



Business Intelligence - Introduction



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Course Outline

- **What is Business Intelligence? Overview**
- **Why is BI important?**
- **How does BI work?**
- **BI Problem Statement**

What is Business Intelligence?

Question

Write on a sheet of paper what Business Intelligence means to you ?

What is Business Intelligence?

Business Intelligence (BI) combines:

- Business analysis,
- Data mining,
- Data visualization,
- Data tools and infrastructure,
- Best practices to help companies make more data-driven decisions.

What is Business Intelligence?

History:

Traditional Business Intelligence first emerged in the 1960s as an information-sharing system between organizations. During the 1980s, BI evolved alongside computing models for decision-making and transforming data into information before becoming a specific offering from BI teams with IT service solutions:

- Development of reporting tools, statistics, and the use of operational databases.
- Development of small decision support systems based on spreadsheets (e.g., budget simulations, etc.).
- Development of expert systems (AI), rule-based systems, designed by extracting knowledge from one or more experts, with limited interest and results.
- Development of specific decision support systems: based on Operations Research (OR) techniques, simulation, optimization, etc.

What is Business Intelligence?

1990s - 2000s: The Rise of BI:

Information technology enabled the development of Data Warehouses (DWH).

New algorithms emerged:

Often derived from statistics and AI, enabling the extraction of information from raw data.

Allowing the extraction of new or hidden information, knowledge from data.

Integrated into Data Mining software.

Web data: Information retrieval (IR) and Web Mining for extracting data from the web.

What is Business Intelligence?

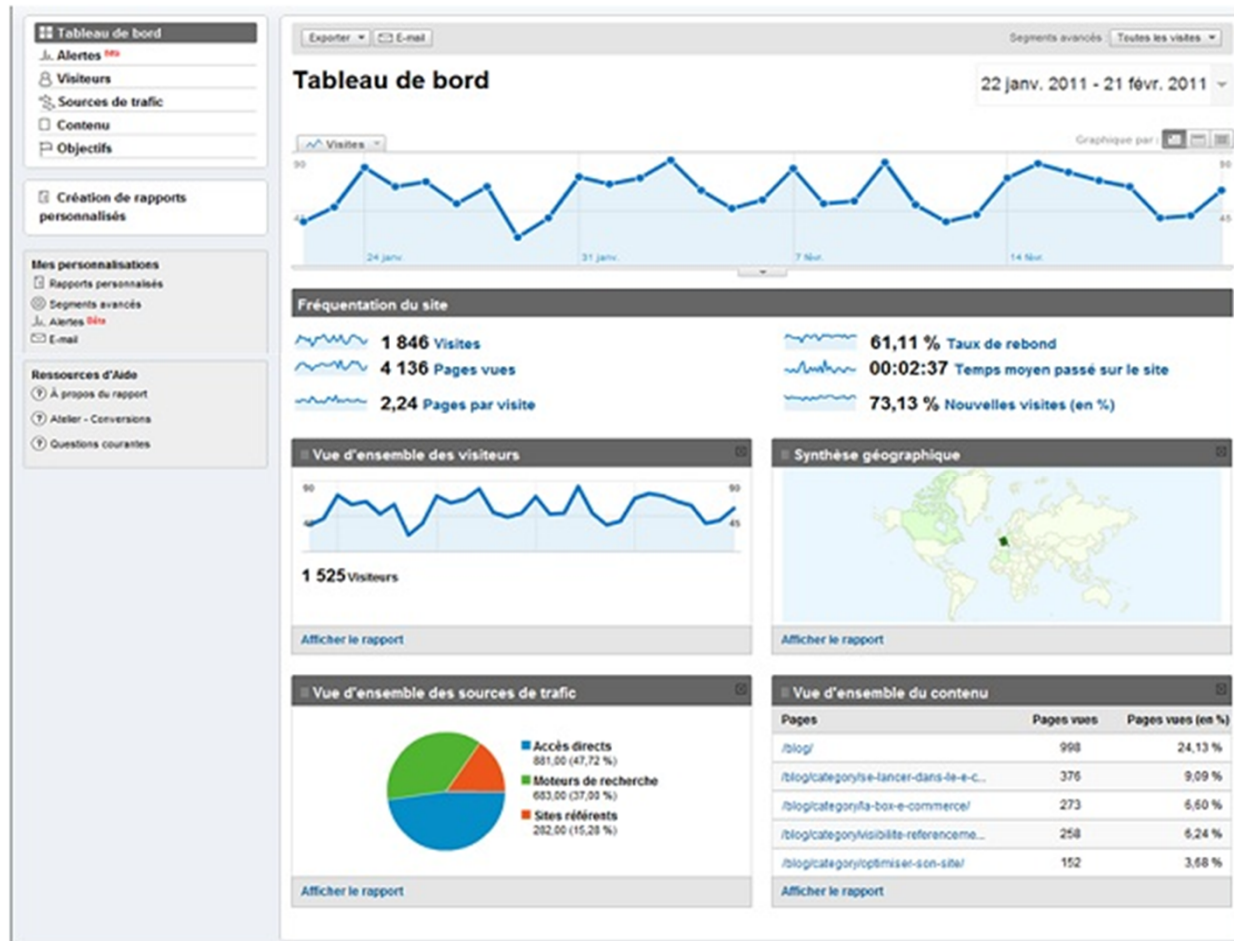
BI in the Context of Information Technology:

