

# Business Intelligence

## Introduction

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- **Business Intelligence** is a discipline that analyzes a company's data using technologies, such as statistics and machine learning, with the objective of increasing competitiveness.
- For example, a big company like Amazon

- There are many automatic and semi-automatic tools to manage this huge volume of data.
- type of data
  - **Structured**
  - **Unstructured data.**

- The most common repositories that store these data are **Data Warehouse** and **Data Lake**.

# LAYERS IN BI SYSTEM

Data source layer

Warehouse layer

Reporting layer

Databases

Cloud-storages

Third-party  
data

Separate files

Extraction

Data  
transformation

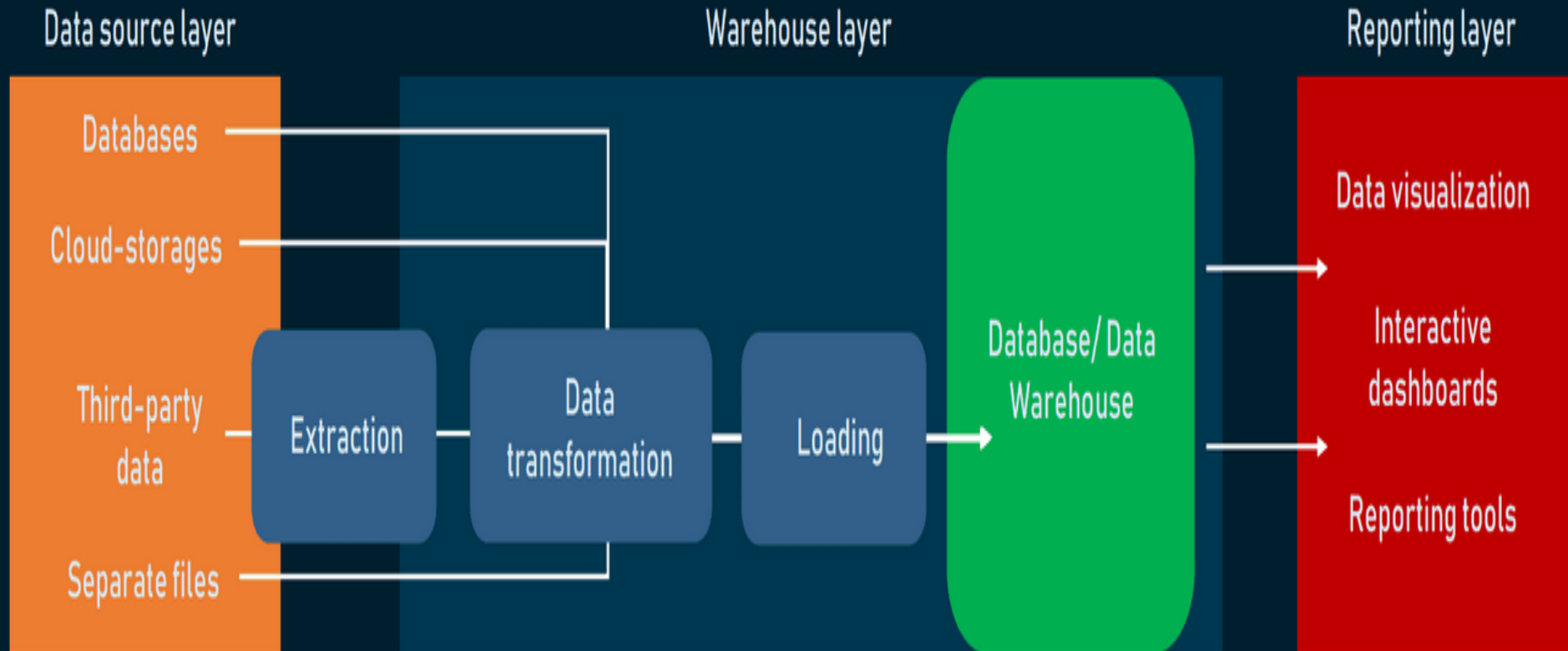
Loading

Database/ Data  
Warehouse

Data visualization

Interactive  
dashboards

Reporting tools



# 1.1 Business Intelligence and Information Exploitation

# Business Intelligence and Information Exploitation

- Data vs Information vs BI
- Data not only stored within structured data systems, but are captured, stored, managed, shared, and distributed across different file formats, representative structures, and even as unstructured data assets.
- power to filter out and deliver the gems of knowledge to the right decision-makers that can trigger the right kinds of choices and actions at the optimal times.

