Chapter 4
Getting Started with Business Intelligence

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"Fundamentals of Business Analytics"

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USING ANALYTICAL INFORMATION FOR DECISION SUPPORT

- In the past, leading market research firms noticed that often senior executives in businesses leveraged "numerical information" to support their decisions.

- They started using the term "Business Intelligence"(BI) for the set of concepts and processes that allows a business executive to make informed decisions.

- The IT applications providing such "numerical information" were commonly called "analytical applications" to distinguish them from transaction-oriented applications.

- The decision making became **informed decision** making with the use of BI.

- What is an "informed decision"?
  - It is a decision based on fact and fact alone.
  - Why is it required to make informed decisions?
    - The simple reason is informed decisions based on fact, not on gut feeling, more often than not are the correct decisions. It's easy to communicate "facts" to the large number of stakeholders.
  - Consistency in decision making
    - A large dispersed set of decision makers ¢an arriveat the same conclusion when facts are presented and interpreted the same way.

Benefits of USING ANALYTICAL INFORMATION FOR DECISION SUPPORT

- This type of decision making will lead to business benefits.
- It will provide insight into the operational efficiencies;
- It will help explore untapped opportunities; and above all it will serve as a window to the business dynamics and performance.
- It will help provide answers to questions, like
    - "Who are my most profitable customers?"
    - "Which are our most profitable products?"
    - "Which is the most profitable marketing channel?"
    - "What are the various up-sell and cross-sell opportunities?"
    - "Who are my best performing employees?"
    - "How is my company performing in terms of the customer expectations?", etc.
- It's is true that business executives, operations staff, and planning analysts all made decisions even when "Business Intelligence" or Business Analytics were not there. The evolution of BI made decision making faster, reliable, consistent, and highly team oriented.

Information Sources for Decision makers before BI Evolution

Decision makers **<u>invest</u>** in obtaining the market facts and internal functions such as finance and marketing sales to evolve business plans. Some of the frequently used information sources are as -

Marketing research: This analysis helps understand better the marketplace in which the enterprise in question is operating. It is about understanding the customers, the competitors, the products, the changing market dynamics, etc. It is to answer questions such as

> "Whether the launch of product X in region A will be successful or not?"
>
> "Will the customers be tothe launch of product X?"
>
> "Should we discontinue item Z?"
>
> "Where should items sand B be placed on the shop shelves?", etc.

Statistical data: This is essentially about unravelling hidden patterns, spotting trends etc. through proven mathematical techniques for understanding raw data. For example, varinace in production rate, correlation of sales with campaigns, cluster analysis of shopping patterns, etc. help decision makers see new opportunities or innovate products or services.

Management reporting: Most enterprises have their own IT teams dedicated to churn out adhoc reports for the management. Often times they invest in specialized tools to prepare reports in graphical format.

Market survey: Enterprises also employ third-party agencies to conduct consumer surveys and competitive analysis. They also use benchmark data to understand their strengths, and specific market opportunities they could exploit as well as risks that might their revenue or market share.

Business Intelligence(BI) Defined

Howard Dresner, of the Gartner Group, in 1989 coined the term BI. He defined BI as **"a set of concepts and methodologies to improve decision making in business through use of facts and fact-based systems".**

- The goal of BI is improved decision making. Yes, decisions were made earlier too (without BI). The use of BI should lead to improved decision making.

- BI is more than just technologies. It is a group of concepts and methodologies.

- It is fact based. Decisions are no longer made on gut feeling or purely on hunch. It has to be backed by facts.

- BI uses a set of processes, technologies, and tools such as

  - Informatica/IBM Datastage/Ab initio for extracting the data,

  - SAS/IBM SPSS for analyzing the data, and

  - IBM Cognos/Business Object for reporting the data) to transform raw data into meaningful information.

- BI mines the information to provide knowledge (KDD — Knowledge Discovery from Data) and uses the knowledge gained to provide beneficial insights; the insights then lead to impactful decision making which in turn provides business benefits such as increased profitability, increased productivity, reduced costs, improved operations, etc.