- Increasing computational power
- Growing storage capacity
- Ever-larger databases
- More powerful database management systems (DBMS) (parallelism, etc.)
- Integration with the web, etc.

What is Business Intelligence?



What is Business Intelligence?



Why is BI important?

Business Intelligence can help companies:

- Make better decisions by displaying current and historical data in a business context.
- Provide performance and competitive benchmarks to make the organization smoother and more efficient.
- Identify market trends more easily to increase sales or revenue.
- When used effectively, the right data can contribute to the overall development of the business.

Why is BI important?

Business Intelligence can help companies:

- Identify ways to increase profits
- Analyze customer behavior
- Compare data with competitors
- Track performance
- Optimize operations
- Predict success
- Spot market trends
- Identify problems and analyze their root causes

How does BI work?

Business Intelligence (BI) depends on two concepts: Objectives and Data Analysis.

- Companies and organizations have questions and goals: to address these questions and track performance against these goals, they gather :
 - the necessary data,
 - analyze it, and
 - determine the actions to take to achieve their objectives.
- Technically, raw data is collected from the company's activities. The data is processed and then stored in data warehouses. Once stored,
 - users can access the data,
 - initiating the analysis process to answer business questions.

How does BI work?

Business Intelligence (BI) encompasses data analysis and business analysis, but it only uses them within the context of the overall process.

BI assists users in drawing conclusions from data analysis.

Data analysts delve into the specifics of the data, employing advanced statistics and predictive analytics to uncover patterns and forecast future trends.

- Data analysis asks, "Why did this happen, and what might happen next?"
- Business Intelligence takes these patterns and algorithms and breaks down the results into actionable language.
- In short, organizations perform business analysis as part of their broader strategic intelligence strategy.
- BI is designed to address specific queries and provide a quick overview for decision-making or planning.

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BI Problem Statement

Business Intelligence (BI) is a set of processes, tools, and technologies to transform business data into accurate and up-to-date information to support decision-making processes:

Data Warehousing (DW)

On-Line Analytical Processing (OLAP)

Data Mining (DM) and Data Visualization (VIS)

Decision Analysis (what-if)

Customer Relationship Management (CRM)

BI can be considered the opposite of Artificial Intelligence (AI):

