

Business Intelligence (BI) for Cost Engineering

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Costing Manager



Helber Macedo



- Costing Manager at Baker Hughes – Subsea Projects
- Author of book A Practical Guide to Cost Engineering (Routledge 2023)
- Certified by AACE – CCP (2014)
- Member of AACE & CaSA
- Has over 18 years of experience in the energy industry.
- The author of a number of technical papers, developed and taught a variety of in-house cost estimating, construction, planning and industrial assembly courses for Petrobras.

Agenda

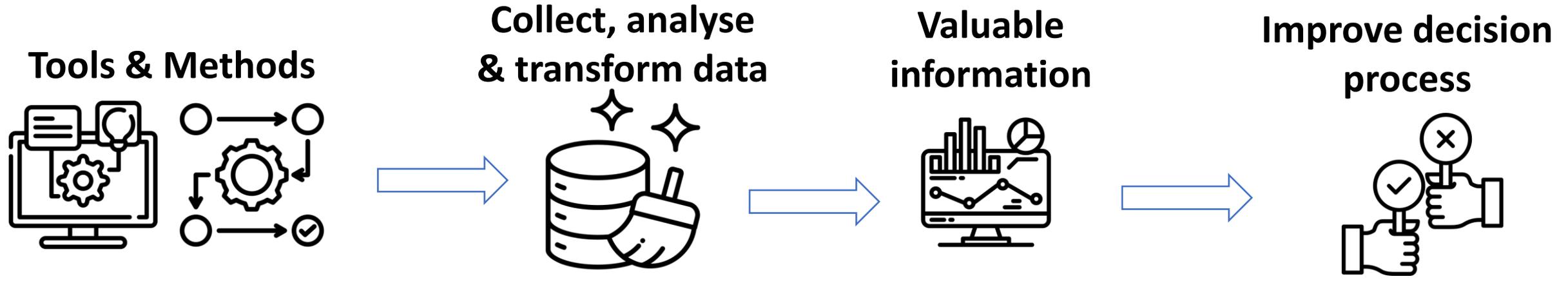
- BI definition
- Benefits
- Application
- Tools
- Process
- Database creation
- BI steps
- Challenges
- Q&A

Business Intelligence (BI) Definition

Business intelligence (BI) uncovers insights for making strategic decisions. Business intelligence tools analyze historical and current data and present findings in intuitive visual formats.

Microsoft

Business Intelligence (BI) Definition



BI Benefits

- Time optimization



- From static view to dynamic visualization



- Analysis improvement



- Multiuser



- Data navigation

BI Tools

- Power BI 

- Tableau  + a b l e a u

- Spotfire 

- And...



