge, 2016

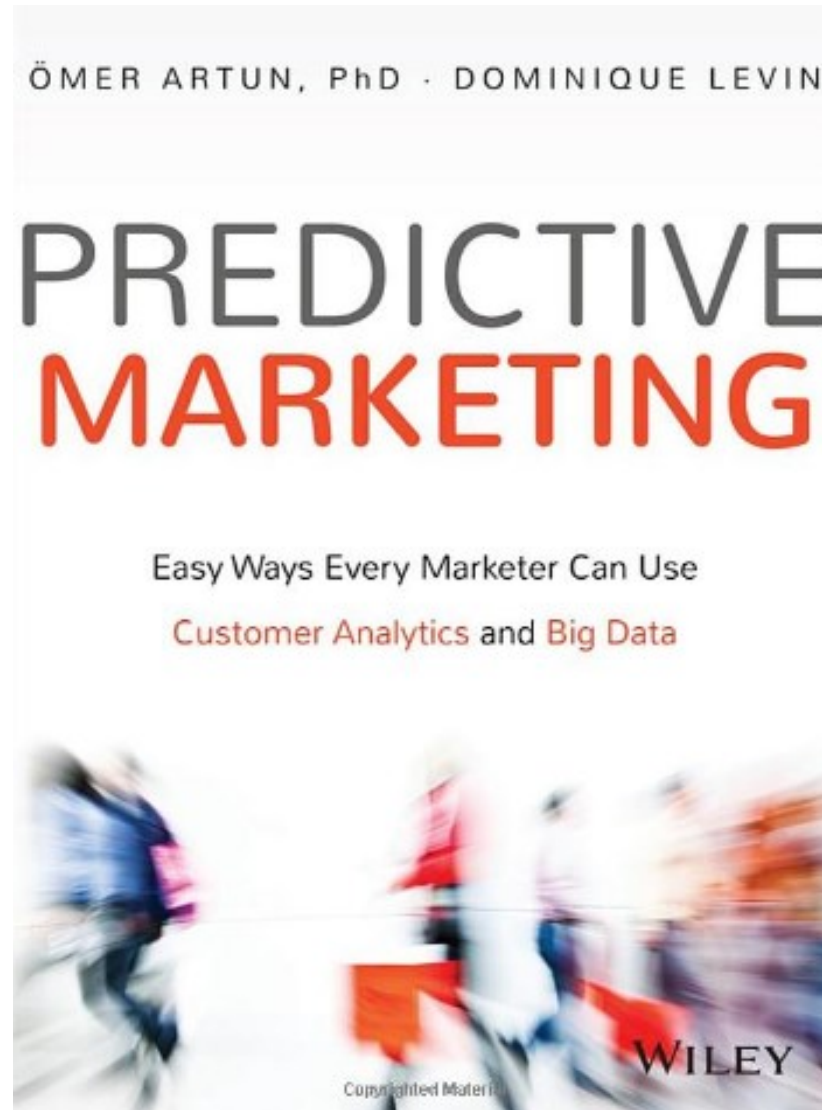


Big Data Value Creation Model

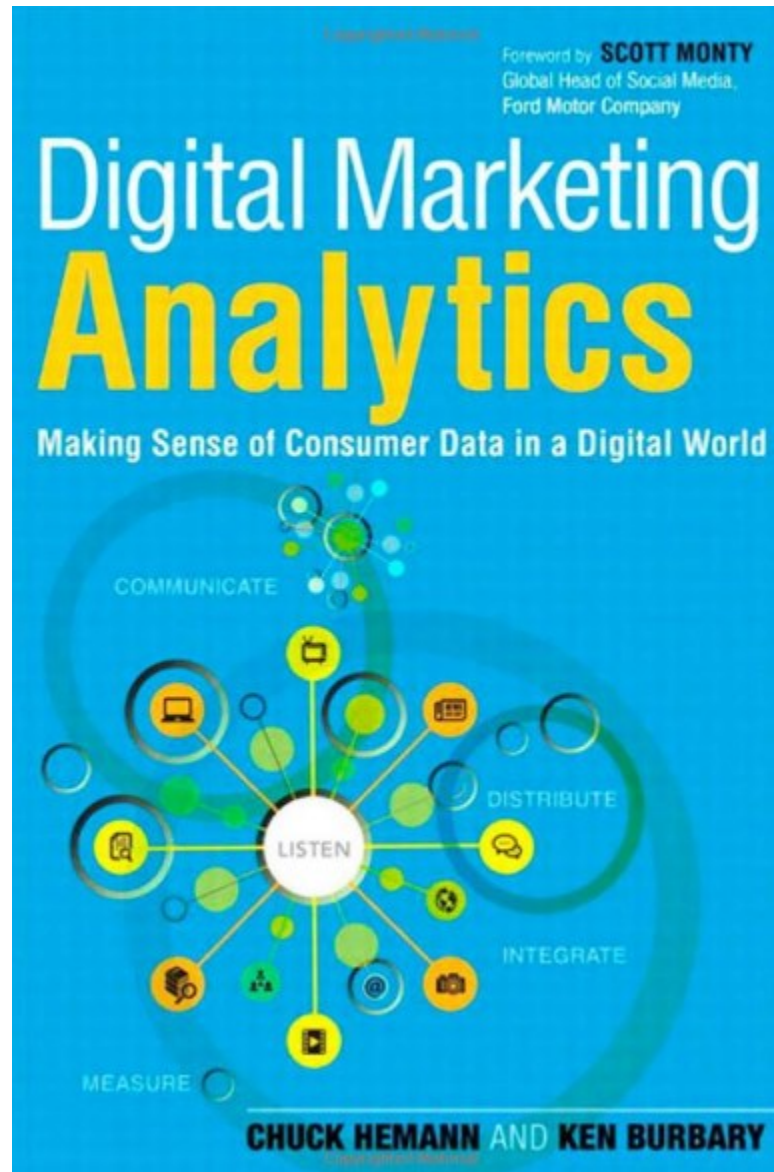
Creating Value with Big Data Analytics:
Making Smarter Marketing Decisions



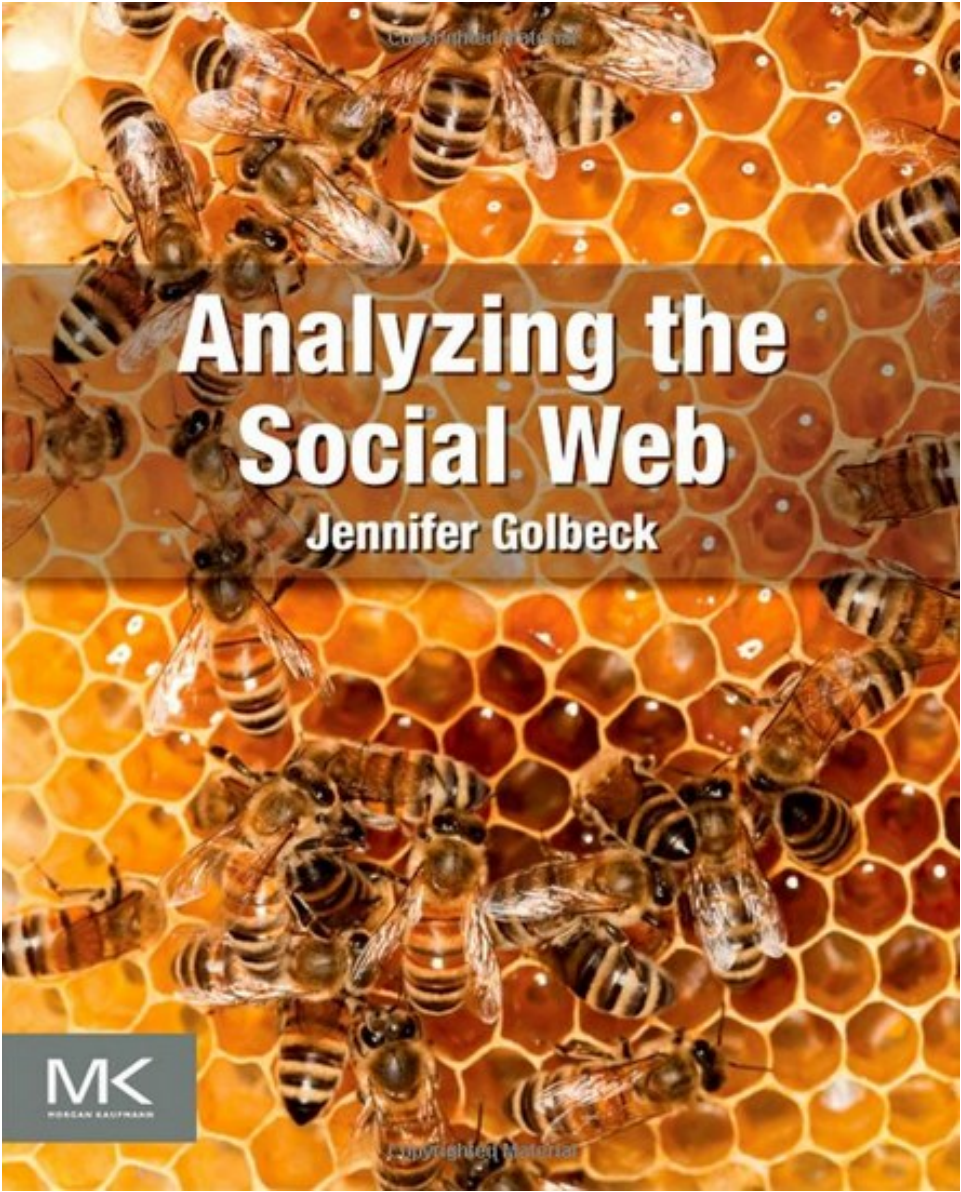
Predictive Marketing: Easy Ways Every Marketer Can Use
Customer Analytics and Big Data,
Omer Artun and Dominique Levin, Wiley, 2015



Predictive Marketing: Easy Ways Every Marketer Can Use Customer Analytics and Big Data, Omer Artun and Dominique Levin, Wiley, 2015



