Business Intelligence: A Discussion on Platforms, Technologies, and solutions

Tutorial

RCIS 2013-Paris May 29-31

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Tutorial overview
knowledge Discovery from Data

- The Thrust of the tutorial is to examine Business Intelligence (BI) Platforms to develop business analytics applications.

- Specifically, we will address:
  - Requirements, development , and capabilities of the BI.
  - Self-service, enterprise, and cloud BI.
  - Confusing BI concepts such as: Platform, infrastructure, technology and architecture .
  - Solutions by three well-known vendors: Microsoft, TableauSoftware and IBM.
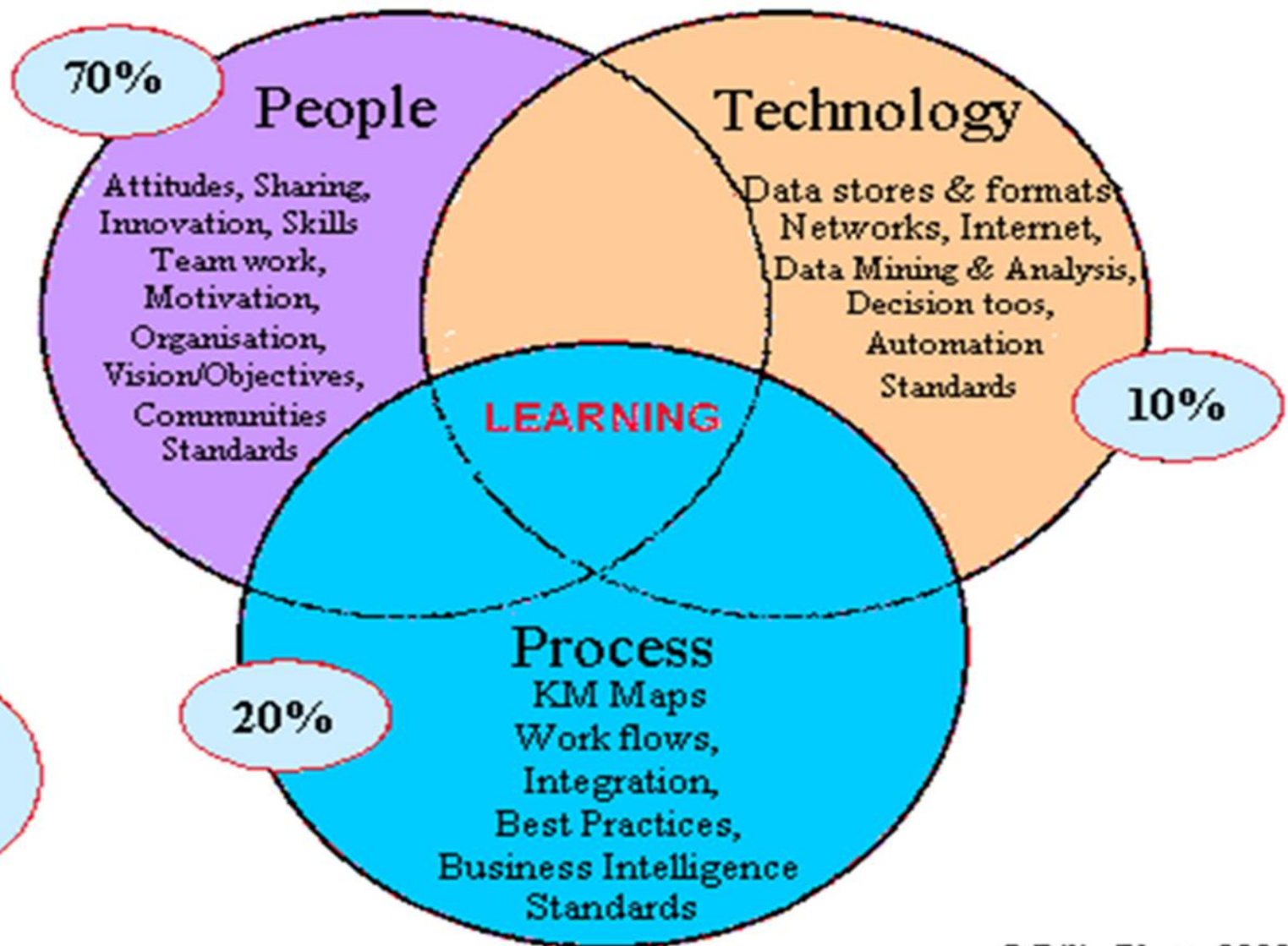
Overview of Business Intelligence

- BI is revolutionizing decision making and information technology across all industries. This phenomenon is largely due to the ever-increasing availability of data.

- The explosive volumes of data are available in both structured and unstructured formats, and are analyzed and processed to become information within context hence providing relevance, and purpose to the decision making process.

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What is Business Intelligence?

- BI is a content-free expression, so it means different things to different people.

- **BI is neither a product, nor a service**
  - BI refers to people, processes, technologies and practices used to support business decision making.

Knowledge Components

70%

People

Attitudes, Sharing,
Innovation, Skills
Team work,
Motivation,
Organisation,
Vision/Objectives,
Communities
Standards

Technology

Data stores & formats,
Networks, Internet,
Data Mining & Analysis,
Decision toos,
Automation
Standards

10%

LEARNING

Process
KM Maps
Work flows,
Integration,
Best Practices,
Business Intelligence
Standards

20%

n% =
effort
required

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What is Business Intelligence?

- BI is an umbrella term that combines architectures, technology, analytical tools, applications, and methodologies to help *transform* data, to information, to knowledge, to decisions, and finally to action.
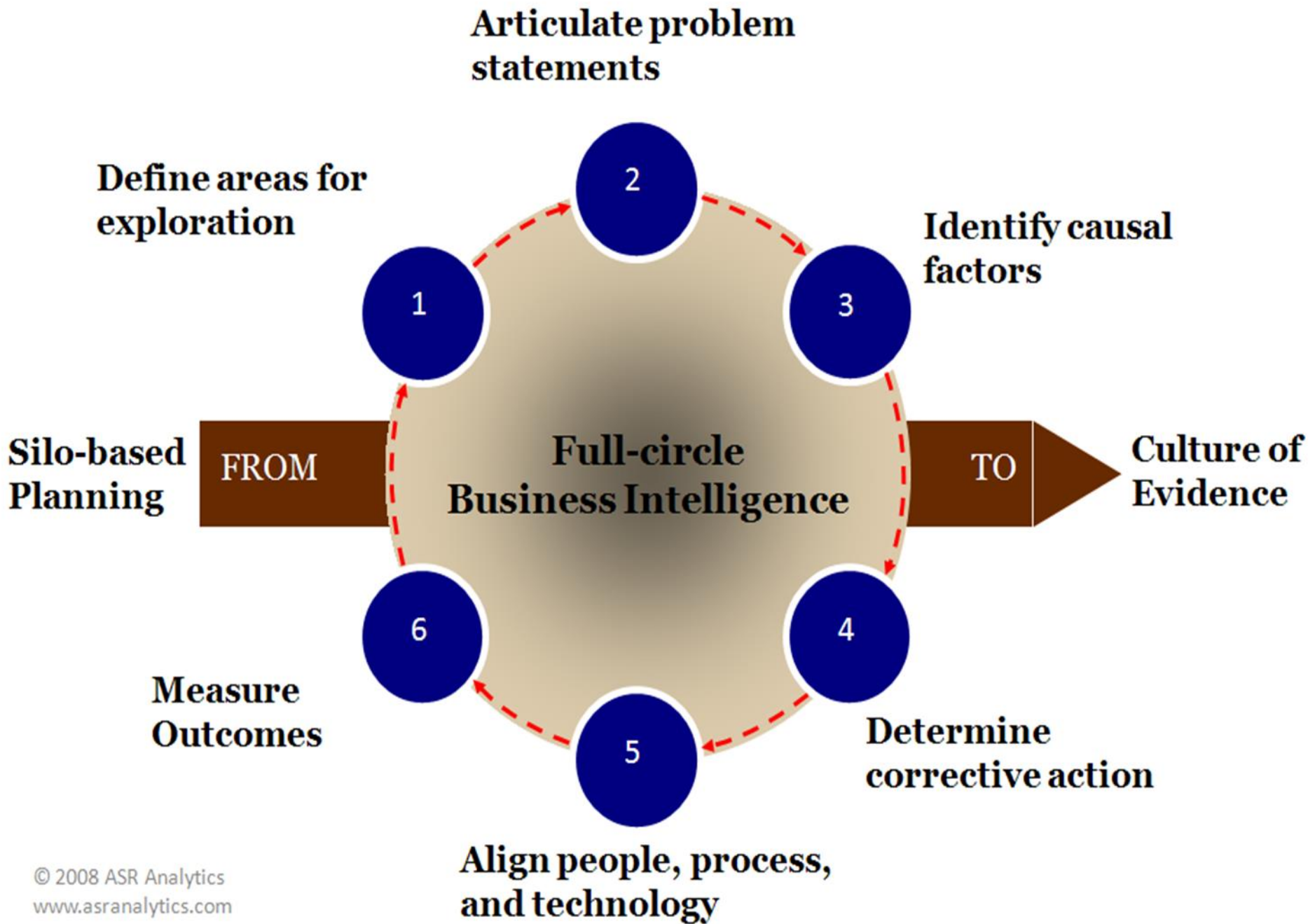
BI Tools for Decision Making

- Next slide depicts one example of sets of Business Intelligence technologies (offered by Microsoft) to support decision making in three levels of organization; Operational, tactical, and strategic.

In the Nutshell!

- BI allows answering the W- business questions:
- the " **Why** ": questions that need to be answered
- the " **What** ": data to be collected, and
- **"Who"** is going to use that data

Articulate problem statements

Define areas for exploration

Identify causal factors

2

1

3

Silo-based Planning

FROM

Full-circle Business Intelligence

TO

Culture of Evidence

6

4

Measure Outcomes

5

Determine corrective action

Align people, process, and technology

© 2008 ASR Analytics
www.asranalytics.com

Success factors of BI

- The strategy and planning phase of a BI project is as important as implementation phase and is not optional. You need to:
  - understand the business needs
  - understand the user needs
  - identify stakeholders
  - define BI strategy and road map
 - prepare the project plan

How to approach BI

- defining the skill set for the project and assembling a project team of internal and external specialists.

- identifying technologies and tools required to meet your BI needs.

- choosing vendors and platforms.

- installing and configuring hardware, setting up tools, and helping IT department to incorporate new processes.

Core Functions of BI

- Core functions include query, reporting, and analysis. Dashboards and other visualization techniques help users quickly understand analysis results.

- All of these capabilities require integrated business data from across the organization.

BI and Big Data

- "Business Intelligence is the process of:
- **analyzing** large amounts of corporate data [**BIG DATA**], usually stored in large databases such as an Enterprise Data Warehouse,
- **Tracking** business performance,
- **Detecting patterns** and trends, and
- Helping enterprise business users make **better decisions**."
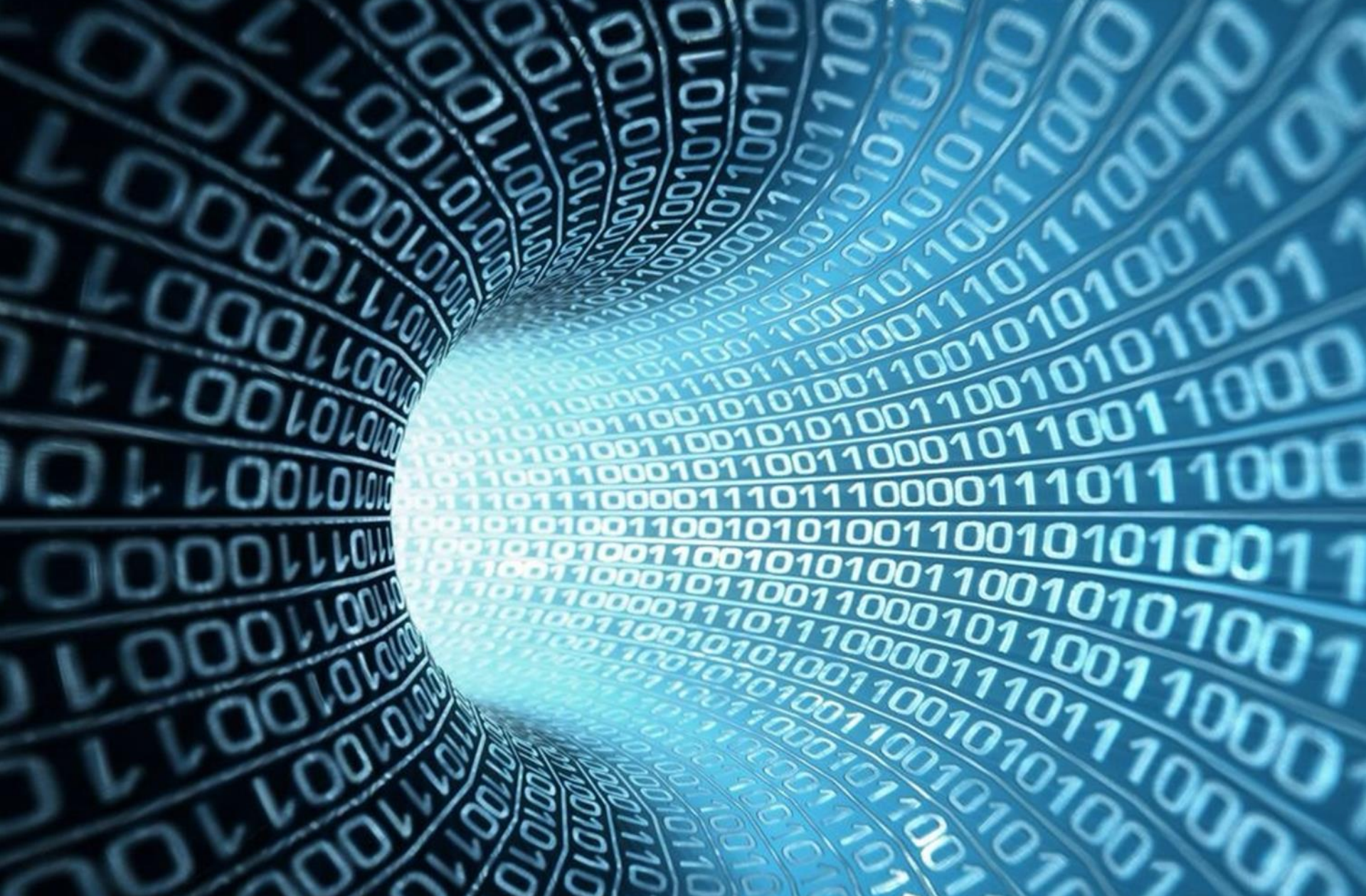
Digitized Data World

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BIG Data

- Organizations are using Big Data to build a better information ecosystem.

- A look at the big data landscape makes it abundantly clear that Big Data is everywhere.

Big Data Landscape

Vertical Apps
PREDICTIVE POLICING
bloomreach. GET FOUND.
MYRRIX

Log Data Apps
splunk> loggly sumologic

Ad/Media Apps
rocketfuel
bluefin
Media Science
TURN
collective[i]
Recorded Future
LuckySort
DataXu
Data. Insight. Action.

