
ADVANTAGES OF MAKING A DASHBOARD WITH A BUSINESS INTELLIGENCE PLATFORM COMPARE TO OTHER REPORTING SOFTWARE.

ABSTRACT-

A Business Intelligence (BI) dashboard is a tool that transforms information and displays Key Performance Indicators (KPI) and metrics to assess the organization's performance. Besides, it is a powerful application to elaborate on the dashboard with big data. It is also more useful for the main reports to project managers, project directors, and executive managers.

Can Business Intelligence's applications provide efficiency of use of resources, the stability of administration of the information, scalability to share spreadsheets or data, and avoid indifference from managers of watching the reports generated?

What other advantages of making a dashboard with Business Intelligence platforms compare to other reporting software?

This research is important:

- To determine the advantages of Business Intelligence over other report software
- To define the main attributes to choose a Business Intelligence dashboard tool.
- To decide what challenges executive managers have to overcome to use a Business Intelligence dashboard.

This paper concluded the following:

- BI platform does not offer any advantage compared to other reporting software. The author has not perceived any benefit elaborating on the charts because it was not intuitive to set figures and parameters. Dundas BI online version is the platform that replicates most of the metrics.
- A BI dashboard tool should include attributes, the modification of arrangements, or formats of data source. Online versions do not include this feature. Also, online versions do not include all the charts listed in the manuals and other characteristics as assigning more values to a secondary axis. And the most important is that BI platforms should be more intuitive in setting the parameters of different axis.
- The challenges that executive managers have to overcome to get the full value of BI applications are that not all the information is replicable in BI dashboard tools. Also, as they are not intuitive, a skilled manager with an advanced level of MS Excel might discourage him/her from using BI tools. Another



factor that might stop using BI tools is that Data Source uses different formats from different supporting areas. It should be standard. And finally, a good challenge should be to train project team members in using significant amount of data with several dimensions to use charts that are more interactive with users in selecting and in filtering to report specific indicators.

KEY WORDS- Cost Reporting, Executive Managers, Business Intelligence, Dashboard, Database, Big Data, Data Analytics, Reports, Metrics, KPI.



INTRODUCTION-

Some companies do not know how to integrate multiple business applications that use different data sources. Another problem that companies face is the lack of visibility of operations and activities from functional areas. When managers or directors get the information, it is not quick, and data is not relevant.

Companies that merge, acquire, or grow fast also have to manage a significant amount of information.

Besides, there is an increase in the volume of information, and end-users require analytical capabilities.

Companies implement Enterprise Resource Planning (ERP) systems to improve processes and reorganize operational data, but still, it gets duplicated or copied on to multiple platforms. These systems do not guarantee reliability and security. Several reports from Finance, Sales, or Operations rarely deliver the same figures. Even if the ERP produces the same information, reports do not reconcile because of the extract process or the format.

Over the last decade, other companies have developed applications for performance management to repair defaults of the accounting modules from ERP vendors. The Chartered Institute of Management Accountants Forum considers that these applications are better for consolidation, elaboration of budgets and forecast, than those performed for ERP systems.

Business Intelligence (BI) is a concept that uses different tools, definitions, and technologies to process data and elaborate useful information that stakeholders use to make decisions.

The goal is to address concerns about business and analysis if strategies provide them a competitive advantage in the sector or market.

Business Intelligence is not only a tool to elaborate dashboards. Business Intelligence is a simple concept to base decisions on facts. For this reason, several technologies exist that support this concept, such as:

1. Extract, Transform and Load (ETL) tools
2. Management of Master Data and Tools for Governance
3. Warehouse of Data
4. Cubes or Database (Multidimensional)
5. Applications to design dimensions, attributes, facts, and measures,
6. Reporting applications or dashboard platform,
7. Platform or tools for Analytics, and
8. Self-service applications

A BI dashboard is a tool that transforms information and displays Key Performance Indicators (KPI) and metrics to assess the organization's performance. BI systems are capable of consolidating very complex data from internal or external third parties, which uses different applications to centralize the information and convert it into actionable data. This data compares to other metrics and performance indicators.

A Business Intelligence dashboard is a powerful application to elaborate dashboard with big data. It is also more useful for the main reports to project managers, project directors, and executive managers.

