



Enhancing Decision Making

With Business Intelligence
applications

Session overview

01

Understand the decision making

- Type of decisions
- The decision-making process
- Decisions in the organization

02

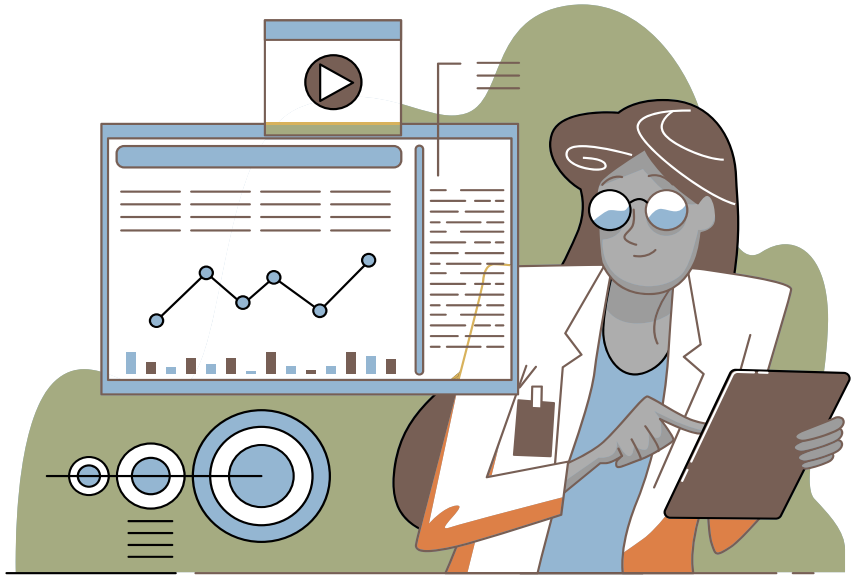
Assessing BI in enterprise

- The need for BI
- BI in logistics & supply chain

03

BI system architecture

- Components of BI environment
- BI functionalities & limitations





The Decision-Making

Decision making is the process of selecting a solution by identifying what decision to make, gathering information, and assessing alternative resolutions.

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Characteristics of Decision Making

- Decision-making is goal-oriented, aims to achieve something.
- Decision-making implies alternatives.
- Decision-making is rational.
- Decision-making may be judgmental and emotional.
- Decision-making is a mental or intellectual process.
- The decision-maker has freedom to choose an alternative.
- A decision may be expressed in words or may be implied from behaviour.
- The final result of each possible alternative is uncertain.



Types of problems & decisions

Unstructured problem

New, unusual, nonroutine, ambiguous, unclear, no pre-defined procedure

Non-Programmed decision

Novel, nonroutine, important, long-time consequence, require evaluation & judgement

Semi-structured problem

Only part of problem can be solved with an accepted procedure

Semi-programmed decision

Having procedure but still require a level of insight & judgement, Impact to performance

Well-structured problem

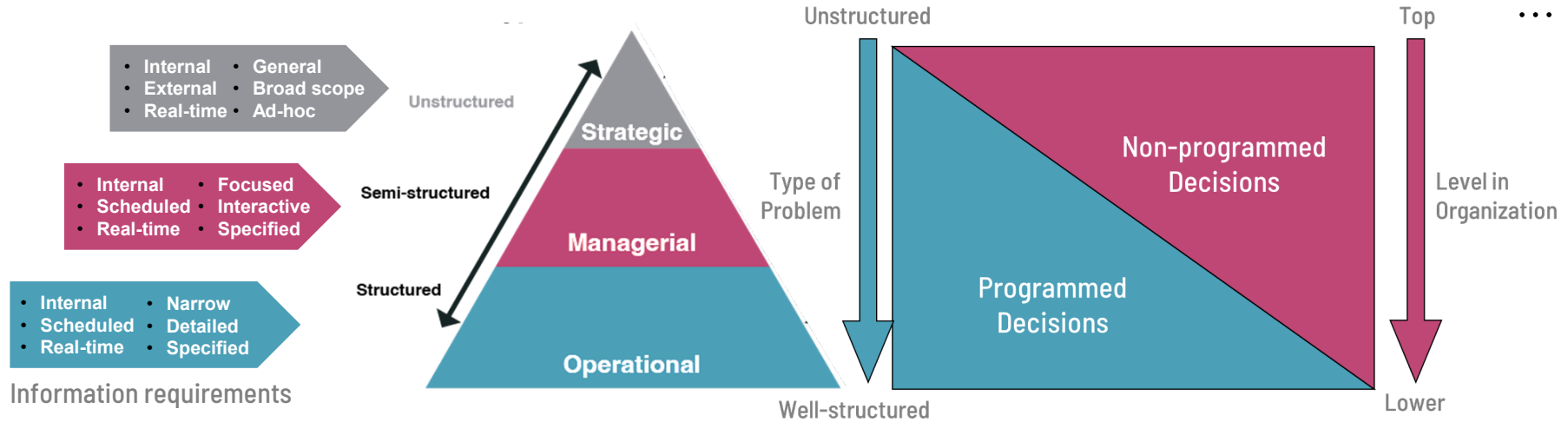
Recurring, routine, easy-to-define, straightforward, have a definite procedure