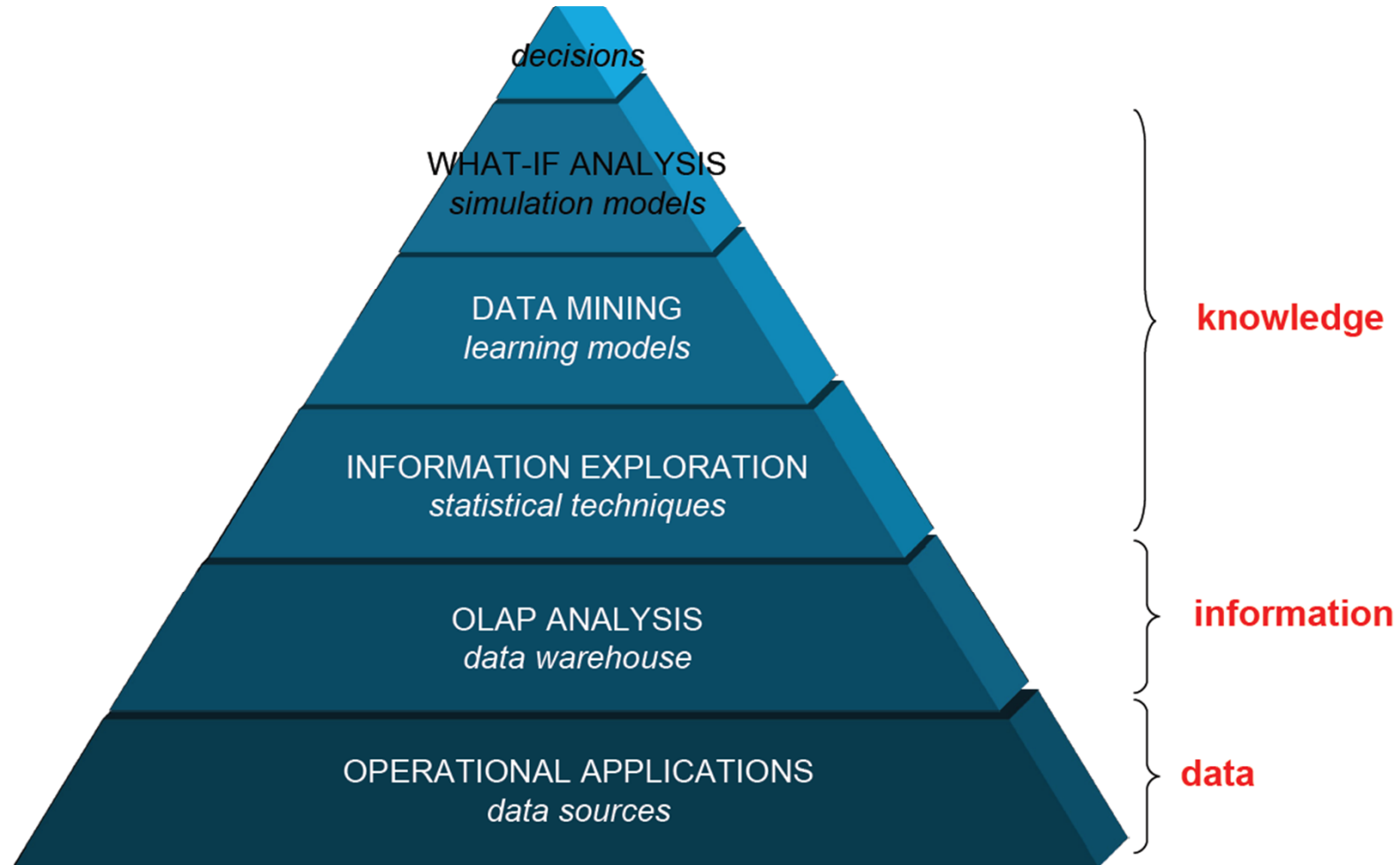
AI systems make decisions for users, while BI systems enable users to make informed decisions based on available data.

However, many BI techniques have their roots in AI.