Jennifer Golbeck (2013), *Analyzing the Social Web*, Morgan Kaufmann



Marketing

Marketing

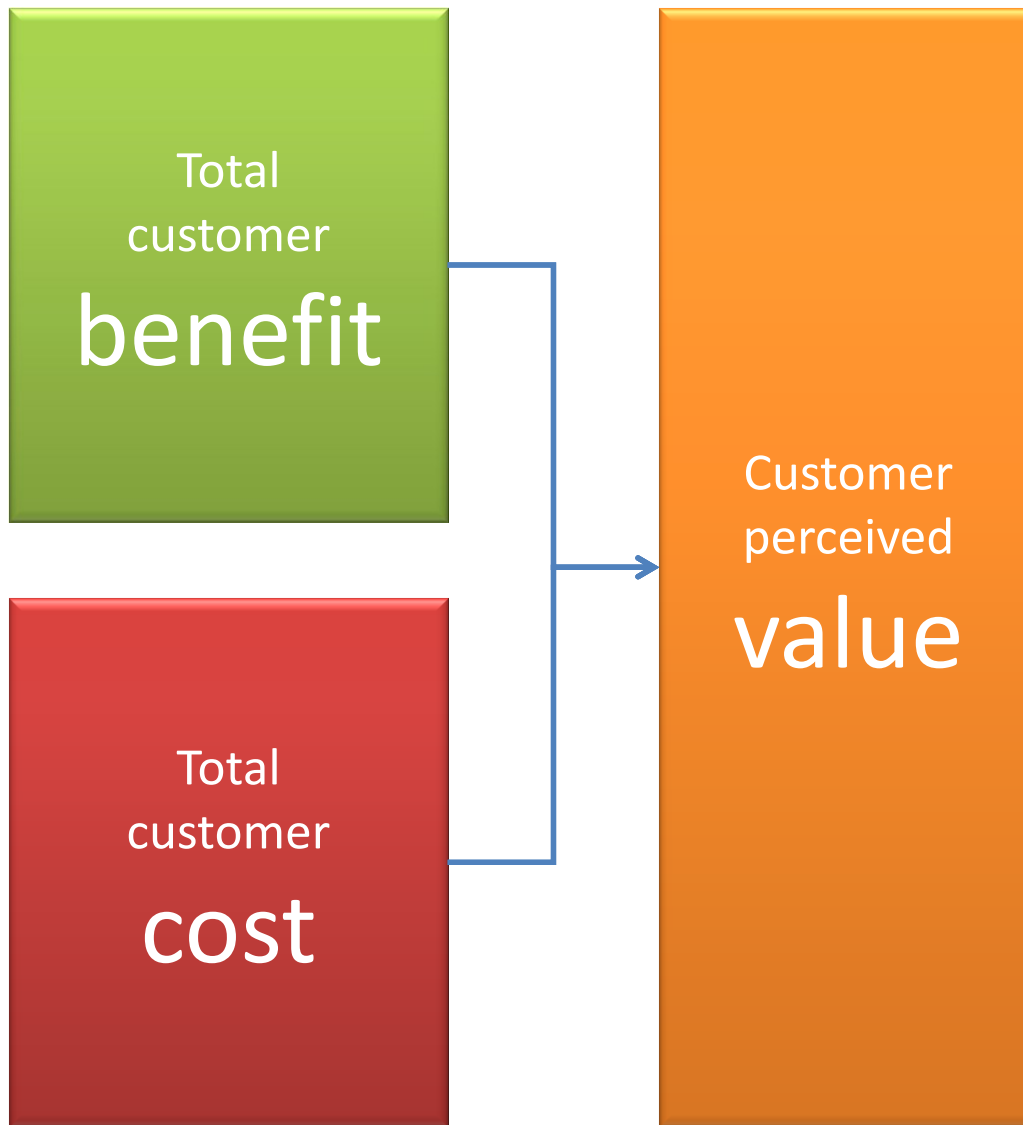
**“Meeting
needs
profitably”**

Value

the sum of the
tangible and
intangible

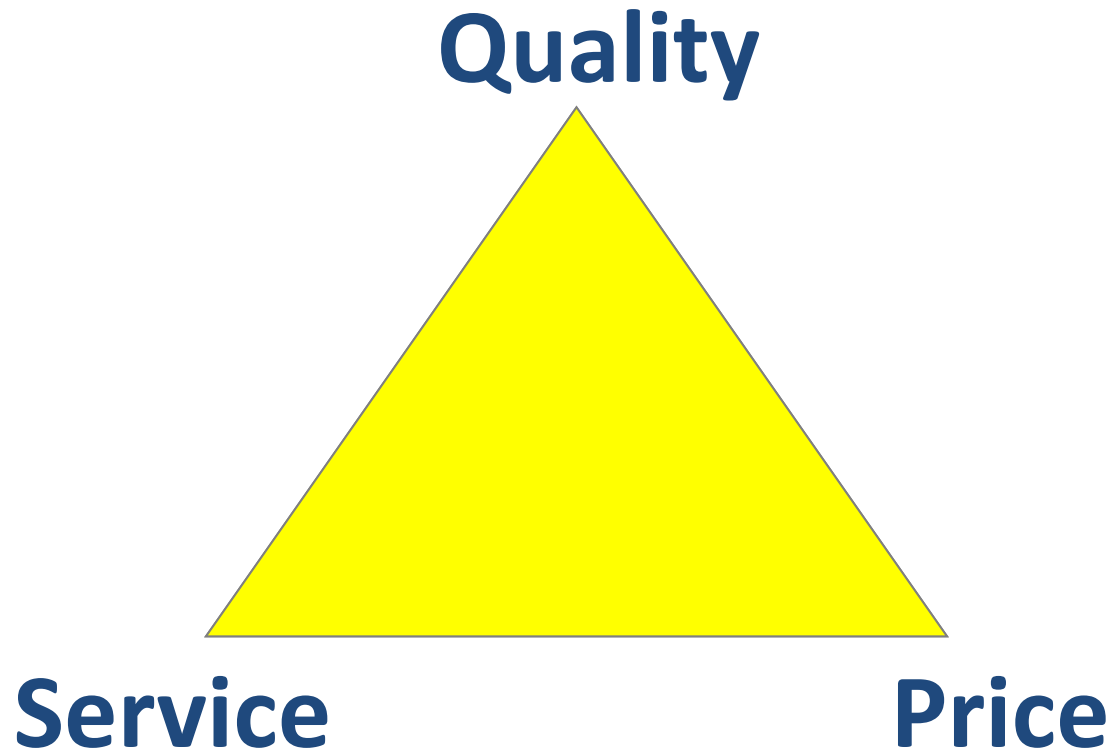
benefits and costs

Value



Customer Value Triad

Quality, Service, and Price
(qsp)

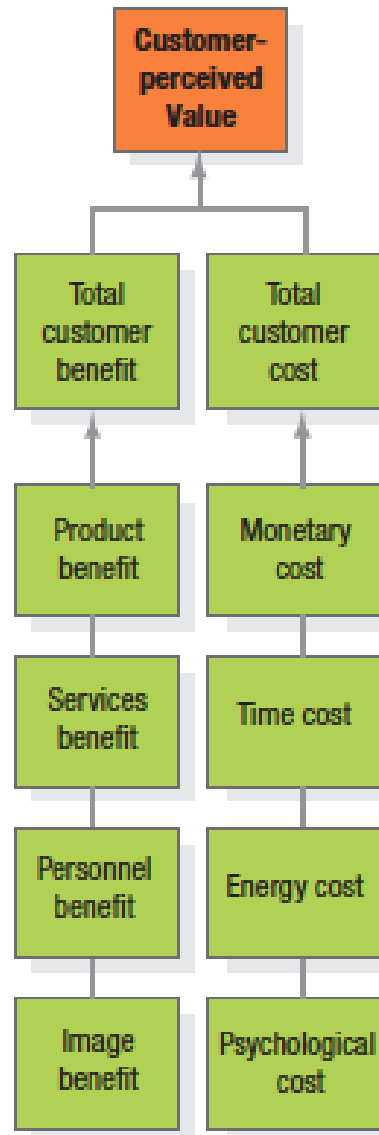


Value and Satisfaction

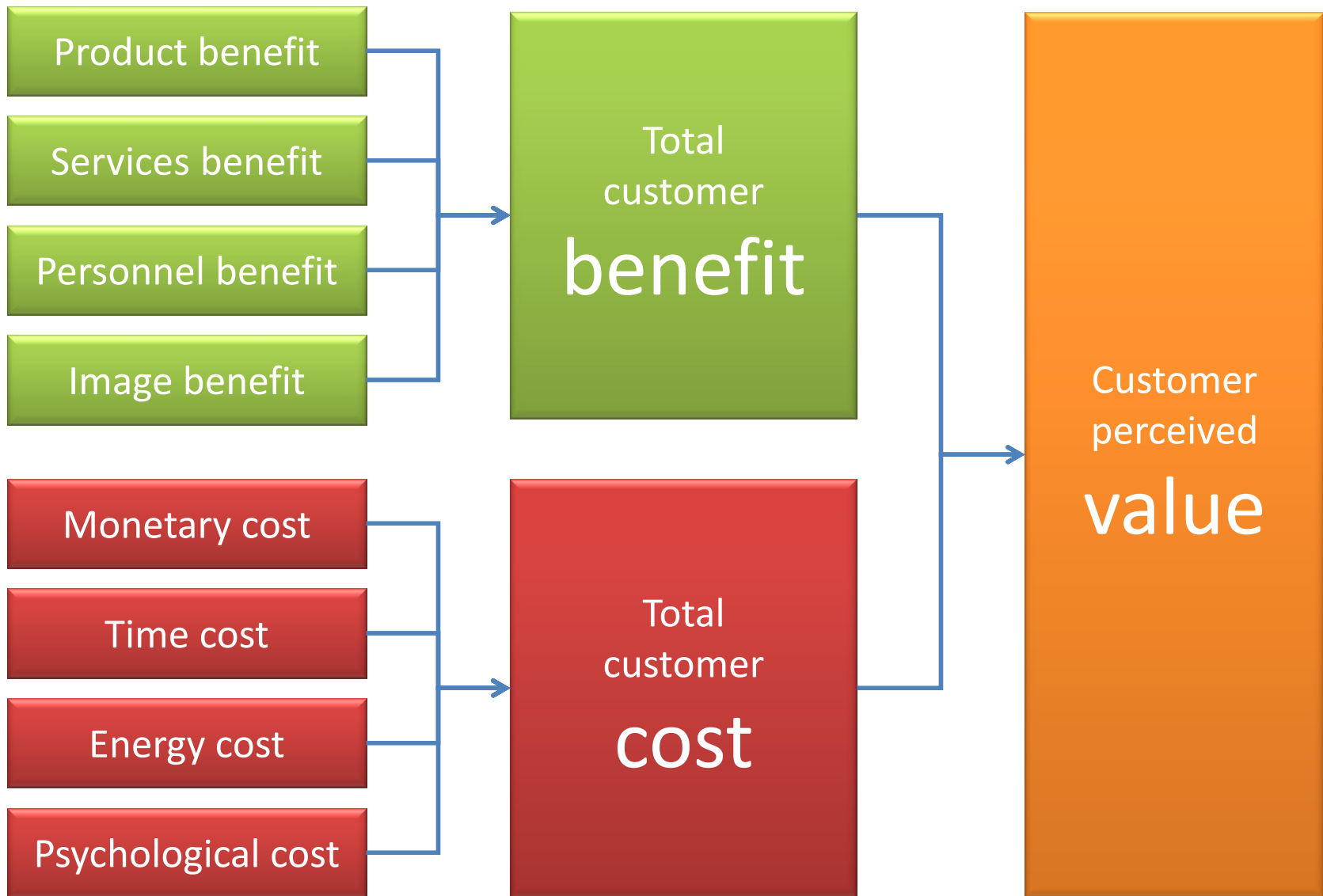
- Marketing
 - identification, creation, communication, delivery, and monitoring of **customer value**.
- Satisfaction
 - a person's judgment of a product's **perceived performance** in relationship to **expectations**