Programmed decision

Repetitive, routine, have pre-defined guidelines or parameters to response



Decisions in organization levels



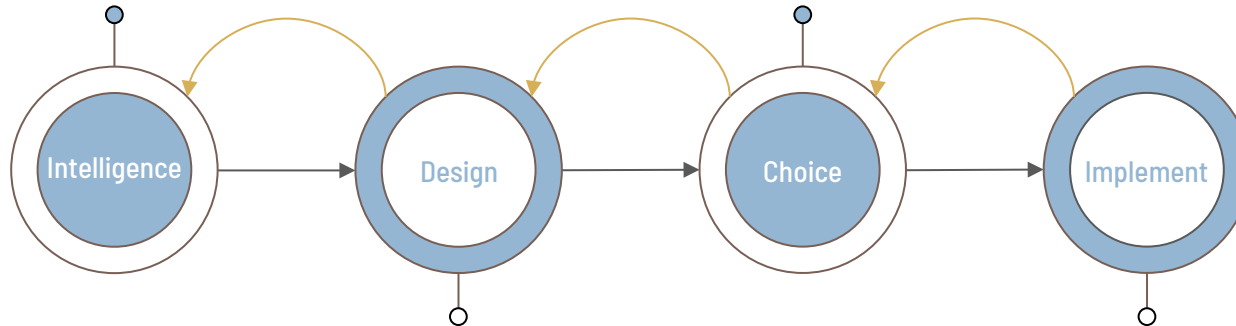
The Decision-making process

Problem discovery

- Identify discrepancy that required decision

Choosing solution

- Evaluate the evidence
- Choose among alternatives



Alternatives discory

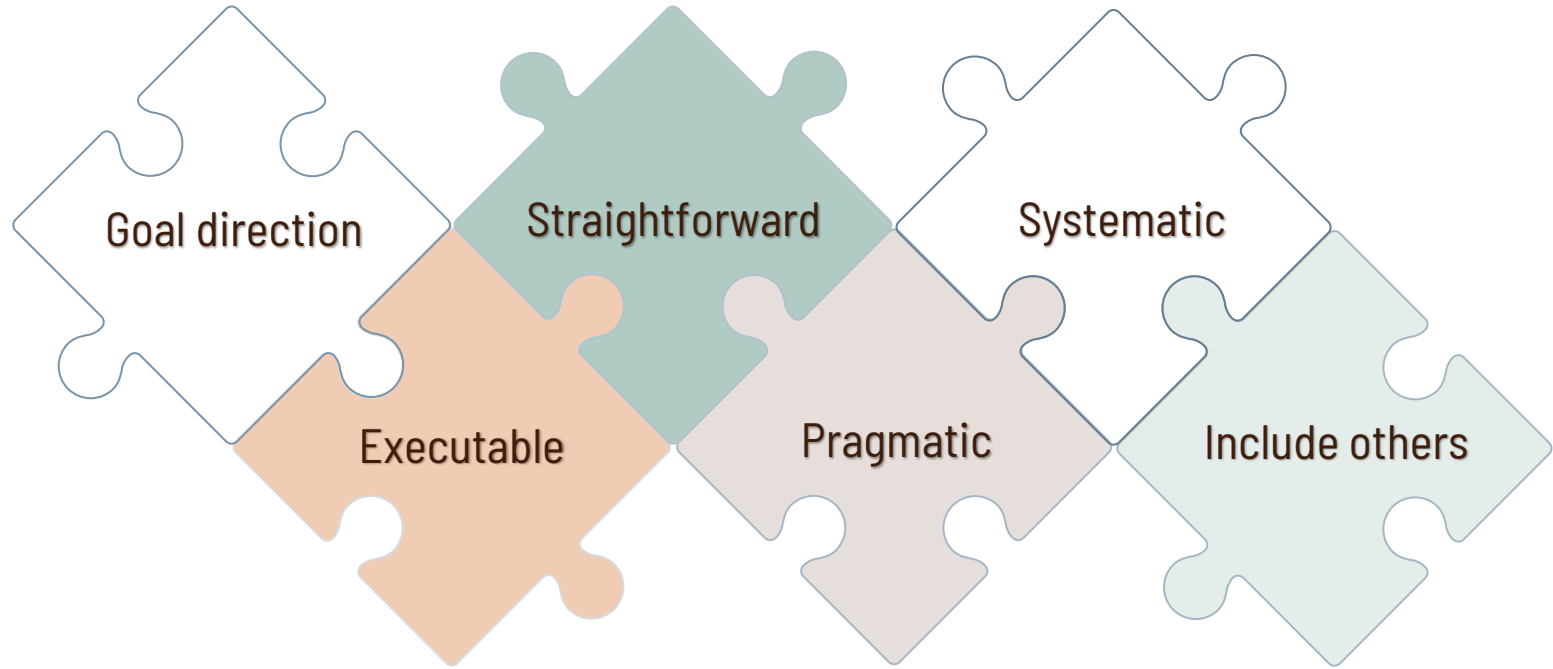
- Gather relevant information
- List out decision criteria
- Identify the alternatives

Solution testing

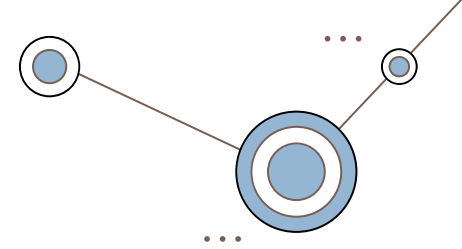
- Implement the solution
- Review the decision

If necessary, the process can be returned to the earlier stage repeatedly to find the most effective solution

What is considered as a good decision...



Understanding managerial roles

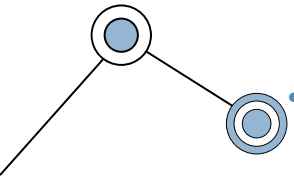


- Managerial roles are behaviours adopted to perform various management functions.
- Managers, including employees, play all or some of these roles – some less and some more, depending on the context of individual's work. Various managerial roles may perform at the same time in daily basis.
- According to Henry Mintzberg, a management theorist, managerial roles fall into 3 categories; **Interpersonal** roles are about dealing with people, **informational** ones are about dealing with knowledge. **Decisional** roles are about action.
- **Decisional** roles are most important and crucial part because making decisions is the core of achieving company's objectives. Decisions taken over at different situations contribute to the company in a certain level.
- Note that many non-managers in organisations also have these sorts of interpersonal, informational and decisional roles when handling their responsibilities.