The transformation of raw data to business benefits through BI may be depicted as

Business Benefits

Impactful Decisions

Beneficial Insights

Knowledge Discovery

Meaningful Information

Raw Data
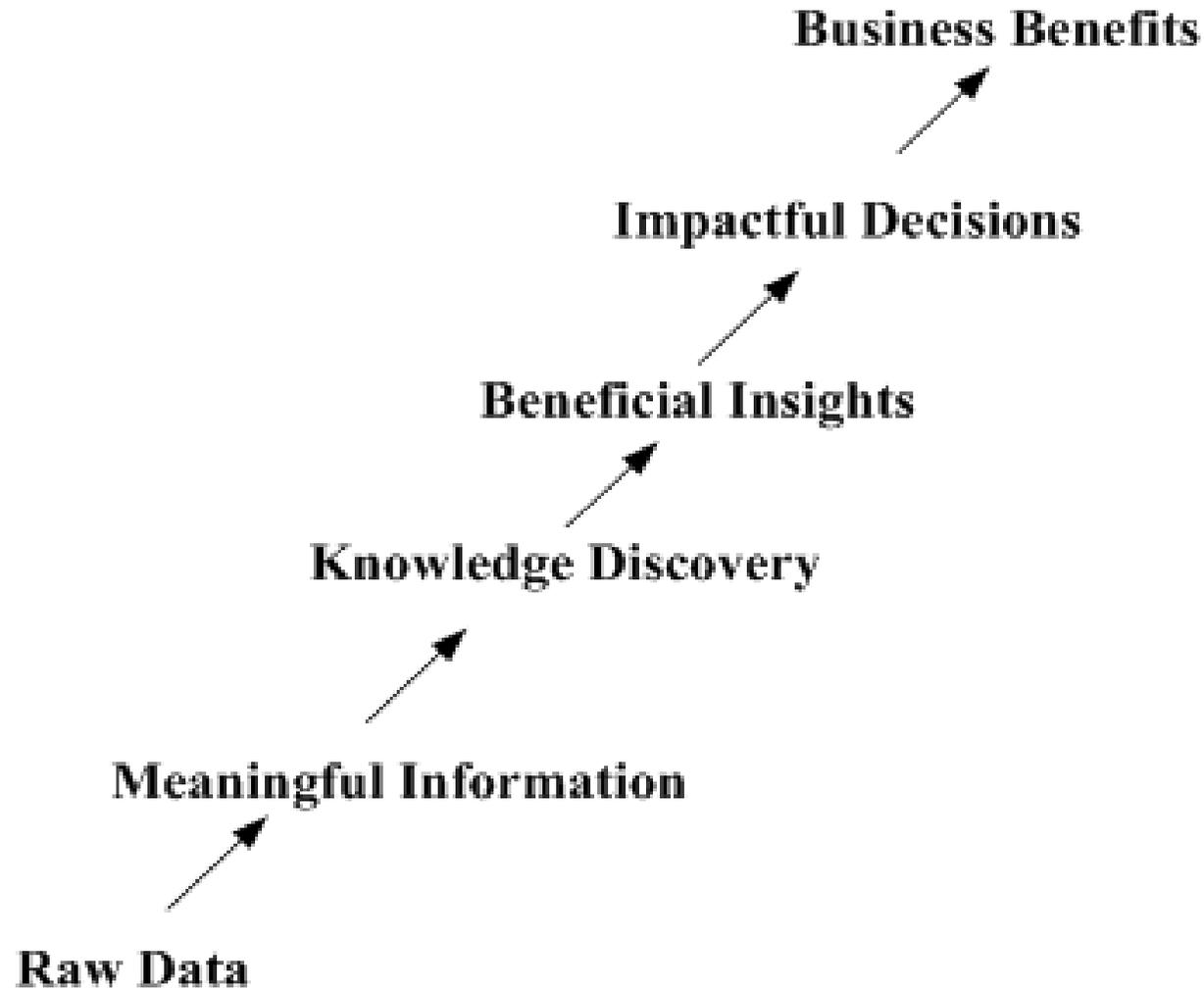
Business Intelligence by Other Names

Reporting

Competitive Intelligence

Decision Support System

Business Investment

Business Analytics

Business Insight

Thus, in short,

- Business Intelligence (BI) is about providing the right information, in the right format to the right decision makers, at the right time.

- BI is an enterprise-wide platform that supports reporting, analysis and decision making.

- BI leads to:

  - ❖ fact-based decision making

  - ❖ "single version of the truth"

- BI includes reporting and analytics.