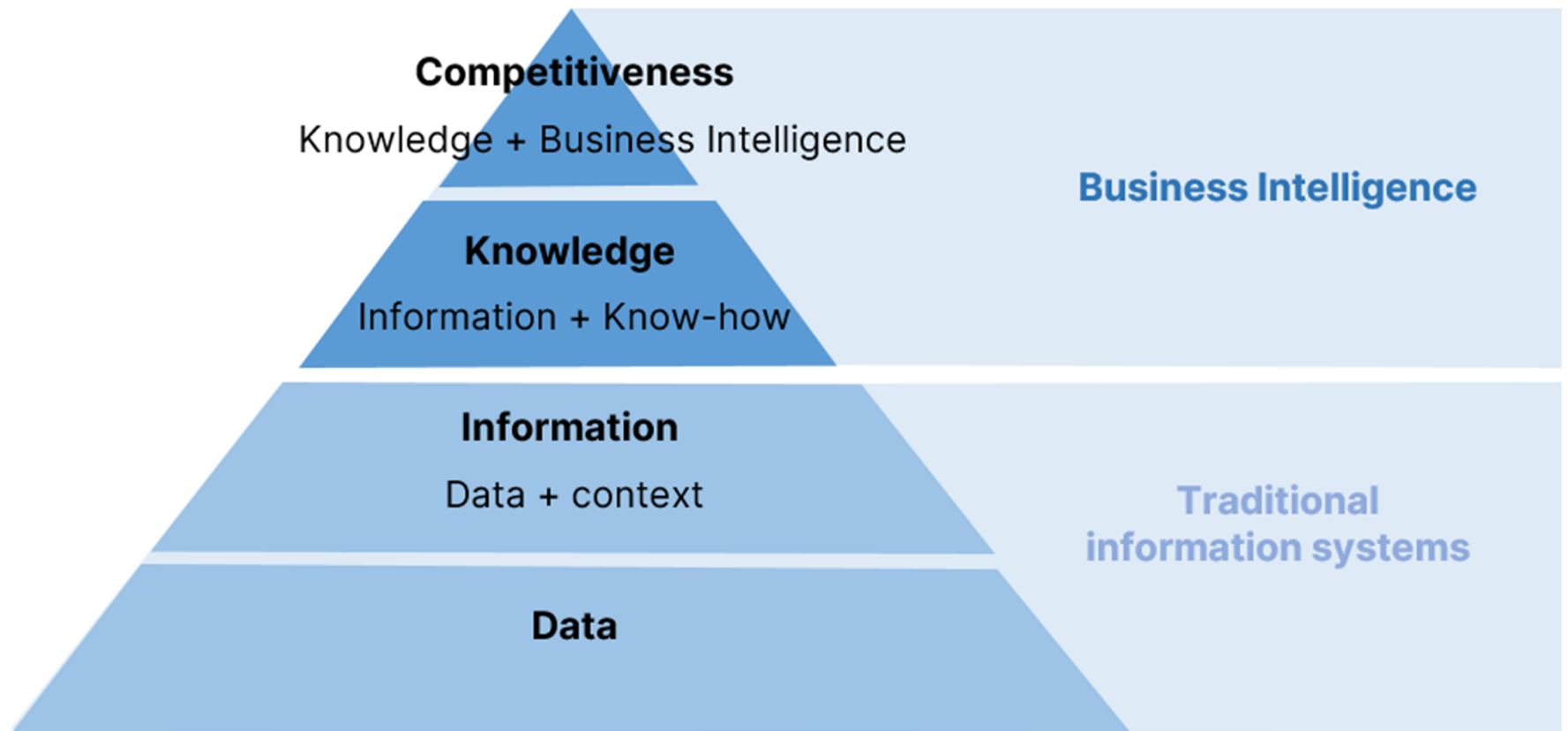
BI Problem Statement

Termes anglais	Termes français
Business Intelligence (BI)	<i>Informatique Décisionnelle (ID)</i>
Decision Support Systems (DSS)	<i>Systèmes d'aide à la décision (SIAD)</i>
Competitive Intelligence (CI)	<i>Intelligence Economique (IE)</i>
Data Warehouse (DW)	<i>Entrepôt de données (ED)</i>
On-Line Analytical Processing (OLAP)	<i>Analyse en ligne de données</i>
Knowledge Discovery in databases (KDD)	<i>Extraction de Connaissances dans les données</i>
Data Mining (DM)	<i>fouille de données, orpillage</i>
Customer Relationship Management (CRM)	<i>Gestion de la Relation Client</i>

BI Problem Statement



BI Problem Statement



BI Problem Statement

Complex and Unusable Operational Database Models:

Often difficult to understand

Do not pertain to a single business objective

Data from Operational Databases:

Identical across different databases

The same concept often defined differently

Tailored for operational systems (accounting, billing, etc.), not for analyzing business functions

Poor quality: missing data, inaccurate data, etc.

Volatile:

- Data is periodically deleted in operational systems (every 6 months)

- Data changes over time—no historical information

BI Problem Statement

La Business Intelligence (BI)

❖ Volumes des entrepôts et données massives

Evolution des unités de volumétrie des données :