- IS capable to support most of managerial roles, to improve managerial effectiveness as well as improving decision making.
- However, some decisional roles still required humanize skills which IS cannot support

10 Managerial Roles, According to Mintzberg

INTERPERSONAL	1	FIGUREHEAD	Represents the organization, as well as motivates the team
	2	LEADER	Leads a team, a department, or an entire organization
	3	LIAISON	Develops and maintains internal and external relationships
INFORMATIONAL	4	MONITOR	Identifies problems and opportunities for growth
	5	DISSEMINATOR	Shares data and communicates it effectively
	6	SPOKESPERSON	Speaks for the organization, defending the company's interests
DECISIONAL	7	ENTREPRENEUR	Organizes and runs business processes
	8	DISTURBANCE HANDLER	Fixes the problem, maintaining productivity
	9	RESOURCE ALLOCATOR	Determines how and where to apply organizational resources
	10	NEGOTIATOR	Participates in negotiations, trying to reach their goals



The need for IT supports for decision making



Vast information

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A large amount of information from various sources, create many alternatives to digest, validate & compare



Time pressure

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Most decisions must be made under time pressure. Real-time & remote accessibility as well as rapid data processing is needed



Uncertainties

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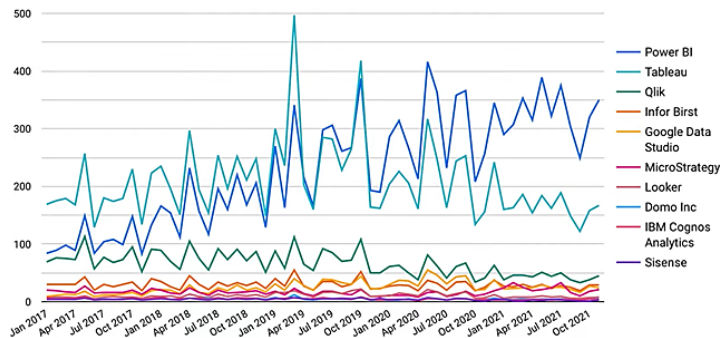
Decisions are becoming more complex due to increased fluctuation & uncertainty involved. A sophisticated analysis is necessary

The increasing sophistication of IS means that essentially any information system should be useful to any decision makers, regardless of their level or function in the organization.

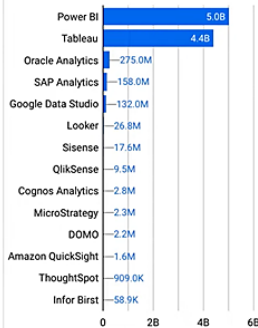
Market Research : Top & Trends of BI tools

Google Search and Market Share of BI Tools

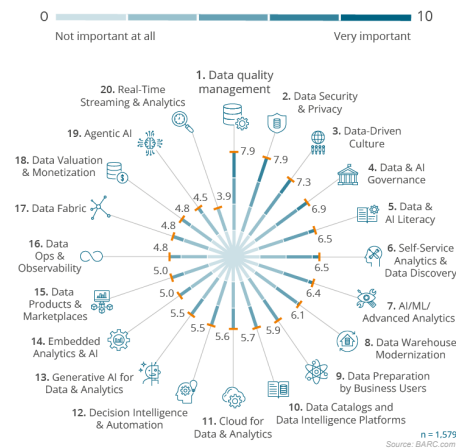
Searches of Different BI Tools Between 2017-2021 (Google Trends)



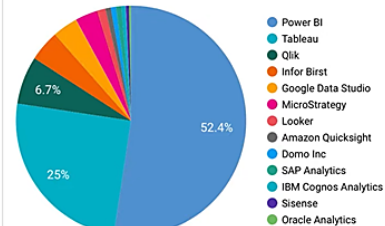
Google Results per Search Term



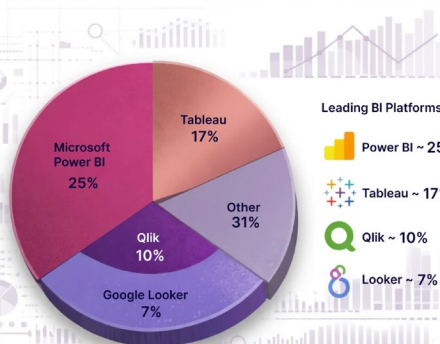
How important are the trends in data, BI and analytics?



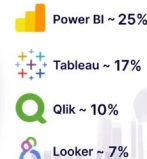
Percentage of BI Tool Searches for November, 2021



Market Share of Top BI Software in 2026



Leading BI Platforms

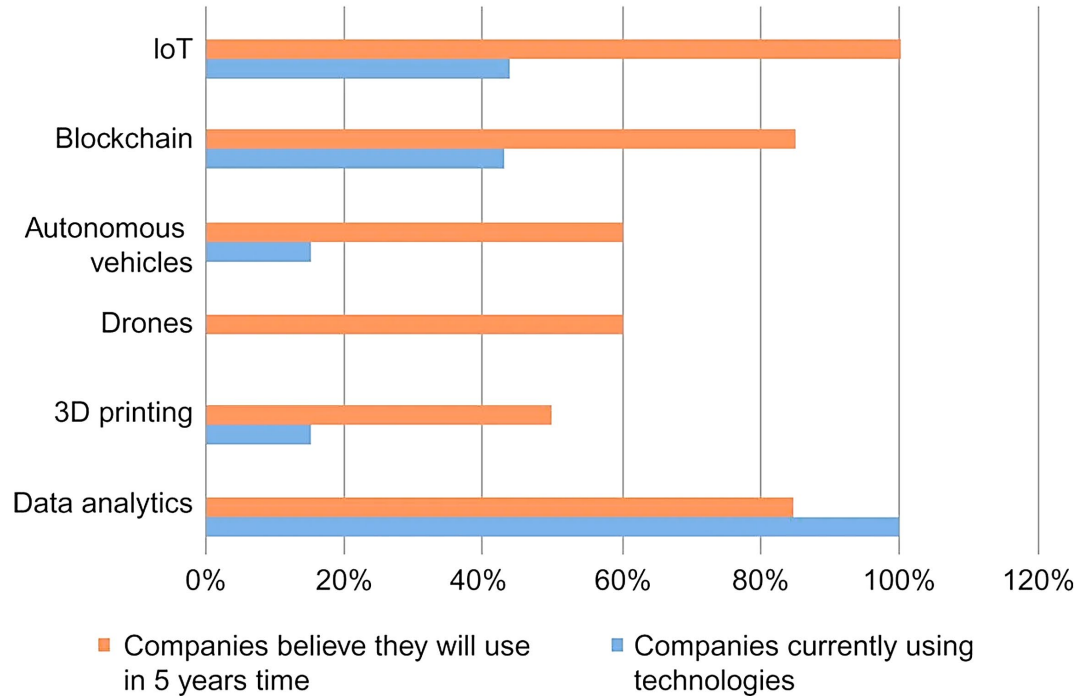


Growth Drivers



Data Analytic usage in Supply Chain Management

Companies currently using technologies for supply chain and projected use in 5 year time frame



(Pagano and Liotine, 2019)

BI roles in supply chain & logistics management



Demand forecasting

Insights on customer behaviours & ordering trends improve forecast accuracy & minimize inventory holding throughout supply chains



Operation excellence

Enhance KPIs controlling, better identify potential improvement areas, improve customer responsiveness



Optimization

Improve resources utilization, allow cost savings from lower resources & eliminate wastes in SC networks



Real-time visibility

Insights & analysis can be generated at real-time information is collected & mining in timely manner



Prevent disruptions

Various strategic plans can be simulated in replicated scenarios to see potential outcomes before selecting solution.