- Historically, data is the raw material that fueled operational activities and transaction systems.
- Today, different data sets are used and then repurposed multiple times, simultaneously feeding both operational and analytical processes intended to achieve different business objectives.



## 1.1.1 Improving the Decision-Making Process

- Every business process has its associated measures of performance, and in a perfect world, each decision would be the *optimal one-the decision whose* results lead to the best overall performance.

- When large amounts of unfiltered data are made available across the organization, overwhelmed individuals may be stunned into “analysis paralysis”
- Solutions
  - overload is reduced by distilling out the specific information
  - From the comprehensive strategic perspective, the senior management team can review overall company performance
  - Actionable information informs both strategic and operational processes, and its delivery to staff members up and down the organizational chart

**The decision-making process can be broken down into three steps:**

1. Analysis of the current situation.
2. Presentation of the data to the manager, who can take the data and make a decision.
3. Applying the final decision.

# The Seven-Step Decision-Making Process:

*By following a deliberate process, you can help ensure the choice and success of the right decision, and reduce or eliminate second-guessing.  
Here is how the process flows:*

1

## Articulate the Decision

Identify the issue and what decision needs to be made.

2

## Gather Information

Do intensive research of relevant background.

3

## Identify Your Options

After gathering the information, tease out the possible and most likely decisions.

4

## Evaluate the Information

See how the research and background you've identified aligns to one or more of your decision options.

5

## Select Your Decision

6

## Implement the Decision

Take all the steps necessary to make sure the decision is made and followed.

7

## Review Your Decision

Refine as needed as you go forward, and evangelize results for future needs.

## 1.1.2 Why a Business Intelligence Program

- Business intelligence processes **help you organize your data so it can be easily accessed and analyzed.**
- Decision makers can then dig in and get the information they need quickly, empowering them to make informed decisions.

**Business Intelligence**

*Business Intelligence (BI) is a broad category of applications and technologies for gathering, storing, analyzing, and providing access to data to help enterprise users make better business decisions.*

**Decision Support System**

*A decision support system (DSS) is a computer program application that analyzes business data and presents it so that users can make business decisions more easily.*





- Some benefits are focused on the ability to answer what might be considered the most basic questions about how a company does business.
- For
- example, it is surprising how few senior managers within a company can answer simple questions about their business, such as:
- How many employees do you have?
  - For each product, how many were sold over the last 12 months within each geographic region?
  - Who are your 10 best customers?
  - What is the value of any particular customer?
  - Who are your 20 best suppliers?