Building
Customer Value,
Satisfaction,
and
Loyalty

Customer Perceived Value



Customer Perceived Value



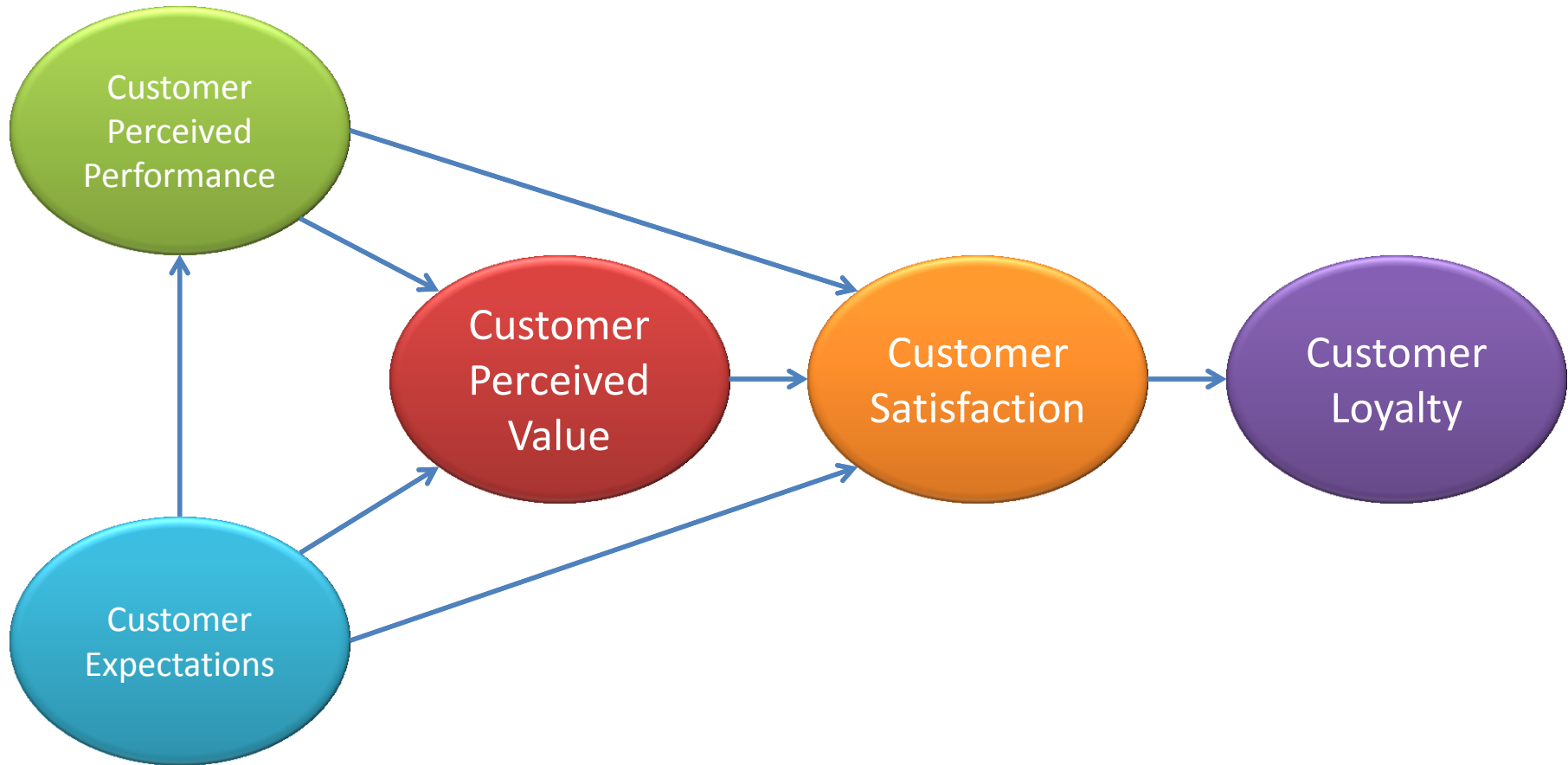
Satisfaction

“a person’s **feelings of pleasure or disappointment** that result from comparing a product’s **perceived performance** (or outcome) to **expectations**”

Loyalty

**“a deeply held commitment to
rebuy or repatronize
a preferred product or service
in the future
despite situational influences and
marketing efforts having the
potential to cause switching
behavior.”**

Customer Perceived Value, Customer Satisfaction, and Loyalty



Marketing

“**Marketing** is an organizational function and a set of processes for creating, communicating, and delivering **value** to customers and for **managing customer relationships** in ways that benefit the organization and its stakeholders.”

(Kotler & Keller, 2008)

Marketing Management

**“Marketing management is the
art and science
of choosing target markets
and getting, keeping, and growing
customers through
creating, delivering, and communicating
superior customer value.”**
(Kotler & Keller, 2008)

Marketing Research

“Marketing Research

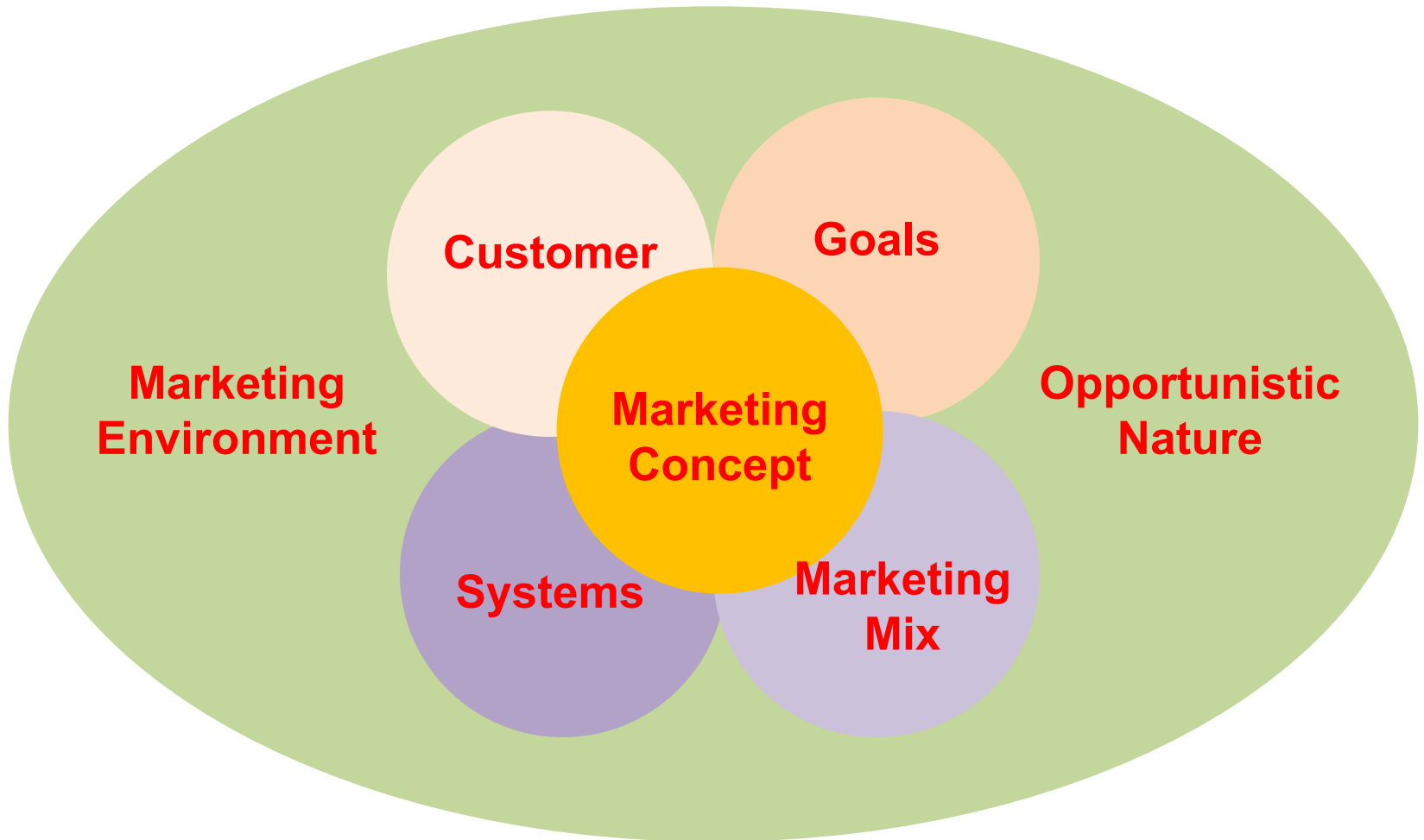
is the

planning, collection, and analysis of **data**
relevant to **marketing decision making**

and

the **communication of the results**
of this **analysis to management.**”

