MODULE 5

Implementing

Business

Intelligence

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Business Intelligence Platform

A business intelligence platform is a software solution that enables organizations to gather, analyze, and visualize their business data to gain valuable insights. It provides a centralized repository for storing data from various sources and offers tools for data analytics, reporting, and data visualization. With a business intelligence platform, businesses can make data-driven decisions, monitor key performance indicators, and identify trends and patterns to optimize their operations and drive growth.

Functional areas of BI Tools

Understand Data

Gather Data

A BI platform should facilitate the collection and consolidation of data from various sources, both internal and external to the organization. This involves integrating data from databases, spreadsheets, cloud services, and other relevant sources into a centralized location for further analysis.

o Once the data is gathered, the BI platform should provide tools and functionalities to explore, analyze, and gain insights from the data.
o This involves applying data modeling, statistical techniques, and data mining to uncover patterns, correlations, and trends within the data.

Visualize Data

An effective BI platform offers visualizations such as charts, graphs, and interactive dashboards to present data in a comprehensible and meaningful way. Visualizations aid in quickly identifying patterns, outliers, and key metrics, enabling users to derive actionable insights from the data.

Business Intelligence Platform Capability Matrix

A capability matrix for a business intelligence platform provides an overview of the features and functionalities it offers.

The Business Intelligence (BI) Platform Capability Matrix provides a comprehensive overview of the technical capabilities of BI platforms and evaluates leading products based on these capabilities. It serves as a valuable reference for understanding the capabilities of each vendor's shipping products.

BI Platform capability Matrix

Reports:

•Enable the creation of formatted and interactive reports with scalable distribution and scheduling capabilities.

•Support interactive reporting, allowing users to create, display, and save prompts that filter data and report layout.

•Handle various reporting styles (e.g., financial, operational, performance dashboards) using data from operational and analytical sources.

•Enable cascading parameters, maintaining specific views when navigating across reports.

•Provide search and navigation functionality within the reports and offer a repository for storing reports.

BI Platform capability Matrix

Dashboards:

Subset of reports that publish key performance metrics to a web-based interface with intuitive visualization elements such as dials, gauges, and traffic lights.

Present trend indicators, color-coded summaries, and state comparisons against established goals or thresholds.

Allow end users to create their own performance metrics.

Support real-time updates to reflect events or scheduled metric updates.

Enable complex alerts and notifications based on groups of related metrics.

BI Platform capability Matrix

Ad Hoc Query:

Empower end users to create custom reports through ad hoc queries.

Incorporate a business-friendly semantic layer that hides the complexity of underlying data sources.

Extend ad hoc query capabilities beyond just the data warehouse to a broader range of sources.

Address performance concerns by providing features such as aggregate awareness, caching, multi-pass SQL, query governance, performance auditing, and native SQL commands.

Facilitate the transformation of ad hoc queries into standard reports and publishing systems.

BI Platform capability Matrix

Microsoft Office Integration:

BI platforms act as the middle tier for managing, securing, and executing BI tasks, while Microsoft Office, particularly Excel, serves as the BI client.

Minimum integration includes rendering reports in Excel while preserving format and enabling data refresh.

Some BI platforms offer full functionality within Excel, including parameterized reporting, dashboards, scorecards, and OLAP.

Extended integration may encompass other Office applications such as Word and PowerPoint.

BI Capability Matrix

2.1 Infrastructure:

Evaluates how tightly the BI platform integrates various components, including security, metadata, administration tools, portal integration, object model, query engine, and shared look-and-feel.

A tightly integrated infrastructure allows for deploying all BI functionality with a single installation.

Vendors with aggressive acquisition strategies may face challenges in maintaining a well-integrated infrastructure.

BI Capability Matrix

2.2 Metadata:

Strong metadata support is crucial for a BI platform. All tools should leverage the same metadata, and the platform should provide robust capabilities to capture, store, reuse, and publish metadata objects.

BI Capability Matrix

2.3 Development:

BI platforms should offer programmatic development tools and a software developer's kit (SDK) to create BI applications and integrate them into business processes or embed them in other applications.

Additionally, the platform should enable developers to build BI applications without coding by providing wizards and drag-and-drop tools for a graphical assembly process.

BI Capability Matrix

2.4 Workflow and Collaboration:

This capability enables BI users to share and discuss information through public folders or discussion threads, as well as integrate BI results within specific business processes.