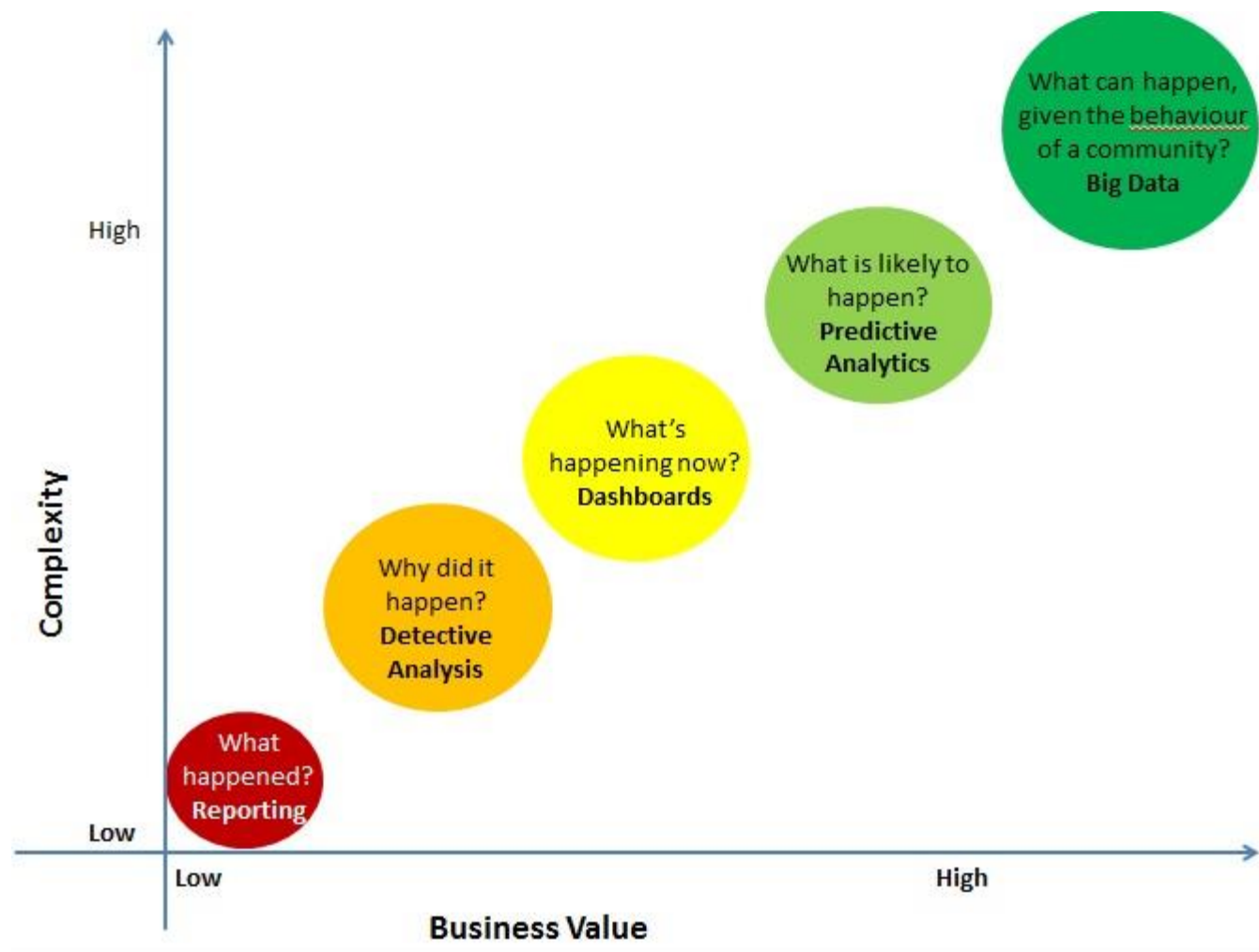
### 1.1.3 Business Intelligence and Program Success

- BI activity: the discovery phase, justification,
- analysis of requirements for design, creation, management, maintenance, or development of a BI program.

- The amorphous understanding of what BI methods and products could do resulted in an absence of a proper perception of the value proposition on behalf of the business sponsor.
- The absence of clear measures of success masked the value of specific milestones and deliverables.
- A communications gap between the implementers and the end users prevented the integration of information requirements into the system development life cycle.
- The scope of the project was not fully understood, causing delays in delivering to the business sponsor.
- Insufficient technical training prevented developers from getting software products to do what the vendors said they do.
- Attempting to incorporate many inconsistent data sources failed because of variance in formats, structures, and semantics.
- Poor understanding of technology infrastructure led to poor planning and scheduling.
- Business users were unable to trust results due to poor data quality.
- The lack of a clear statement of success criteria, along with a lack of ways to measure program success, led to a perception of failure.

- an operational business framework while providing the introductory technical background and highlighting important topics such as:
  - Management issues
  - Managing change
  - Technical issues
  - Performance issues
  - Complexity