The Nature of Marketing Research



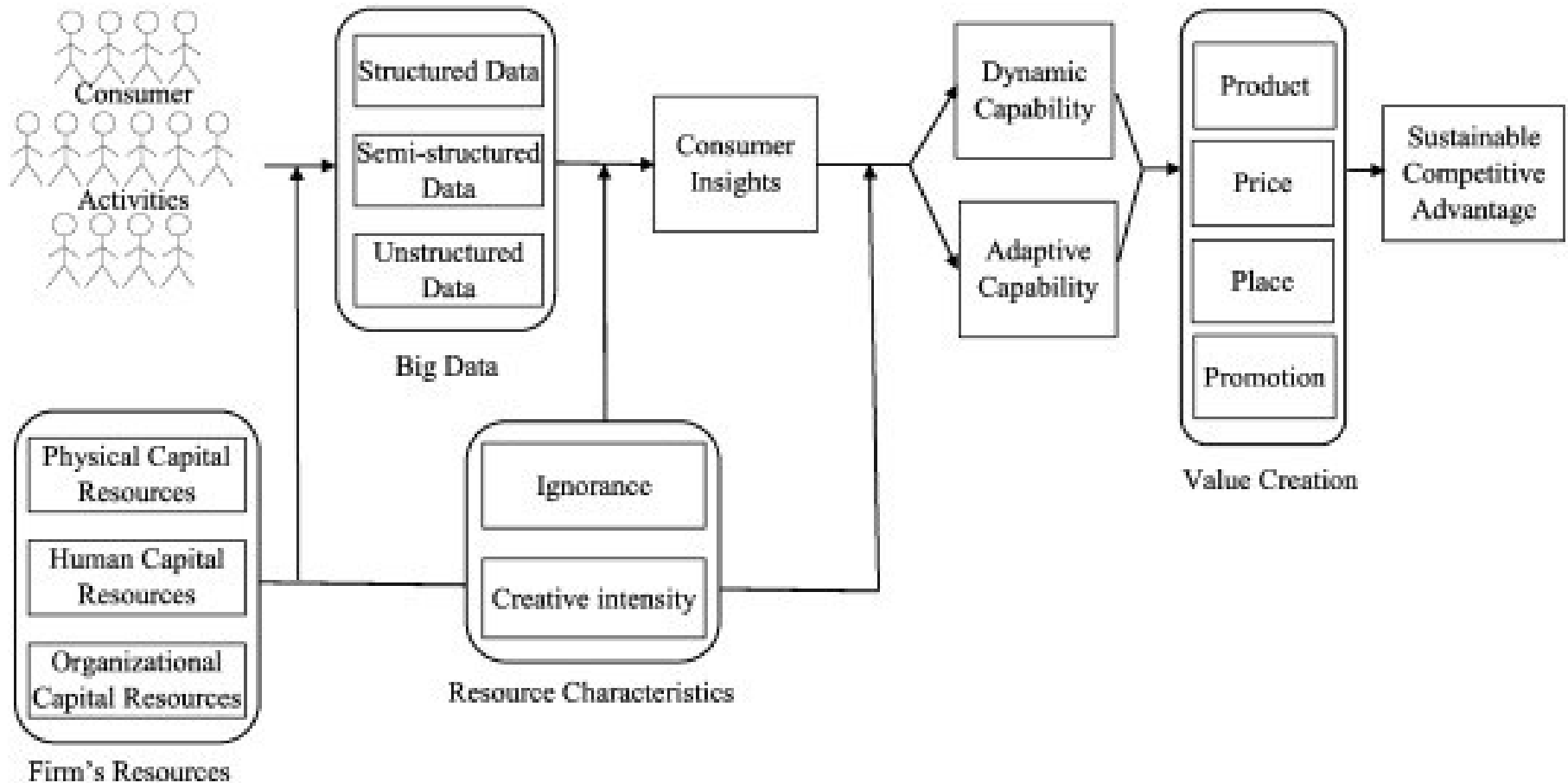
Marketing Research

**systematic design, collection,
analysis, and reporting of
data and findings
relevant to a
specific marketing situation
facing the company.**

A Marketing Mix Framework for Big Data Management

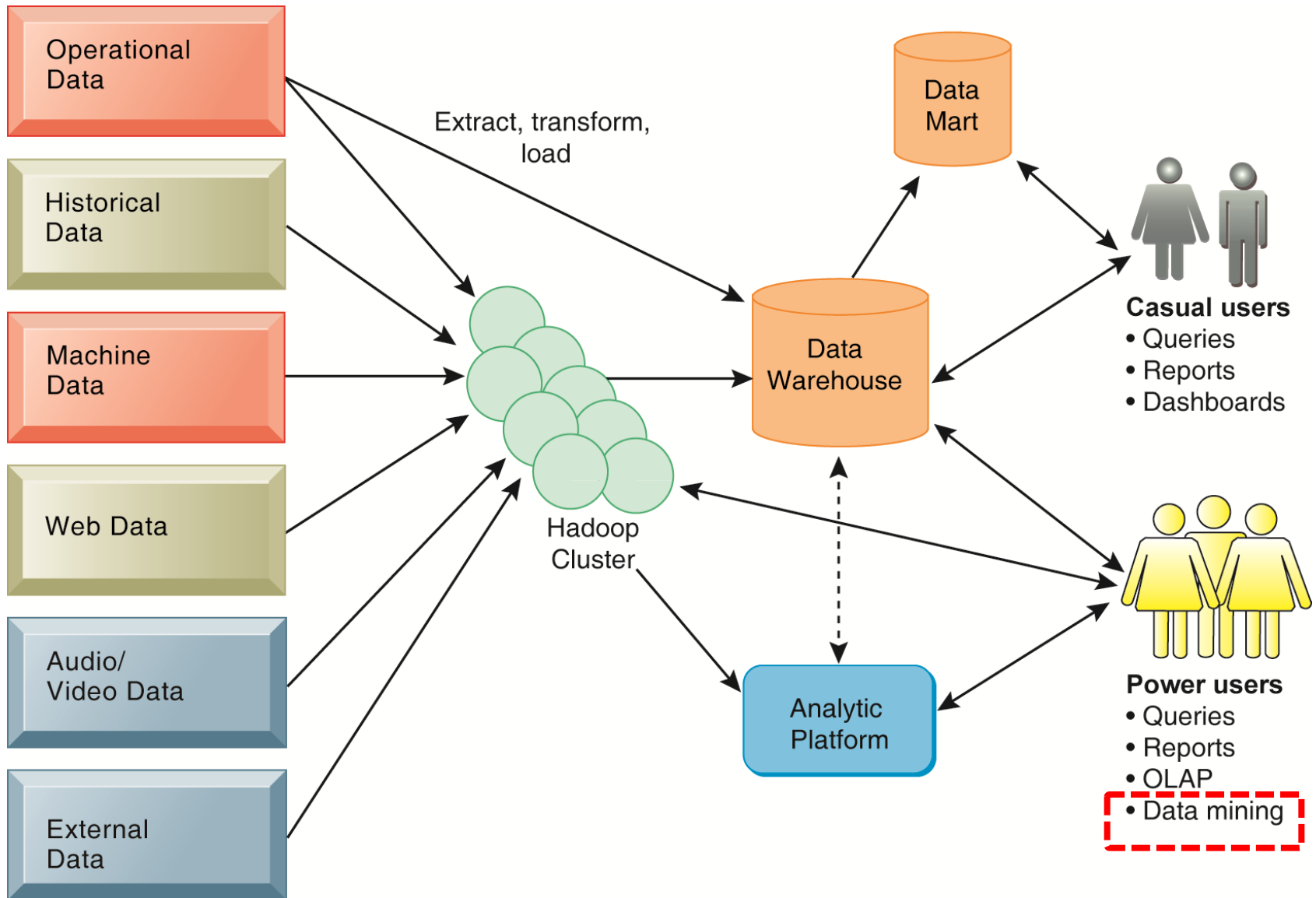
	People	Product	Promotion	Price	Place
Data	<ul style="list-style-type: none"> Demographics Social Networks Customer Review Click Stream Survey Data 	<ul style="list-style-type: none"> Product Characteristics Product Category Customer Review Survey Data 	<ul style="list-style-type: none"> Promotional Data Survey Data 	<ul style="list-style-type: none"> Transactional Data Survey Data 	<ul style="list-style-type: none"> Location-based social networks Survey Data
Method	<ul style="list-style-type: none"> Clustering Classification 	<ul style="list-style-type: none"> Association Clustering Topic Modeling 	<ul style="list-style-type: none"> Regression Association Collaborative Filtering 	<ul style="list-style-type: none"> Regression Association 	<ul style="list-style-type: none"> Regression Classification
Application	<ul style="list-style-type: none"> Customer Segmentation Customer Profiling 	<ul style="list-style-type: none"> Product Ontology Product Reputation 	<ul style="list-style-type: none"> Promotional Marketing Analysis Recommender Systems 	<ul style="list-style-type: none"> Pricing Strategy Analysis Competitor Analysis 	<ul style="list-style-type: none"> Location-based Advertising Community Dynamic Analysis