The BI application should support assigning and tracking events or tasks to specific users.

Workflow and collaboration features are often delivered through integration with separate portal or workflow tools.

BI Capability Matrix

3.1 OLAP (Online Analytical Processing):

Enables end users to analyze data with fast query and calculation performance, allowing for "slice and dice" analysis.

BI platforms should support various storage architectures (relational, multidimensional, in-memory) and provide user-friendly functions and dimension member management.

Additional features include sorting/ranking, alternate hierarchies, inter-row calculations, asymmetric hierarchies, and drill-down capabilities on measures.

BI Capability Matrix

3.2 Visualization:

   Enhances data display by using interactive pictures and charts instead of traditional rows and columns.

   BI platforms should support projecting multidimensional data in a visually appealing manner using size, shape, and color to represent dimensionality.

   The ability to project data onto physical design surfaces (e.g., a store, airplane, or stadium) may also be evaluated.

BI Capability Matrix

3.3 Predictive Modeling and Data Mining:

Enables organizations to use advanced mathematical techniques to classify categorical variables and estimate continuous variables.

BI platforms should provide capabilities for predictive modeling and basic comparative statistics.

Predictive modeling aids in anticipating business outcomes, facilitating better planning and optimization of processes.

BI Capability Matrix

3.4 Scorecards:

Extends the metrics displayed in a dashboard by aligning them with strategic objectives on a strategy map. Scorecards often involve using performance management methodologies like the "balanced scorecard" framework or Six Sigma.
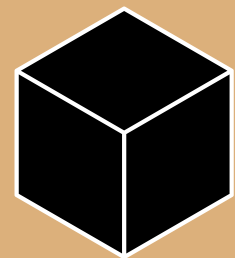BI platforms should support the creation and visualization of scorecards, connecting key performance metrics with strategic goals.

Components of BI Capability Matrix

Data Integration

Data extraction from various sources
Data transformation and cleansing
Data loading into a centralized repository

Data Modeling

Data Analysis and Reporting

Creation of data models for efficient data storage and retrieval
Design and implementation of data structures for analysis and reporting

Ad-hoc querying and data exploration
Interactive dashboards and visualizations
Advanced analytics and statistical modeling
Scheduled and automated report generation

Data Visualization
Rich visualizations, such as charts, graphs, and maps
Interactive and customizable dashboards
Drill-down and filtering capabilities for deeper insights

Components

Self-Service Analytics

o User-friendly interfaces for non-technical users

o Drag-and-drop functionality for creating reports and dashboards

o Data discovery and exploration tools

Collaboration and Sharing

Sharing of reports and dashboards with team members

Collaborative features for discussions and annotations

Controlled access and permissions for data sharing

Data Security and Governance

Role-based access control

Data encryption and protection

Compliance with data privacy regulations

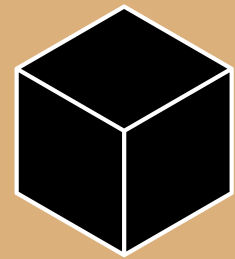# Components of BI Capability Matrix

Scalability and Performance

- Ability to handle large volumes of data
- Efficient data processing and query optimization
- High availability and reliability

Integration and Connectivity

Integration with various data sources and systems

API support for data integration with external applications

Connectivity to cloud-based services and databases

Mobile and On-the-Go Access

Mobile-friendly interfaces and responsive design

Access to reports and dashboards on mobile devices

Offline capabilities for data access in remote locations

BI Target Databases

Exclusive template ready to be customized for your presentation. Exclusive template ready to be customized for your presentation.

Types of BI Target Databases

Relational Databases:

Traditional relational databases like Oracle, Microsoft SQL Server, MySQL, and PostgreSQL are widely used for BI.

They provide structured data storage and offer robust querying capabilities.

Relational databases are suitable for handling large volumes of data and complex data relationships.

Online Analytical Processing (OLAP) Databases:

OLAP databases are optimized for multidimensional analysis.

They store pre-aggregated data to enable fast querying and slicing and dicing of data.

Examples of OLAP databases include Microsoft Analysis Services, Oracle OLAP, and IBM Cognos TM1.

Data Warehouses:

Data warehouses are specifically designed for BI and analytics.