## 1.1.4 The Analytics Spectrum

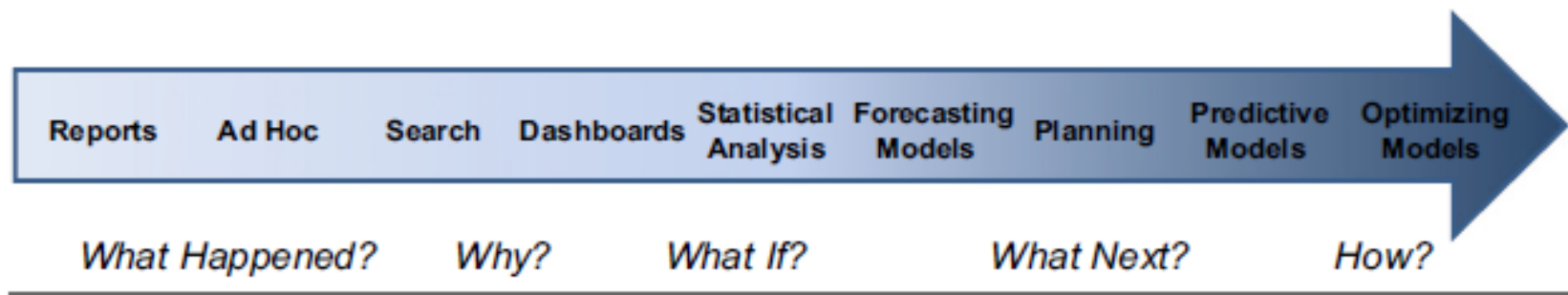




## Reporting - Answer to What happened?

The domain of Analytics starts from answering a simple question - What happened? This activity is typically known as reporting. These are typically the MIS which people want to receive first thing in the morning. It is a snapshot of what has happened. Following is an example of how a typical report might look like:

City	Region	Business sourced	Bad quality	Rejection score
Mumbai	West	130	10	7.7%
Pune	West	50	2	4.0%
Nasik	West	30	0.5	1.7%
Indore	West	20	0.6	3.0%
Kolkata	East	100	7	7.0%
Asansol	East	10	0	0.0%
Burdwan	East	15	0.2	1.3%
Ranchi	East	40	3	7.5%
Delhi	North	150	20	13.3%
Gurgaon	North	40	0.5	1.3%
Chandigarh	North	50	1	2.0%
Faridabad	North	20	0.4	2.0%
Amritsar	North	10	0.7	7.0%
Bangalore	South	90	4	4.4%
Chennai	South	95	3	3.2%
Mysore	South	40	1	2.5%
Cochin	South	20	0.2	1.0%



**Figure 1.1** A range of techniques benefits a variety of consumers for analytics.

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### **Tools used in reporting:**

Majority of elementary reporting happens on MS Excel across the globe. More evolved Organizations might pull the data through databases using tools like SQL, MS Access or Oracle. But typically, the dissemination of reports happens through Excel.

### **Skills required for reporting:**

- MS excel
- Business understanding
- Ability to perform monotonous task with diligence

## Detective Analysis - Answer to Why did it happen?

Detective Analysis starts where reporting ends. You start looking for reasons for unexpected changes. Typical problems you work on are "Why did the Sales drop in last 2 months?" or "Why did the latest campaign under-perform or over-perform?". In order to find out answers to these questions, you look at past trends or you look at distribution changes to find out the reasons for the changes. However, all of this is backward looking.

### **Tools used in detective analysis:**

Typically used tools are MS excel, MS Access, Minitab, R (basic regression). You tend to use advanced Excel and Pivot tables while dealing with these problems and typically creating time series graphs helps a lot.

### **Skills required for detective analysis:**

- Structured thinking
- MS Access, Excel, basic regression
- Business understanding

## Dashboards – Answer to What's happening now?

Dashboard is an Organized and well presented summary of key business metrics. They are usually interactive so that the user can find out the exact information he is looking for. Dashboard, in ideal state should provide real time information about performance. Following is an example of how a dashboard might look like:



### **Tools used for creating dashboards:**

For limited size of data, dashboards can be made using Advanced excel. But, typically Organizations use more advanced tools for creation and dissemination of tools. Business Objects, Qlikview, Hyperion are names of some such softwares.

### **Skills required for creating dashboards:**

- Strong structured thinking: The person will need to create the entire architecture and data model
- Business Understanding: If you don't understand what you want to represent, God help you!

## **Predictive Modeling – Answer to What is likely to happen?**

This is where you take all your historical trends and information and apply it to predict the future. You try and predict customer behaviour based on past information. Please note that there is a fine difference in forecasting and predictive modeling. Forecasting is typically done at aggregate level, where as predictive modeling is typically done at a customer / instance level

### **Tools used for Predictive modeling:**

SAS has the highest market share among tools used for predictive modeling followed by SPSS, R, Matlab.