Right Information   Right Time   Right Format
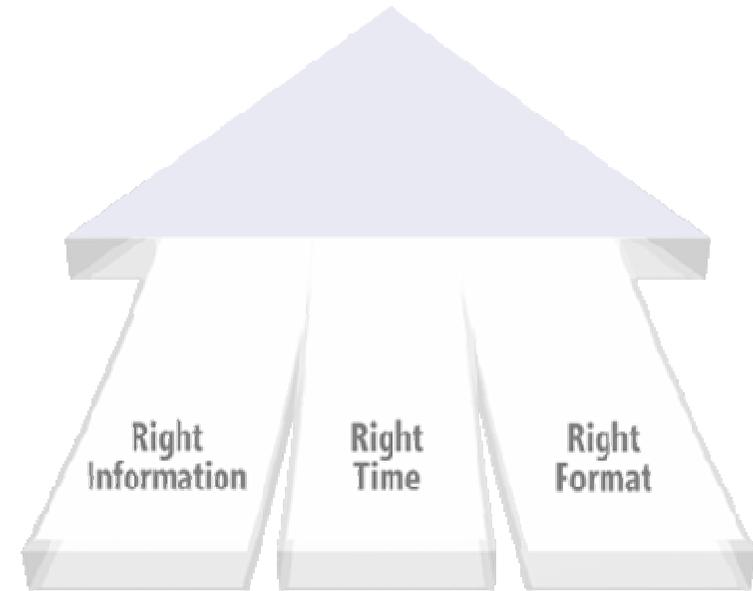
Features of Business Intelligence

Fact-based decision making:

Decisions made through Business Intelligence are based purely on fact and history.

It is about staying in tune with the data flowing through your business systems.

Refer to the case study brief on "GoodFood Restaurants Inc.". Let us try to understand fact-based decision making using the example of our "GoodFood" restaurant. Every restaurant will report the quantity of food wasted across the globe within six hours from the closing hour of restaurant. This data is aggregated and shared among all chefs, back office staff, operations manager, and marketing campaign teams. A team analyzes reasons and spot drivers of variance and set target to reduce wastage week-by-week. The same team tracks data and initiates actions to correct the process to reduce waste and achieve set target.

Single version of truth: Put simply, a single version of truth means that if the same piece of data is available at more than one place, all the copies of the data should agree wholly and in every respect. BI helps provide single version of truth.

In our above example of the restaurant, picture a customer walking into the restaurant a little late for lunch. He asks at the reception about the availability of a particular cuisine (say, Thai cuisine) at the buffet lunch. The receptionist confirms the availability after checking on the networked computer system, and the customer proceeds to the dining area. On the way, the customer come across the head waiter and asks the same question. He too confirmed using his PDA (Personal Digital Assistant).

Thus, this is the "single version of truth" wherein same piece of information shared by multiple persons agrees wholly and in every respect.

Features of Business Intelligence (Contd..)

360 degree perspective on your business: BI allows looking at the business from various perspectives. Each person in the project/program team will look at the data from his/her role and will look for attributes that add value for decision making in his/her role.

In the GoodFood example, a "reservation table number" helps the steward escort guests to the right place in the dining area, helps the chef visit the guests to describe the "day's speciality", and helps the service staff reach for cleaning and rearrange table whenever needed. Similarly, the food wastage will be viewed by different department with different perspectives – the finance by cost of wastage, the housekeeping by disposal methods, chefs by reason for rejection by guests, the quality team for finding innovative approaches to reduction, and the information systems team for devising measures that indicate improvement in processes.

Virtual team members on the same page: In today's business context, not all stakeholders or decision makers will be in the same building/geographic location. Businesses are highly distributed in nature and executives travel extensively. The team of people who work on a common project/purpose/business goal but are spread across locations is terms as a virtual team. Technologies like BI bring them together and provide them the same facts at the speed of light in personalized forms.