They integrate data from various sources and provide a consolidated view for reporting and analysis.

Popular data warehouse platforms include Snowflake, Amazon Redshift, and Google BigQuery.

Columnar Databases

Columnar databases store data in a column-wise format, enabling efficient compression and fast query performance.

They are suitable for analytical workloads and data-intensive BI applications.

Popular columnar databases used in BI include Amazon Redshift, Google BigQuery, and Apache Cassandra.

Types of BI Target Databases

NoSQL Databases

NoSQL databases, such as MongoDB, Cassandra, and HBase, are non-relational databases that offer flexible data models.

They can handle unstructured and semi-structured data and support high scalability and performance.

NoSQL databases are often used in BI for handling big data and real-time analytics.

In-Memory Databases:

In-memory databases store data in the computer's main memory for faster data access and processing.
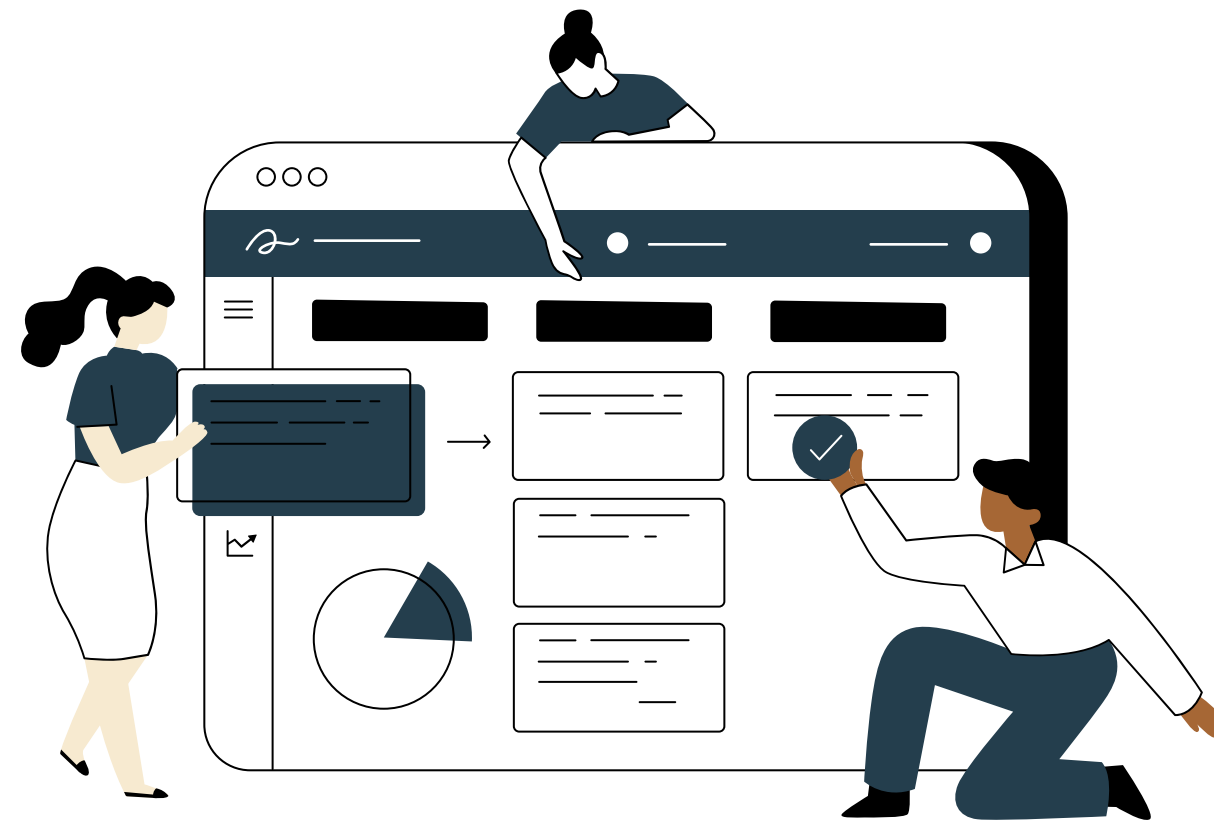
They are suitable for real-time analytics and interactive data exploration.

Examples of in-memory databases used in BI include SAP HANA, Oracle TimesTen, and Apache Ignite.