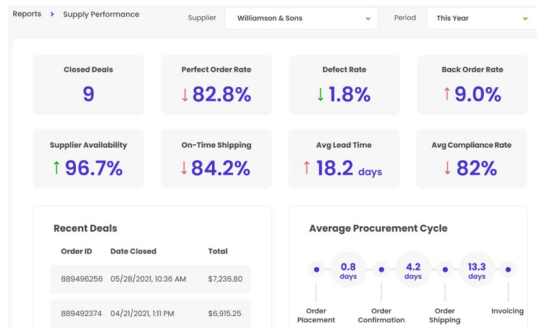
Collaboration

multiple users to access and work on data simultaneously, encouraging a data-driven culture across supply chain networks

A diagram illustrating a star graph structure. A central node, represented by a large blue circle with a white ring, is connected to several peripheral nodes. One peripheral node on the left is a small blue circle with a white ring, labeled with a brown 'S' next to it. Another peripheral node on the right is a small blue circle with a white ring, with three dots above it indicating a continuation of the graph. The nodes are connected by brown lines.

Order-to-Cash KPIs

ORDERS	FULFILLMENT	BILLING	RECEIVABLES
Orders Amount \$41,348 ▲	Orders Fill-Rate \$44.6% ▼	Billings \$47,484 ▲	Days Sales Outstanding 20.2
Orders Trends 	Fulfillment Trends 	Billing Trends 	DSO by Orders Range 
# Orders Current Month 98	Order Fulfillment 	Days Order to Bill - Current Month 1.29	Accounts Receivable \$752.2M
Avg Order Value - Current Month \$102.35 ▲		# Customers Billed 12	Last Month 6



Inventory Management Metrics

Period: 1 month

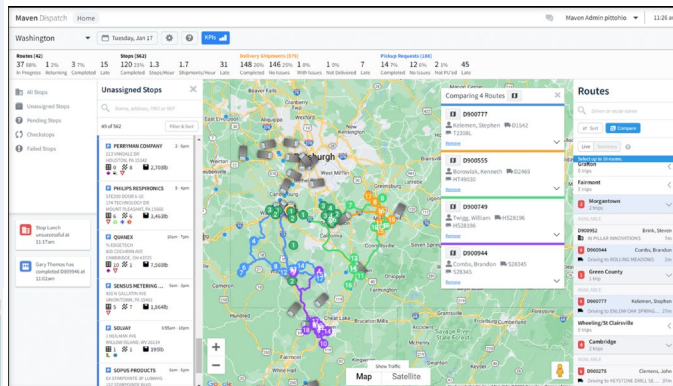
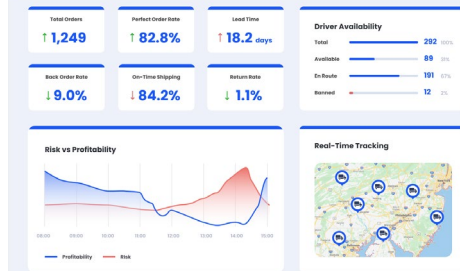
Inventory Turnover Ratio	Average Inventory	Cost of Goods Sold	Service Level
1.1	\$1,523,200	\$1,668,573	95.2%
Days to Sell Inventory	Lead Time	Perfect Order Rate	Rate of Return
16.2	14.1	94.7%	2.1%

Sales Orders

Completed	415
In Progress	32
Returns	11
Overdue Shipping	2

Inventory

In Stock Items	136
Out of Stock Items	12
Low Stock Items	4
Dead Stock Items	2



Warehouse Order Performance

Back Order Rate

Inventory Accuracy

Perfect Orders

Cash to Cash Cycle

Back Order Rate

Month	Back Order Rate (%)
Jan	5
Feb	2
Mar	8
Apr	55
May	85
Jun	95
Jul	95
Aug	65
Sep	90
Oct	98
Nov	95
Dec	100

Inventory Accuracy

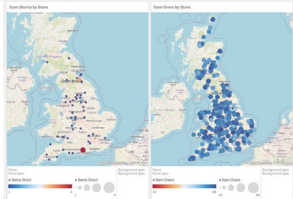
Month	Inventory Accuracy (%)
Jan	94
Feb	93
Mar	94
Apr	93
May	94
Jun	93
Jul	94
Aug	95
Sep	94
Oct	95
Nov	95
Dec	96

Perfect Orders

Month	Perfect Orders (%)
Jan	100
Feb	98
Mar	97
Apr	99
May	96
June	97
July	98
Aug	97
Sept	96
Oct	97
Nov	98
Dec	95

Cash to Cash Cycle

Quarter	Sales (%)	Inventory (%)	Payable (%)
G1	55	25	20
G2	50	30	20
G3	55	25	20
G4	50	30	20



Business Intelligence vs Business Analytic

Business Intelligence

BI is applications or technologies for gathering, integrating, storing, analysing, and presents relevant information of past & present data in visualization , enhancing informed decisions for current performance effectiveness.