Data As A Service
factual.
GNIP DATASIFT Windows Azure Marketplace INRIX LexisNexis SPACE CURVE
kaggle
knoema beta
LOQATE Everything Location

Business Intelligence
ORACLE | Hyperion
SAP Business Objects RJMetrics
Microsoft | Business Intelligence
IBM COGNOS birst
MicroStrategy
Autonomy
QlikView
bime
DOMO
Chart.io GoodData

Analytics and Visualization
tableau
OPERA metaLayer
METAMARKETS
TERADATA ASTER
SAS TIBCO
panopticon Real-Time Visual Data Analysis
Datameer
platfora
alteryx visual.ly
Palantir
dataspora centrifuge
KARMASPHERE
pentaho
ClearStory CIRRO
AYATA

Analytics Infrastructure
Hortonworks VERTICA An HP Company MAPR
cloudera INFOBRIGHT
PARACCEL
EMC² GREENPLUM
NETEZZA kognitio
DATASTAX EXASOL calpont

Operational Infrastructure
COUCHBASE 10gen MongoDB company
TERADATA HADAPT
TERRACOTTA VoltDB
MarkLogic INFORMATICA

Infrastructure As A Service
amazon web services
Windows Azure
infochimps
Google BigQuery

Structured Databases
ORACLE MySQL
Microsoft SQL Server PostgreSQL
IBM DB2
SYBASE
memsql

Technologies
hadoop
hadoop MapReduce
mahout
APACHE HBASE
Cassandra

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What is BIG DATA???
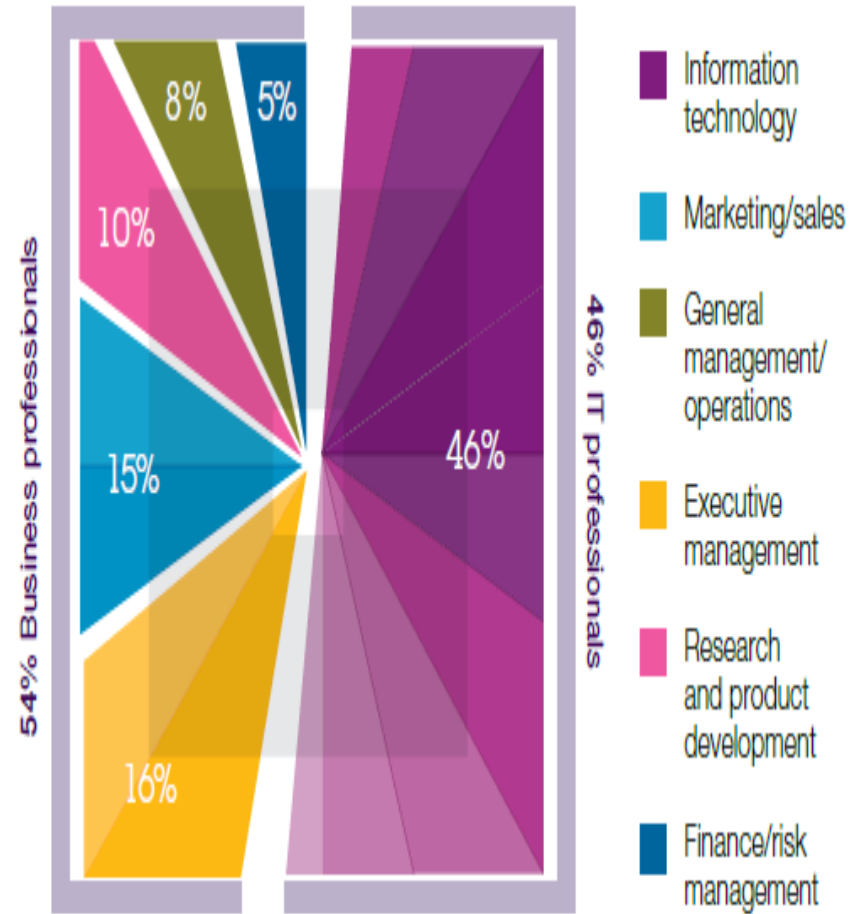
BIG DATA??

- Survey conducted by IBM and University of Oxford in mid-2012, which consisted of:
  - 1144 professionals
  - 95 countries
  - 26 industries.
    - including both business professionals (54%) and
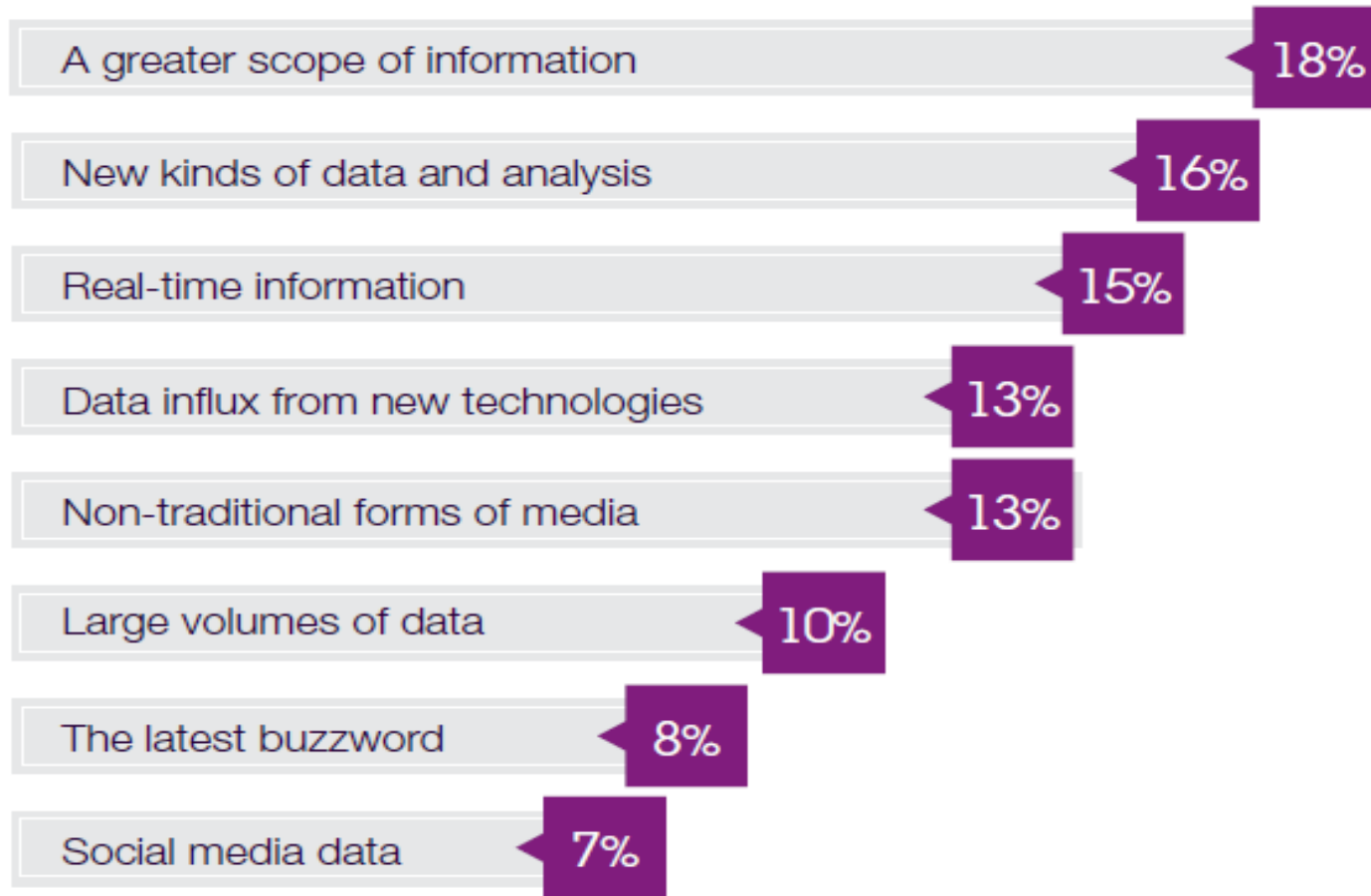   - IT professionals (46%).

Respondents

Defining big data

- A greater scope of information — 18%
- New kinds of data and analysis — 16%
- Real-time information — 15%
- Data influx from new technologies — 13%
- Non-traditional forms of media — 13%
- Large volumes of data — 10%
- The latest buzzword — 8%
- Social media data — 7%
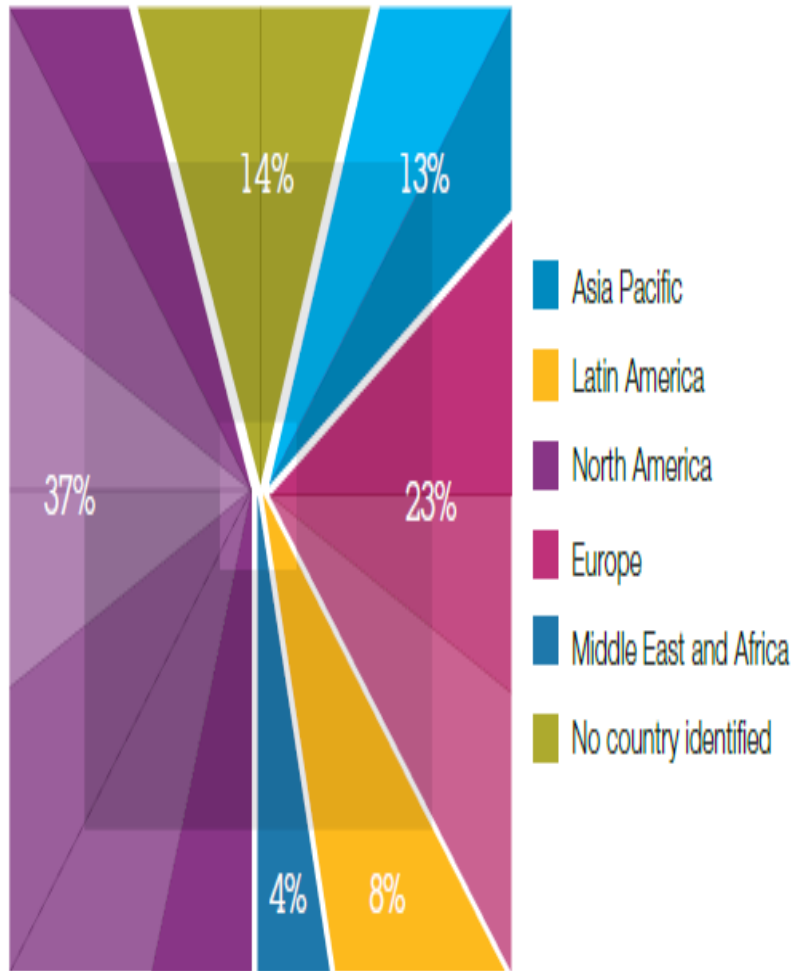
Respondents were asked to choose up to two descriptions about how their organizations view big data from the choices above. Choices have been abbreviated, and selections have been normalized to equal 100%.
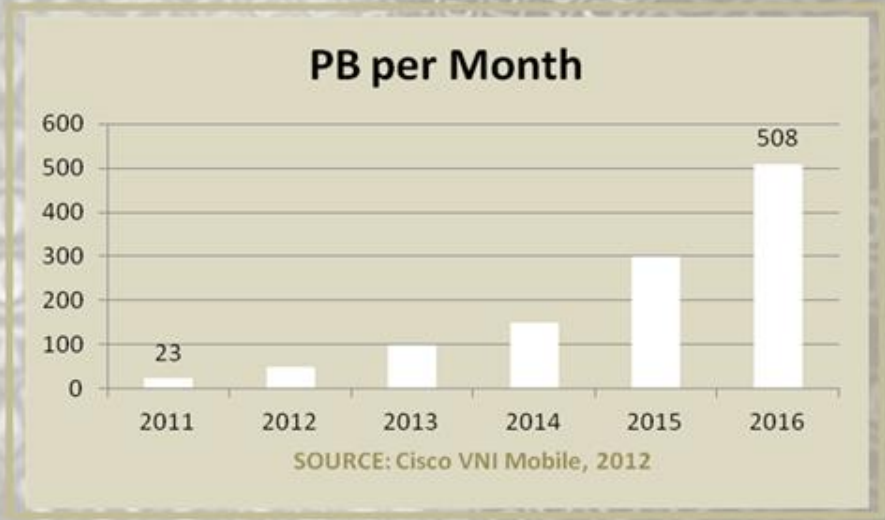
THE FOUR V's OF BIG DATA

"Big data" is large datasets at rest.

But all that data got there the same way...

Over a network.

Is yours ready to handle the load?

PB per Month

23 (2011)
508 (2016)

SOURCE: Cisco VNI Mobile, 2012

VOLUME

6 PB

Amount of data generated per day by a 1Gpx surveillance camera

VARIETY

Network-connected healthcare devices exploding

Cows transmit health data over the Internet to the tune of 200mb a year
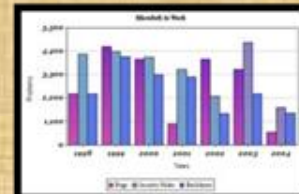
VELOCITY

150463

API calls per second to Google, Twitter, and Facebook alone

Credit card industry processes 32,000 TPS. Mobile expected to raise that to 1 million TPS

VALUE

How fast can the data be analyzed and acted on to provide business value?

SOURCES: CISCO, VELOCITY 2011, GIGAOM, MASHABLE

Big Data Management Solution

- Big data has the potential to change the way that companies leverage data.

- As the volume, velocity, variability/variety, and value of data increases, organizations should adapt their data management practices as they load and analyze all this information.
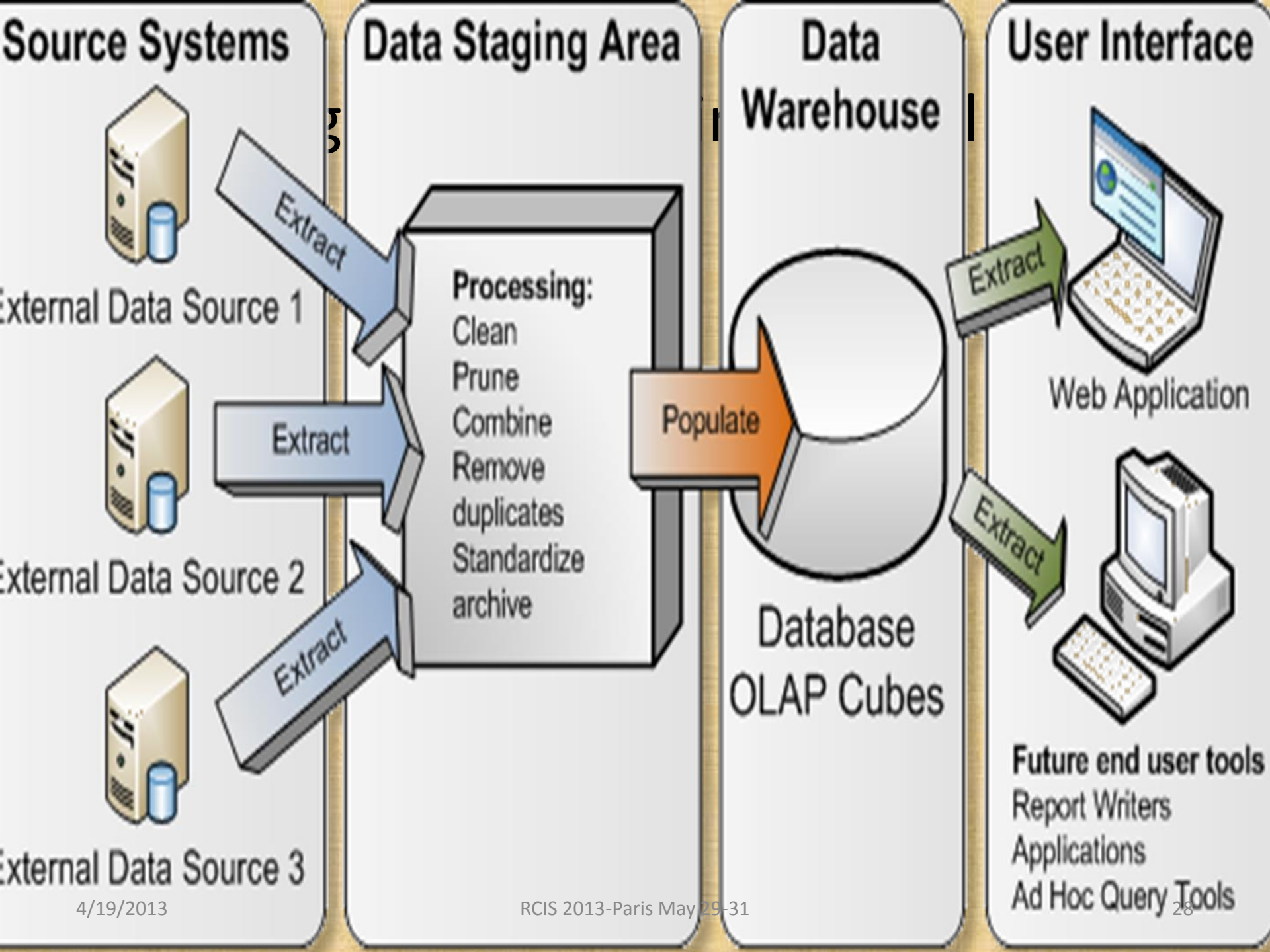
From Big Data to Business Intelligence