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METHODOLOGY-

Step 1

A BI dashboard is a tool that transforms information and displays Key Performance Indicators (KPI) and metrics to assess the organization's performance. BI systems are capable of consolidating very complex data from internal or external third parties, which uses different applications to centralize the information and convert it into actionable data. This data compares to other metrics and performance indicators.

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What other advantages of making a dashboard with Business Intelligence platforms compare to other reporting software?

Let's determine the advantages of Business Intelligence over other report software.

Step 2

For reporting, we will compare

1. Business Intelligence Software
 - a. Power BI Desktop
 - b. IBM Cognos Online
 - c. Dundas BI Online
2. ERP SAP (CJ13 module)
3. MS Excel

Step 3

We can have the following platform in the form of dashboards or tables from each application as follows:

1. Business Intelligence Software
 - a. Power BI Desktop



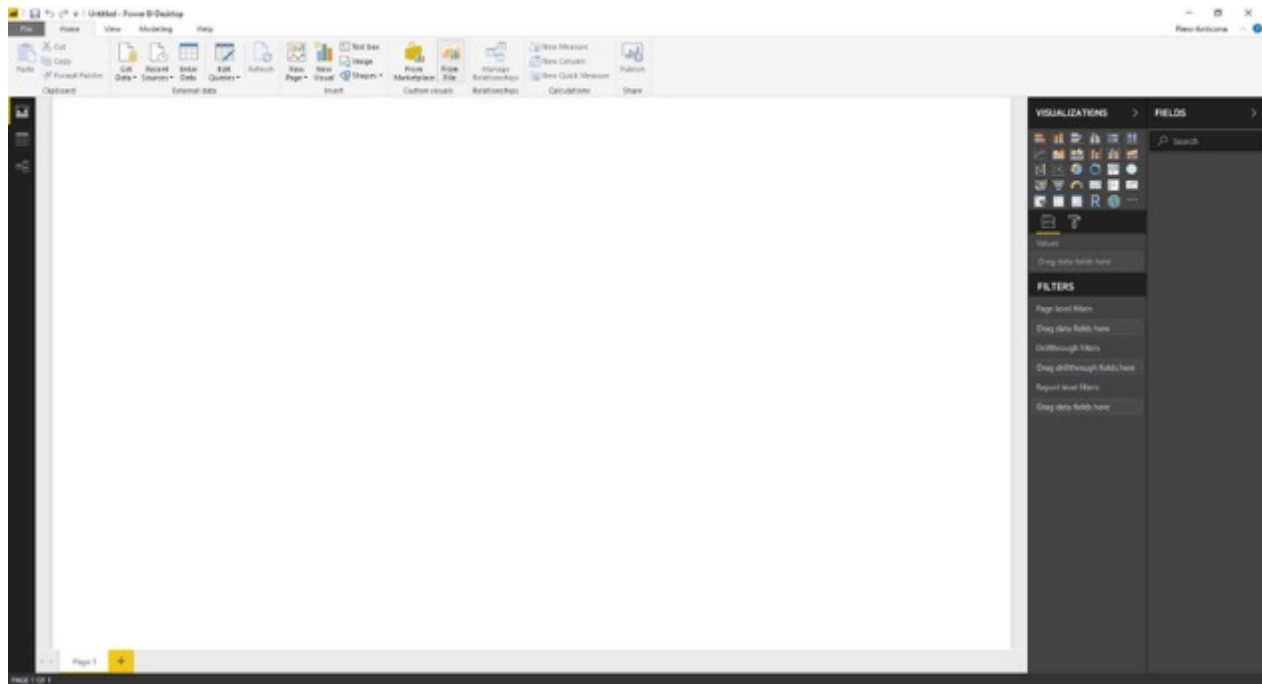


Figure 1 Print Screen of Power BI Desktop¹

Based on the following list of charts:

- Area charts: Basic (Layered) and Stacked
- Bar and column charts
- Cards: Single number
- Cards: Multi-row
- Combo charts
- Doughnut charts
- Funnel charts
- Gauge charts
- Key influencers chart
- KPIs
- Line charts
- Maps: Basic / ArcGIS / Filled (Choropleth) / Shape
- Matrix
- Pie charts
- Ribbon chart