Example: Data warehouse, Reporting, Dashboard

Business Analytics

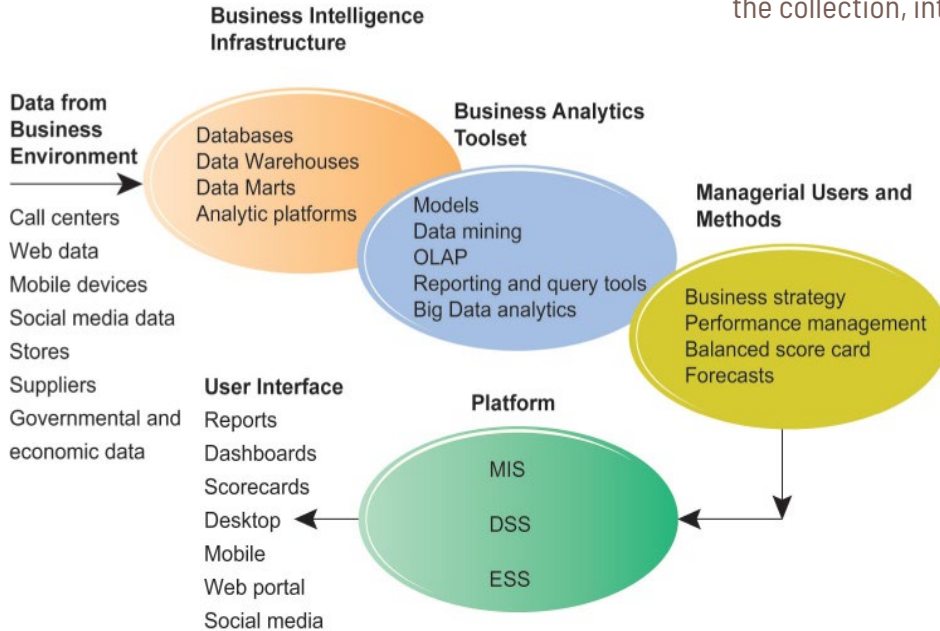
BA is the process or techniques for analysing & understanding past data to predict future opportunities or challenges to develop actionable strategic data-driven decisions for company's growth.

Example: online analytical processing (OLAP), statistics, predictive models, data mining.

- BI is considered as a part of BA for data integration, processing & presenting tool. While two are very different terms, they are not contradictory, actually they work towards a common goal – to help organizations improve decision-making.
- Both terms can be used interchangeably as BI software nowadays is able to support both functionality.

Components of Business intelligence

BI Systems are a set of technologies, processes, and tools that facilitate the collection, integration, analysis, and presentation of business data.

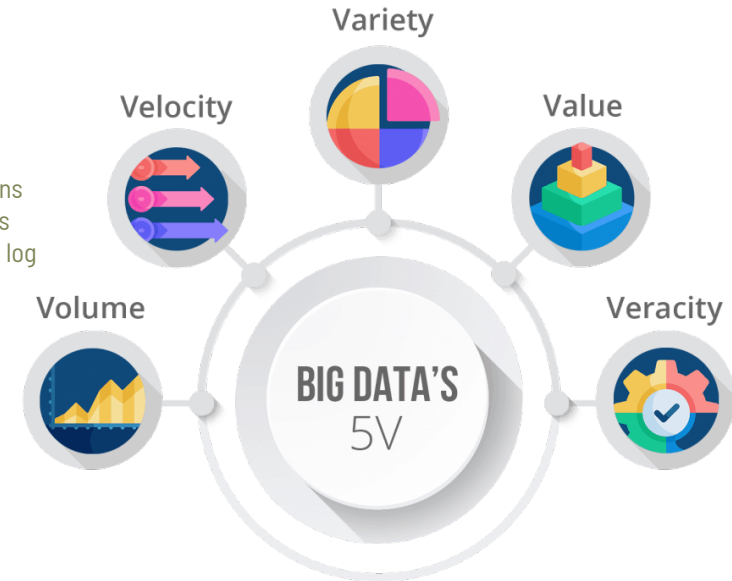
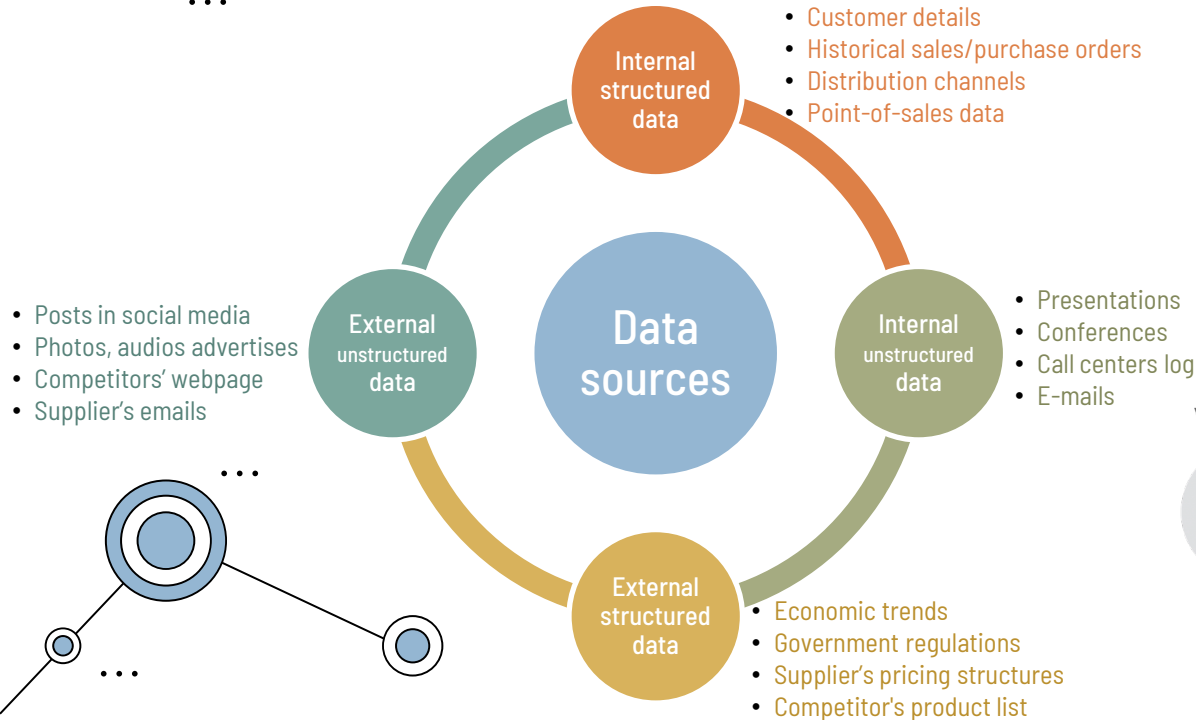