Data sources

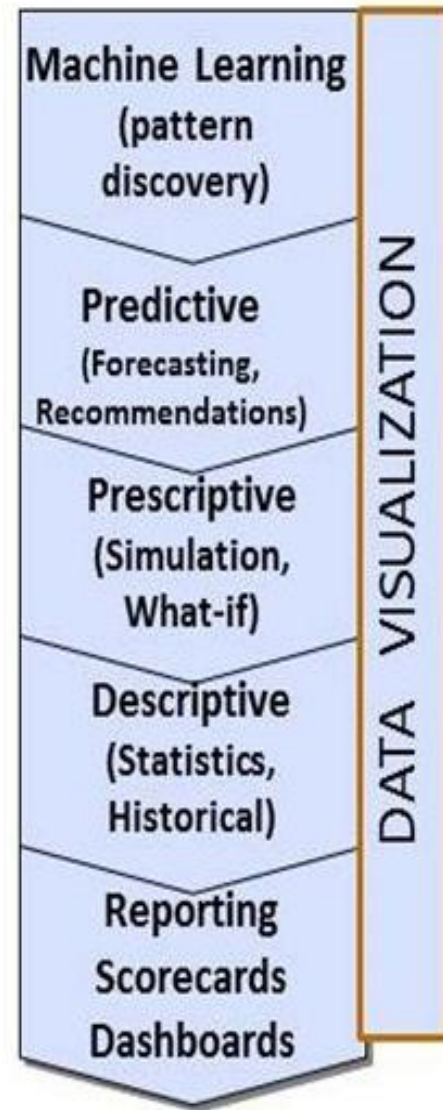Data movement
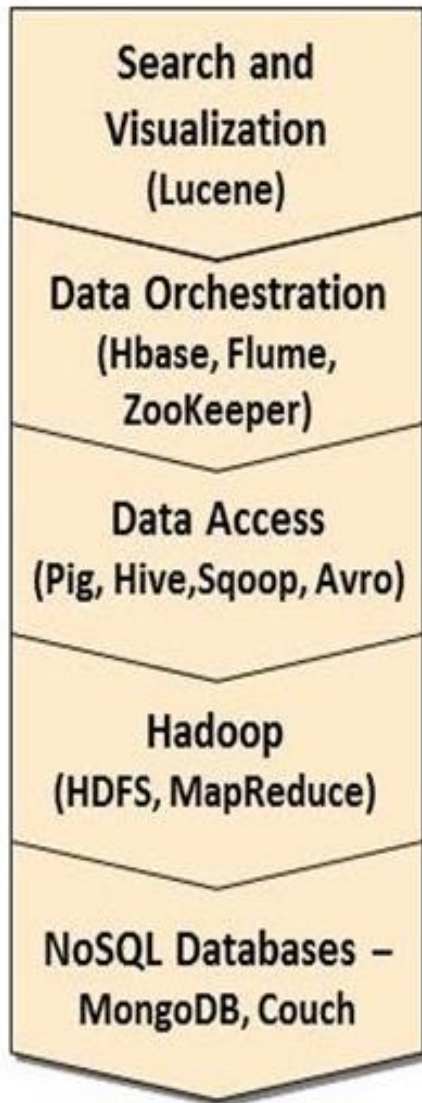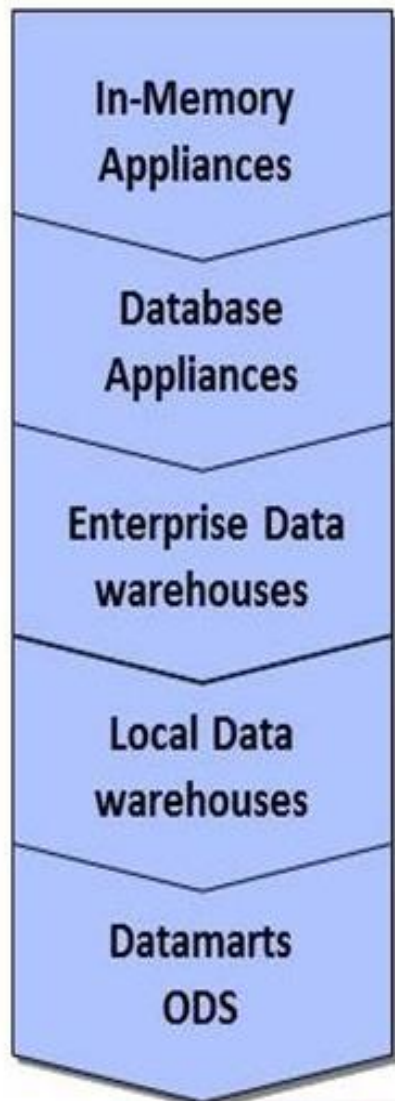
Data Storage

Data presentation

Data Stack Structured & Unstructured	Hadoop and Big Data Ecosystem	Enterprise Information Management Stack	BI Platforms, Analytics Tools and Insight Stack	
In-Memory Appliances	Search and Visualization (Lucene)	Data Governance	Machine Learning (pattern discovery)	DATA VISUALIZATION
Database Appliances	Data Orchestration (Hbase, Flume, ZooKeeper)	Data Integration	Predictive (Forecasting, Recommendations)	
Enterprise Data warehouses	Data Access (Pig, Hive, Sqoop, Avro)	Data Quality	Prescriptive (Simulation, What-if)	
Local Data warehouses	Hadoop (HDFS, MapReduce)	Data Virtualization	Descriptive (Statistics, Historical)	
Datamarts ODS	NoSQL Databases – MongoDB, Couch	Master Data Management	Reporting Scorecards Dashboards	

Capabilities of BI
Improving Operational Efficiency

- Simplifying reporting and data analysis.

- Deploying human resources more efficiently by enabling organizations to focus resources on problems and exceptions.

- Improving efficiency of processes by allowing businesses to measure the effectiveness of these processes and monitoring the impact of changes and improvements.

- Enhancing IT efficiency by **providing self-service business analysis solutions and by simplifying the IT infrastructure.**

BI capabilities
Data Consolidation and Integration

- A BI solution that is integrated with an enterprise resource planning (ERP) system can access consolidated data from across the organization in real time.

- The solution should also integrate with other software applications within the organization to allow users **to access data from multiple sources, including structured and text-based.**

BI capabilities
Production Reporting

- Production reporting creates high-volume, regularly run reports, such as monthly sales reports.

- Controlled access to reports means each user sees only appropriate information.

BI capabilities
Ad Hoc Queries

- Ad hoc query tools allow business users to create queries without IT support. Users can employ these queries to understand trends and root causes.

- These tools can provide powerful sorting, grouping, filtering, and charting capabilities as well as drill down and drill around.

- Grid interfaces permit users to see multiple data elements in one view.

BI capabilities
Advanced Analytics with Drill Downs

- Advanced analytics allows users to view data across multiple classifications or dimensions (such as product, location, time period, and/or salesperson) and slice and dice the data to look at various combinations, such as the sales in December.

- Advanced analytics also permits organizations to define hierarchies that enable a user to, for example, view sales for each region and then drill down to view sales in each state, each store within that state, each salesperson, and each product.

BI capabilities
What-if Analysis

- "What if" analysis allows people to use past data to see how different potential changes would affect their business. For example, what would happen to sales if prices are raised by 10%?

BI capabilities
Dashboards

- Dashboards provide business users with a summary of information critical to their everyday decision making and can proactively alert them to problems.

BI capabilities
Portals

– Portals allow each user to create a personalized view that tracks the indicators most pertinent to their job in real time.

- For example, a CEO might want to see graphs displaying revenue over the past year, month, or week. Portals are protected by role-based security and accessible over the web.

BI capabilities
Scorecards and Key Performance Indicators (KPIs)

- Scorecards and KPIs help monitor important business metrics, such as customer satisfaction, profitability, and sales per employee. By tracking KPIs, organizations can align individual and department metrics with the organization's strategic goals.

BI capabilities
Exception Handling and Alerts

– Automated alerting and notifications use the organization's email system to notify users when specific events occur. This allows businesses to automate processes while devoting their resources to handling exceptions.

Business Intelligence (BI) Platforms

- Business intelligence (BI) platforms enable enterprises to build BI applications by providing capabilities in three categories:
  - analysis, such as online analytical processing (OLAP);
  - information delivery, such as reports and dashboards; and
  - platform integration, such as BI metadata management and a development environment.

Business Intelligence Platforms

- In order to deliver business intelligence to the widest audience and to maximize the benefits that it can deliver its technologies must be organized to:
    - to implement the business intelligence process,
    - to support the range of applications best suited to every user of every type.

- These capabilities are realized within an infrastructure, which is called BI platform.

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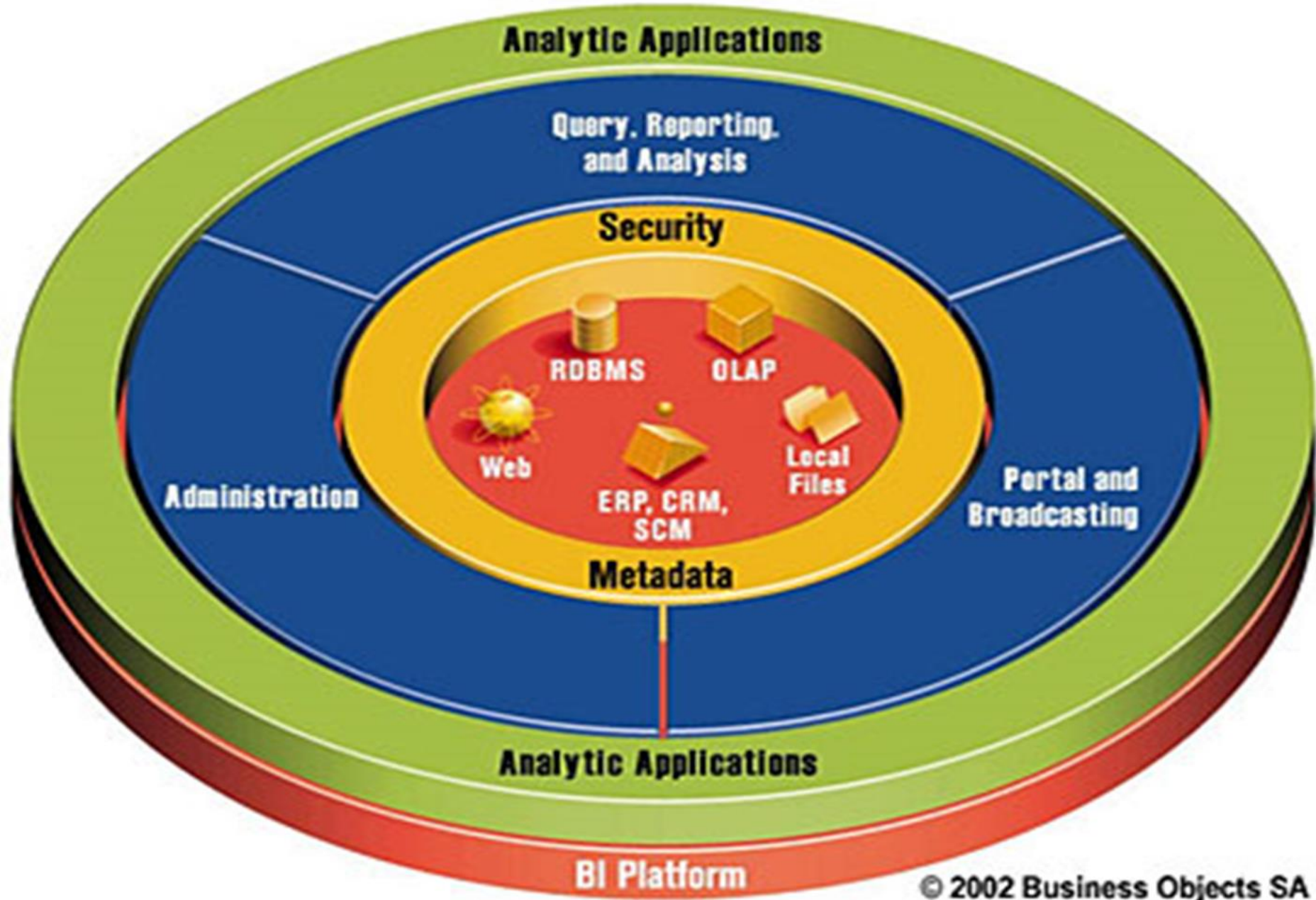
Business Intelligence Technology

- Used to be
  - Loose collection of technologies
  - Applied in ad-hoc manner
  - Used by few interested individuals/ corporations
- Today
  - BI technologies are tightly integrated
  - Easily and widely deployed
  - Used as catalyst for efficiency and effectiveness.

Business Intelligence Platform Requirements

- Business intelligence platforms should include the following technologies, where each technology implement a set of capabilities:
  - a data warehouse, with its source data
  - business analytics, a collection of tools for manipulating, mining, and analyzing the data in the data warehouse;
  - business performance management (BPM) for monitoring and analyzing performance
  - a user interface (e.g., dashboard)
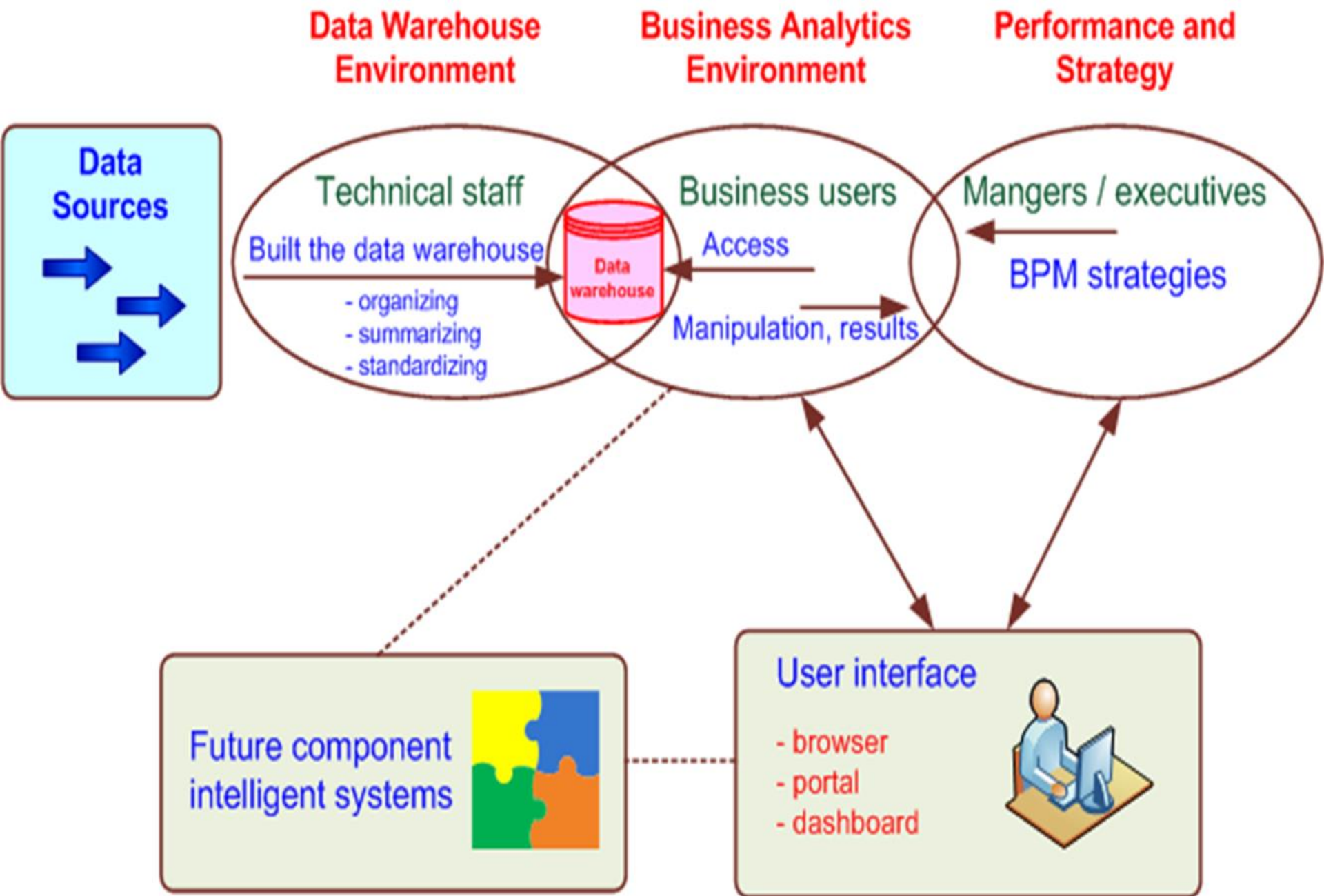
Data Warehouse

- ## What is it?