¹ By the author

- Scatter, bubble, and dot plot charts
- Scatter-high density
- Slicers
- Standalone images
- Tables
- Treemaps
- Waterfall charts

2. IBM Cognos Online

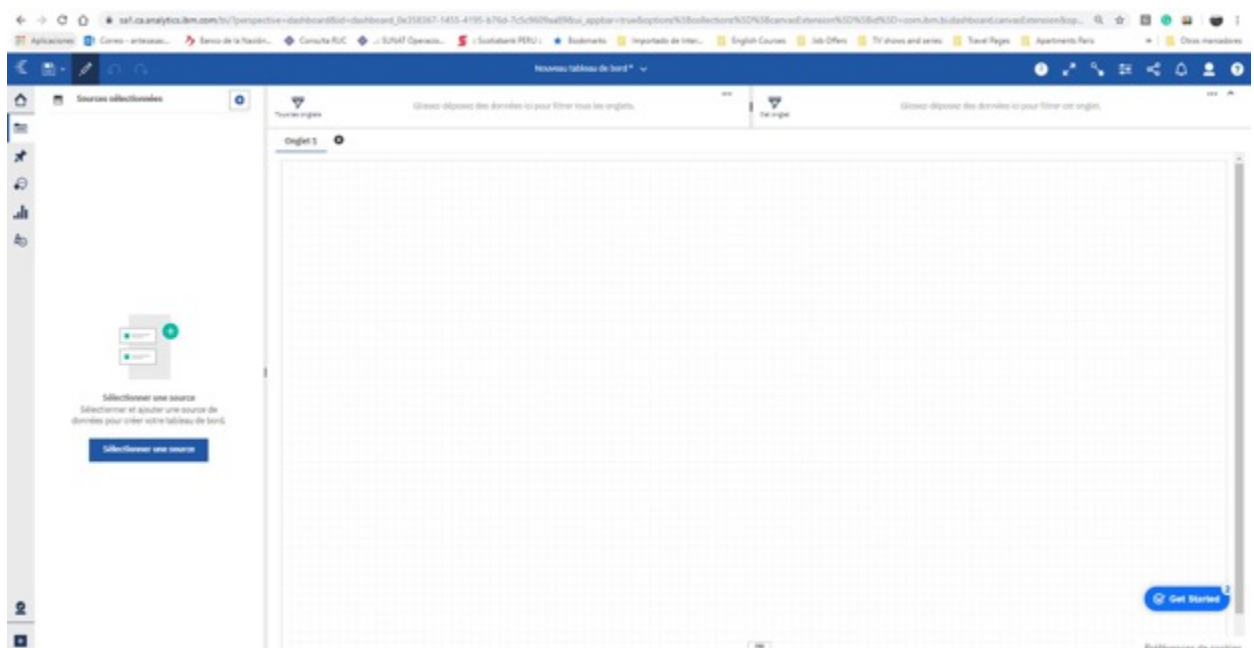


Figure 2 Print Screen IBM Cognos Online²

Based on the following list of charts:

- Column Charts
- Line Charts
- Pie Charts
- Bar Charts
- Area Charts
- Point Charts
- Combination Charts

² By the Author

- Scatter Charts
- Bubble Charts
- Quadrant Charts
- Bullet Charts
- Gauge Charts
- Pareto Charts
- Progressive Column Charts
- Micro charts
- Marimekko Charts
- Radar Charts
- Polar Charts
- Range Indicator Charts