BI Products and Vendors

Common Features

o BI products typically include functionalities like data connectors to various data sources, data transformation and cleansing capabilities, and data modeling tools.

o They offer interactive dashboards, reports, and visualizations for data exploration and analysis.

o Advanced analytics features, such as predictive analytics, machine learning, and data mining, may also be available in some BI products.

BI Products

o BI products encompass a wide range of software tools and platforms designed to collect, analyze, and visualize data for business insights.

o These products offer features such as data integration, data modeling, ad-hoc querying, reporting, data visualization, and advanced analytics.

o BI products can be on-premises software, cloud-based solutions, or hybrid models, providing flexibility in deployment options.

Vendor Differentiation

A Each BI vendor has its own strengths and focuses on different aspects of BI, such as ease of use, data visualization capabilities, advanced analytics, or integration with specific data sources.

B Vendors may also offer additional services, such as consulting, training, and customer support, to help organizations effectively implement and utilize their BI products.

C When selecting a BI product, organizations should consider factors like their specific business requirements, scalability, ease of use, integration capabilities, pricing models, and vendor support.
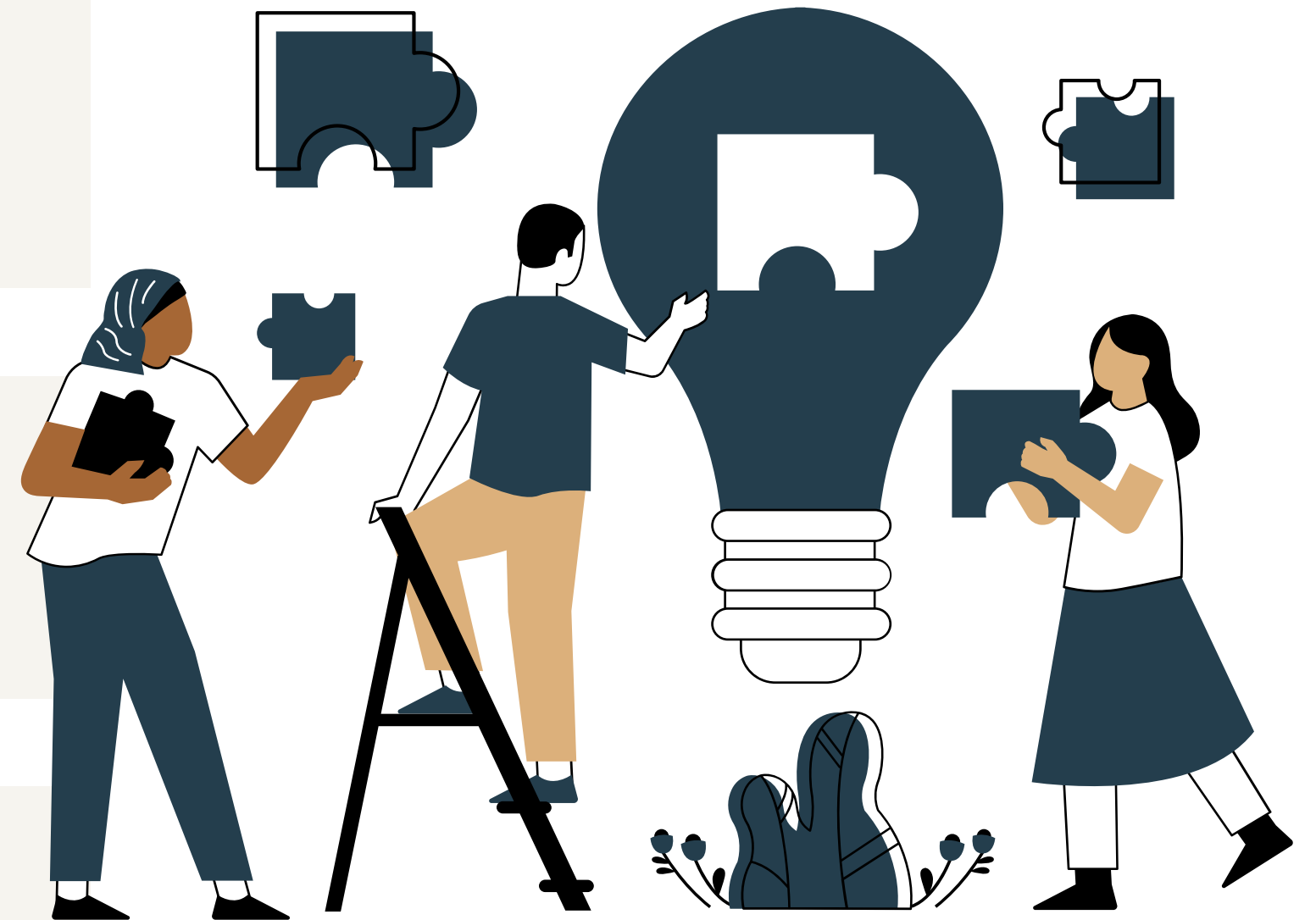
Popular BI Vendors