  - A physical repository where relational data are specially organized to provide enterprise-wide, cleansed data in a standardized format

Characteristics of Data Warehouse

- **A data warehouse is a**
  - **Subject-oriented,**
  - **Integrated,**
  - **Time-variant and**
  - **non-volatile**

collection of data in support of management's decision making process.

DATA WAREHOUSE
characteristics

- **Subject-Oriented:** Information is presented according to specific subjects or areas of interest, not simply as computer files. Data is manipulated to provide information about a particular subject.

DATA WAREHOUSE
characteristics

- **Integrated:** A single source of information for and about understanding multiple areas of interest.

- The data warehouse provides one-stop shopping and contains information about a variety of subjects.

DATA WAREHOUSE
characteristics

- **Non-Volatile:** Stable information that doesn't change each time an operational process is executed. Information is consistent regardless of when the warehouse is accessed.

DATA WAREHOUSE
characteristics

- **Time-Variant:** Containing a history of the subject, as well as current information. Historical

DATA WAREHOUSE
characteristics

- **Accessible:** The primary purpose of a data warehouse is to provide readily accessible information to end-users.

- **Process-Oriented:** It is important to view data warehousing as a process for delivery of information. The maintenance of a data warehouse is ongoing and iterative in nature.

Information Factory
A Conceptual Architecture For Business Intelligence
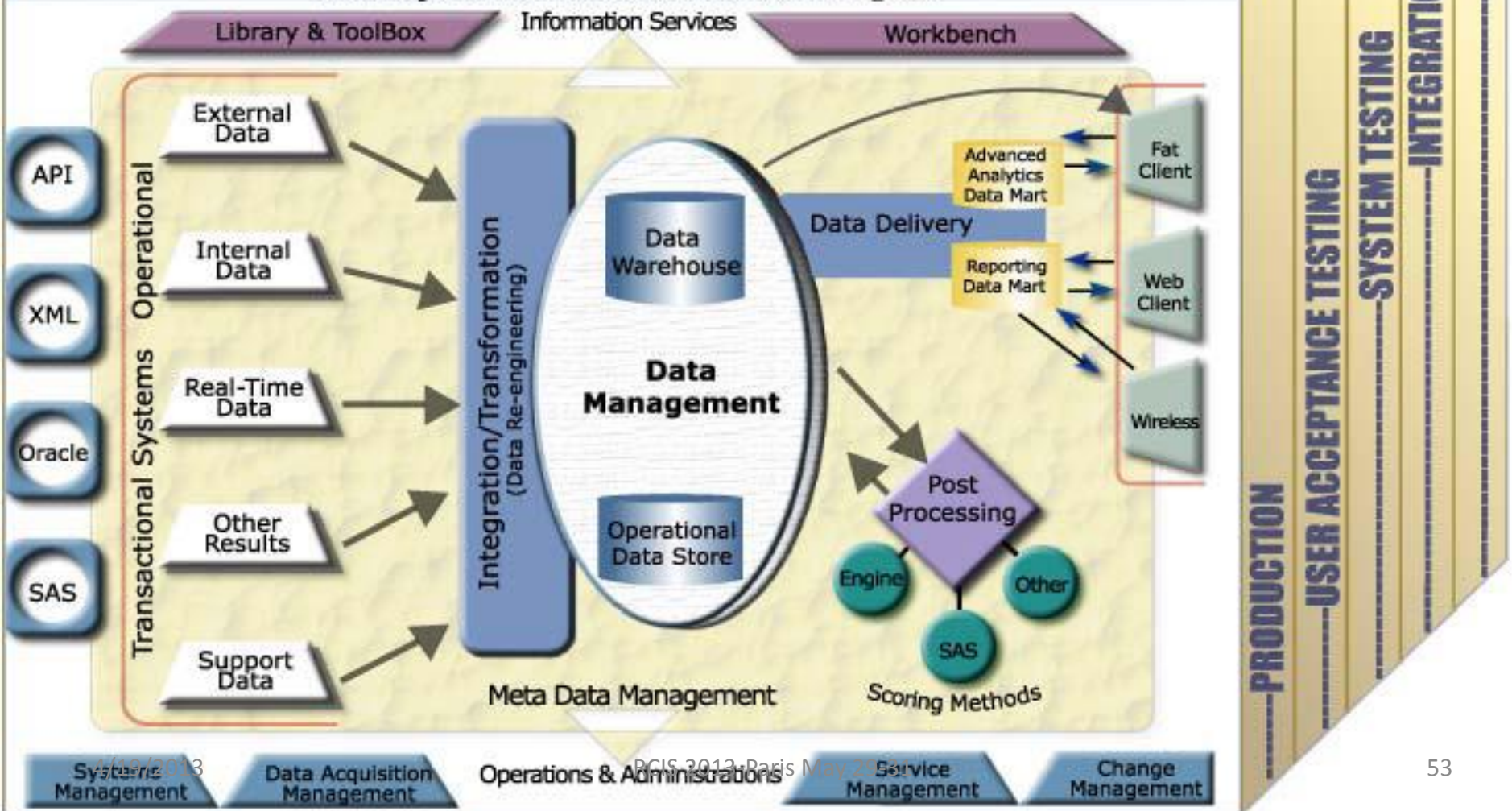
ETL **- Extract from source**

- In this step we extract data from different internal and external sources, structured and/or unstructured.

- The data will be put in a so-called Staging Area (SA), usually with the same structure as the source.

ᴇ**T**ʟ **- Transform the data**

- Once the data is available in the Staging Area, it is all on one platform and one database. So we can easily
  - Join and unjoin tables,
  - filter and sort the data
  - Pivot to another structure and make business calculations. In this step of the ETL process, we can check on data quality and clean the data if necessary.

ET**L** - **Load into the data warehouse**

- Finally, data is loaded into a data warehouse, usually into fact and dimension tables. From there the data can be combined, aggregated and loaded into datamarts or cubes as is deemed necessary.

ETL

- Today, ETL is much more - It also covers data profiling, data quality control, monitoring and cleansing, real-time and on-demand data integration in a service oriented

Data profiling and data quality control

- Profiling the data, will give direct insight in the data quality of the source systems. It can display how many rows have missing or invalid values, or what the distribution is of the values in a specific column.

- Based on this knowledge, one can specify business rules in order to cleanse the data, or keep really bad data out of the data warehouse.

- Doing data profiling before designing your ETL process, you are better able to design a system that is robust and has a clear structure.

Data Profiling: tutorial

- http://www.youtube.com/watch?v=usLXd7WS5aQ

- http://www.youtube.com/watch?v=My3dCwSwa60

Metadata management

- Information about all the data that is processed, from sources to targets by transformations, is often put into a metadata repository; a database containing all the metadata.

- The entire ETL process can be 'managed' with metadata management, for example you want to know what the impact of a change will be, for example the size of the order identifier (id) is changed, and in which ETL steps this attribute plays a role.

Top ETL TOOLS

	Tools	version	Vendors
1.	Oracle Warehouse Builder (OWB)	11gR1	Oracle
2.	Data Services	XI 3.2	SAP Business Objects
3.	IBM Information Server (Datastage)	9.1	IBM
4.	SAS Data Integration Studio	4.21	SAS Institute
5.	PowerCenter	9.0	Informatica
6.	Elixir Repertoire	7.2.2	Elixir
7.	Data Migrator	7.7	Information Builders
8.	SQL Server Integration Services	10	Microsoft
9.	Talend Open Studio & Integration Suite	4.0	Talend
10.	DataFlow Manager	6.5	Pitney Bowes Business Insight
11.	Data Integrator	9.2	Pervasive
12.	Open Text Integration Center	7.1	Open Text
13.	Transformation Manager	4.1.4	ETL Solutions Ltd.
14.	Data Manager/Decision Stream	8.2	IBM (Cognos)
15.	Clover ETL	2.9.2	Javlin
16.	Centerprise	5.0	Astera

DW Framework

Data Sources: ERP, Legacy, POS, Other OLTP/wEB, External data

ETL Process: Select, Extract, Transform, Integrate, Load

Enterprise Data warehouse — Metadata, Replication

No data marts option

Access: Data mart (Marketing), Data mart (Engineering), Data mart (Finance), Data mart (...)

API / Middleware

Applications (Visualization): Routine Business Reporting, Data/text mining, OLAP, Dashboard, Web, Custom built applications

OPERATIONAL DATA	Data Warehouse DATA
application oriented	subject oriented
detailed	summarized, otherwise refined
accurate, as of the moment of access	represents values over time, snapshots
serves the clerical community	serves the managerial community
can be updated	is not updated
transaction driven	analysis driven
managed in its entirety	managed by subsets
nonredundancy	redundancy is a fact of life
static structure; variable contents	flexible structure
requirements for processing understood before initial development	requirements for processing not completely understood before development
compatible with the Software development Life Cycle	completely different life cycle
small amount of data used in a process	large amount of data used in a process

Required Platform for Data warehouse

- It should be a coherent platform, not a set of diverse and heterogeneous technologies. For example, a single toolset should provide build and manage capabilities across both relational and multidimensional data warehouses.

Build and Manage Capabilities

	Microsoft	Oracle	IBM
Toolsets	Analysis Manager provides comprehensive relational and OLAP build and manage capabilities.	Oracle9i Warehouse Builder provides relational build and manage capabilities. Oracle Enterprise Manager provides OLAP build and manage capabilities.	DB2 UDB Data Warehouse Center (DWC) provides basic relational basic build and manage capabilities. DB2 Warehouse Manager adds additional relational build and manage capabilities. DB2 OLAP Administrative Services provides OLAP build and manage capabilities.
Extraction data sources	Microsoft SQL Server Oracle ODBC Files Access 2000, Excel 2000 Microsoft Visual FoxPro dBase, Paradox Microsoft Exchange Server Microsoft Active Directory	IBM DB2 Informix Microsoft SQL Server Sybase Oracle ODBC Files	DB2 Informix Microsoft SQL Server Oracle Sybase Files
Additional Extraction Data Sources	Host Integration Server provides extraction from IBM mainframe data sources.	Oracle Pure Extract provides extraction from IBM mainframe data sources. Oracle Warehouse Builder Integrator for SAP provides extraction from SAP R/3.	DB2 Warehouse Manager provides extraction from SAP R/3, i2, and Web Server logs. Tools from IBM partners ETI and Ascential integrate within DWC to provide additional ETL capabilities.
ETL execution	Process-oriented execution of tasks within packages. Packaged may be versioned and/or password protected.	Process-oriented and execution of ETL steps controlled by Enterprise Manager.	Individually executed ETL steps.
ETL implementation	DTS is implemented as a COM framework accessed programmatically or with packaged visual tools.	PL/SQL stored procedures in Oracle9i database,	DB2 stored procedures and user defined functions (UDF). 150 predefined transformations.
Data cleansing	None packaged.	Oracle Pure Name and Address provides name and address data cleansing.	IBM partners Trillium Software Systems provides name and address data cleansing.

OLAP (On-Line Analytical Processing)

- is an approach to swiftly answer multi-dimensional analytical queries.
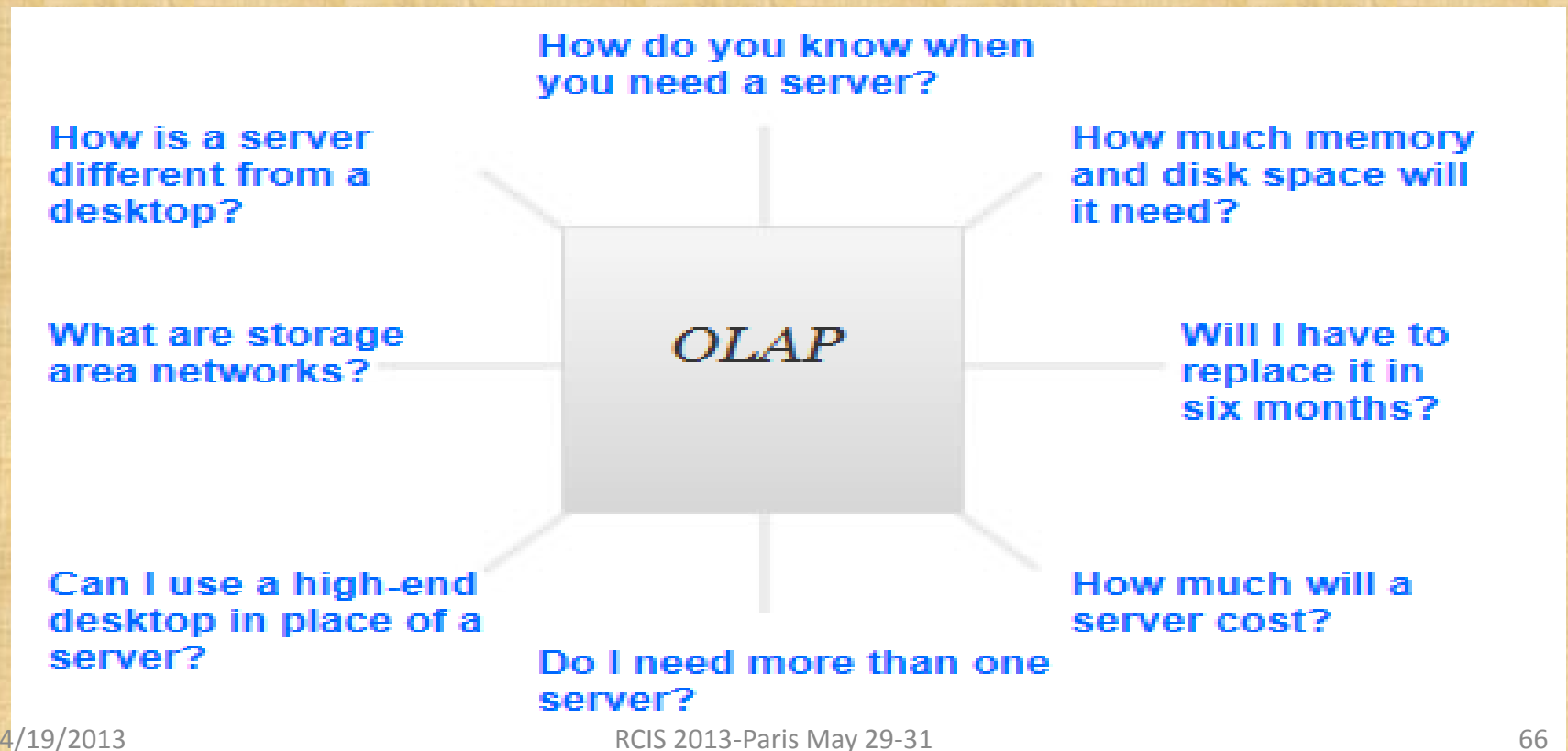
Online Analytical Processing
OLAP

- Allows users to analyze database information from multiple database systems at one time.