A resource-based view of the impact of Big Data on competitive advantage



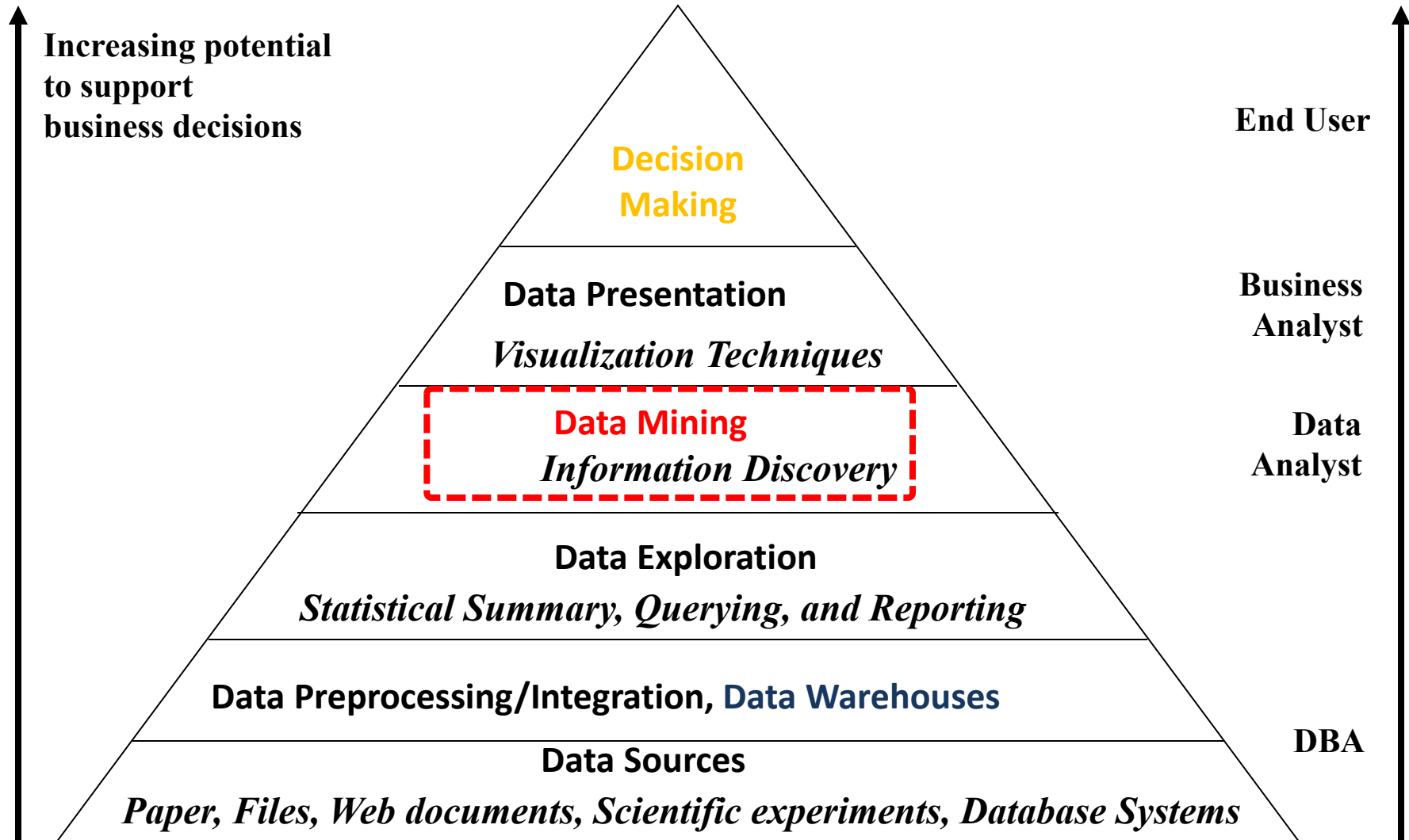
Big Data
Analytics
and
Data Mining

Business Intelligence (BI) Infrastructure

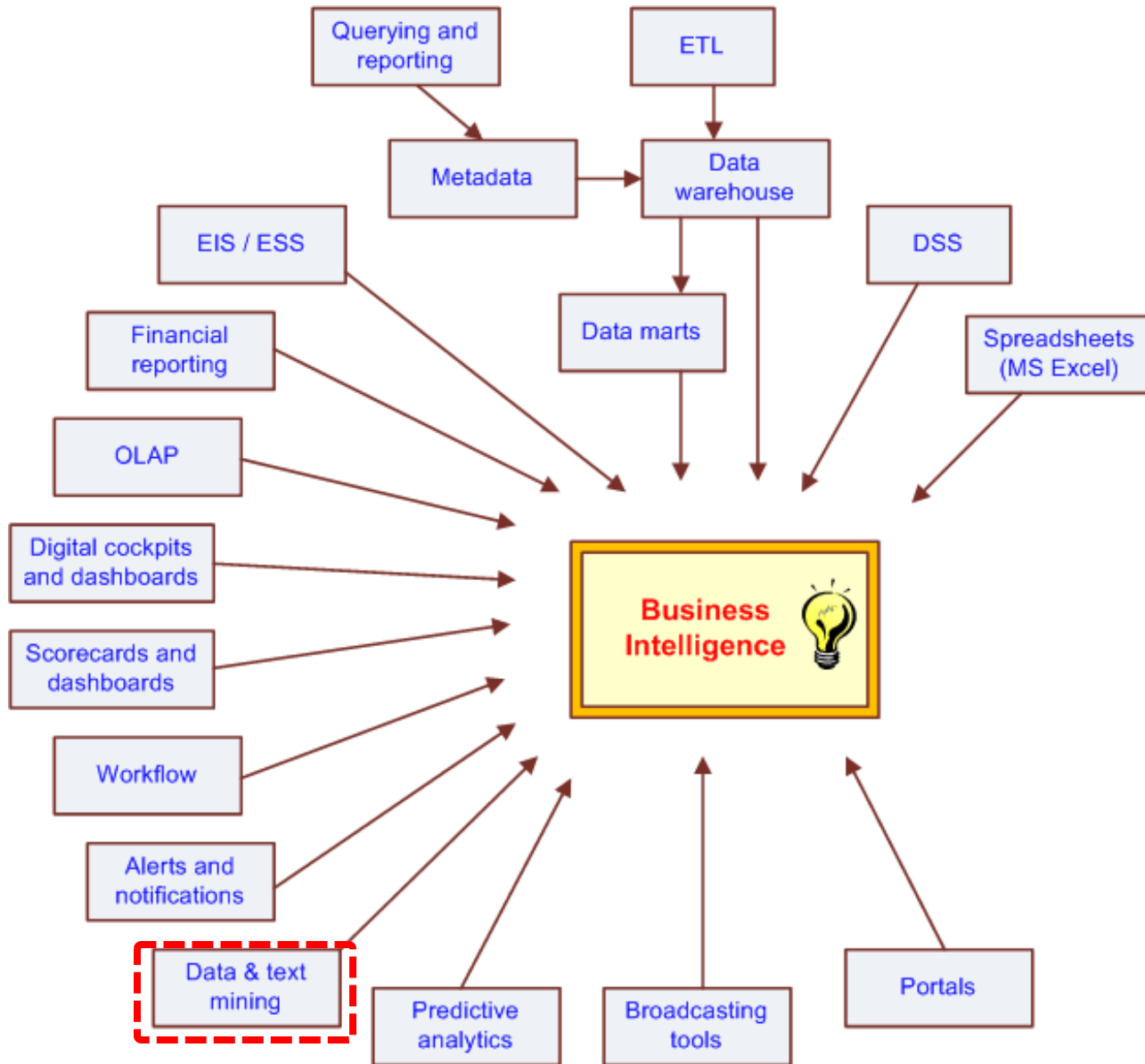


Data Warehouse

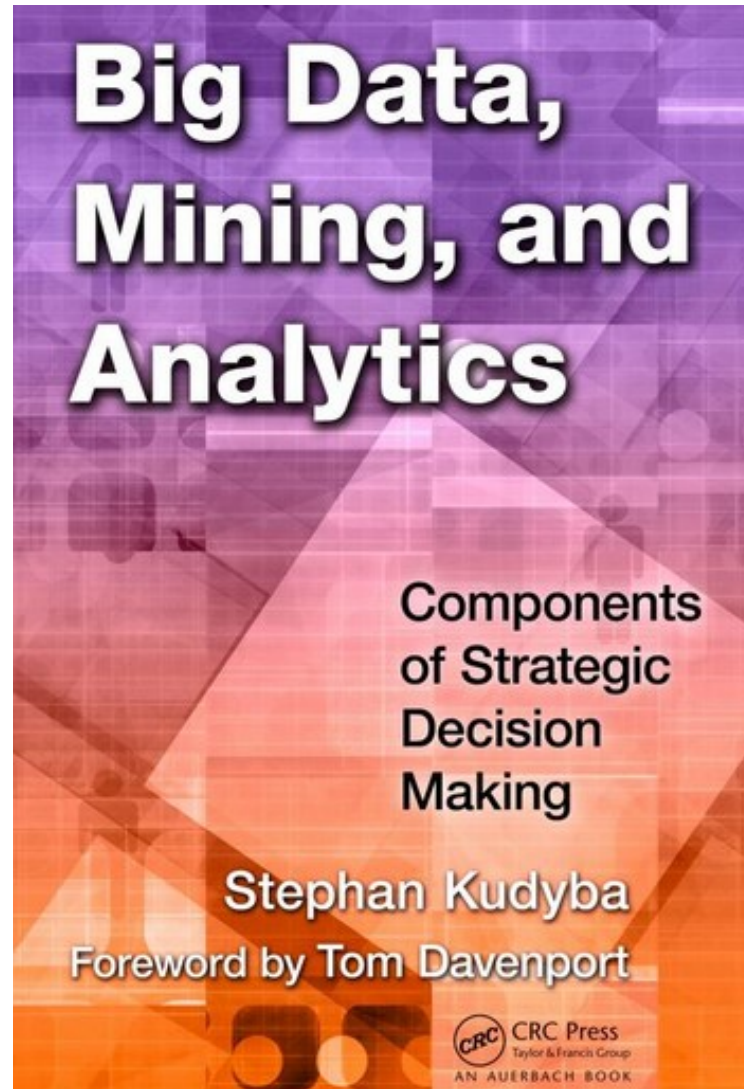
Data Mining and Business Intelligence



The Evolution of BI Capabilities

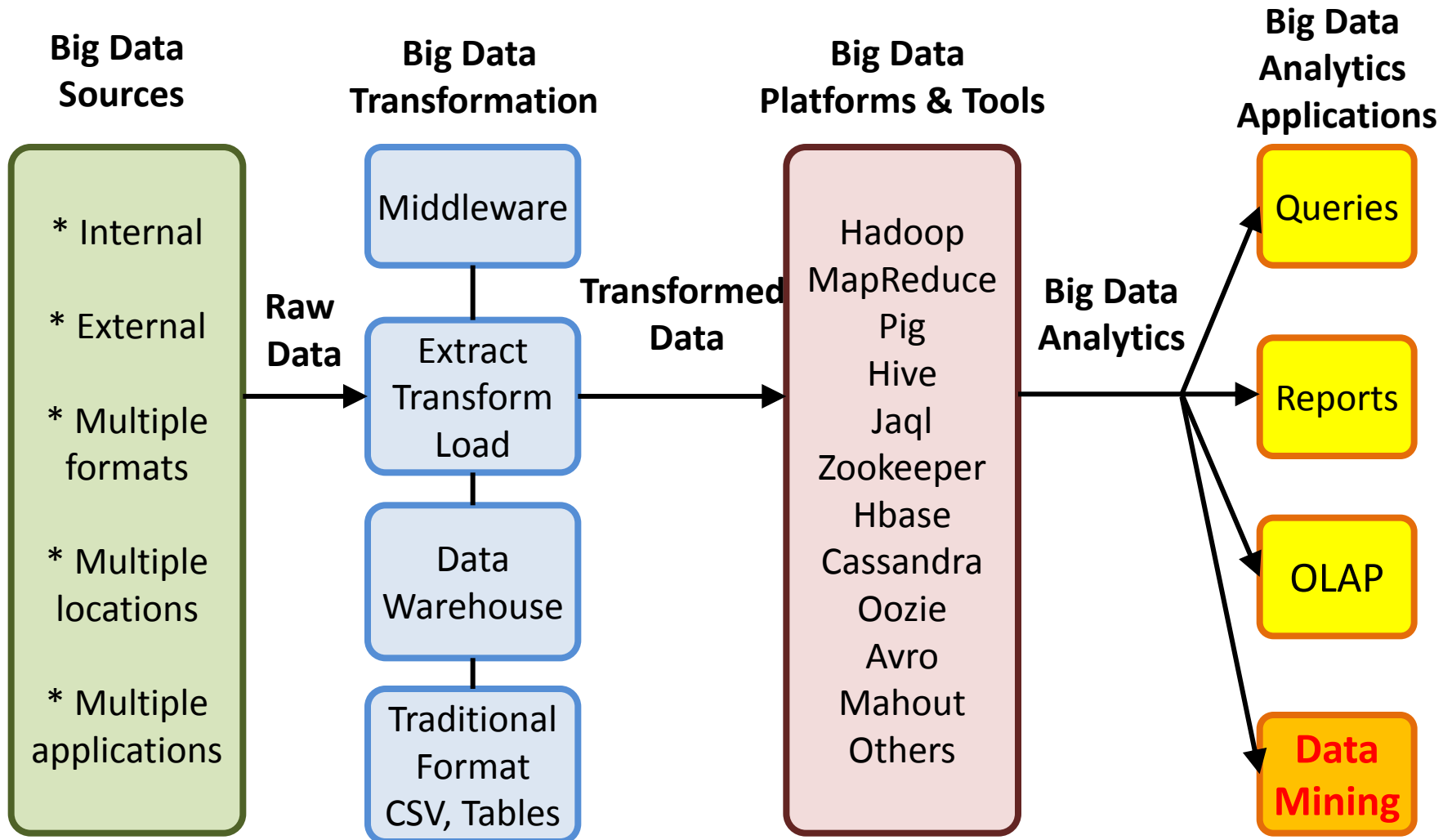


Stephan Kudyba (2014),
Big Data, Mining, and Analytics:
Components of Strategic Decision Making, Auerbach Publications



Source: <http://www.amazon.com/gp/product/1466568704>

Architecture of Big Data Analytics



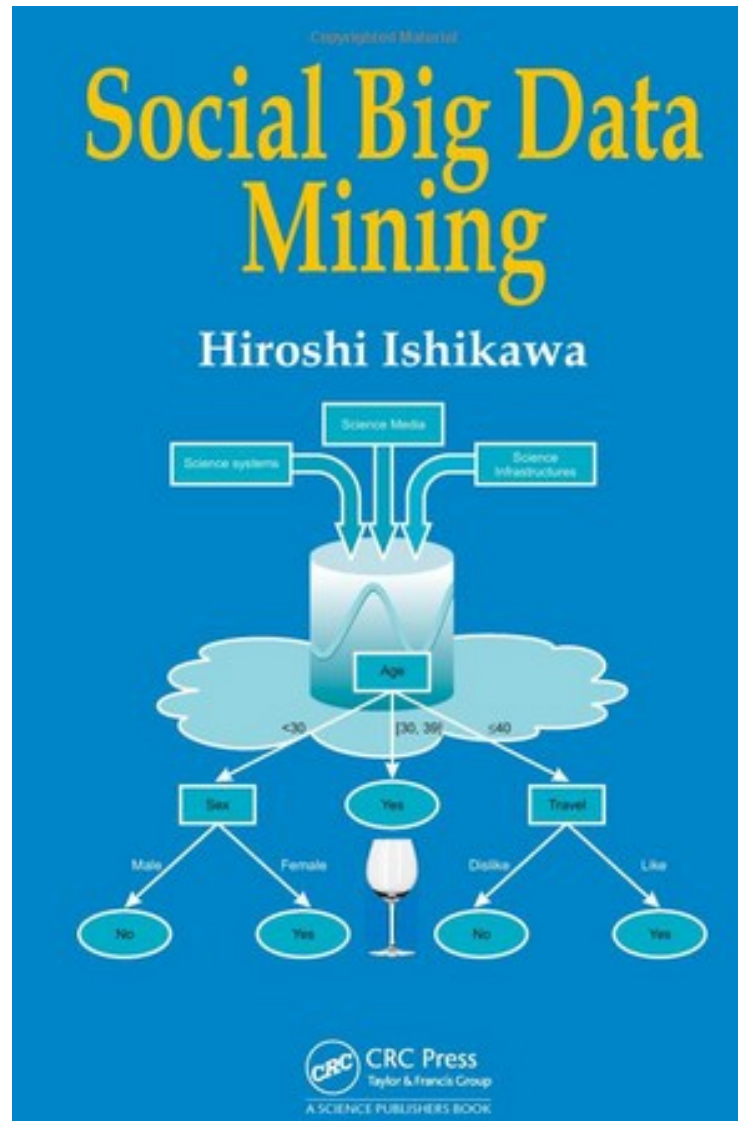