- Several well-established vendors dominate the BI market, including: Microsoft Power BI
- Tableau
- QlikView
- IBM Cognos
- SAP BusinessObjects
- MicroStrategy
- Oracle Analytics Cloud
- Salesforce Einstein Analytics
- SAS Business Intelligence

The Big Four Business Intelligence vendors

The Big Four Business Intelligence (BI) vendors refer to the four major players in the BI market that have a significant presence and market share. These vendors are known for their comprehensive BI solutions and widespread adoption across industries

Microsoft Power BI

It provides intuitive data visualization, interactive dashboards, and self-service analytics capabilities.

Power BI integrates well with other Microsoft tools and technologies, such as Excel and Azure.

Power BI is a widely used and highly regarded BI platform offered by Microsoft.

Qlik

o Qlik offers a robust BI platform known for its associative data model and data discovery capabilities.

o It enables users to explore data intuitively, make associations across multiple data sources, and uncover insights.

o Qlik provides self-service analytics, powerful data visualization, and collaboration features.
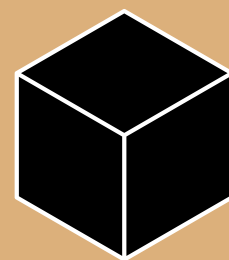
Tableau

o Tableau is renowned for its user-friendly and powerful data visualization capabilities.

o It allows users to create visually appealing and interactive dashboards and reports.

o Tableau supports advanced analytics and offers a range of data connectivity options.

SAP BusinessObjects

o SAP BusinessObjects is a comprehensive BI suite offered by SAP, a leading enterprise software company.

o It provides a range of tools and applications for reporting, ad-hoc analysis, data visualization, and data exploration.

o SAP BusinessObjects integrates with other SAP products and offers extensive enterprise-level capabilities.

BI Components and Architecture
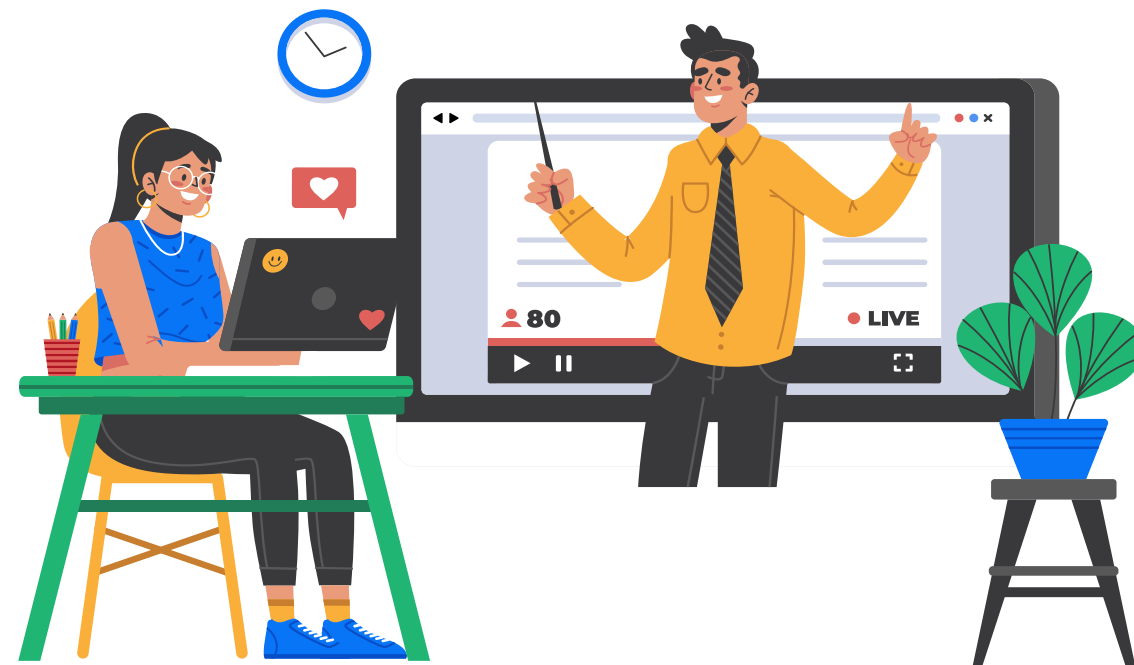
Data Sources