3. Dundas BI Online

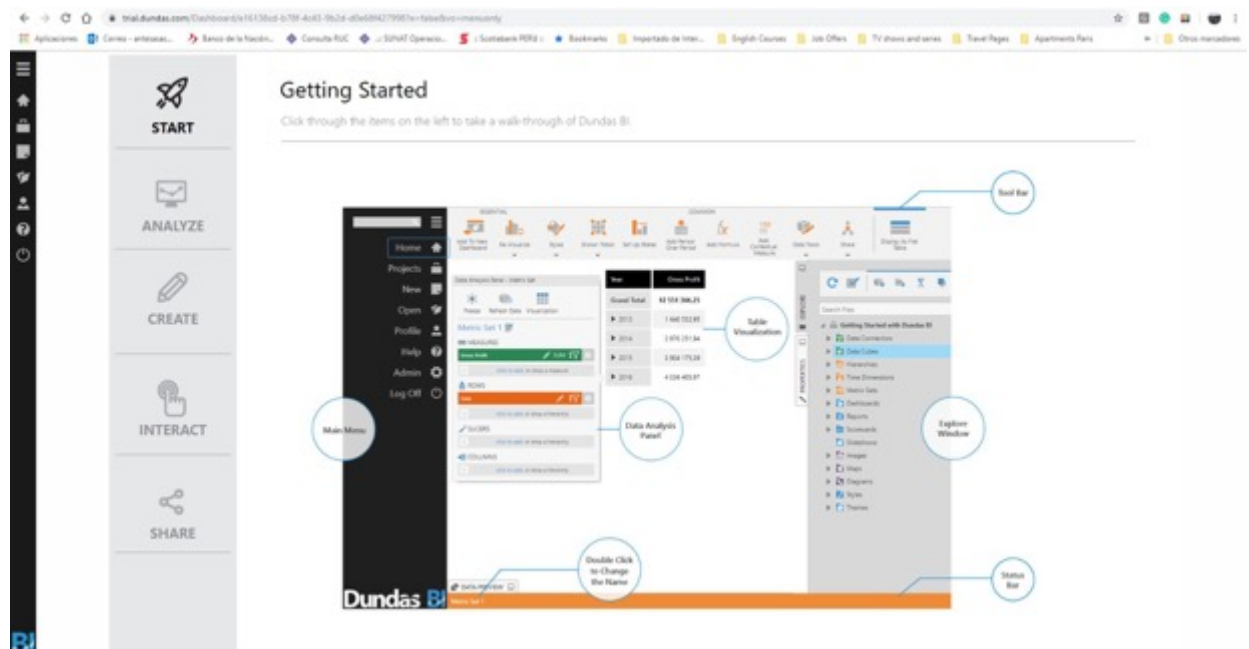


Figure 3 Print Screen Dundas BI Online³

Based on the following list of charts:

- Bubble Chart
- Data Bar Table
- Table

³ By the Author

- Calculate Box Plot
- Parallel Coordinates
- Treemap
- Add Trend Line
- Bar
- Stacked Bar
- Line
- Point
- Pie
- Scatter Plot
- Pie/Sunburst
- Waterfall
- Radar Charts
- Gauges

4. ERP SAP

This ERP contains a different list of reports, but we will focus only on the most used by the user, which is CJ13.

Display Actual Cost Line Items for Projects																
Document Master Record																
Layout: PRJ A-0007-11 Trevor Project Object: 500040 To 731600 UPCC Sales Local... Cost Element: * To * Posting Date: * To *																
Doc. Date	Posting Date	Project def.	WBS elem.	Object	Year	Per	COCr	ValueCOCur	Cost Ele.	Cost element name	Document...	RefDocNo	Doc...	Material	Quantity	Name
10.04.2014	10.04.2014	A-0007-11	4500	4500	20...	1	RM	572.73-	500040	UPCC Sales Local	10002409	90003159	RV	M140-001-319		
10.04.2014	10.04.2014	A-0007-11	4500		20...	1	RM	5.17	600662	Filters COS Clearing	10002400	4900003253	WL	M140-001-319	1.000	
10.04.2014	10.04.2014	A-0007-11	4500		20...	1	RM	103.40		Filters COS Clearing	10002407	4900003255	WL	M140-001-319	20.000	
10.04.2014	10.04.2014	A-0007-11	4500		20...	1	RM	51.70		Filters COS Clearing	10002408	4900003256	WL	M140-001-319	10.000	
10.04.2014	10.04.2014	A-0007-11	4500		20...	1	RM	150.00-	721400	Promotion	10002404	100000042	SA			
10.04.2014	10.04.2014	A-0007-11	4500		20...	1	RM	5,888.00-		Promotion	10002405	1800000008	DR			
10.04.2014	10.04.2014	A-0007-11	4500		20...	1	RM	288.00-		Promotion	10002410	100000043	SA			
10.04.2014	10.04.2014	A-0007-11	4500		20...	1	RM	250.00		Promotion	10002403	4900003254	WA	331-300-420	1.000	
10.04.2014	10.04.2014	A-0007-11	4500		20...	1	RM	400.00	731600	Tel & Fax Charges	10002406	1900000034	KR			
								RM = 6,088.46-								
								RM = 6,088.46-								