- While relational databases are considered to be two-dimensional, OLAP data is multidimensional, meaning the information can be compared in many different ways.

- For example, a company might compare their computer sales in June with sales in July, then compare those results with the sales from another location, which might be stored in a different database.

OLAP

- The term *OLAP* was created as a slight modification of the traditional database term OLTP (Online Transaction Processing).

- OLAP use a multidimensional data model, allowing for complex analytical and ad-hoc queries with a rapid execution time

OLAP

- The core of any OLAP system is an OLAP Cube (also called a 'multidimensional cube' or a *hypercube*).

- It consists of numeric facts called *measures* which are categorized by dimensions.

- Measures are derived from the records and dimensions are derived from the tables
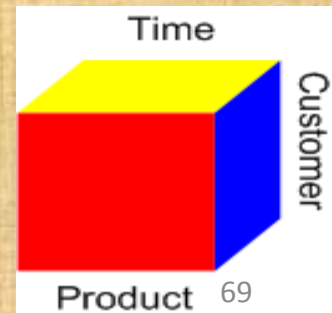
OLAP Cube
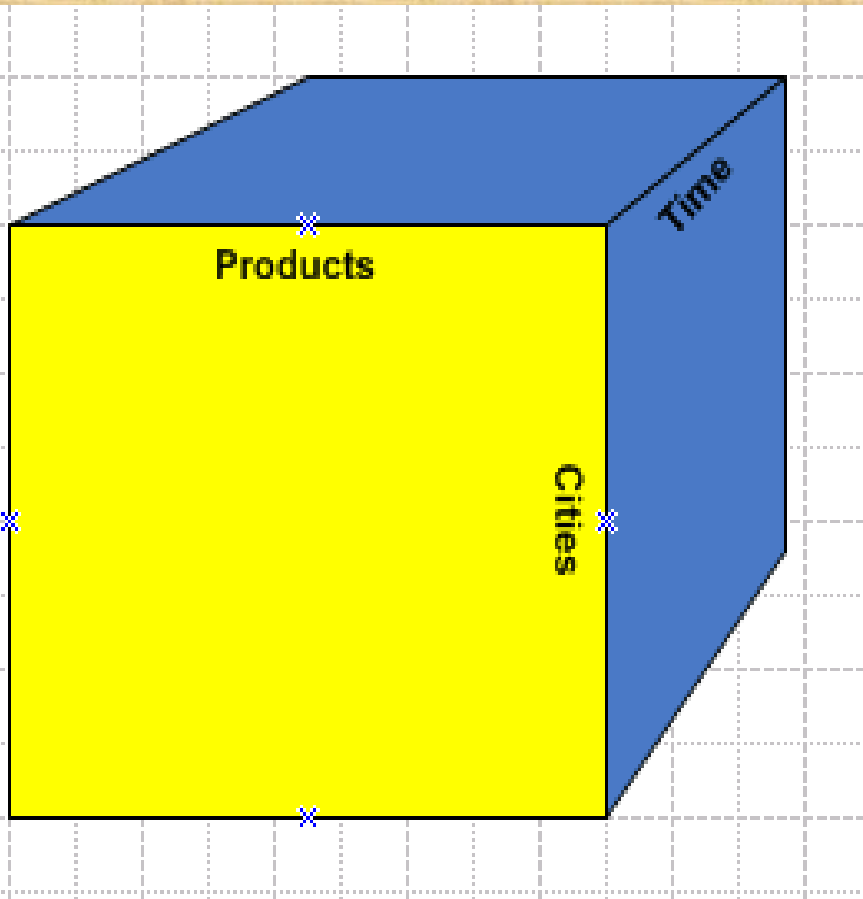
- Is the capability of manipulating and analyzing data from multiple perspectives.

- OLAP cubes can be thought of as extensions to the two-dimensional array of a Spreadsheet.

Pivot

- Cube allows the analyst might to view or "pivot" the data in various ways. Having seen the data in this particular way the analyst might then immediately wish to view it in another way.

- The cube could effectively be re-oriented because this re-orientation involves re-summarizing very large amounts of data, this new view of the data has to be generated efficiently to avoid wasting the analyst's time, i.e. within seconds, rather than the hours a relational database and conventional report-writer might have taken

Hierarchy

- Each of the elements of a dimension could be summarized using a hierarchy.
  - For example May 2005 could be summarized into Second Quarter 2005 which in turn would be summarized in the Year 2005.
  - Similarly the cities could be summarized into regions, countries and then global regions;
  - products could be summarized into larger categories; and cost headings could be grouped into types of expenditure

Drill down

- Conversely the analyst could start at a highly summarized level, such as the total difference between the actual results and the budget, and **drill down** into the cube to discover which locations, products and periods had produced this difference.

slice and dice

- The analyst can navigate through the database and screen for a particular subset of the data, changing the data's orientations and defining analytical calculations.

- This is called "slice and dice". Common operations include slice and dice, drill down, roll up, and pivot

OLAP slicing

- *Slice*: A slice is a subset of a multi-dimensional array corresponding to a single value for one or more members of the dimensions not in the subset.
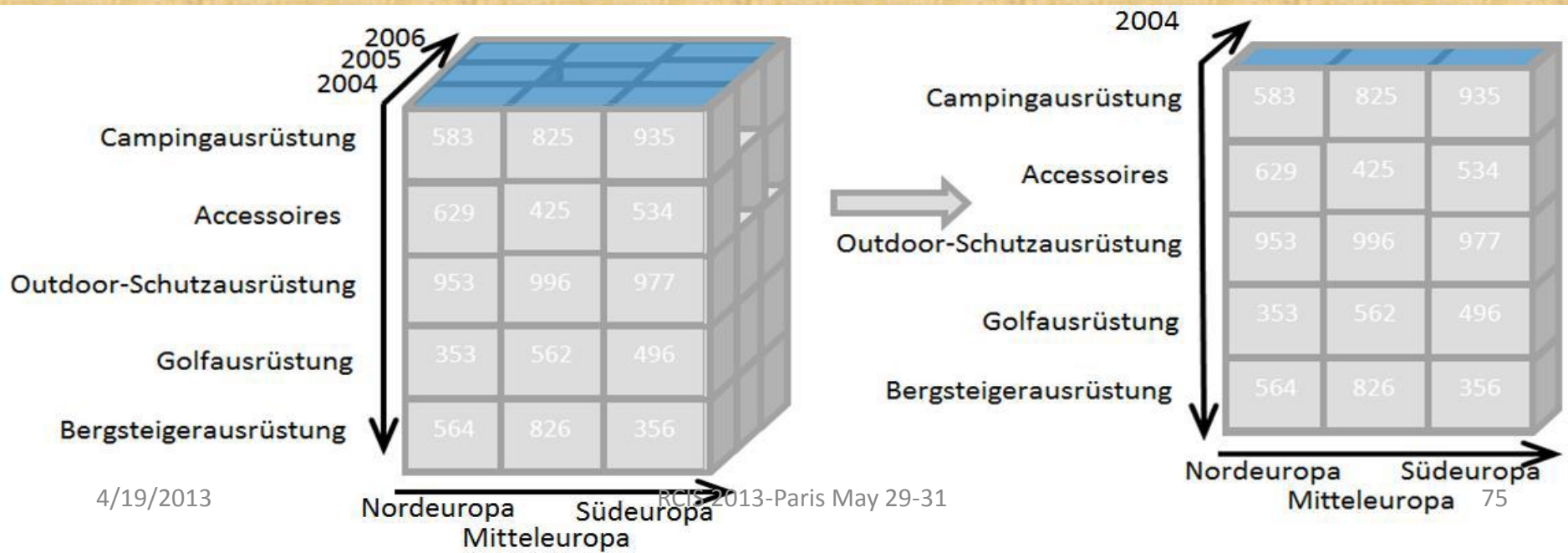
OLAP Dicing

- *Dice*: The dice operation is a slice on more than two dimensions of a data cube.
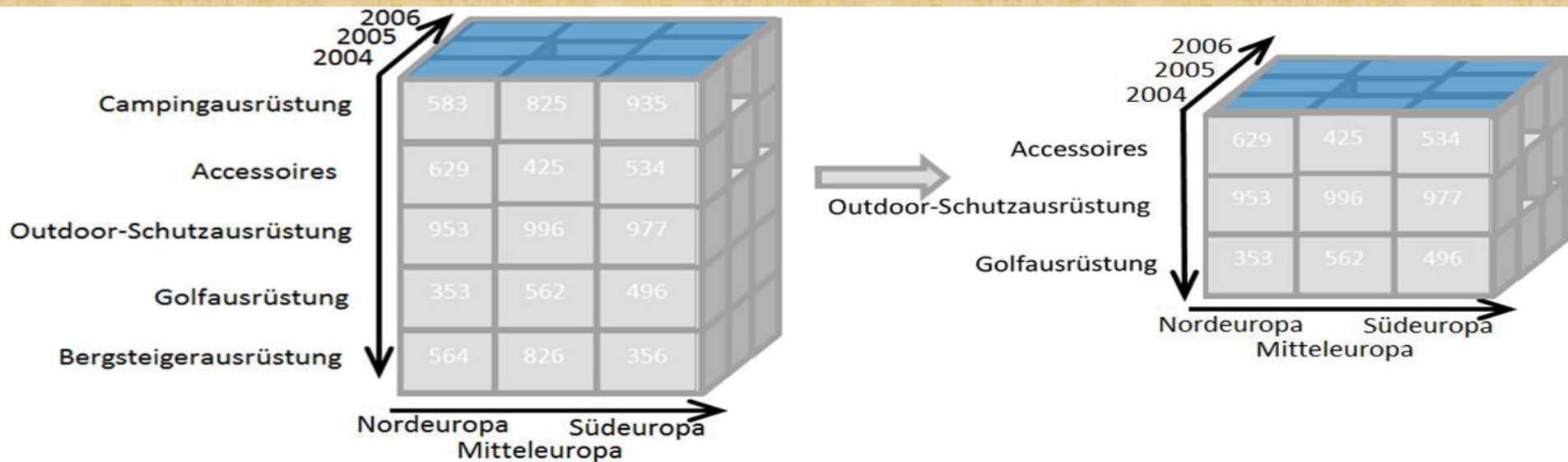
OLAP Drill Down

- *Drill Down/Up*: Drilling down or up is a specific analytical technique whereby the user navigates among levels of data ranging from the most summarized (up) to the most detailed (down).

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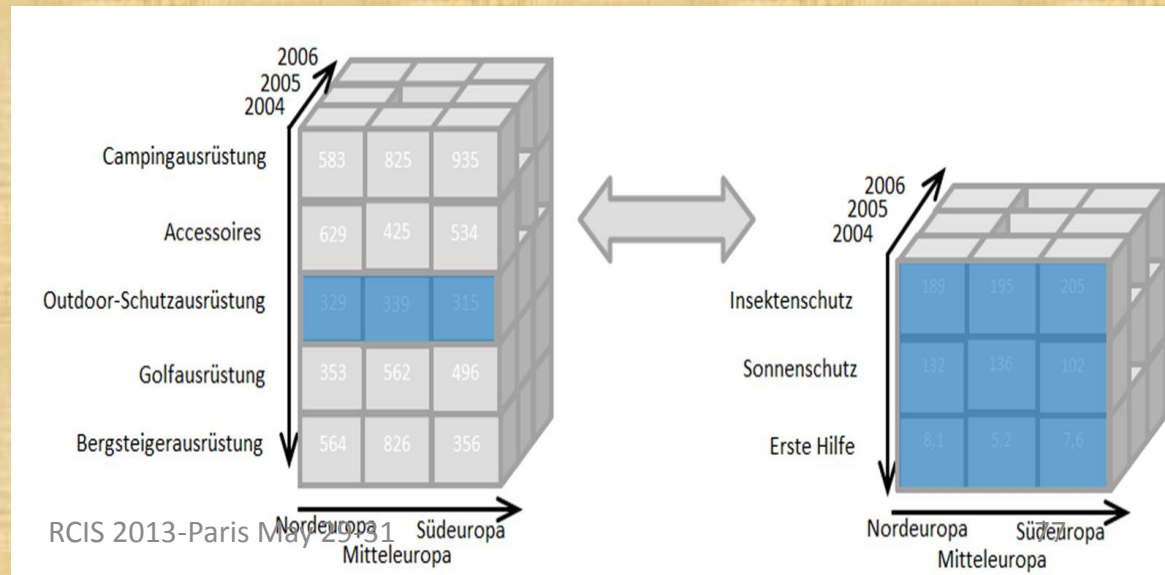
Roll-UP

- *Roll-up*: A roll-up involves computing all of the data relationships for one or more dimensions. To do this, a computational relationship or formula might be defined

rotate operation.