Architecture of Big Data Analytics



Source: Stephan Kudyba (2014), Big Data, Mining, and Analytics: Components of Strategic Decision Making, Auerbach Publications

Social Big Data Mining

(Hiroshi Ishikawa, 2015)



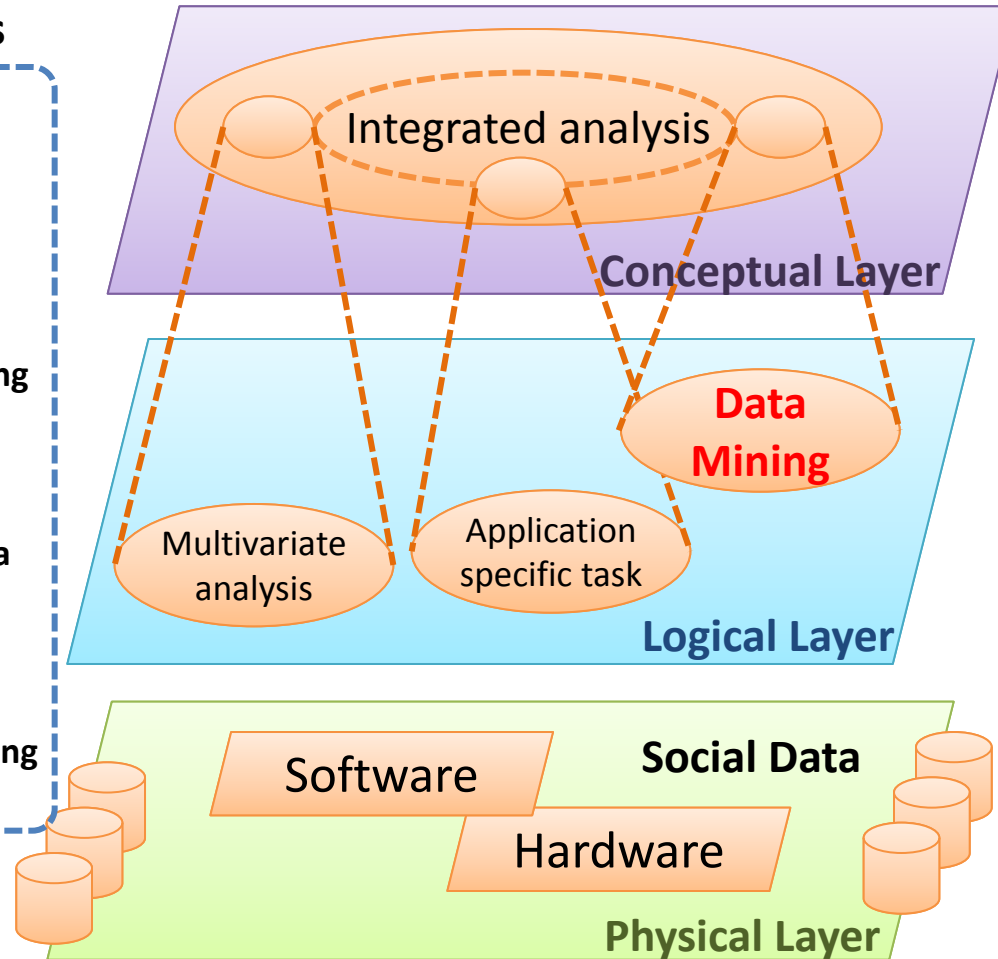
Source: <http://www.amazon.com/Social-Data-Mining-Hiroshi-Ishikawa/dp/149871093X>

Architecture for Social Big Data Mining

(Hiroshi Ishikawa, 2015)

Enabling Technologies

- Integrated analysis model
- Natural Language Processing
- Information Extraction
- Anomaly Detection
- Discovery of relationships among heterogeneous data
- Large-scale visualization
- Parallel distributed processing