Figure 4 Print Screen Transaction CJ13⁴

5. MS Excel

⁴ By the Author



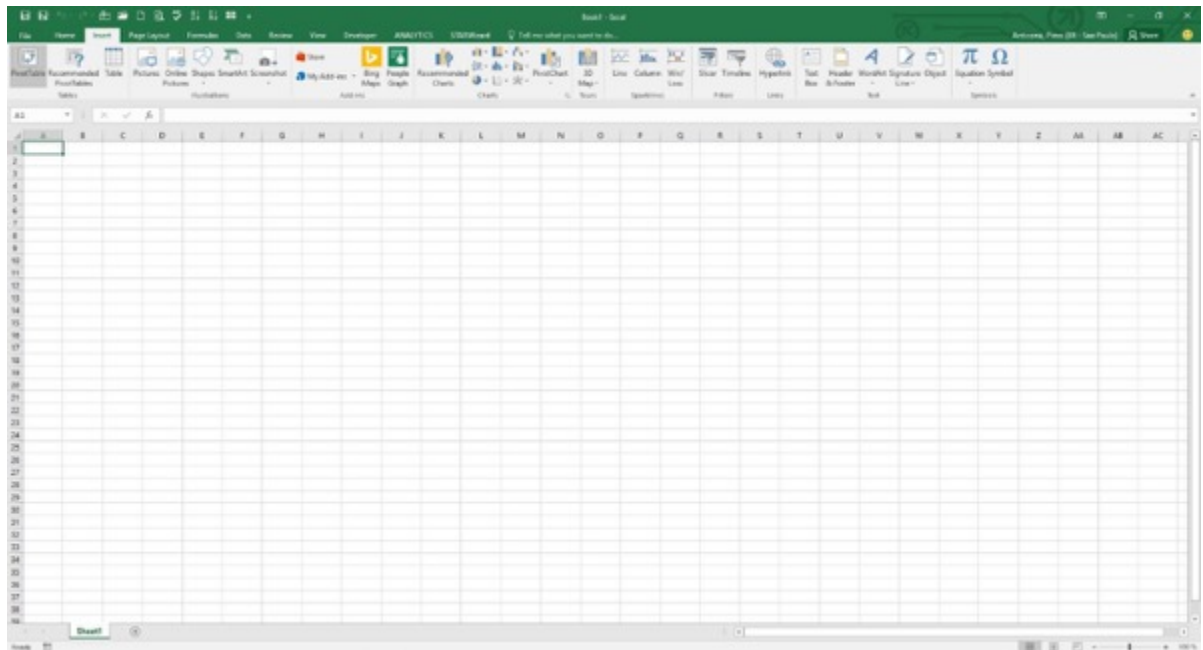


Figure 5 Print Screen MS Excel⁵

Step 4

Stephen J.C. Paterson has suggested a dashboard for the Oil and Gas sector in his paper Best in Class – Dashboard for the Oil and Gas Projects (click here). A first-page dashboard contains the following:

- A brief executive narrative
- Common Metrics such as:

⁵ By the Author

Type	Metric	Formula
Schedule	Schedule Performance Index (SPI)	$SPI = BCWP / BCWS$
	Schedule Variance (SV)	$SV = BCWP - BCWS$
	Schedule Variance % (SV%)	$SV \% = (SV / BCWS) * 100$
	% Schedule	$\% \text{ Schedule} = (BCWS_{cum} / BAC) * 100$
	% Complete	$\% \text{ Complete} = (BCWP_{cum} / BAC) * 100$
	Baseline Execution Index (BEI)	Total Tasks Completed / (Total Tasks with Baseline Finish On or Prior to Current Report Period + Tasks without baseline finish dates)
Cost	Cost Performance Index (CPI)	$CPI = BCWP / ACWP$
	Cost Variance (CV)	$CV = BCWP - ACWP$
	Cost Variance % (CV%)	$CV \% = (CV / BCWP) * 100$
	% Spent	$\% \text{ Spent} = (ACWP_{cum} / BAC) * 100$
	Variance at Completion (VAC)	$VAC = BAC - EAC$
	Variance at Completion % (VAC%)	$VAC \% = (VAC / BAC) * 100$
	Estimate at Complete (EAC _{CPI} or EAC _{Composite})	$EAC_{CPI} = ACWP_{cum} + [(BAC - BCWP_{cum}) / CPI_{cum}]$ $EAC_{Composite} = ACWP_{cum} + [(BAC - BCWP_{cum}) / (CPI_{cum} * SPI_{cum})]$
	To Complete Performance Index (TCPI _{Target})	$TCPI_{Target} = \text{Work Remaining} / \text{Cost Remaining} = (BAC - BCWP_{cum}) / (Target - ACWP_{cum})$