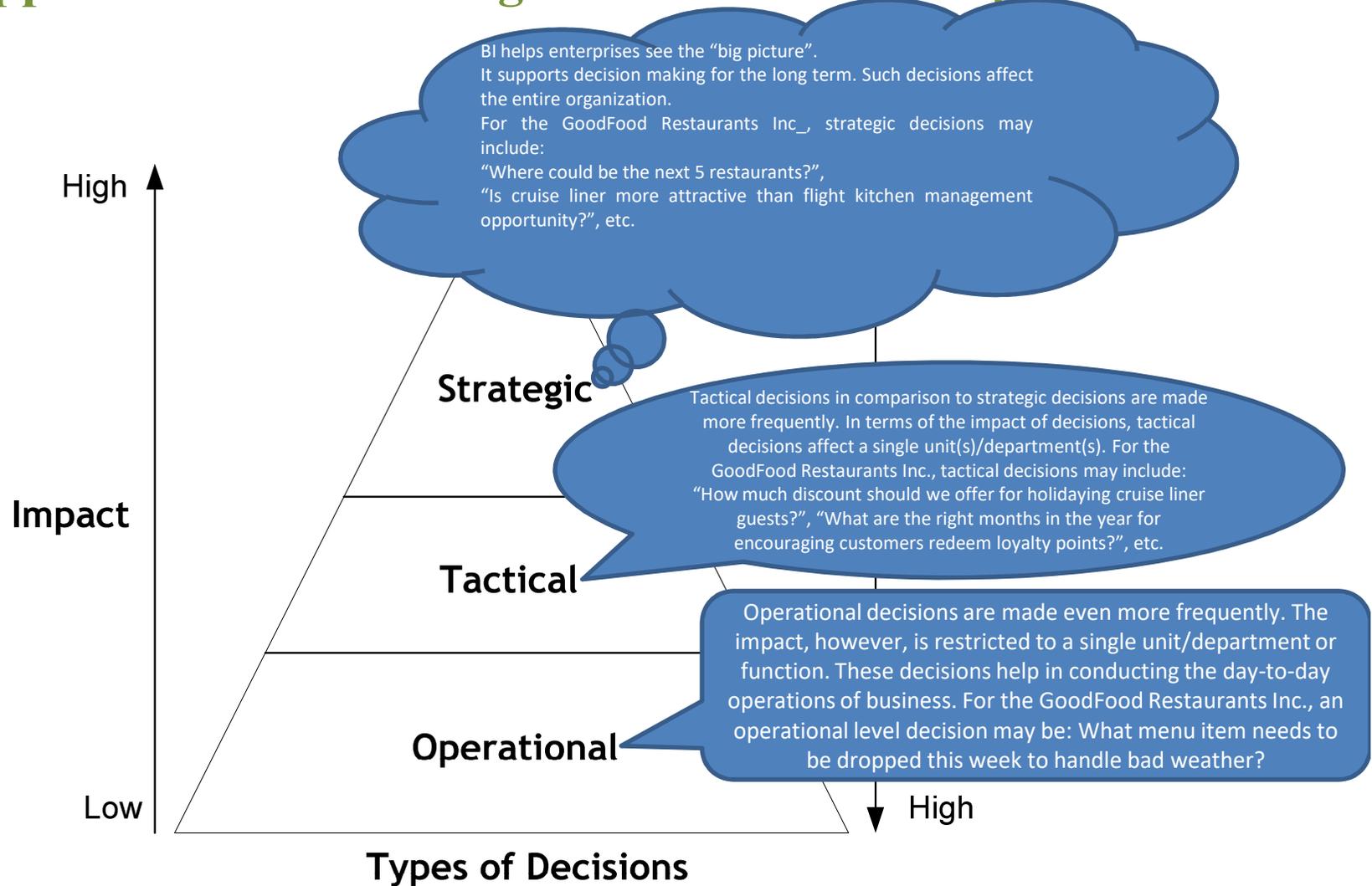**You may read the example from your book about GoodFood restaurant example**.

Answer a Few Quick Questions

- What problems can an enterprise encounter, if the **single version of truth** is compromised?

- Cite a few examples from everyday life of **fact-based decision making**.

- What is your understanding of **360 degrees perspective** and why do you think it is important?

- You are a Project Manager. You lead a 10 member team. Your team members are in three geographically different locations. What measures will you take to ensure that all your team members are on the same page?

BI Benefit - Visibility into Enterprise Performance

- Business Intelligence provides a clear insight into the enterprise's performance.

- This is by way of an operational dashboard.

- An operational dashboard makes use of visual forms such as charts, tables, matrix, indicators, etc.