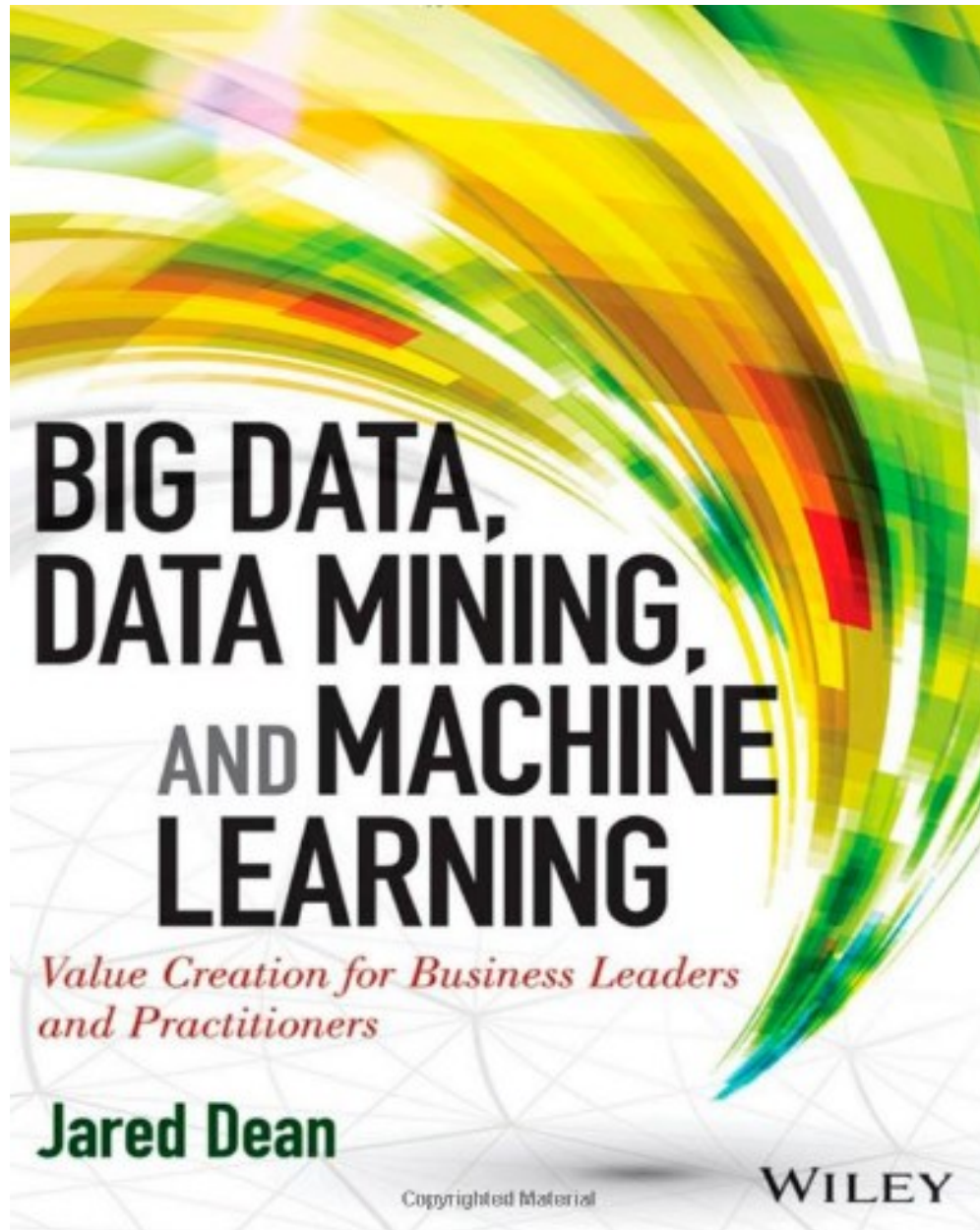


Analysts

- Model Construction
- Explanation by Model
- Construction and confirmation of individual hypothesis
- Description and execution of application-specific task

Big Data Analysis

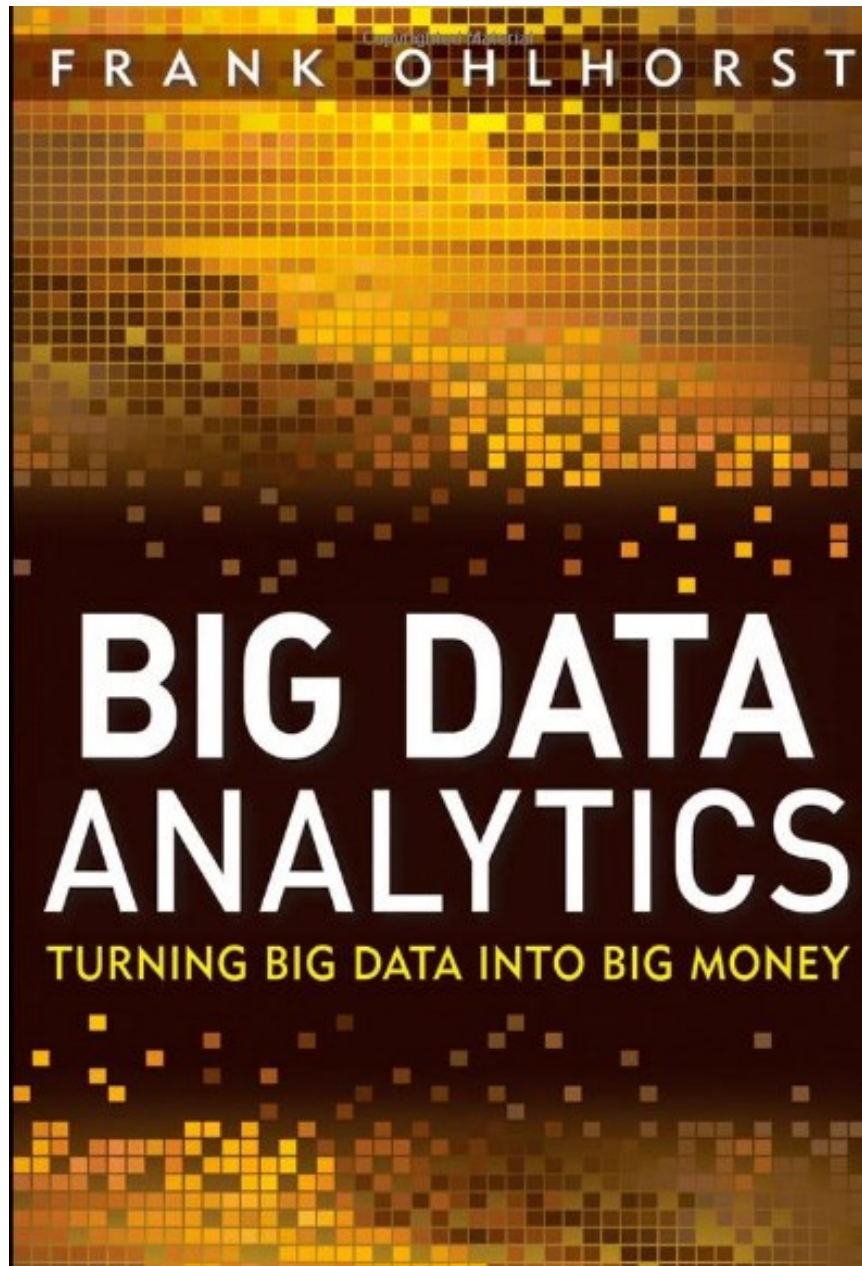
**Too Big,
too Unstructured,
too many different source
to be manageable through
traditional databases**



Deep Learning

Intelligence from Big Data







Business Intelligence Trends

1. **Agile** Information Management (IM)
2. **Cloud** Business Intelligence (BI)
3. **Mobile** Business Intelligence (BI)
4. **Analytics**
5. **Big Data**

Business Intelligence and Analytics

- Business Intelligence 2.0 (BI 2.0)
 - Web Intelligence
 - Web Analytics
 - Web 2.0
 - Social Networking and Microblogging sites
- Data Trends
 - Big Data
- Platform Technology Trends
 - Cloud computing platform

Business Intelligence and Analytics: Research Directions

1. Big Data Analytics

- Data analytics using Hadoop / MapReduce framework

2. Text Analytics

- From Information Extraction to Question Answering
- From Sentiment Analysis to Opinion Mining

3. Network Analysis

- Link mining
- Community Detection
- Social Recommendation

Big Data, Big Analytics:

**Emerging Business Intelligence
and Analytic Trends
for Today's Businesses**

Big Data, Prediction vs. Explanation

Big Data:

The Management Revolution

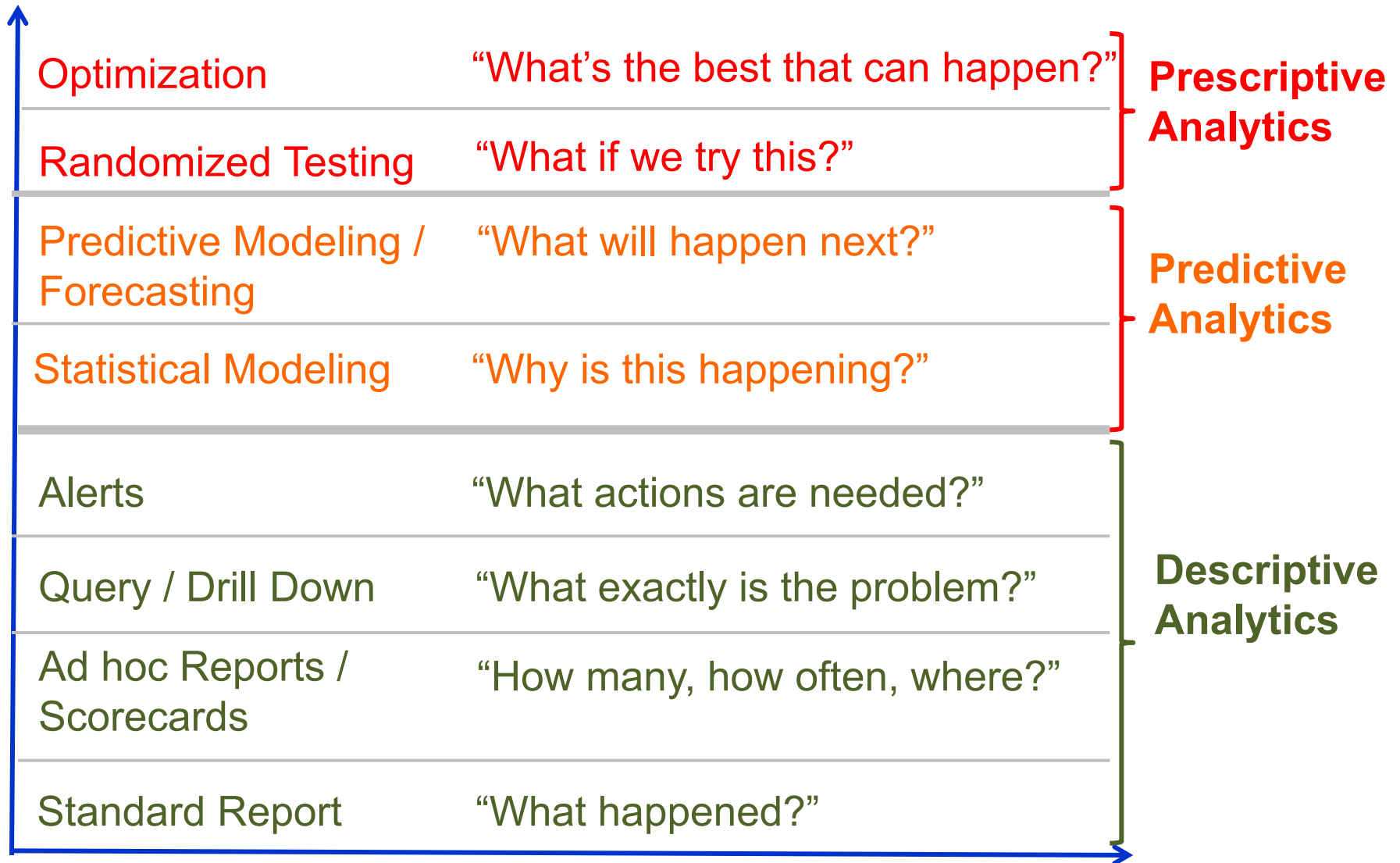
Business Intelligence and Enterprise Analytics