Various data sources, such as databases, data warehouses, cloud services, and external systems, provide the raw data for business intelligence.

Data Integration

Data integration processes extract, transform, and load (ETL) data from different sources into a unified format suitable for analysis and reporting.

Data Storage

The data storage component includes data warehouses, data marts, or data lakes where the integrated and transformed data is stored for efficient retrieval and analysis.

Data Modeling

Data modeling involves creating logical and physical data models that define the structure and relationships of the data for analysis purposes.

Business Intelligence Tools

BI tools provide a user interface for interacting with the data, conducting analysis, and creating visualizations, reports, and dashboards.

These tools can include data discovery and exploration tools, reporting tools, data visualization tools, and self-service analytics platforms.

Analytics and Reporting

Analytics capabilities enable users to perform complex calculations, statistical analysis, and predictive modeling on the data.

Reporting features allow the generation of predefined or ad-hoc reports based on the analyzed data.

Data Presentation:

Data presentation components focus on visualizing the analyzed data through interactive dashboards, charts, graphs, and other visual elements.

These components make it easier for users to understand and interpret the insights derived from the data.

Collaboration and Sharing:

Collaboration features enable users to share insights, reports, and dashboards with others, fostering collaboration and knowledge sharing within the organization.

Security and Governance:

Security and governance components ensure that data is protected, access is controlled, and compliance with regulations and policies is maintained.

These components include user authentication, data encryption, data privacy measures, and data governance frameworks.

Data Mart

• A structure/access pattern specific to data warehouse environments

• Subset of a data warehouse focused on a single subject or business line

• Provides faster access to specific data for teams or departments

Purpose of Data Mart

• Isolate data sets for specific teams to request and access relevant data

•Simplify data retrieval and analysis by focusing on specific business needs

•Eliminate the need to search through complex data warehouses or aggregate data manually

Benefits of Data Marts

o Faster access to data and insights for targeted business functions

o Improved efficiency in data retrieval and analysis

o Reduced complexity by storing and managing data specific to business units

Use Case 1: Marketing Team's Brand Positioning:

• Request demographic information on customers who purchased a specific product during a particular period

• Use data mart to analyze customer data for better brand positioning

Use Case 2: Sales Representatives' Performance Tracking:

• Combine month-over-month and year-over-year sales data in a data mart

• View sales representatives' performance in a single dashboard for tracking and analysis

Use Case 3: Shipping Efficiency:

• Use a data mart to track the total time and cost of shipping orders

• Analyze overall shipping efficiency and cost by interacting with sales department data mart

Types of Data Mart

Dependent Data Marts

- Logical subsets of a physical subset of a higher data warehouse
- Data marts are treated as subsets of a data warehouse
- Data marts extract essential records from the data warehouse
- No need for data mart integration, Also known as a top-down approach

Independent Data Marts

- Independent data marts are created first, then a data warehouse is designed using these data marts
- Data marts are designed independently
- Integration of data marts is required
- Also known as a bottom-up approach

Hybrid Data Marts

- Combination of input from sources other than a data warehouse
- Useful for situations where ad hoc integrations are needed
- Can accommodate new groups or products added to the organization

Implementing Data Mart

Designing

Gather business and technical requirements.
Identify data sources.
Select the appropriate subset of data.
Design the logical and physical architecture of the data mart.

Populating

Extract data from the source systems identified in the design phase.
Transform and cleanse the data to ensure accuracy and consistency.
Load the transformed data into the data mart.
Perform regular data updates or refreshes to keep the data mart up to date.

Services

Constructing

Create the physical database and logical structures associated with the data mart.
Set up tables, indexes, and access structures based on the design.