- It rotates the data in order to provide an alternative presentation of data.
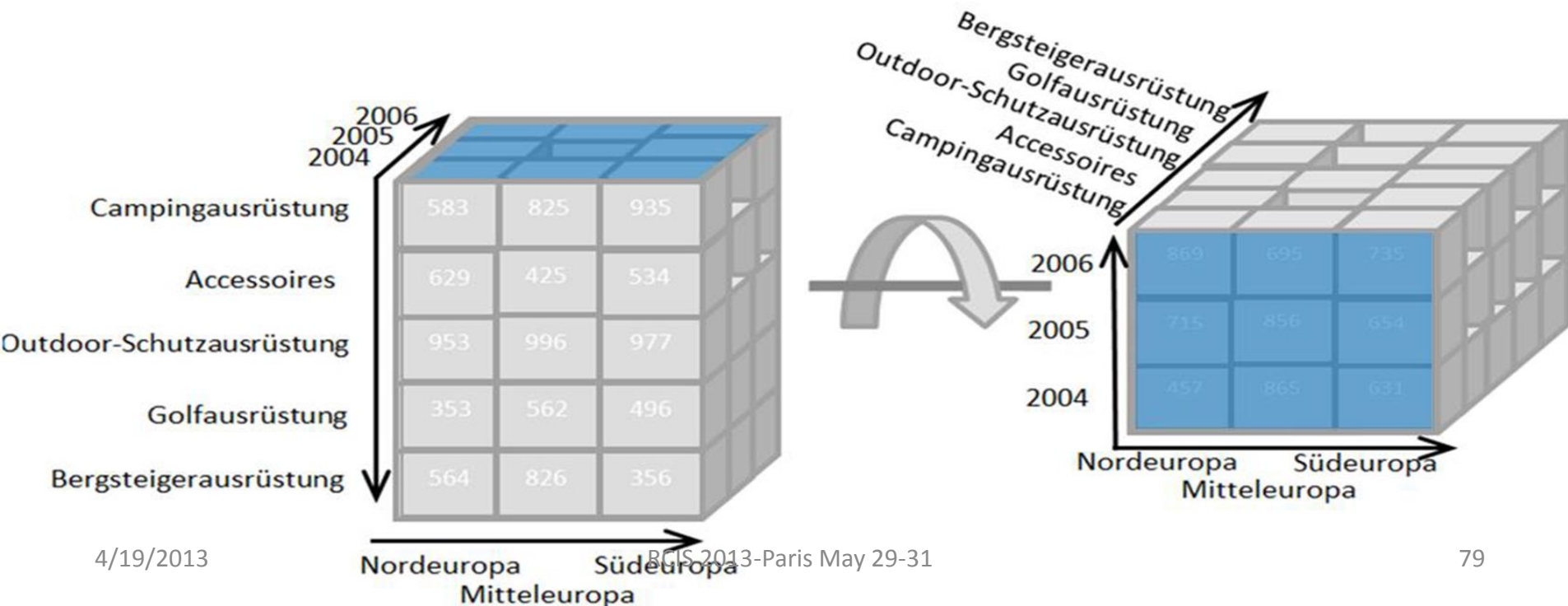
Data Warehouse and OLAP
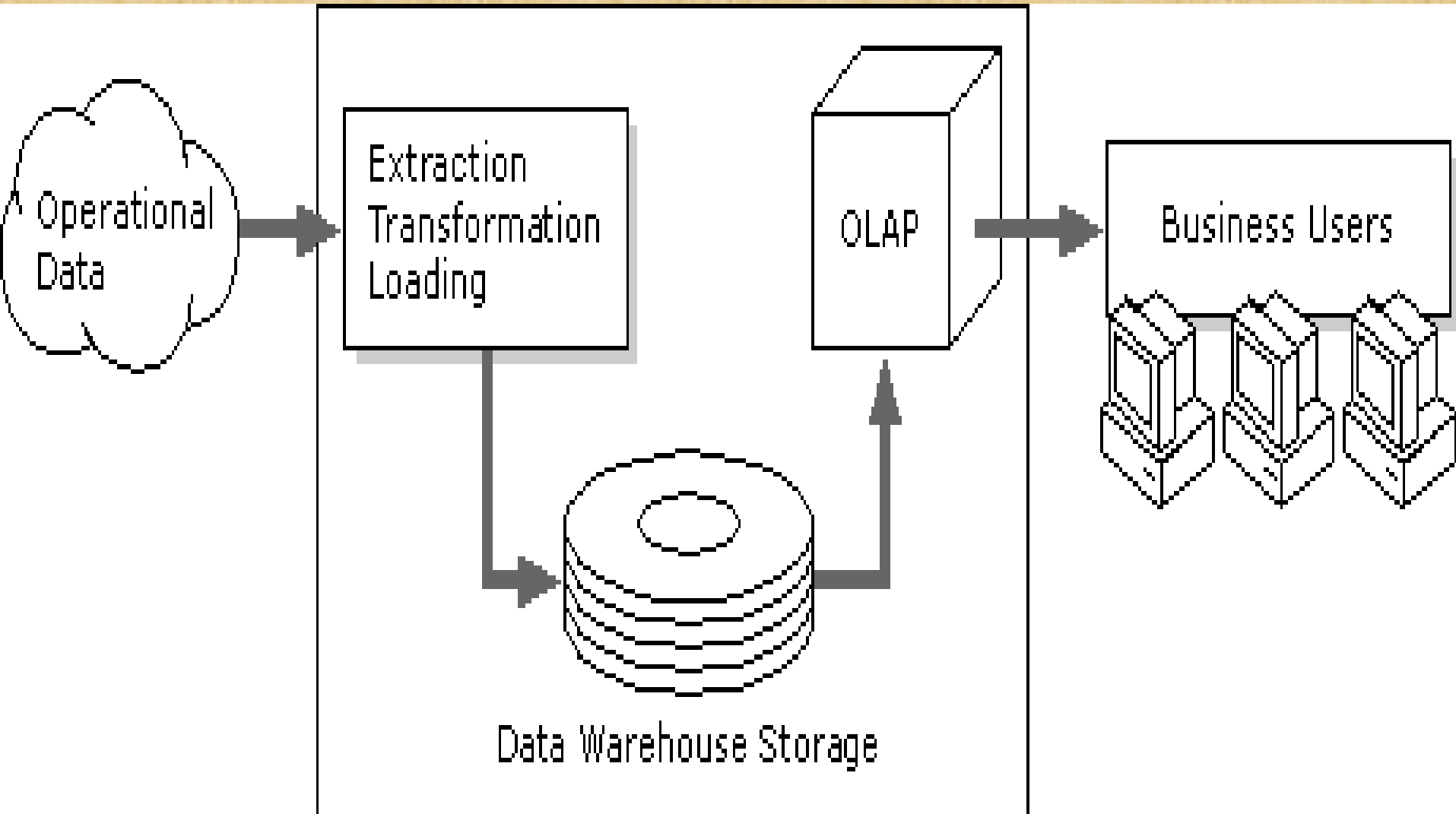
OLAP and Data Mining

- An OLAP server is required to organize and compare the information.

- Clients can analyze different sets of data using functions built into the OLAP server.

- Because of its powerful data analysis capabilities, OLAP processing is often used for data mining, which aims to discover new relationships between different sets of data.

Data Mining

- Data mining is the process of analyzing data from different perspectives and summarizing it into useful information - information that can be used to increase revenue, cuts costs, or both.

- It allows users to analyze data from many different dimensions or angles, categorize it, and summarize the relationships identified. Technically, data mining is the process of finding correlations or patterns among dozens of fields in large relational databases.

Data Mining

- Data mining uses artificial intelligence techniques, neural networks, and advanced statistical tools (such as cluster analysis) to reveal trends, patterns, and relationships, which might otherwise have remained undetected.

Data Mining

- Data mining parameters include:
- Association - looking for patterns where one event is connected to another event
- Sequence or path analysis - looking for patterns where one event leads to another later event
- Classification - looking for new patterns
- Clustering - finding and visually documenting groups of facts not previously known
- Forecasting - discovering patterns in data that can lead to reasonable predictions about the future.

Dashboard

- Is a graphical user interface that organizes and presents information in a format that is easy to read and interpret

Performance Scorecard

- A scorecard displays progress over time towards specific goals.

- Dashboard and scorecard designs are increasingly converging. For example, some commercial dashboard products also include the ability to track progress towards a goal.

- A product combining elements of both dashboards and scorecards is sometimes referred to as a scoreboard.

Scoreboard

- http://finance.yahoo.com/echarts?s=APA#chart3:symbol=apa;range=1m;indicator=volume;charttype=line;crosshair=on;ohlcvalues=0;logscale=off;source=undefined

Census Visualization

Dash Boards

- http://visalix.xrce.xerox.com/
- http://www-958.ibm.com/software/data/cognos/manyeyes/
- http://www.sund.de/netze/applets/som/som2/index.htm
- http://webdocs.cs.ualberta.ca/~aixplore/learning/DecisionTrees/Applet/DecisionTreeApplet.html
- http://www.heatonresearch.com/articles/42/page1.html
- http://www.tocloud.com/
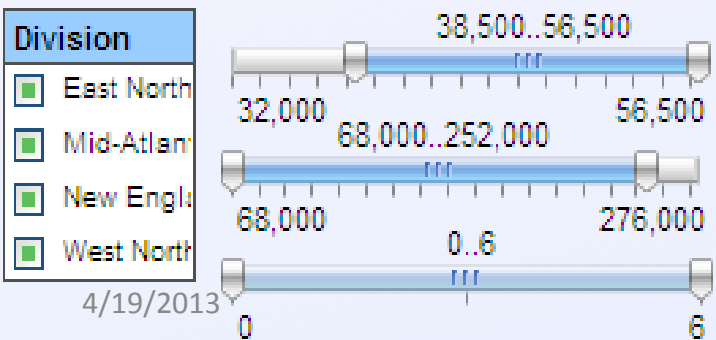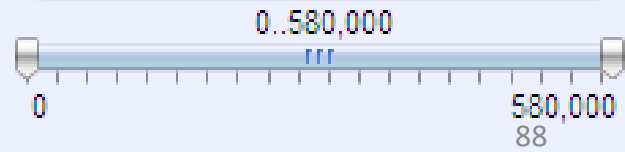
executive dashboard

- An executive dashboard is a computer interface that displays the key performance indicators (KPIs) that corporate officers need to effectively run an enterprise.

executive dashboard

- Features of an effective executive dashboard include:
    - An intuitive graphical display that is thoughtfully laid-out and easy to navigate.
    - A logical structure behind the dashboard that makes accessing current data easy and fast.
    - Displays that can be customized and categorized to meet a user's specific needs.
    - Information from multiple sources, departments or markets.

Tableau BI Software

- www.tableausoftware.com
  - Play the video tour

Interfaces

- Business intelligence platforms should provide open interfaces to data warehouse databases, OLAP, and data mining. Where appropriate, Interfaces should comply with standards. Open, standards-based interfaces make it easier both to buy and to build applications that use the facilities of a business intelligence platform.

Standard-Based Interface

- Open Database Connectivity (ODBC)

- XMI can be used to exchange information about data warehouses

- **A**pplication **P**rogramming **I**nterface(API) used by an application program to communicate with the operating system or some other control program such as a DBMS.

The interfaces for relational data, OLAP, and data mining

	Interfaces		
	Microsoft	**Oracle**	**IBM**
Relational interfaces	SQL and Transact/SQL ODBC and JDBC OLE DB ADO ADO.NET	SQL and PL/SQL ODBC and JDBC	SQL and DB2 SQL ODBC and JDBC
OLAP Interfaces	MDX DSO Pivot Table Service XML for Analysis	OLAP DML Java OLAP API SQL and PL/SQL	Essbase API
Data mining interfaces	DSO Pivot Table Service Wizards	Oracle9i Data Mining API (Java)	Intelligent Miner • C++ • SQL • Visual tools DB2 OLAP Miner • Essbase API

Magic Quadrant for Business Intelligence and Analytics Platforms: A Gartner Research Report
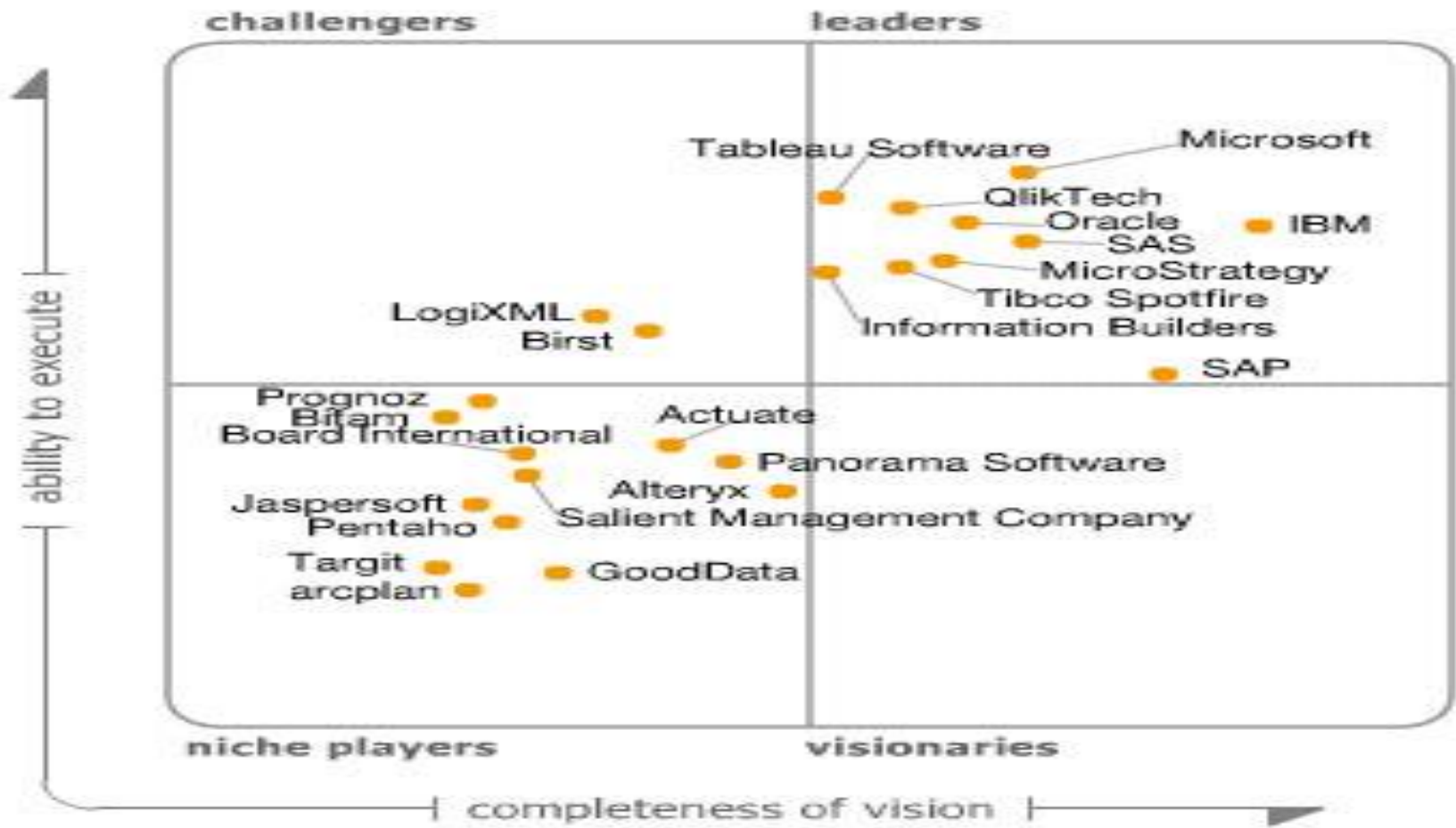
As of February 2013

BI architecture and Platform

- Business Intelligence (BI) platform should provide flexible systems management for an enterprise BI standard that allows administrators to confidently deploy and standardize their BI implementations on a proven, scalable, and adaptive service-oriented architecture.

business intelligence architecture

- The underlying BI architecture plays an important role in business intelligence projects because it affects development and implementation decisions.

- A business intelligence architecture is a framework for organizing the data, information management and technology components that are used to build business intelligence (BI) systems for reporting and data analytics.

Data Components

- The data components of a BI architecture include the data sources that corporate executives and other end users need to access and analyze to meet their business requirements.

- Important criteria in the source selection process include data currency, data quality and the level of detail in the data.

- Both structured and unstructured data may be required as part of a BI architecture, as well as information from both internal and external sources.

Information management

- Information management architectural components are used to transform raw transaction data into a consistent and coherent set of information that is suitable for BI uses.

- This part of a BI architecture typically includes data integration, data cleansing and the creation of data dimensions and business rules that conform to the architectural guidelines.

- It may also define structures for data warehousing or for a data federation approach that aggregates information in virtual databases instead of physical data warehouses or data marts.

Server Applications/Enterprise

- Includes features for managing security, running reports, displaying dashboards, report bursting, scripted business rules, OLAP analysis and scheduling out of the box.

Business Intelligence Technology

- Business Intelligence (BI) encompasses the technologies, applications, and means for collecting, integrating, analyzing, and presentation business data.

- Using data that has been stored in a data warehouse, software applications are able to use this data to report past business information as well as predict future business information, including trends, threats, opportunities and patterns. Two types of BI applications are:
  - Enterprise
  - Self- Service

Enterprise BI

- Some of the currently popular **enterprise level** systems, which can manage information about all of the business functions and systems, are sold and implemented by Oracle, SAP, IBM, SAS, and Hewlett Packard (HP).

- Popular BI applications could be complex and experts in this field are in high demand.

Self-Service Business Intelligence

Self-service BI

- is defined as the facilities within the BI environment that enable BI users to become more self-reliant and less dependent on the IT organization.

- These facilities focus on four main *objectives:*
  - easy access to source data for reporting and analysis,
  - easy-to-use BI tools and improved support for data analysis,
  - fast-to-deploy and easy-to-manage data warehouse options such as appliances and cloud computing, and
  - simpler and customizable end-user interfaces.

Do it Yourself BI
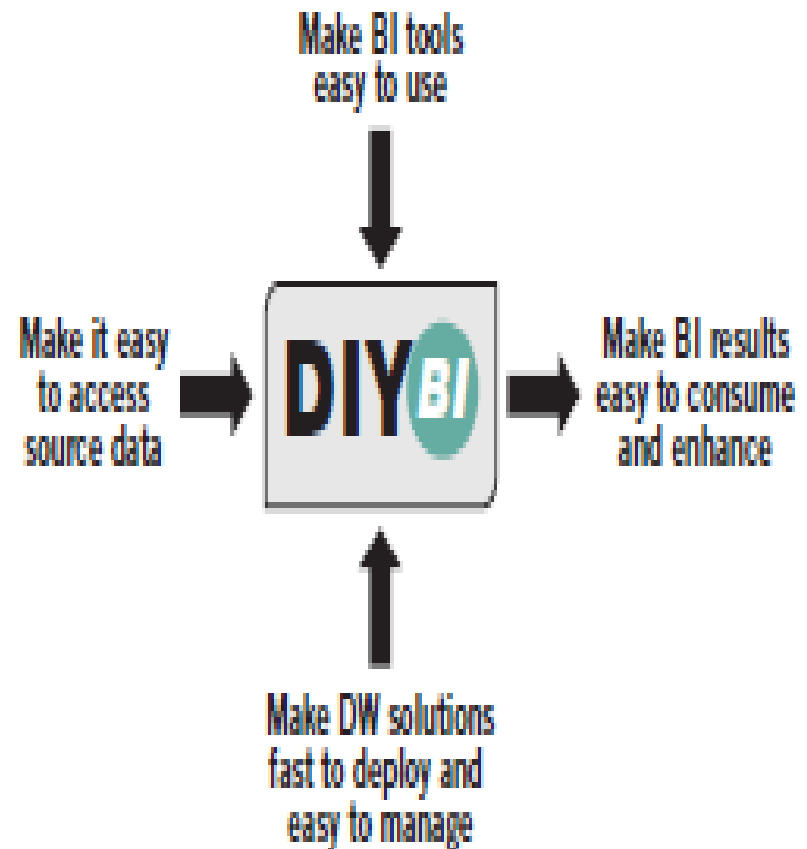
Self-Service Business Intelligence

What are the main reasons for implementing self-service BI? (Select all that apply).