### **Skills required for Predictive modeling:**

- Strong structured thinking
- Business Understanding
- Problem Solving



# **Taming the Information Explosion**

# Four Steps to Taming the Data Explosion

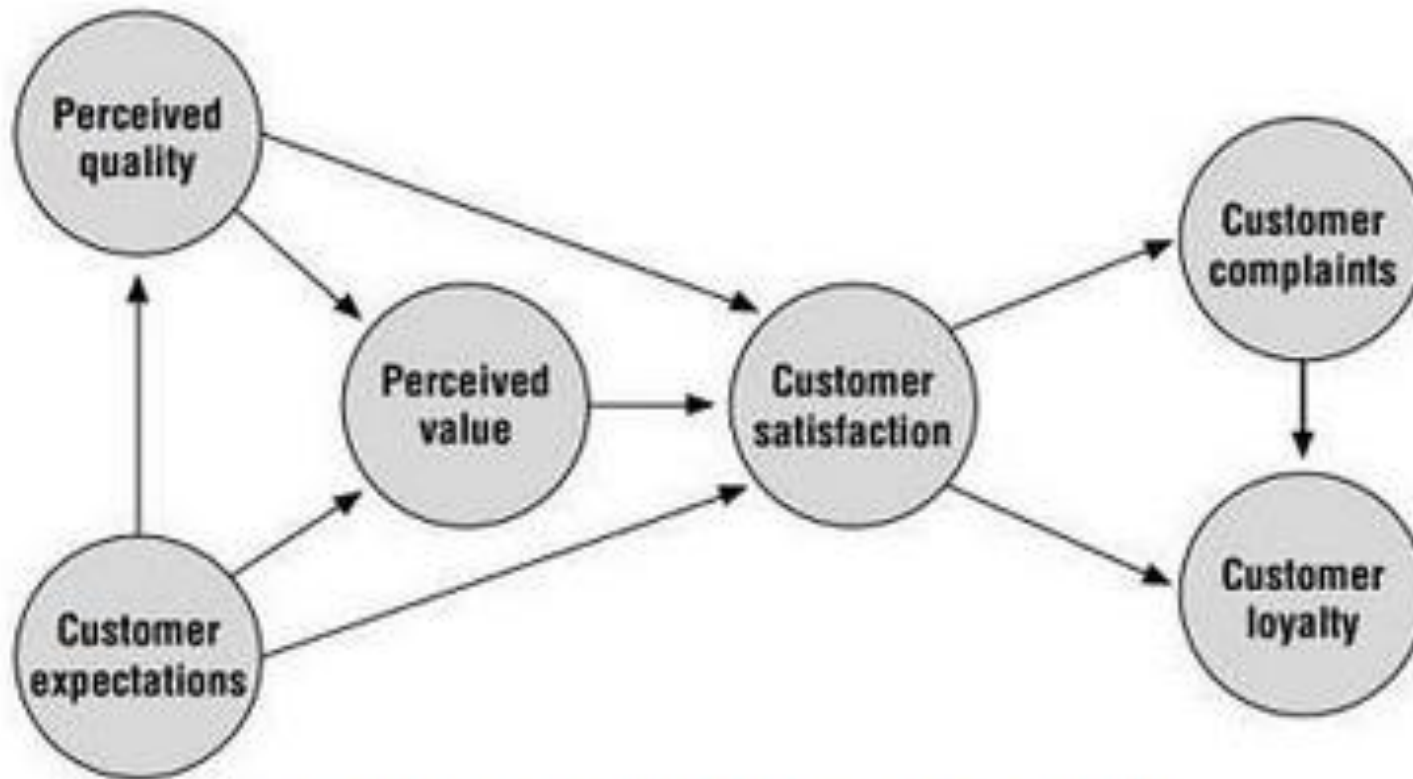
- Start with Policy. As a first step to taming the data explosion, corporates need to apply data management policies. ...
- Tame with Technology. ...
- Characterize, Classify, Act. ...
- Importance of a Documented Process. ...
- Benefits of Information Management.

# **Performance Metrics and Key Performance Indicators**

# Performance Metrics and Key Performance Indicators

- Performance metrics measure how well we perform within a particular business context.
- A performance metric relates an objective “score” (with a specific unit of measures) within a subjective scale of success.
- Examples: sales, profit, return on investment, customer happiness, customer reviews, etc.,

# Example



**Model of Customer Satisfaction**

- performance metrics are associated with every business process.
- The highest level of metric is the key performance indicator (KPI).
- KPIs can be collected together to provide a conceptual scorecard for a business and can be associated with a number of different business activities, especially within our **four value driver** areas such as financial value, productivity, risk, and trust.

- Key performance indicators capture the business definitions as part of the corporate knowledge base, and then provide a visualization dashboard that reflects those KPI measurements, presented in a form for management review.