Accessing

Provide appropriate tools and interfaces for users to access and query the data mart.
Define user roles and permissions to control data access.
Develop reports, dashboards, and analytical models to enable data analysis.
Implement data governance policies to ensure data quality and integrity.

Managing:

Monitor and maintain the data mart's performance and availability.

Conduct periodic data audits and quality checks.

Address any data integration or compatibility issues.

Continuously evaluate and optimize the data mart to meet evolving business needs.

Benefits of Implementing a Data Mart

Enhanced data quality and accuracy.
By focusing on a specific line of business or team, a data mart allows for more targeted data cleansing, integration, and validation processes. This ensures that the data within the data mart is highly accurate, leading to more reliable insights and decision-making.

Tailored analytics and reporting. A data mart can be designed to cater to the specific analytics and reporting needs of a particular business area. It can include pre-built reports, dashboards, and analytical models tailored to the users' requirements. This enables faster and more relevant insights, empowering users to make informed decisions.

Improved performance and efficiency.
Since a data mart contains a subset of data relevant to a specific department or team, query performance is generally faster compared to accessing a large enterprise data warehouse. This allows for quicker data retrieval and analysis, leading to improved operational efficiency.

Increased data autonomy and self-service.
With a data mart, business teams have the flexibility to access and analyze data on their own terms, without relying heavily on IT resources. They can explore and manipulate data, create ad-hoc reports, and derive insights without extensive technical knowledge or expertise, promoting a self-service data culture within the organization.

Benefits of Implementing a Data Mart

A Support for decision-making and strategy formulation. A data mart provides the necessary data and insights to support decision-making processes within a specific department or team. It enables users to identify trends, patterns, and correlations in the data, facilitating strategic planning, performance monitoring, and goal setting.

B Scalability and adaptability. Data marts can be designed to accommodate future growth and changing business needs. As new requirements emerge or the organization expands, additional data marts can be created or existing ones can be modified to incorporate new data sources and analytics capabilities.

Functional areas of BI Tools

Know your customers

o This involves gathering and analyzing data to gain insights into customer behavior, preferences, and needs.

o BI platforms help businesses collect and consolidate customer data from various sources, such as CRM systems, transactional databases, and marketing campaigns.

o By understanding customers better, businesses can personalize their offerings, improve customer satisfaction, and optimize marketing strategies.

Standardize Data Pipeline

o A data pipeline refers to the process of collecting, transforming, and preparing data for analysis.

o BI platforms facilitate the standardization of data pipelines by providing tools for data extraction, cleansing, integration, and transformation.

o Standardizing the data pipeline ensures consistent and reliable data across the organization, enabling accurate reporting and analysis.

Functional areas of BI Tools

Design the Data Access Layer for Different Use Cases

o The data access layer refers to the infrastructure and architecture enabling users to retrieve and interact with data stored in databases or warehouses.

o BI platforms offer capabilities to design and configure the data access layer based on specific use cases, such as ad hoc querying, report generation, and data exploration.

o Designing an efficient and user-friendly data access layer ensures that users can easily access the data they need for their analysis and reporting tasks.

Empower with Self-service

o Self-service BI empowers users to access and analyze data independently without relying on IT or data specialists.

o BI platforms provide intuitive and user-friendly interfaces that allow non-technical users to explore data, create reports, and generate insights.

o Self-service capabilities enable users to ask ad hoc queries, create personalized dashboards, and perform data visualizations, promoting a data-driven culture within the organization.

Functional areas of BI Tools

Modernize with Advanced Analytics

o Advanced analytics refers to the use of statistical modeling, data mining, machine learning, and predictive analytics techniques to uncover patterns, trends, and insights from data.

o BI platforms incorporate advanced analytics functionalities, enabling users to apply sophisticated algorithms and techniques to their data.