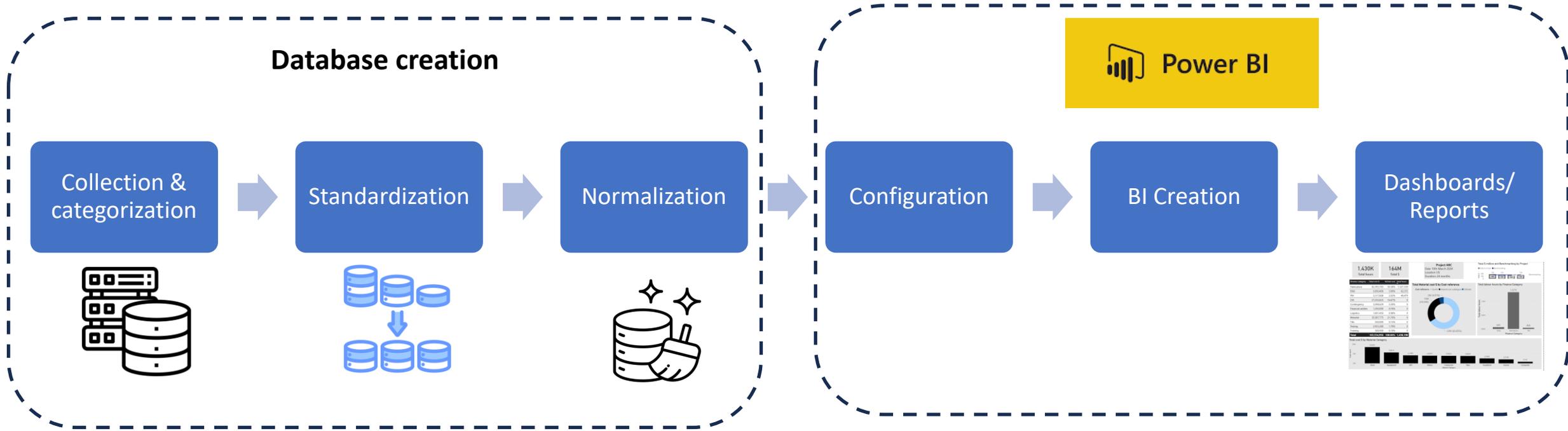
BI Applications Tools

- Project Control
- Cost review and validation
- Schedule analysis
- Benchmark and KPIs

Process

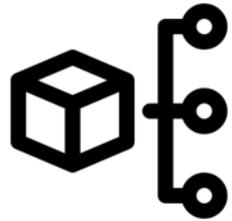


BI Process



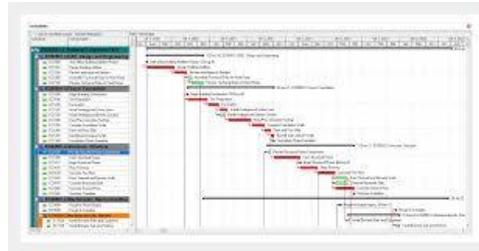
BI Process – Collection & Categorization

The step defines **what** and **when** the data is collected. Also, Categorization (e.g., cost and schedule) aims to reflect your process (e.g. Project Control for a period). It means that the database could be composed of different sources, such as schedule (e.g., P6) and costs (e.g., SAP).



What

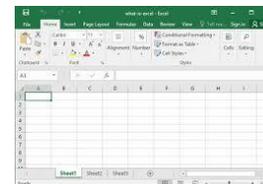
Schedule (P6)



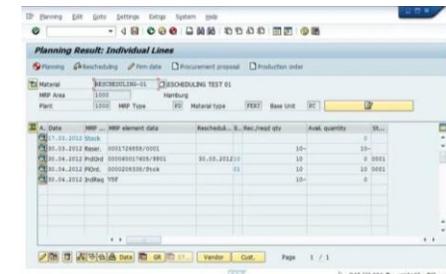
Cost estimation software



Other (e.g., Unit and currency conversion rates)



SAP (Cost database)



Calendar

2026 CALENDAR



Baker Hughes



Project Controls
EXPO
London, UK

BI Process - Standardization

The standardization aims to ensure that the data collection process is the same for all professionals. It could be automated, so it defines how the data is collected.

The standardisation means that the database should be formatted or should have the required info (columns) always in the same format. The reason is BI should be able to read the data from different projects and it is only possible if the database has the same format.



How

	A	B	C	D	E	F	G	H	I
1	ID	Description	Cost	A	B	C	D	...	N
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									