## Goal this Year



## Website Visitors



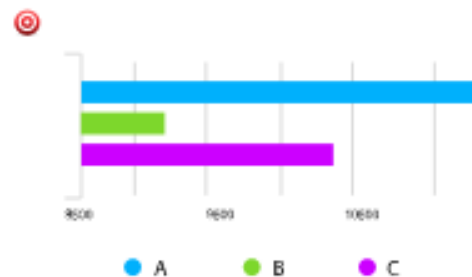
## # of Sales



## League Table: Top Performing

		Actual	Trend
1	Ralph	\$262,100.00	
2	Errena	\$263,099.00	
3	Sarah	\$249,754.00	
4	Jamie	\$243,000.00	

## Production



## Sales Revenue





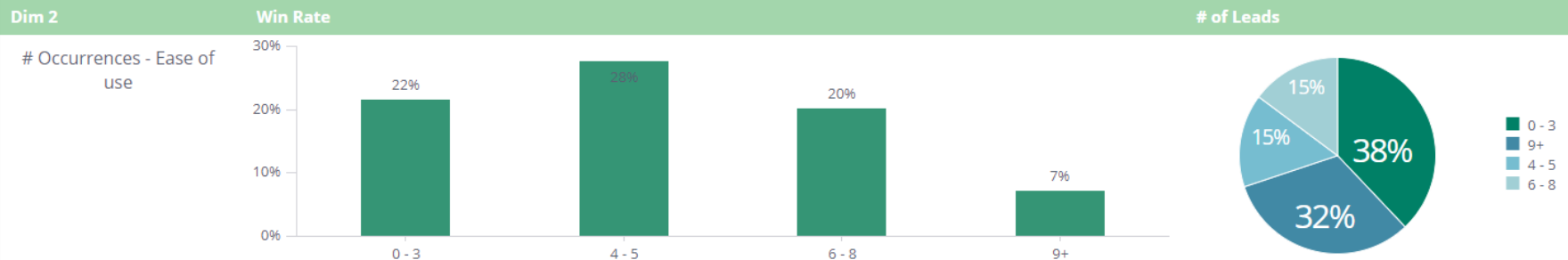
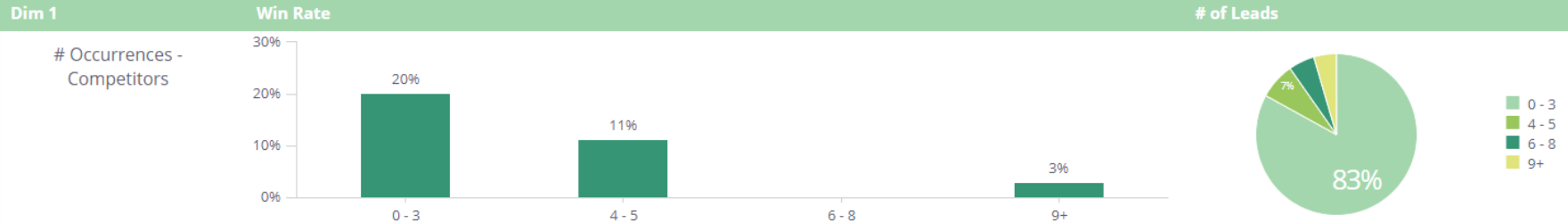
- This BI dashboard displays the results of the analytics required to configure the KPIs in a succinct visual representation that can be understood instantaneously or selected for drill-down.
- A BI dashboard will not only provide real-time presentation of the selected KPIs, but will also hook directly into the BI components that allow for that drill-down.

# Example : Sales Calls Analysis

## How Can We Improve Our Win Rate?

Win Rate: **17.81%** | # of Leads: 730

# of unique Calls: **1,657** | CALLS PER LEAD: 2.27



## Correlation Between Dims



- sample performance metrics:
  - Revenue generation via customer profiling and targeted marketing
  - Risk management via identification of fraud, abuse, and leakage
  - Improved customer satisfaction via profiling, personalization, and customer lifetime value analysis
  - Improved procurement and acquisition productivity through spend analysis

# Horizontal Use Cases for Business Intelligence

# Horizontal Use Cases for Business Intelligence

- Customer Analysis
- Revenue Generation
- Human Resources and Staff Utilization
- Product Management, Productivity Analysis, and Cost Management
- Operations
- Finance and Risk Management
- Supply Chain Management
- Sales Channel Analytics
- Behavior Analysis

# 1. Customer Analysis

- The intent of the original batch of *customer relationship management (CRM)* applications was to provide a means for capturing information about customer contacts as a way to solidify the company–customer relationship and thereby lead to increased sales, volumes, and satisfaction