o By leveraging advanced analytics, organizations can gain deeper insights, make data-driven predictions, and discover hidden opportunities for growth and improvement.
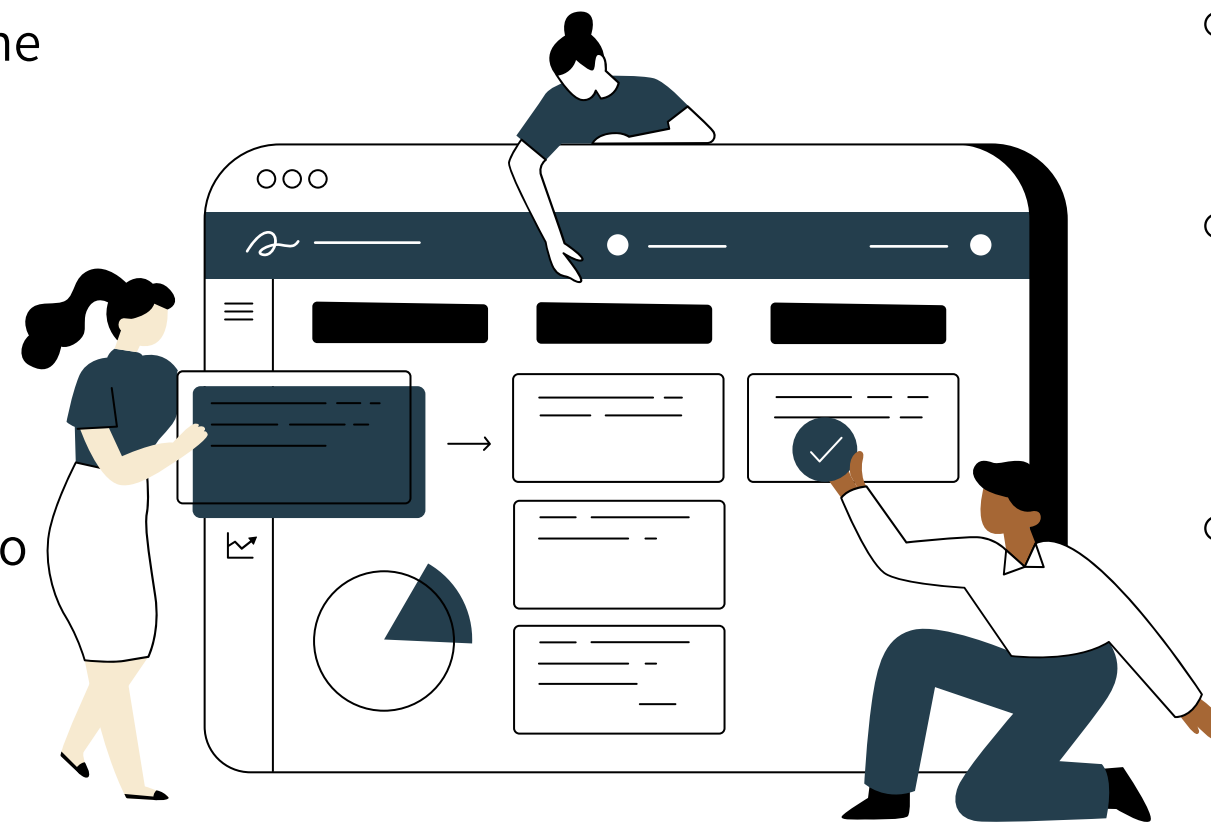
Monitor Usage for Continuous Improvements

o Monitoring the usage and effectiveness of BI tools and solutions is crucial for continuous improvement.

o BI platforms provide monitoring and analytics capabilities to track user engagement, adoption rates, and system performance.

o By analyzing usage patterns and user feedback, organizations can identify areas for improvement, optimize system performance, and enhance the overall user experience.

Performance Management and Scorecards:

BI tools support performance management by providing scorecards, key performance indicators (KPIs), and performance monitoring capabilities.

Users can track performance metrics, set targets, and monitor progress towards organizational goals.

Collaboration and Sharing:

BI tools enable collaboration and sharing of insights by allowing users to share dashboards, reports, and analysis results with others.

Users can collaborate, annotate, and comment on shared content, fostering teamwork and knowledge sharing.

Mobile BI:

Many BI tools offer mobile support, allowing users to access and interact with BI content on mobile devices.

Users can view dashboards, reports, and visualizations on the go, enabling real-time decision-making and analysis.

Data Governance and Security:

BI tools include features for data governance, ensuring data quality, consistency, and security.

Administrators can define access controls, user permissions, and data governance policies to protect sensitive data and comply with regulations.

Data Exploration and Discovery:

Some BI tools provide data exploration and discovery capabilities, allowing users to uncover hidden insights and patterns in data through interactive exploration and data discovery techniques.