- In our example of the GoodFood Restaurant, the restaurant owner views the progress of the chain of restaurants on a single dashboard. This quickly tells him, with relevant data, which branch is doing excellent business, where the business is average with data, etc. Timely information as provided by the dashboard leads to early remedial procedures.
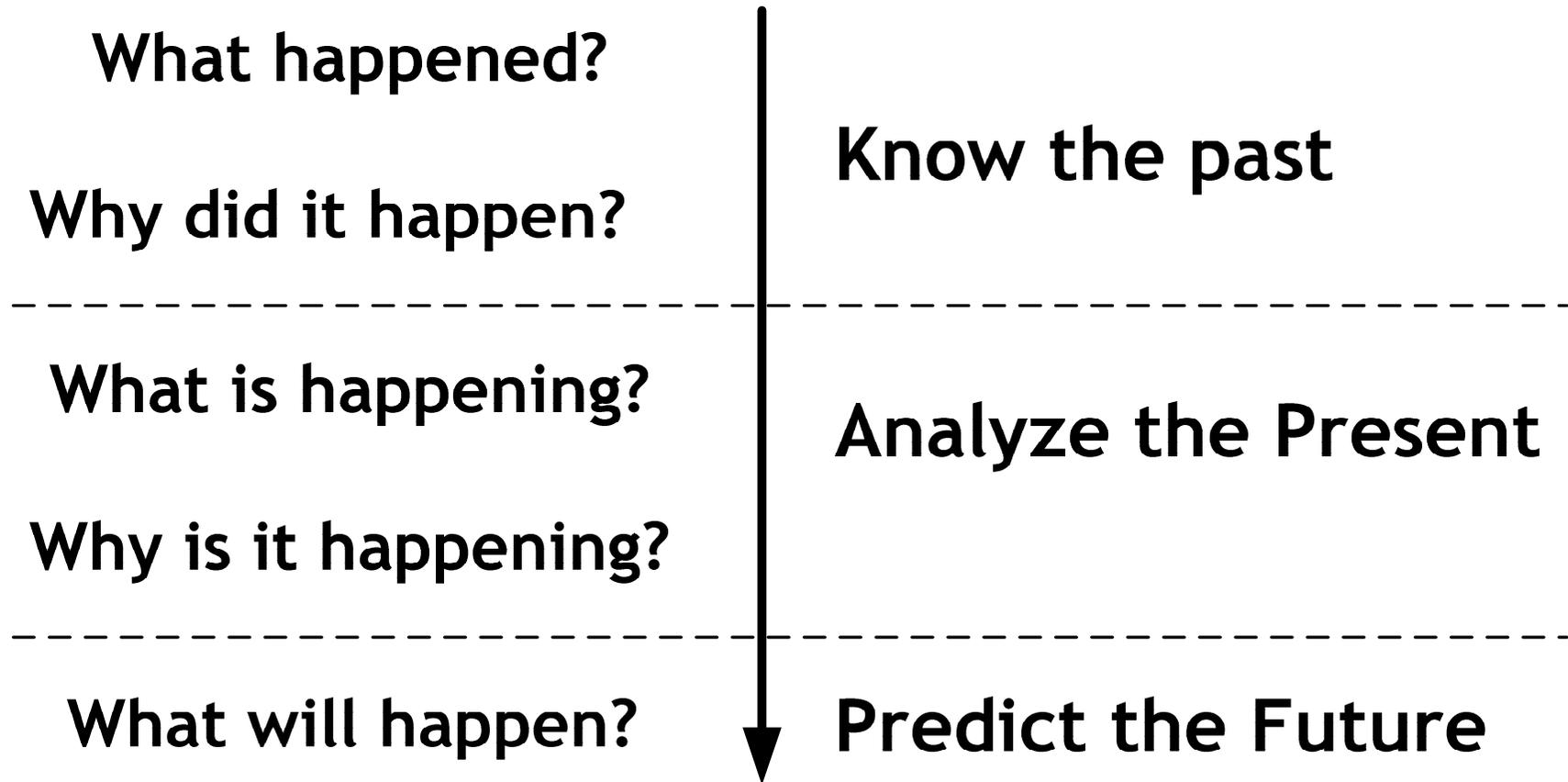
BI Supports decision making at all levels of Enterprise

Answer a Quick Question

Do you think "BI only deals with analysis of past data" ?

Why BI?

What happened?	Know the past
Why did it happen?	
What is happening?	Analyze the Present
Why is it happening?	
What will happen?	Predict the Future

Need for BI at Virtually All Levels

- There is too much data, but too little insight!

- Business Intelligence has been there in the boardroom for long. There is a need to expand business intelligence from the boardroom to the front lines!

- Structured and unstructured data need to converge!

How BI?