Following are different aspects of customer analytics that benefit the sales, marketing, and service organizations as they interact with the customers:

- Customer profiling.
- Personalization.
- Collaborative filtering
- Customer satisfaction
- Customer lifetime value.
- Customer loyalty

# Customer Profiling

- Companies are realizing that all customers are not clones of some predefined market segment; instead, the characteristics of the “best customers” almost reflect a self-organized categorization.
  - **1) The Psychographic Approach**
  - **2) The Consumer Typology Approach**
  - **3) The Consumer Characteristics Approach**



# Personalization

- It is the process of crafting a presentation to the customer based on that customer's profile, is the modern-day counterpart to the old-fashioned salesperson who remembers everything about his or her individual "accounts."

# Collaborative filtering

- *Collaborative filtering* (CF) is a technique used by recommender systems.
- It is a method of making automatic predictions (**filtering**) about the interests of a user by collecting preferences or taste information from many users (collaborating).

# Customer satisfaction

- One benefit of the customer profile is the ability to provide customer information to the customer satisfaction representatives.
- This can improve these representatives' ability to deal with the customer and expedite problem resolution.

# Customer lifetime value

- The lifetime value of a customer is a measure of a customer's profitability over the lifetime of the relationship, which incorporates the costs associated with managing that relationship and the revenues expected from that customer.

# Customer loyalty

- This means that a company's best opportunities for new sales are with those customers that are already happy with that company's products or services

## 2) Revenue Generation

- acquired knowledge by sharing it with the different front-end teams such as marketing and sales as a way to encourage methods for increasing revenues.
  - Targeted marketing.
  - Cross-selling and up-selling
  - Market development
  - Loyalty management

# Targeted marketing

- Knowledge of a set of customer likes and dislikes can augment a marketing campaign to target small clusters of customers that share profiles.

## Cross-selling and up-selling

- Increasing same-customer sales is somewhat of an art, but involves advising customers of opportunities for getting better value from an increased order (up-selling) or by purchasing complementary items (cross selling).



## Market development

- This activity allows analysts to evaluate those demographic characteristics of individuals within particular regions as a way of understanding geographic dependencies to drive more efficient marketing programs targeted at geo-demographic profiles based on physical location.

# Loyalty management

- Determining when a customer is about to shutter their relationship provides a great opportunity to reestablish ties by providing discrete offers to stay.

# Improving the Decision-Making Process

- Every business process presents a situation in which information is collected, manipulated, and results are presented to help individuals make decisions
- Some decisions are
  - Significant
  - Business critical
  - narrower

- Every business process has its associated measures of performance, and in a perfect world, each decision would be the *optimal one*.
- But those decision-makers are sometimes prevented from making the optimal decision.

- When large amounts of unfiltered data are made available across the organization individuals may be stunned into “**analysis paralysis**” the compulsion to delay decision-making.
- This paralysis can be diminished by reducing to **specific** information rather than **all** information to help make the **optimal decision** so that specific actions can be taken.

# Example

- The senior management team can review overall company performance to consider any alternatives for adjusting corporate strategy for long-term value generation.
- From the immediate, operational perspective, day-to-day activities can be improved with specific pieces of intelligence suggesting adjustments for optimizing activities in real time.

- That is, business processes are augmented with the ability to incorporate information that is actionable streaming the results of analyses directly into the process, tracking performance measures, and indicating when better decisions are being made.

# **BUSINESS INTELLIGENCE AND PROGRAM SUCCESS**



# Business Intelligence and Program Success

- Anybody involved in the BI process is concerned about the ability to take advantage of information in a way that can improve the way the organization operates.
- Ultimate goal of BI is powered by the ability to
  - manage access
  - availability of necessary information to assess business needs,
  - identify candidate data sources, and
  - effectively manage the flow of information into a framework suited for reporting and analysis needs.

- Although a significant amount of money has been invested in attempts at building and launching BI frameworks and applications, most of that money has been spent in **infrastructure**, whereas very little has been invested in managing and exploiting a valuable corporate asset a company's data.

- And in some arenas, the concept of what constitutes “business intelligence” is so poorly defined.

- BI activity involves:
  - the discovery phase,
  - justification,
  - analysis of requirements for design,
  - creation,
  - management,
  - maintenance,
  - or development of a BI program