Components that drive BI to support decision-making includes;

1. Data from business environment
2. Business intelligence infrastructure
3. Business analytics toolset
4. Managerial users and methods
5. Delivery platform
6. User interface

1. Data from business environment

Big data need to be integrated & organized in order to be used for analysis & decision making



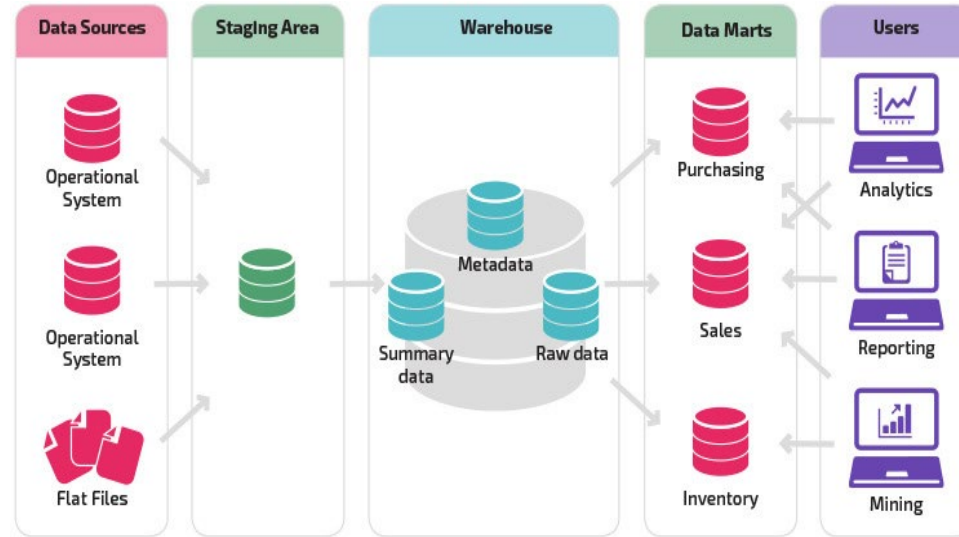
2. Business intelligence infrastructure



DATA WAREHOUSE

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A database stores current & historical data of potential interest for the decision makers throughout the company, extracted from all operation systems using within the company. Require high skills to analyse & present with global views of enterprise & relationships amongs business partners.



DATA MART

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A subset of data warehouse contain portions of focused data for a specific group of users in separated database. Provide more granular view for specific areas or business units by promoting ease of access & presenting with timely manner. Can support even for operational decisions.

The basic characteristics of data warehouses and data marts include;

- Organized by business dimension or subject
- Use online analytical processing
- Integrated
- Time variant
- Non-volatile

3. Business analytics toolset

01

OLAP Online Analytical Process
Multidimensional analysis

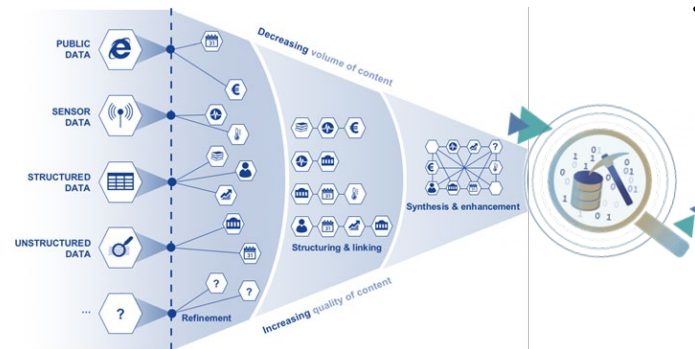
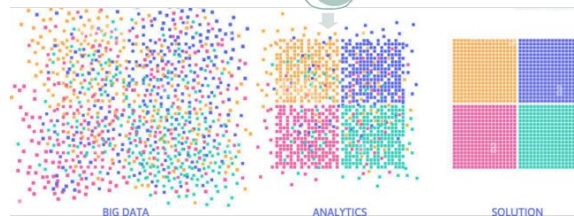
Multidimensional data analysis tool, rapid execution of complex analytical queries.