IT Department
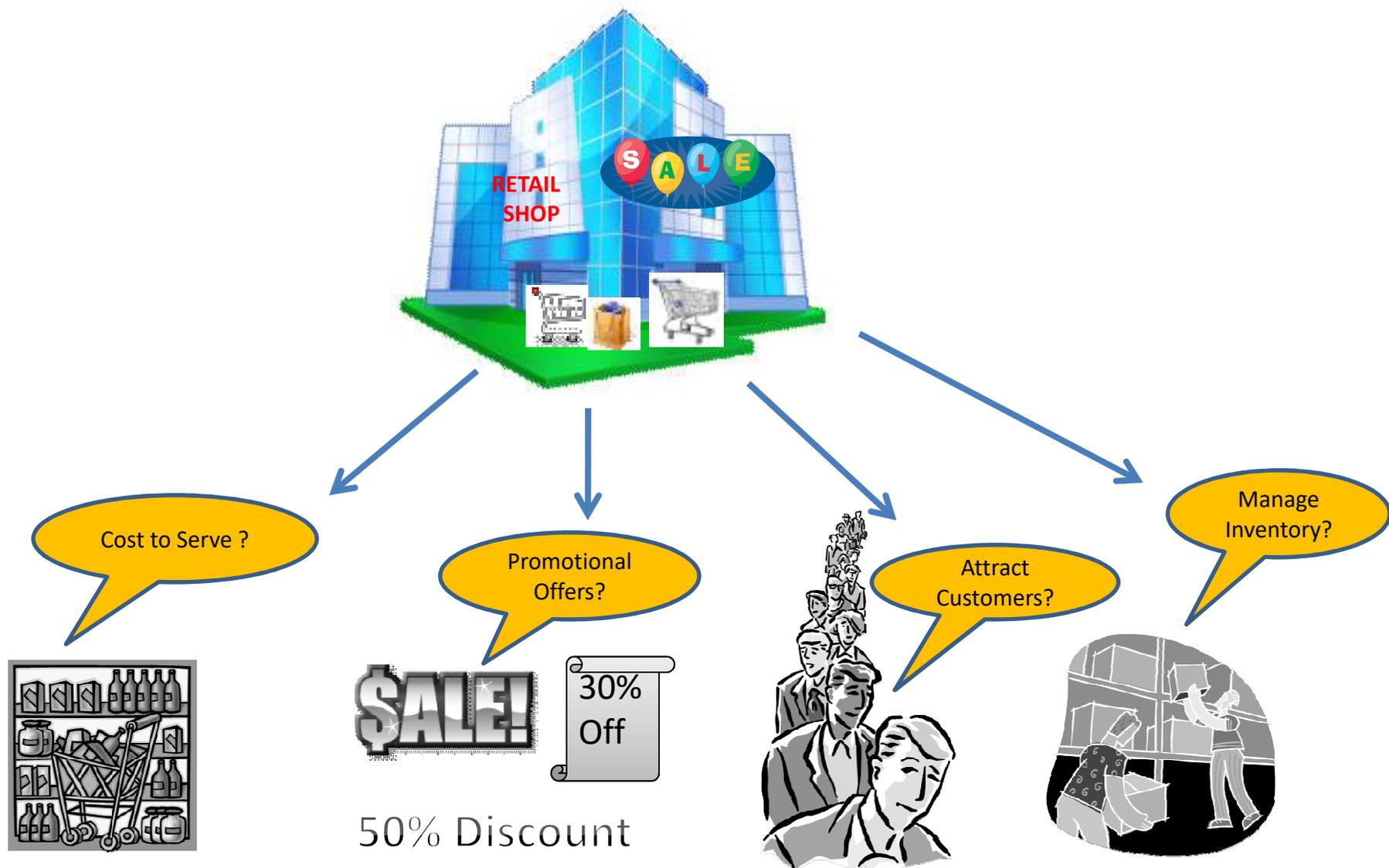
Business Users

Source Systems

Data Warehouse

BI Tools

ORDERS

INVOICES
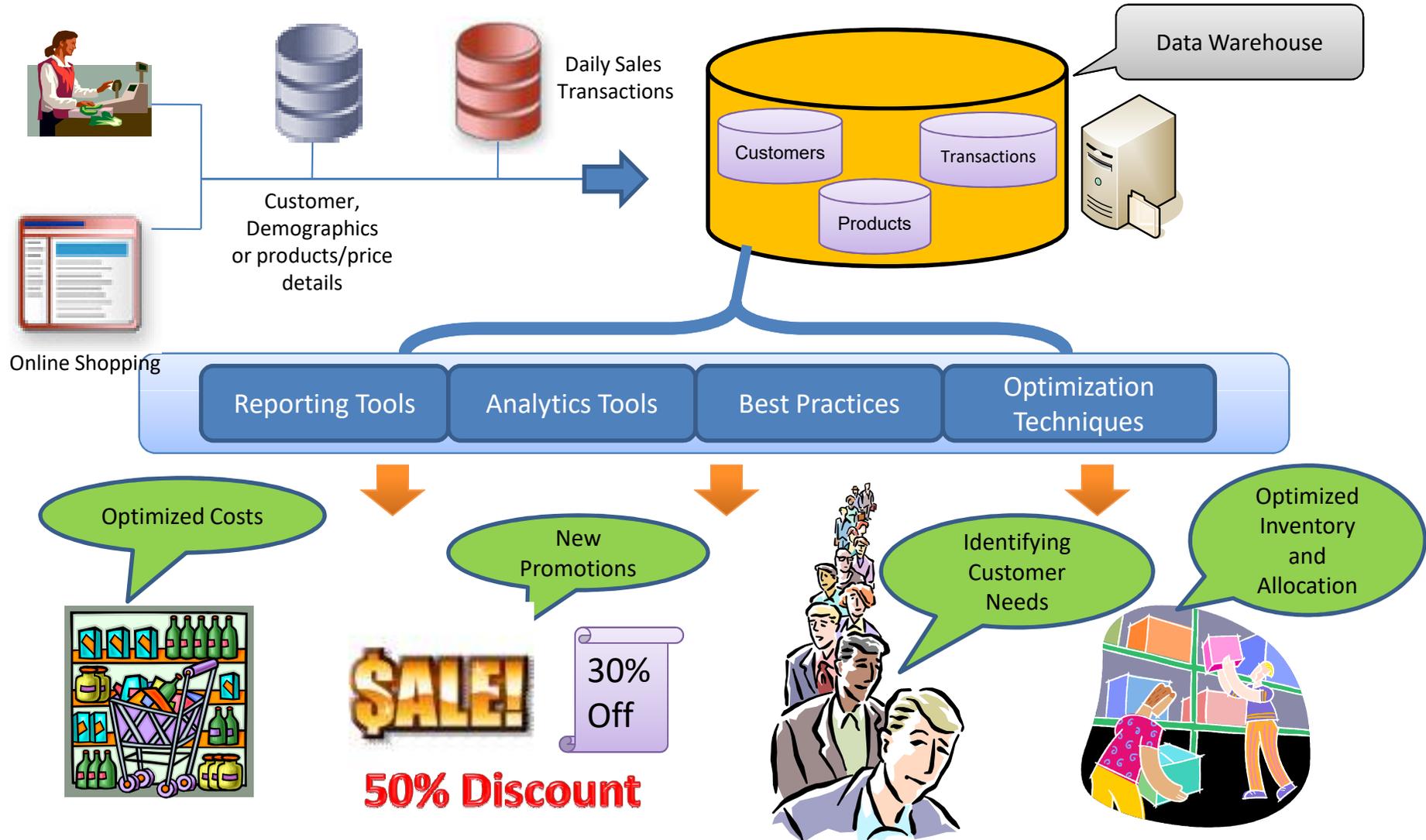
SHIPPING

Web Clicks

External Data

•Extract
•Transform
•Load

Relational Tables