BI Process - Normalization

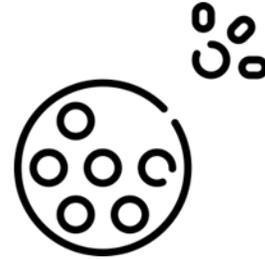
1 Data Study & Understanding



2 Data cleaning



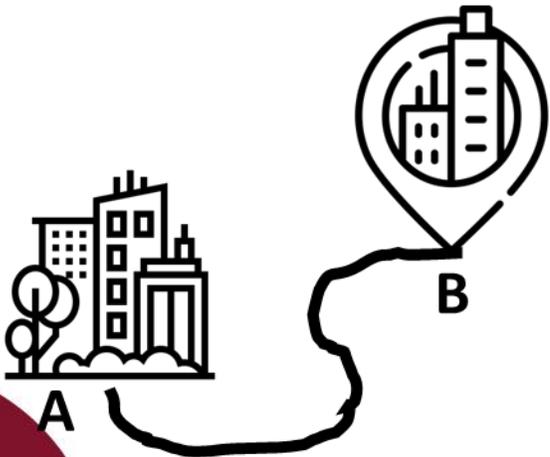
3 Outliers



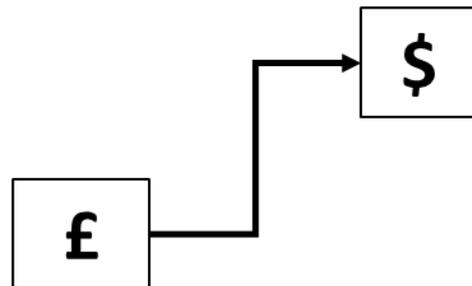
4 Escalation



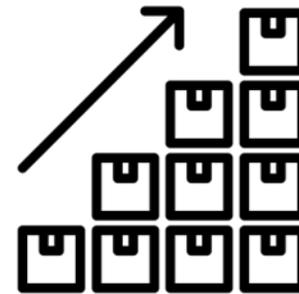
5 Location



6 Currency Rate conversion



7 Quantity



8 Statistics



BI Process - Configuration



Configuration is the first step in the BI tool. Configuration means preparing and transforming the database, such as removing columns or rows, creating new columns, deleting empty rows, etc.

The screenshot displays the Power Query interface. The main area shows a data table with the following columns: Part number, Custom factor, Description, Unit, Quantity, Grand total quantity, and Original cost. The 'APPLIED STEPS' pane on the right lists the following steps:

- Source
- Navigation
- Promoted Headers
- Changed Type
- Removed Columns
- Filtered Rows
- Changed Type1
- Inserted Year
- Changed Type2
- Added Conditional Column
- Renamed Columns
- Added Conditional Column1
- Renamed Columns1
- Added Conditional Column2
- Changed Type3
- Replaced Value
- Added Conditional Column3
- Added Conditional Column4

POWER
QUERY

BI Process - Configuration



Model view shows all of the tables, columns, and relationships in your model. This view can be especially helpful when your model has complex relationships between many tables.

The screenshot displays the Power BI Desktop interface in Model view. The ribbon at the top includes 'File', 'Home', and 'Help' tabs. The main workspace shows a data model with several tables and their relationships. The 'Unique Seats' table is selected, and its context menu is open, listing columns such as 'contractId', 'createdAt', 'email', 'firstName', 'lastName', and 'seatId'. The 'Connections' table is also visible, showing 'Recorded At' and 'Seat ID' columns. The 'Activities' table is connected to 'Unique Seats' with a 1 to * relationship. The 'TimeOfDay' table is connected to 'Activities' with a 1 to * relationship. The 'Fields' pane on the right shows the 'Properties' of the selected table. The bottom status bar indicates 'All tables'.

BI Process - Configuration



Model view shows all of the tables, columns, and relationships in your model. This view can be especially helpful when your model has complex relationships between many tables.

Cost estimation software



SAP (Cost database)

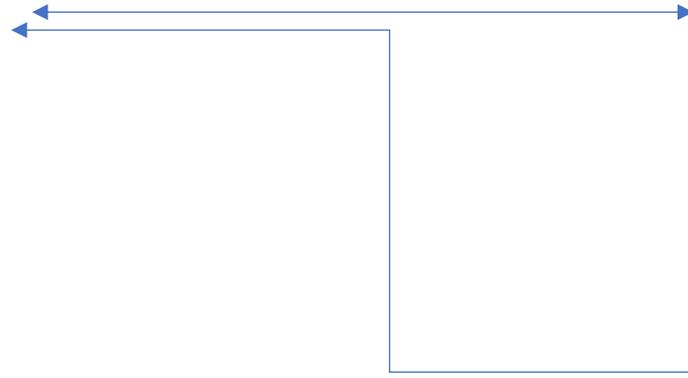


The screenshot shows a table with columns: Date, MRP, MRP element data, Searchable, Rec. Prod. Qty, Avail. quantity, and M... The table contains several rows of data with dates and numerical values.

Calendar

2026 CALENDAR

A grid of 12 monthly calendars for the year 2026, from January to December. Each calendar shows the days of the month and the corresponding day of the week.