02

DATA MINING

Searching tool for hidden information, insights & Predictive Analysis

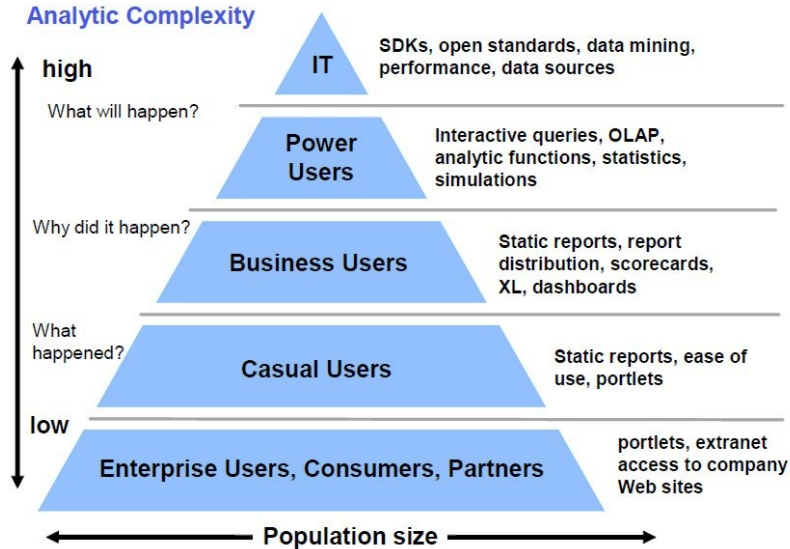


03

BIG DATA ANALYTICS

Uncovering tool from very large & complexity data sets

4. Managerial users and methods



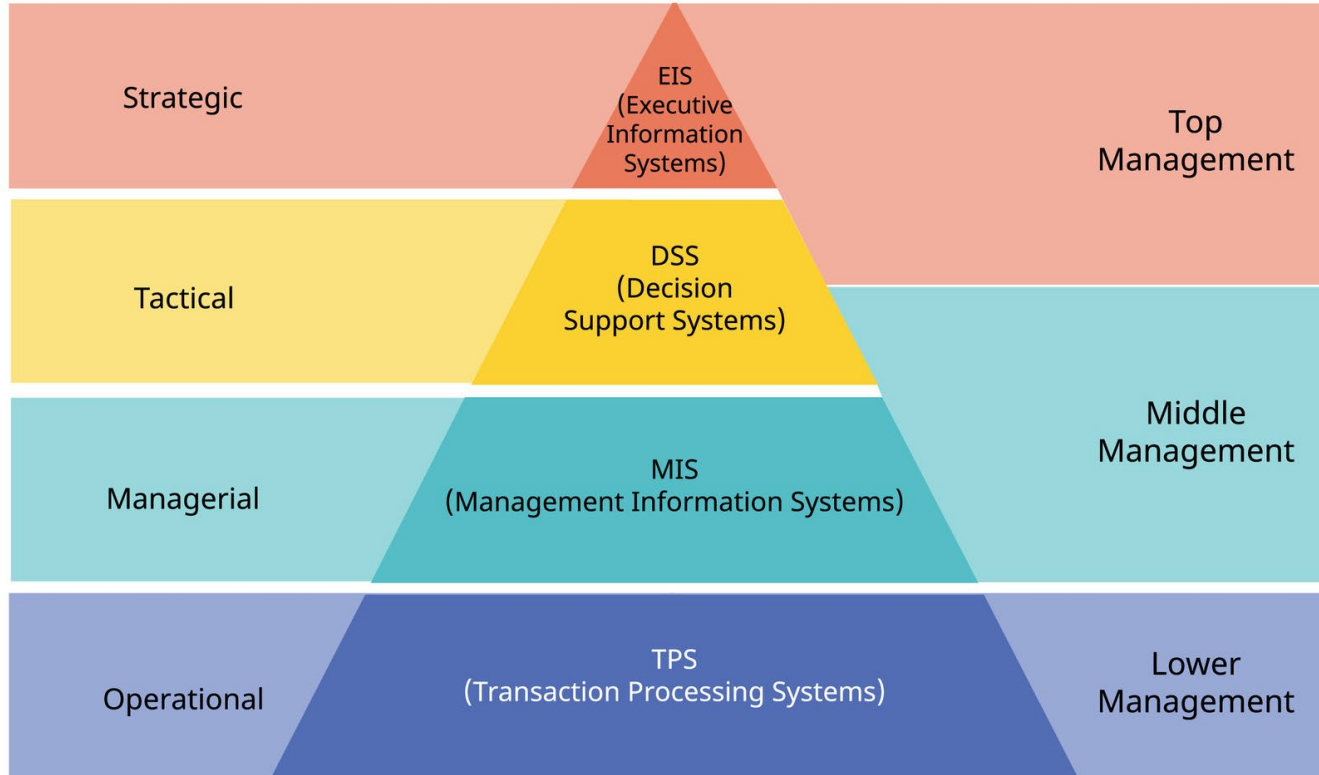
Business intelligence applications are only as intelligent as the human beings who use them.

Decision-makers, especially managers, have to ask the right questions or track the right bit of information.

Consumers & producers of reports must work closely together. Oversight management could result in wrong BI outputs that mislead or divert attention from the real issues.



5. BI delivery platform



6. User interface

Today's business intelligence & analytics software suites emphasize visualization techniques e.g. dashboards, scorecards.

Graphical representation of data can convey meaning of large amounts of data better than paragraphs of text.

Managers & employees who need to make decisions are now required to access on demand from not only from desktops but from other smart devices.



Management strategies for BI adoption

01

One-stop solution

Using same vendor for hardware & software

02

Multi best-of-breed

Select best database, warehousing & software package from best vendors

BI functionalities for decision making

Production reports

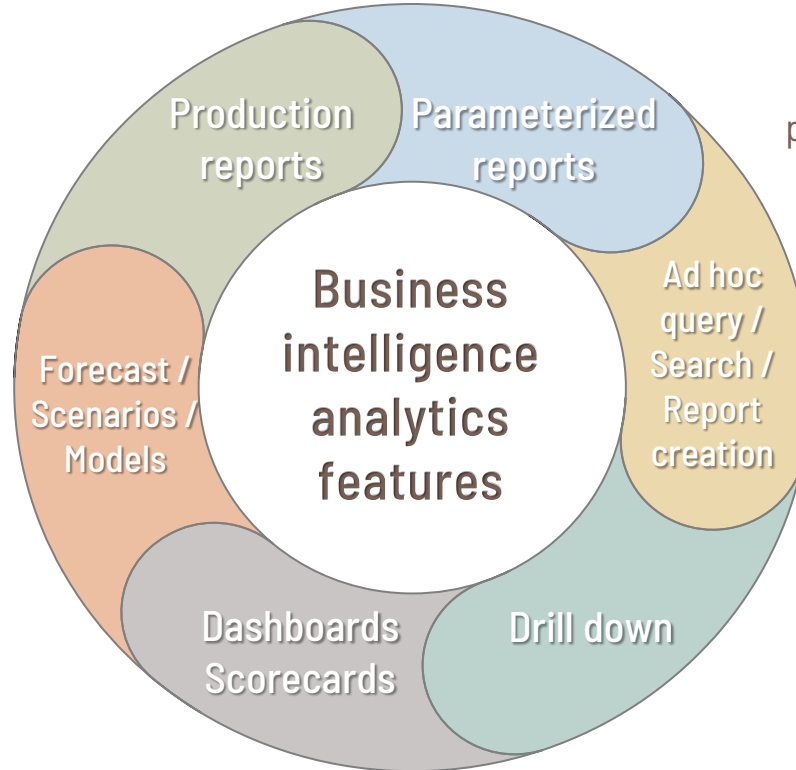
Pre-defined reports based on industry-specific requirements

Forecast/ scenarios/ Models

Ability to perform forecasting, what-if scenarios & statistical analysis

Dashboards/ scorecards

Visual tools for presenting information graphically



Parameterized reports

Users can assign parameters as in pivot table to filter data & distinguish impacts of parameters.