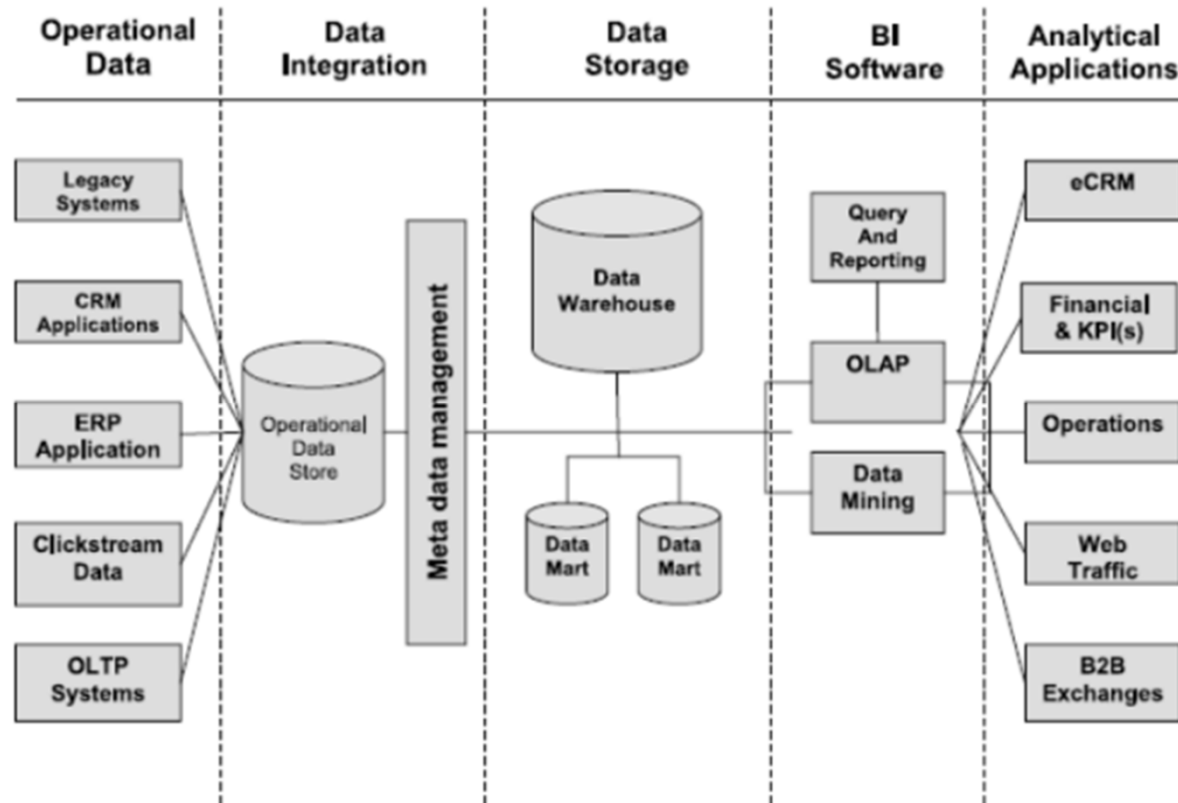
Unité	Symbole	Valeur	Observation
<i>Octet</i>	Octet		1 o représente un caractère d'imprimerie (8 bits)
<i>KiloOctet</i>	Ko	1 000 (1024)	30 Ko : une page de texte 100 Ko : image numérique basse résolution
<i>MegaOctet</i>	Mo	10 ⁶	5 Mo : un morceau de musique 500 Mo : un CD-Rom
<i>GigaOctet</i>	Go	10 ⁹	1 Go : 1 film de 2 heures 500 Go à un HD de PC
<i>TeraOctet</i>	To	10 ¹²	1 To : 6 millions de livres ; la moitié du catalogue de la BN de France 10 To : presque la volumétrie de la bibliothèque du Congrès Américain
<i>PetaOctet</i>	Po	10 ¹⁵	1 Po : 2 milliards de photos numériques de résolution moyenne 8 Po : très grande partie de l'information sur Internet
<i>ExaOctet</i>	Eo	10 ¹⁸	5 Eo : Toutes les informations produites jusqu'à 2003
<i>ZettaOctet</i>	Zo	10 ²¹	1,8 Zo : La totalité des informations produites jusqu'à 2011
<i>YottaOctet</i>	Yo	10 ²⁴	1 Yo : C'est ce que pourra traiter un data center simultanément

BI Problem Statement

De la donnée ... à l'action : Cycle de la BI



BI Problem Statement



BI Problem Statement

Example of BI-related Queries:

Q1: On October 11, 2013, find the 5 best-selling products for each product sub-category that represents more than 20% of sales in its product category.

Q2: As of December 15, 2012, determine the shipping priority and potential gross revenue of the orders with the 10 largest gross revenues among the orders that have not yet been shipped. Only orders from the book market segment are considered.

BI Problem Statement

```
SELECT p.ProductID, p.ProductName, SUM(od.Quantity) AS TotalSold
FROM Products p JOIN OrderDetails od ON p.ProductID = od.ProductID
WHERE o.OrderDate = '2013-10-11'
GROUP BY p.ProductID, p.ProductName
ORDER BY TotalSold DESC LIMIT 5;
```

```
SELECT o.OrderID, o.ShippingPriority, SUM(od.Quantity * od.UnitPrice) AS
PotentialRevenue
FROM Orders o JOIN OrderDetails od ON o.OrderID = od.OrderID
WHERE o.ShippedDate IS NULL AND p.CategoryID = (SELECT CategoryID
FROM Categories WHERE CategoryName = 'Books')
GROUP BY o.OrderID, o.ShippingPriority
ORDER BY PotentialRevenue DESC LIMIT 10;
```


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