•Report
•Query
•Analyze
•Alert

Analytic Applications
(Product Profitability, Workforce Planning, CRM)
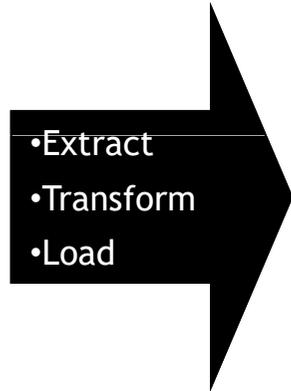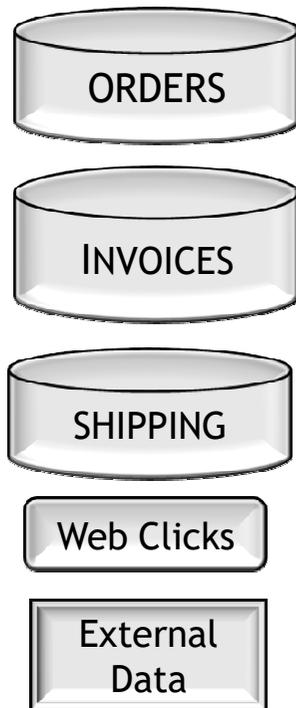
Challenges in Retail Industry

RETAIL SHOP

Cost to Serve ?