- Predictive analytics
- Data mining
- Business analytics
- Web analytics
- **Big-data** analytics

Three Types of Business Analytics

- Prescriptive Analytics
- Predictive Analytics
- Descriptive Analytics

Three Types of Business Analytics



Big Data Landscape 2016

Infrastructure

Hadoop On-Premise
 cloudera Hortonworks
 MMAPR Pivotal
 IBM InfoSphere
 splunk jethro

Hadoop in the Cloud
 amazon web services Google Cloud Platform
 Microsoft Azure IBM InfoSphere
 CAZENA altilscale
 Quale xplenty

Spark
 databricks
 GridGain
 TACHYON NEXUS

Cluster Services
 amazon web services
 Kubernetes
 HPCC SYSTEMS
 MESOSPHERE
 Core OS pepperdata
 StackIQ

Analytics

Analyst Platforms
 Palantir
 AYASDI
 Quid enigma
 Digital Reasoning
 ORBITAL INSIGHT

Analytics Platforms
 Microsoft
 guavus
 Datameer
 interana

Data Science Platforms
 context relevant
 CONTINUUM DataRobot
 Alpine ADATAO
 MODE ploity
 dataiku tonian
 DOMINO sense
 yhat ALGORITHMIA

Visualization
 +ableau
 Google Cloud Platform
 Roambi
 Qlik
 CHARTIO

Applications

Sales & Marketing
 RADIUS Gainsight
 bloomreach Zeta
 livefyre blueyonder
 @kahuna Lattice
 persado infer sense
 AVISO ACTIONIQ
 QUANTIFIND ENGA GIO

Customer Service
 MEDALLIA
 ATTENITY CLARABRIDGE
 STELLAService
 NGDATA Preact
 DigitalGenius wiseia
 appurri
 fuse machines

Human Capital
 gild
 Connectifier
 textio
 entelo
 hiQ

Legal
 RAVEL
 JUDICATA
 Everlaw
 Brevia
 PREMIONION

NoSQL Databases
 amazon DynamoDB
 Google Cloud Platform ORACLE
 Microsoft Azure
 mongoDB MarkLogic
 DATASTAX
 KEROPIKE Couchbase
 SequoiaDB redislabs influxdata

NewSQL Databases
 SAP HANA Clustrix Pivotal
 paradigm4
 memsql nuODB
 MariaDB VOLTDB
 citusdata
 deepdb Trafodion Cockroach LABS

BI Platforms
 Power BI amazon
 DOMO
 Wave Analytics
 GoodData birst
 kyvos insights
 platfora looker
 atscale ARCADIA
 SIBSENSE

Statistical Computing
 SAS
 SPSS
 MATLAB

Log Analytics
 splunk
 sumologic
 kibana
 CLOUD PHYSICS
 loggly

Social Analytics
 NETBASE
 DATASIFT
 tracx bitly
 syntheso
 bottlenose
 simplereach

Ad Optimization
 MediaMath Integral
 Ad Science
 rocketfuel
 theTradeDesk
 OpenX
 Adgorithms
 Liventent dstillery
 DataXu Appier TAFAD

Security
 CYLANCE
 CounterTack cyberason
 ThreatMetrix
 AREA 1 SECURITY
 Recorded Future
 Guardian Analytics
 FORTSCALE sift science
 Kaybase feedzai SIGNIFYD

Vertical AI Applications
 facebook
 Clara
 KASISTO
 lumiata

Graph Databases
 neo4j
 OrientDB
 InfiniteGraph

MPP Databases
 TERADATA
 VERTICA
 NETEZZA
 kognitio
 dremio

Cloud EDW
 amazon web services
 Google Cloud Platform
 Microsoft Azure
 Pivotal
 snowflake
 HAWAIIAN DATA LABS
 Infoworks

Data Transformation
 alteryx
 TRIFACTA
 tamer
 MuleSoft
 StreamSets
 Alation

Data Integration
 informatica
 Put potential to work:
 MuleSoft
 snapLogic
 BedrockData

Real-Time
 amazon web services
 METAMARKETS
 confluent
 DATATORRENT
 dataArtisans

Machine Learning
 Azure Machine Learning
 H2O.ai
 SKYTREE
 rapidminer
 DATAFORMA
 deepnlp VISENZE
 PredictionIO glowfish

Speech & NLP
 NarrativeScience
 api.ai NUANCE
 @gridspace
 semanticmachines
 cortico.io
 mublu
 MindMeld
 IDIBON yseop

Horizontal AI
 IBM Watson
 Cortana sentiment
 VIV
 nervana
 Numenta
 MetaMind
 clarifai
 DEXTRA
 Cosmotec
 DataScience

Publisher Tools
 outbrain
 mixpanel
 Chartbeat
 yieldbot
 Yieldmo

Govt/ Regulation
 Socrata
 OPENGOV
 FN FiscalNote
 enigma
 PREPOL
 mark43
 OpenDataSoft

Finance
 affirm
 LendingClub
 OnDeck
 Kreditech
 Kabbage
 INSIKT
 Lenddo
 ZUORA Dataminr
 KENSHCO AIDYIA
 iSENTIUM
 Quantopian
 sentiment

Management / Monitoring
 New Relic
 APPDYNAMICS
 actifio
 Numerify
 splunk
 DATADOG
 Trocana Anodot

Security
 TANIUM
 illumio
 CODE42
 DataGravity
 CipherCloud
 VECTRA
 sqrrl BlueTalon

Storage
 amazon web services
 Google Cloud Platform
 Microsoft Azure
 panasas
 nimblestorage
 Qumulo

App Dev
 apigee
 CASK
 Typesafe
 CONCURRENT

Crowd-sourcing
 amazon mechanicalturk
 CrowdPower
 WorkFusion

Search
 hp
 ORACLE
 ENDECA
 EXALEAD
 Lucidworks
 elastic ThoughtSpot
 MAANA swifttype

Data Services
 OPERA
 Mis Sigma
 DATA SCIENCE
 kaggle datascience
 DataKind

For Business Analysts
 OrigamiLogic
 ClearStory
 CIRRO
 import io

SMB / Commerce
 Google Analytics
 AMPITUDE RJMetrics
 BLUECORE
 sumAll granify
 Airtable
 retention custora

Education/ Learning
 KNEWTON
 Clever
 Declara
 PANORAMA
 knowTe

Life Sciences
 23andMe
 Pathway Genomics
 Counsyl
 Recombine
 KYRUUS
 FLATIRON
 zymergen HealthTap
 METABIOTA ZEPHYR HEALTH
 ovia
 Gingerio transcriptic Glow
 entlic AiCure Atomwise

Industries
 OP@WER eHarmony
 RetailNext
 STITCH FIX
 WorkFusion
 BLUE RIVER
 TACHYUS
 SwiftKey
 Seeq FarmLogs
 HowGood
 select
 NIGHT MACHINE
 statmuse BOXEVER

Cross-Infrastructure/Analytics

amazon web services Google Microsoft IBM SAP SAS hp Autonomy vmware talent TIBCO TERADATA ORACLE NetApp

Open Source

Framework
 hadoop HOPS
 YARN Spark
 MESOS TEZ
 Flink CDAP

Query / Data Flow
 SLAMDATA
 DRILL
 Google Cloud Dataflow

Data Access
 cassandra
 HBASE
 mongoDB
 CouchDB
 riak
 OPENTSOB

Coordination
 talent
 Apache Zookeeper
 Apache Ambari

Real-Time
 STORM
 Spark
 APEX
 Flink
 TACHYON druid

Stat Tools
 R
 Scala
 Numpy
 SciPy

Machine Learning
 milib
 Apache SINGA
 MADlib
 Aerosolve
 Caffe
 FeatureFu
 DIMSUM
 WEKA
 jupyter DL4J

Search
 elasticsearch
 Solr
 Lucene

Security
 Apache Ranger
 Zeppelin
 Visualization

Data Sources & APIs

Health
 Apple JAWBONE GARMIN
 practicefusion fitbit
 Withings VALIDIC netatmo
 kinsa Human API

IOT
 UPTAKE
 ThingWorx
 helium samsara
 AUGURY estimate

Financial & Economic Data
 Bloomberg DOW JONES
 YODLEE PREMISE S&P CAPITAL IQ
 quandl xignite CB INSIGHTS
 mattermark estimize PLAID

Air / Space / Sea
 PLANET LABS
 spire
 WINDWARD
 CRUISE SKYCATCH
 Airware DroneDeploy

Location/People/Entities
 GARMIN foursquare InsideView esri
 STREETLINE
 connecting the real world
 CARTODB factual PlaceIQ
 Crimon Hexagon placemeter BASIS Sense

Other
 qualtrics
 panjiva
 DATA.GOV

Incubators & Schools
 GA DataCamp
 INSIGHT METIS
 DataElite
 The Data Incubator

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Summary

- Data Science
- Big Data Marketing

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