Reason	Percentage
Constantly changing business needs	65%
Inability of IT to meet business user demand	57%
Need to be a more analytic-driven organization	54%
Slow or untimely access to information	47%
Business user dissatisfaction with IT BI capabilities	34%
Existing environment is too complex to use	28%
Lack of IT budget or need to reduce IT budget	28%
Lack of IT BI/DW skills	21%
Other	5%
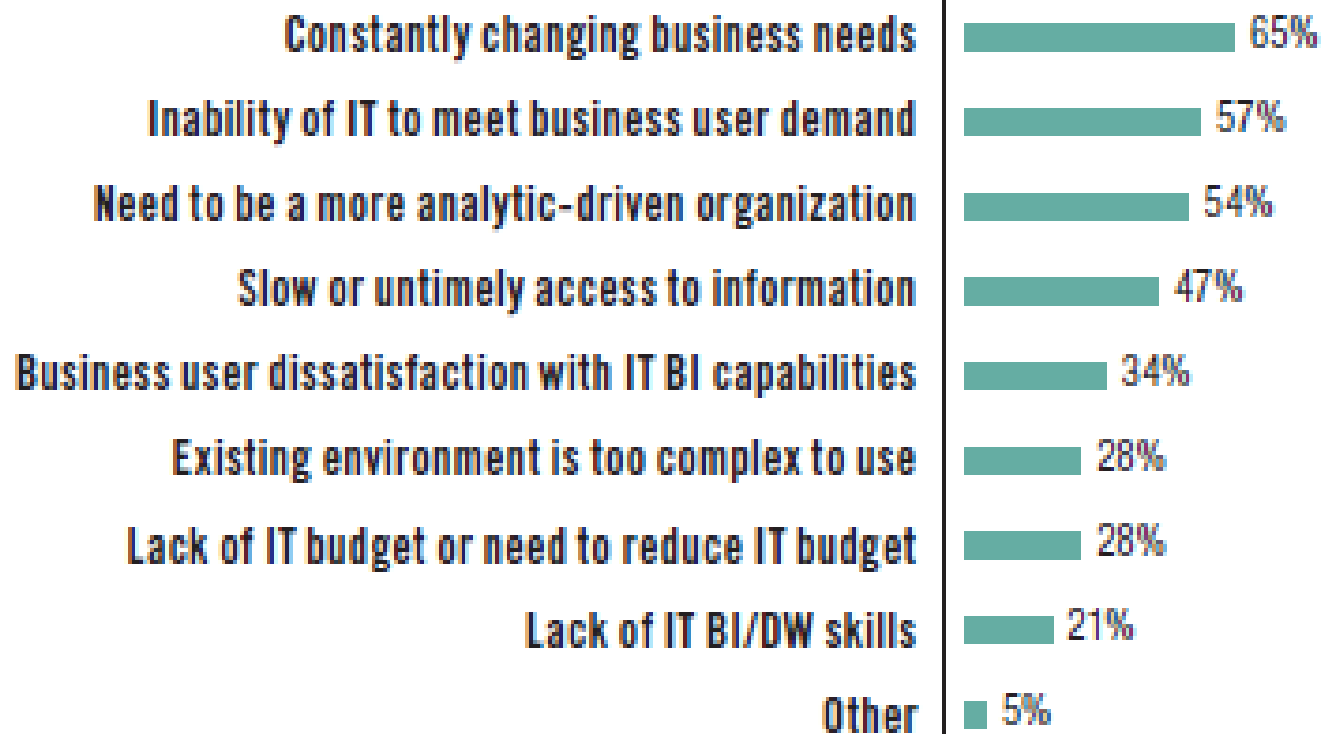
Self-Service Business Intelligence Platforms

- In Forrester's 31-criteria evaluation of self-service business intelligence (BI) vendors, we found that IBM, Microsoft, SAP, SAS, Tibco Software, and MicroStrategy led the pack due to the breadth of their self-service BI functionality offerings. Information Builders, Tableau Software, Actuate, Oracle, QlikTech, and Panorama Software were close on the heels of the Leaders, also offering solid functionality to enable business users to self-serve most of their BI requirements.

Vendor	Product name	Version	Release date
Actuate	ActuateOne	11 SP4	Q2 2012
IBM	IBM Cognos Insight	v10.1	February 2012
Information Builders	WebFOCUS	7.7.03	November 2011
Microsoft	• Power View • PowerPivot • Excel • SharePoint	• SQL Server 2012 • Microsoft Office 2010 • SharePoint Server 2010	April 2012
MicroStrategy	MicroStrategy	9.2.1A	September 2011
Oracle	Oracle Business Intelligence Suite Enterprise Edition	11g	Q4 2011
Panorama Software	Necto	11	May 2011
QlikTech	QlikView	11	November 2011
SAP	SAP BusinessObjects	4.0 Feature Pack 3	April 2012
SAS	SAS Enterprise Business Intelligence	4.31	July 2011
Tableau Software	• Tableau Desktop • Tableau Server	7	January 2012
Tibco Software	Tibco Spotfire Analytics	v4.0	November 2011

Prioritized Technology Intitiatives Strategic to BI

Categories: Not Important, Somewhat Important, Important, Very Important, Critical

Initiatives (top to bottom):
- Dashboards
- End user "self service"
- Data warehousing
- Advanced visualization
- Integration with operational processes
- Data mining and advanced algorithms
- Mobile device support
- In-memory analysis
- Collaborative support for group-based analysis
- Big data
- Ability to write to transactional applications
- Software-as-a-service and "cloud computing"
- Text Analytics
- Complex Event Processing (CEP)
- Social media analysis (Social BI)
- Open source software

About Cloud Business Intelligence

- "Cloud Business Intelligence" (Cloud BI) is the concept of delivering Business Intelligence capabilities as a "service" – using cloud-based architectures (e.g., SOA, multi-tenancy, elasticity). It promises lowered costs, faster deployment and greater flexibility over more traditional BI solutions.

- Cloud BI can be deployed as a "private cloud" (internally hosted systems), "public cloud" (externally hosted on the world-wide-web) and as a "hybrid" – leveraging both environs. However, public cloud is the form most often thought of when speaking about cloud-

Importance of Cloud Business Intelligence

- Although Business Intelligence remains dominated by more traditional approaches and technologies, the demand for Cloud BI capabilities is on the rise.

- A survey by XX at date from respondent, revealed that more than 30% of respondents indicating it is "critical" or "very important" to them

Cloud BI Requirements

Feature	Both	Cloud BI Only	Traditional BI Only
Mobile deployment	64.0%	19.0%	17.0%
Social media analysis	62.0%	19.0%	20.0%
Collaboration	63.0%	16.0%	22.0%
Data visualization	67.0%	10.0%	23.0%
Personalized dashboards	65.0%	11.0%	24.0%
Interactive analysis	65.0%	9.0%	26.0%
Ad-hoc query	63.0%	7.0%	30.0%
Real-time	59.0%	11.0%	31.0%
Production reporting	60.0%	9.0%	32.0%
Pre-packaged vertical/functional	58.0%	10.0%	32.0%
Predictive/Advanced analytics	58.0%	7.0%	35.0%

■ Both ■ Cloud BI Only ■ Traditional BI Only
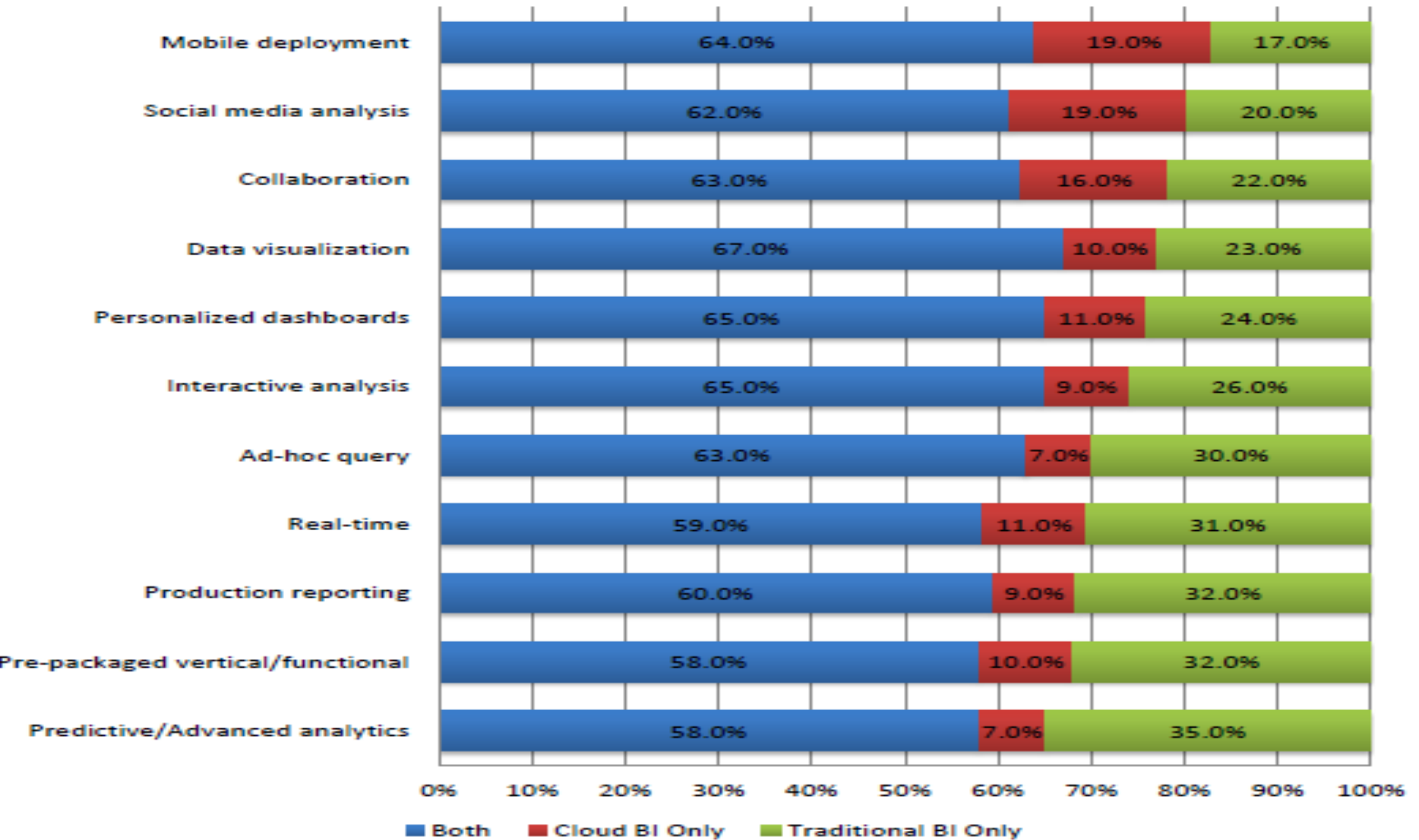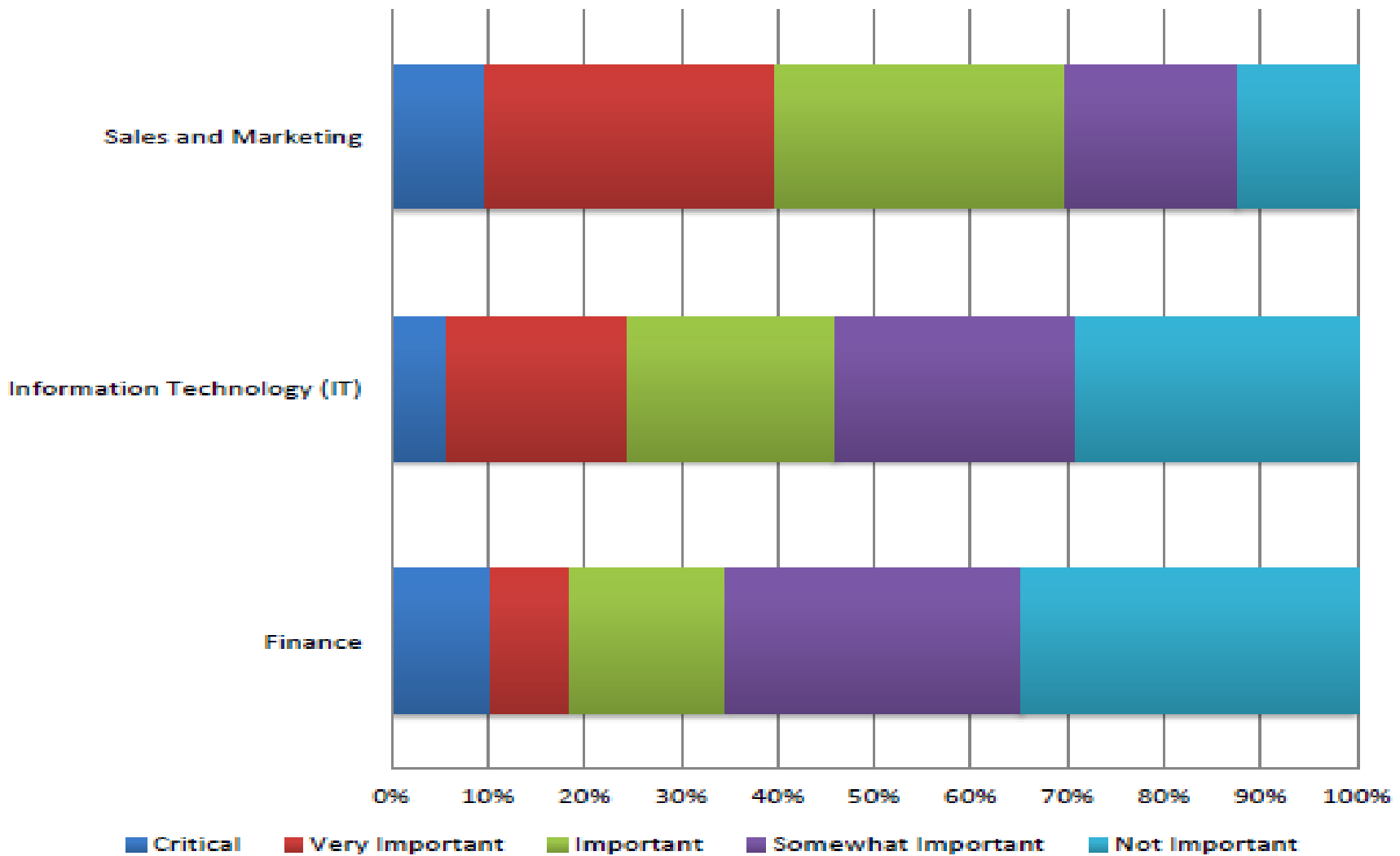
igure 16 – Cloud Business Intelligence Feature Requirements