BI Process – BI Creation



File Home Insert Modeling View Optimize Help

Clipboard: Paste, Copy, Format painter

Get data, Excel workbook, OneLake catalog, SQL Server, Enter data, Dataverse, Recent sources

Queries: Transform data, Refresh data

Insert: New visual, Text box, More visuals

Calculations: New visual calculation, New measure, Quick measure

Share: Sensitivity, Publish, Prep data for Copilot AI, Copilot

Share

1,430K
Total hours

164M
Total \$

Project ABC
Date 10th March 2024
Location US
Duration 24 months

Total \$ million and Benchmarking by Project

● Total \$ million ● Benchmarking

Project	Total \$ million	Benchmarking
1	180	155
2	164	155
3	155	155
4	150	155

Finance Category	Total cost \$	%Total cost	Total hours
Fabrication	82,393,783	50.38%	1,327,339
ENG	5,050,400	3.09%	62,372
PM	3,317,808	2.03%	40,479
CM	27,255,825	16.67%	0
Contingency	3,594,629	2.20%	0
Financial adders	1,250,000	0.76%	0
Logistics	1,601,450	0.98%	0
Material	35,587,775	21.76%	0
T&L	250,000	0.15%	0
Testing	2,933,280	1.79%	0
Training	300,000	0.18%	0
Total	163,534,950	100.00%	1,430,190

Total Material cost \$ by Cost reference

Cost reference: Quote (blue), Internal cost catalogue (black), Estimate (dark blue)

Cost reference	Value	Percentage
Quote	23M	65.85%
Internal cost catalogue	10M	29.24%
Estimate	2M	4.91%

Total labour hours by Finance Category

Finance Category	Total labour hours
ENG	62K
Fabrication	1,327K
PM	40K

Total cost \$ by Material Category

Material Category	Total cost \$
Steel	8,483K
Equipment	5,691K
SBT	4,169K
Valves	4,007K
Connector	3,932K
Pipe	3,852K
Insulation	2,566K
Sensor	2,074K
Computer	814K

Visualizations: Build visual, Filters, Values, Drill through, Cross-report, Keep all filters, Add drill-through fields here

Data: Search, Database test, Sheet1

Page 1

BI Challenges

BI Challenges

- Training
- Database quality
- Process knowledge (what and how you want to show the data)
- Continuous improvement
- Maintenance

Conclusion

Conclusion

- Business Intelligence can promote standardisation, time optimisation, and dynamic data visualisation.
- BI is not magic; if the cost database is poor, the dashboard will not be robust and can lead to misinterpretation and errors.
- Training and continuous improvements are key to successfully implementing BI in organizations.

A Practical Guide To Cost Engineering

40% discount

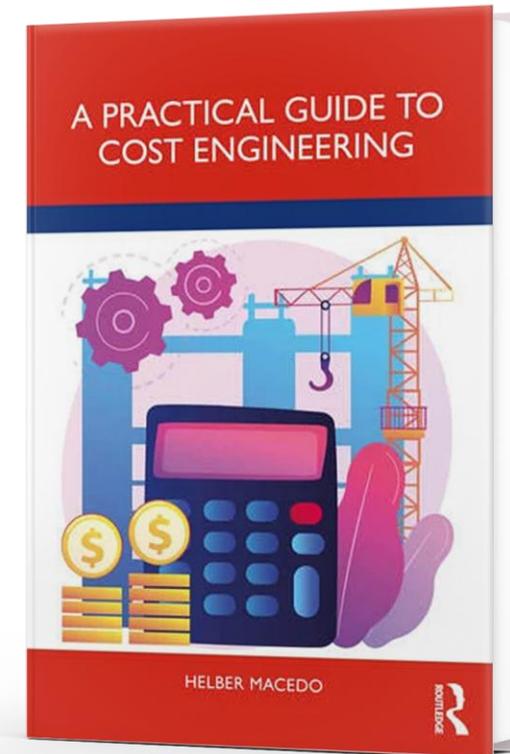
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visit www.routledge.com

Direct link to the book:

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**Thank you!
Questions?**

**Thank
You**