Ad hoc query/ search/report creation

Users can create their own reports base on queries & searches

Drill down

Ability to move from high-level comprehensive view to a more detail view

Types of analytics in BI applications

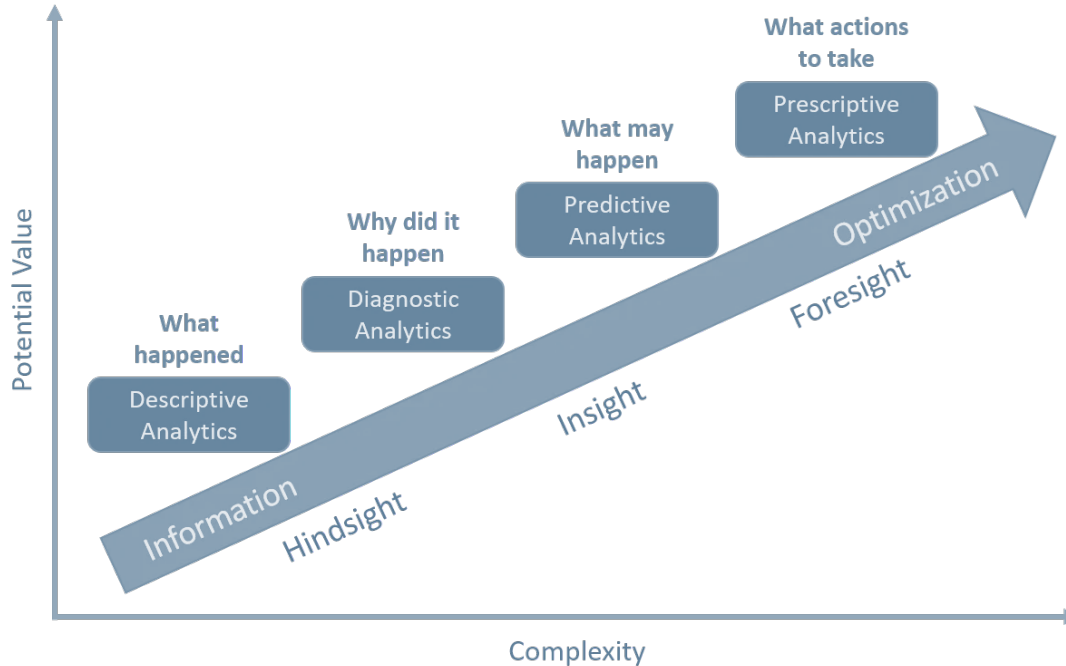
- BI tools employ many types of analytics to analyse data and support decision making in various aspects. ...

Descriptive Analytics

Provide historical insights & trends from past behaviours

Diagnostic Analytics

Identifying the correlation factors to determine the causes of trends



Predictive Analytics

Detect patterns and predict possible outcomes and future trends.

Prescriptive Analytics

Recommend actions to achieved the specified or predicted possible outcome

Challenges of adopting Business intelligence

Costly implementation

High costs of software
licensing, data warehousing,
advance analytics toolsets

Incentivised KPI hide the real performance

Real issues are masked
behind excluding variables

Technical knowledge required

Technical analysts needed
for complex visualization or
ad hoc analysis

Misaligning strategy

The BI-roadmap is not set
toward the organizational
strategic direction

Data governance & Privacy Concerns

Risk of data breaches and
other security threats

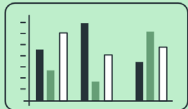


Top BI tools comparison

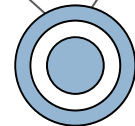


	Power BI	Tableau	Qlik
Free version	Yes, with limited functions	Yes, separated tool	Yes, with limited functions
Storage limit	Cloud storage 10 GB per subscription Charging applied for more storage	Cloud storage 100 GB	Cloud storage 500 GB
Deployment	On premise Cloud, only with Azure	On premise Some cloud servers e.g. Azure, AWS	On premise Cloud incl. SaaS service
Advanced Analytics capabilities	Forecasting, clustering, decision tree	Forecasting, clustering, drill down, filtering	Predictive analytics need more integration with another Qlik's product
Data connectivity	No connector or ETL required, interact directly with cloud storage	Has built-in connectors Has own data warehouse	Use in-memory technique No need for data warehouse
Visual capabilities	Simplest visualization to use	Most interactive & intuitive visualization	Interactive with AI assist on visual creation
Ease of learning	Relatively easy for non-technical beginners with some knowledge in MS excel & DAX	Offer drag-and-drop interface, drop list options. Need trainings for tool navigations	Required knowledge of scripting and data model, with mathematics expressions
Strength	Affordable, scalability, ease of use, simple but included essential functionalities	Ease-of-use, full ranges of interactive visualization, compatible with many OS & devices	Handling big data real-time with in-memory technologies, embedded AI supports, Mobility
Weak points	Cloud compatible with only Azure Window-only application Less interactive visualizations	Less integration than Power BI, interactions might get slower with more filtering.	Most expensive, inflexible data extraction capabilities.

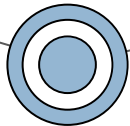
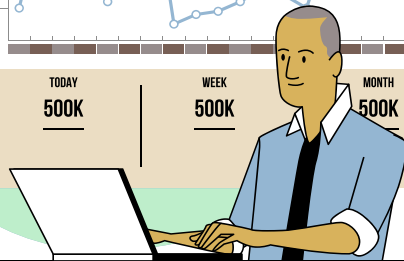
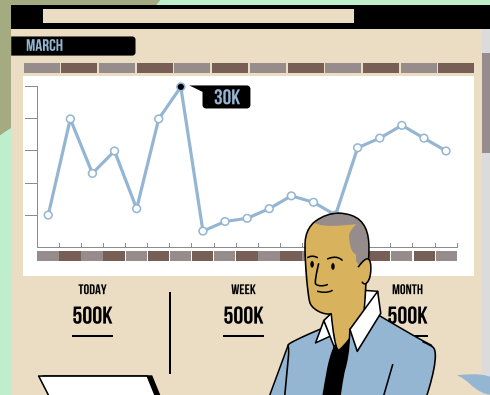
Thank you



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