Cloud Business Intelligence Importance by Function

Plans for Cloud-based Business Intelligence
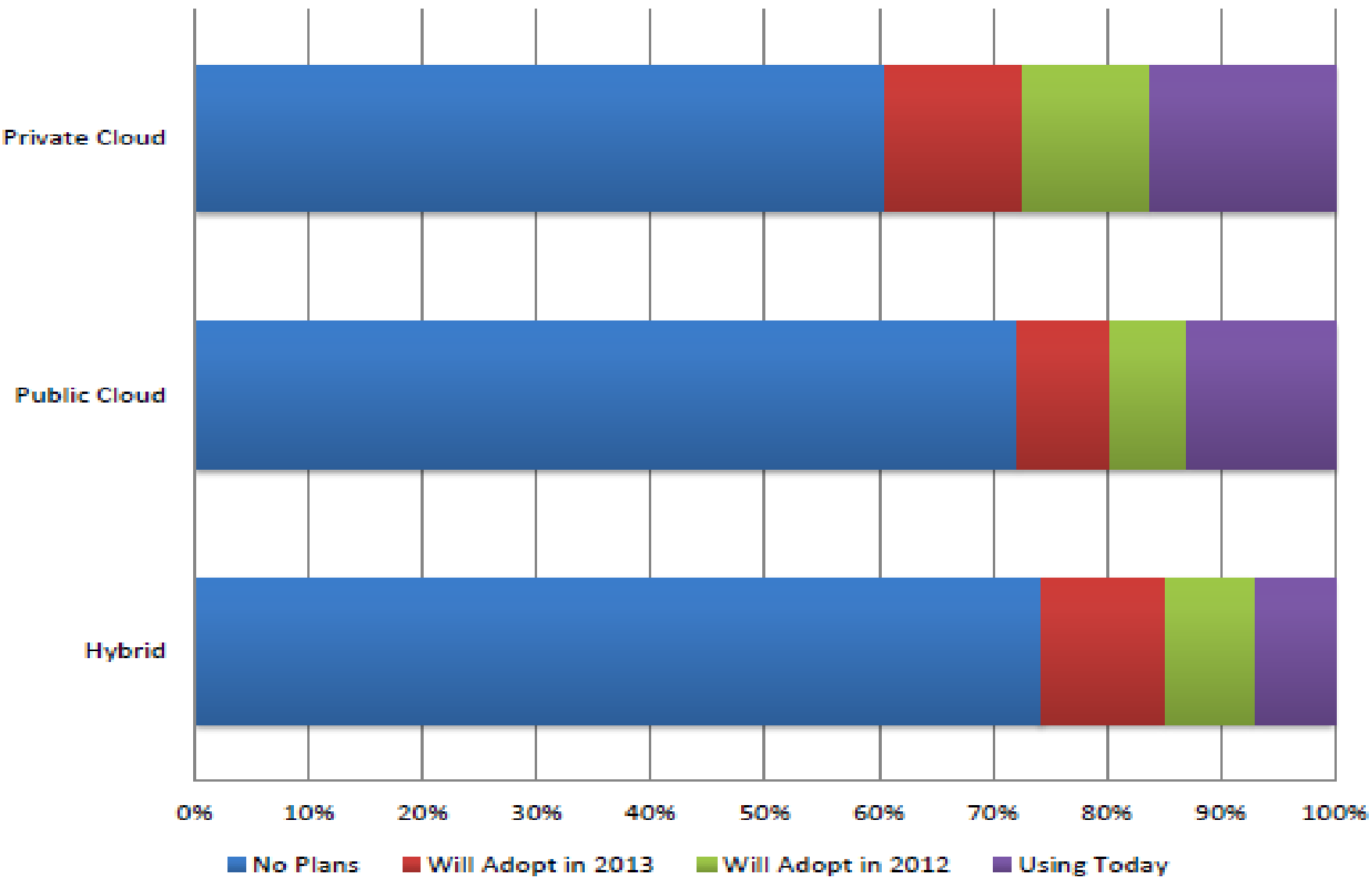
Table 1 - Cloud BI Feature Prioritization by Function

Sales and Marketing	IT	Finance
Mobile Deployment	Mobile Deployment	Data visualization
Data visualization	Collaboration	Mobile Deployment
Personalized dashboards	Data visualization	Personalized dashboards
Ad-hoc query	Personalized dashboards	Interactive Analysis
Collaboration	Interactive Analysis	Collaboration
Social Media Analysis	Social Media Analysis	Real-time
Interactive Analysis	Ad-hoc query	Pre-packaged vertical/functional analytical applications
Production reporting	Real-time	Production reporting
Pre-packaged vertical/functional analytical applications	Production reporting	Social Media Analysis
Predictive/Advanced Analytics	Predictive/Advanced Analytics	Predictive/Advanced Analytics
Real-time	Pre-packaged vertical/functional analytical applications	Ad-hoc query

Cloud BI Architectural Features

Feature	Critical	Very Important	Important	Somewhat Important	Not Important
Data Integration/Data Quality tools/ETL	33%	39%	16%	6%	5%
Relational database support	33%	40%	18%	5%	5%
Connectors to on-premise applications and data (e.g., ERP, CRM)	32%	35%	22%	5%	6%
Automatic upgrades	28%	38%	22%	7%	6%
Multi-dimensional database support	27%	41%	18%	7%	6%
Multi-tenancy (single executable supporting multiple customers)	23%	34%	21%	12%	10%
Data Virtualization	23%	39%	23%	9%	6%
Web Services API	22%	36%	25%	10%	7%
Cloud Database Connectors (e.g., database.com, SimpleDB, CloudSQL)	20%	37%	22%	12%	11%
In-Memory data support	19%	35%	25%	14%	7%
Cloud application connections (e.g., Salesforce, Netsuite, Taleo)	16%	32%	24%	16%	12%
Big Data (e.g., Hadoop) access	14%	33%	25%	16%	12%
RESTful API	12%	27%	28%	18%	16%

■ Critical ■ Very Important ■ Important ■ Somewhat Important ■ Not Important

Cloud Business Intelligence Security

Cloud security remains one of the most pressing issues for Cloud BI adoption. As such, we surveyed respondents about their requirements for security (Figure 24). ISO 27001 (Specification for Information Management Security) was the top choice, followed by SAS 70 (an auditing specification). A surprising 21% indicated that they have no requirement for cloud security.
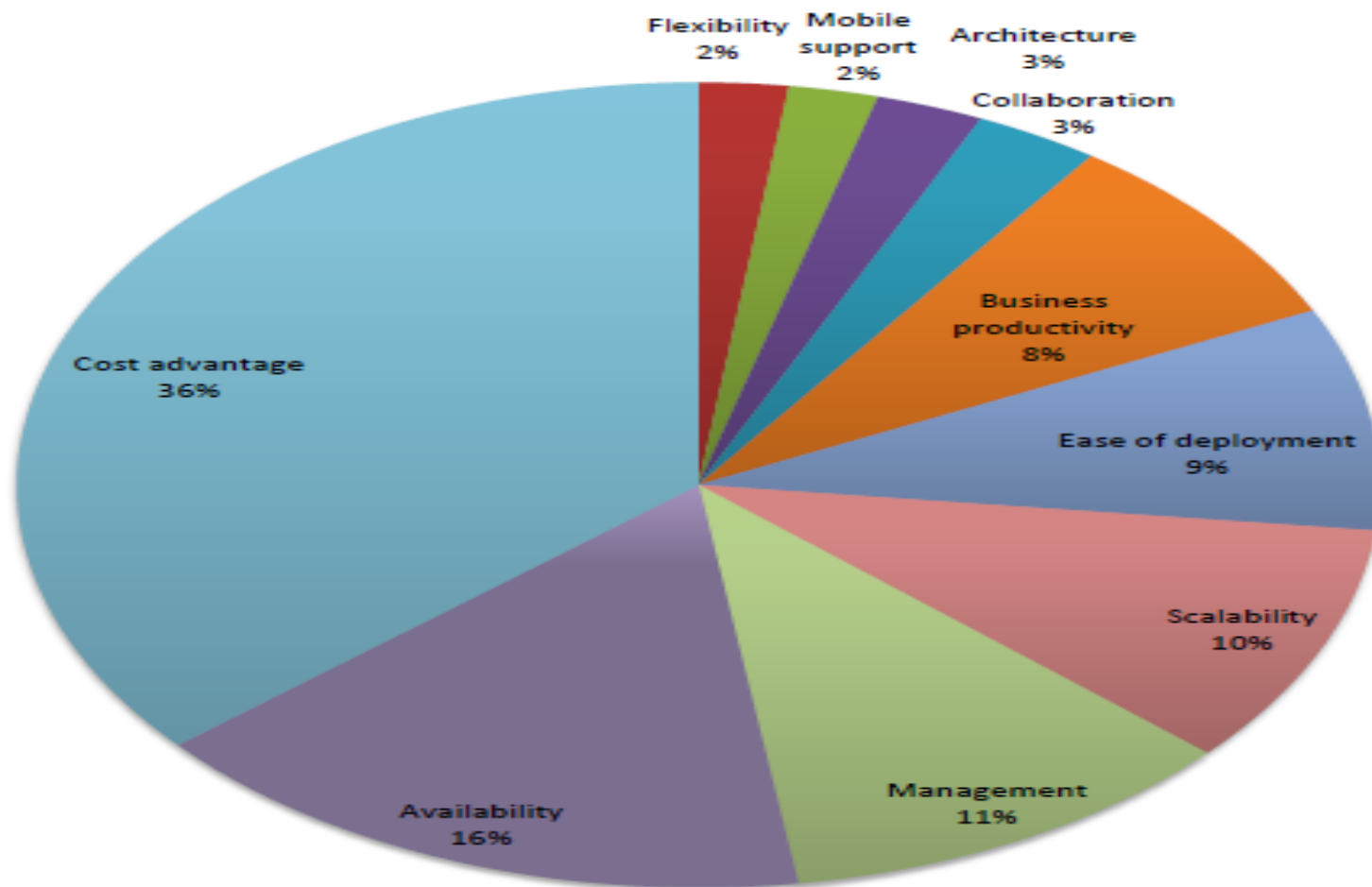
Cloud Security Requirements

## Perceived Benefits and Barriers for Cloud Business Intelligence

When asked about the perceived benefits of Cloud BI (Figure 25), the majority were aligned with the major selling points of these solutions – including "cost advantage" (36%), "availability" (16%) and "management" (11%). The least compelling perceived benefits included "flexibility", "mobile support", and "architecture".

Benefits/Advantages of Cloud BI

- Flexibility 2%
- Mobile support 2%
- Architecture 3%
- Collaboration 3%
- Business productivity 8%
- Ease of deployment 9%
- Scalability 10%
- Management 11%
- Availability 16%
- Cost advantage 36%

The number one perceived barrier to Cloud BI adoption was Security & Privacy (56%), followed by issues surrounding "data integration" (12%) and "performance" (12%). Only a small minority cited Immaturity, "complexity", or "customization" as barriers (Figure 26). A small, but notable minority (4%), of predominately IT professionals, cited "loss of control" as a barrier.

Barriers/Limitations of Cloud BI
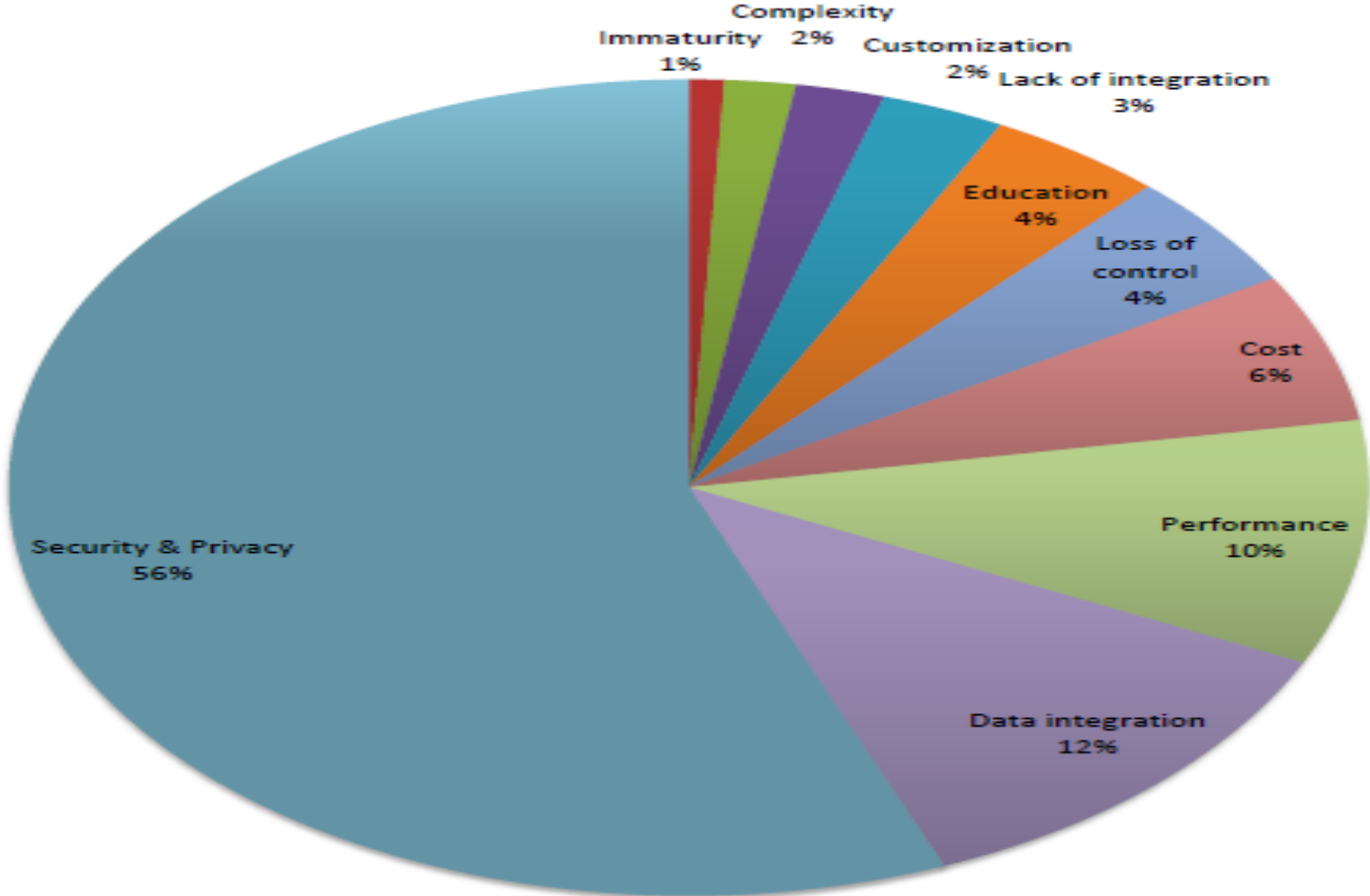
Consumerization of BI

- BI tools must be simple, mobile and "fun" in order to expand use and value.

- *Intuitive, fun interfaces:* BI business users are demanding the same experience from their BI tools that they have come to enjoy with their personal tools.

- Like the Apple iPhone and iPad, Google and Facebook, BI tools must be intuitive to use without the need for IT assistance.

- Ease of use was the No. 1 driver of purchasing in 2010 and will only accelerate as a key requirement in the future.

Consumerization of BI

- *Mobile:* The need for more intuitive and interactive BI tools and applications extends to users on the go, but the vast majority of organizations have yet to embrace mobile BI. But this is set to change very quickly with the proliferation of Apple's iPhone and iPad products, with other tablets on the horizon (an extension of the intuitive interface movement).

Consumerization of BI

- *Business user data mashups:* Business user data mashup capabilities accelerate the analytic process and will also extend BI platform use to a broader set of users and use cases.

- Traditional BI platforms require IT to model data in a well formed semantic layer — this creates a bottleneck with business analysts that want to rapidly and iteratively combine (mashup) and explore data — without relying on IT.

Market Overview

- The demand side of the BI platforms market was defined by an intensified struggle between business users' need for "**ease of use**" and " **flexibility"** on the one hand and IT's need for **standards and control** on the other.

Forecast

- According to Gartner the market for BI platforms will remain one of the fast growing software markets despite sluggish economic growth in most regions.

- The BI platform market's compound annual growth rate through 2014 is expected to be 7.0%

Fin
Merci Beaucoup

Questions

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