Promotional Offers?

50% Discount

Attract Customers?

Manage Inventory?

Retail Industry Leveraging BI

Daily Sales Transactions

Customer, Demographics or products/price details

Online Shopping

Data Warehouse

Customers

Transactions

Products

| Reporting Tools | Analytics Tools | Best Practices | Optimization Techniques |

Optimized Costs

New Promotions

Identifying Customer Needs

Optimized Inventory and Allocation

$ALE!

30% Off

50% Discount

Explain…

Explain how BI is being leveraged in the **insurance/healthcare/banking** sector, etc.

Data Mining in Retail

The Diapers-Beer Example

- A (hypothetical) pattern learned from transaction data: "On Friday evenings, shoppers who buy diapers also buy beer."

- Highlights new, surprising correlations that can be acted on by the store.
  - To promote more users to display this behavior, consider dynamic store layout decisions that might alter locations of products based on co-purchase
  - Consider couponing strategies that can be used to cross promote related products in some cases.

Data Mining in Credit Card Fraud

- Credit card fraud costs the industry billions of dollars each year and pattern discovery tools and machine learning models such as neural networks are routinely used to analyze fraud databases to identify triggers.

- "A self-service transaction at a gas station followed by an expensive purchase" is indicative of fraud.

  – An example pattern learned from credit card fraud data

  – Pattern is then used in real-time to flag transactions that might be fraudulent. For instance, if you fill gas in your car with a credit card and then make an expensive purchase then the merchant may be instructed (by the point of sale system) to check the user's ID.

Data Mining in UI Optimization

"A simple example had to do with discovering that on the Yahoo Front Page, centering the search box on the page (as opposed to having it be left-justified) would increase consumer usage. This led to better user engagement and there was no cost to Yahoo! to make the change. This was discovered by discovering the hidden pattern that showed that Netscape users tended to use search more than IE users, and by discovering that the only visible difference was the subtle position of the box! It was centered on Netscape browsers but left justified on IE browsers. A very unnoticeable difference, yet an important one. Who would figure that out???"

Data Mining for Marketing

Online Product Recommendations

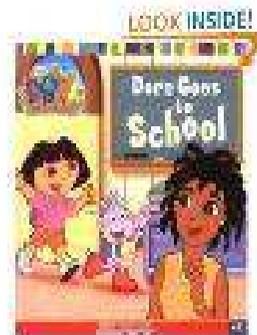- Amazon.com pioneered the use of collaborative filtering based approaches to recommend products to users online.
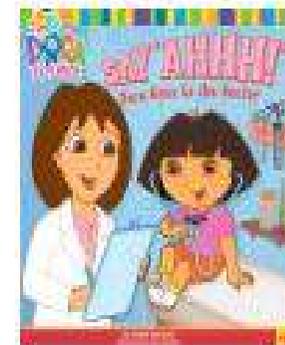
ERP vs. BI

ERP	BI as an enterprise application
ERP is for data input	BI is for data retrieval
Essentially an operational /transactional/ OLTP system	Essentially OLAP
Supports the capture, storage and flow of data across multiple units of an organization	Supports the integration of data from varied data sources, transforms the data as per business requirements and stores it in the business data warehouse
Has support for a few prebuilt reports which usually help to meet the transactional needs of the organization	Supports advanced form of reporting (boardroom quality) and visualization. Has support for dynamic reports, drill down reports, drill across reports , etc.
Has little or no support for analytical needs of the organization	Supports the analytical needs of the organization

Introduction to Business Analytics

Business analytics is heavily dependent on data.

For its successful implementation, business analytics requires a high volume of high quality data.

The challenges faced by business analytics are: storage, integration, reconciliation of data from multiple disparate sources across several business functions and the continuous updates to the data warehouse.

Differences between Business Intelligence and Business Analytics

	Business Intelligence	Business Analytics
Answers the questions:	•What happened? •When did it happen? •Who is accountable for what happened? •How many? •How often? •Where did it happen?	•Why did it happen? •Will it happen again? •What will happen if we change x ? •What else does the data tell us that we never thought to ask? •What is the best that can happen?
Makes use of:	•Reporting (KPIs, metrics) •Automated Monitoring/Alerting (thresholds) •Dashboards /Scorecards •OLAP (Cubes, Slice & Dice, Drilling) •Ad hoc query	•Statistical/Quantitative Analysis •Data Mining •Predictive Modeling •Design of experiments to extract learning out of business data •Multivariate Testing