Figure 6 Common Metrics for a Dashboard by S. Paterson⁶

- Unique metrics such as:
 - Safety
 - Hit Task %
 - Critical Path Length Index (CPLI)
 - Current Execution Index (CEI)
 - Milestones
 - IEAC's

Can we elaborate on a dashboard with the alternatives proposed?

FINDINGS-

Step 5

⁶ Paterson, S. (2017, October). Best in Class – Dashboards for Oil and Gas Projects. Retrieved September 27, 2019, from <https://pmworldlibrary.net/wp-content/uploads/2017/10/pmwj63-Oct2017-Paterson-Best-in-Class-Dashboards-for-OG-Projects.pdf>, Page 9.

The dashboards elaborated by the different platforms are as follows:

1. Business Intelligence Software
 - a. Power BI Desktop



Figure 7 Dashboard developed with Power BI Desktop⁷

⁷ By the Author

b. IBM Cognos Online



Figure 8 Dashboard elaborated with IBM Cognos online⁸

c. Dundas BI Online

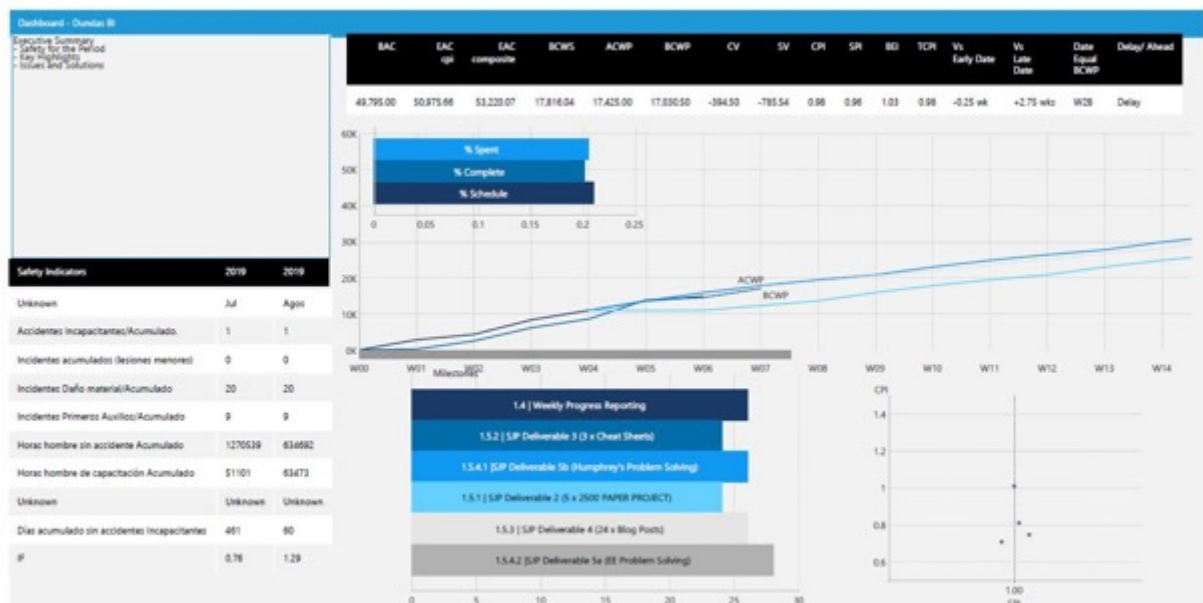


Figure 9 Dashboard designed with Dundas BI online⁹

⁸ By the Author

⁹ By the Author

2. ERP SAP (CJ13 module)
 SAP does not create a dashboard
3. MS Excel
 Stephen J.C. Paterson created one with Excel.

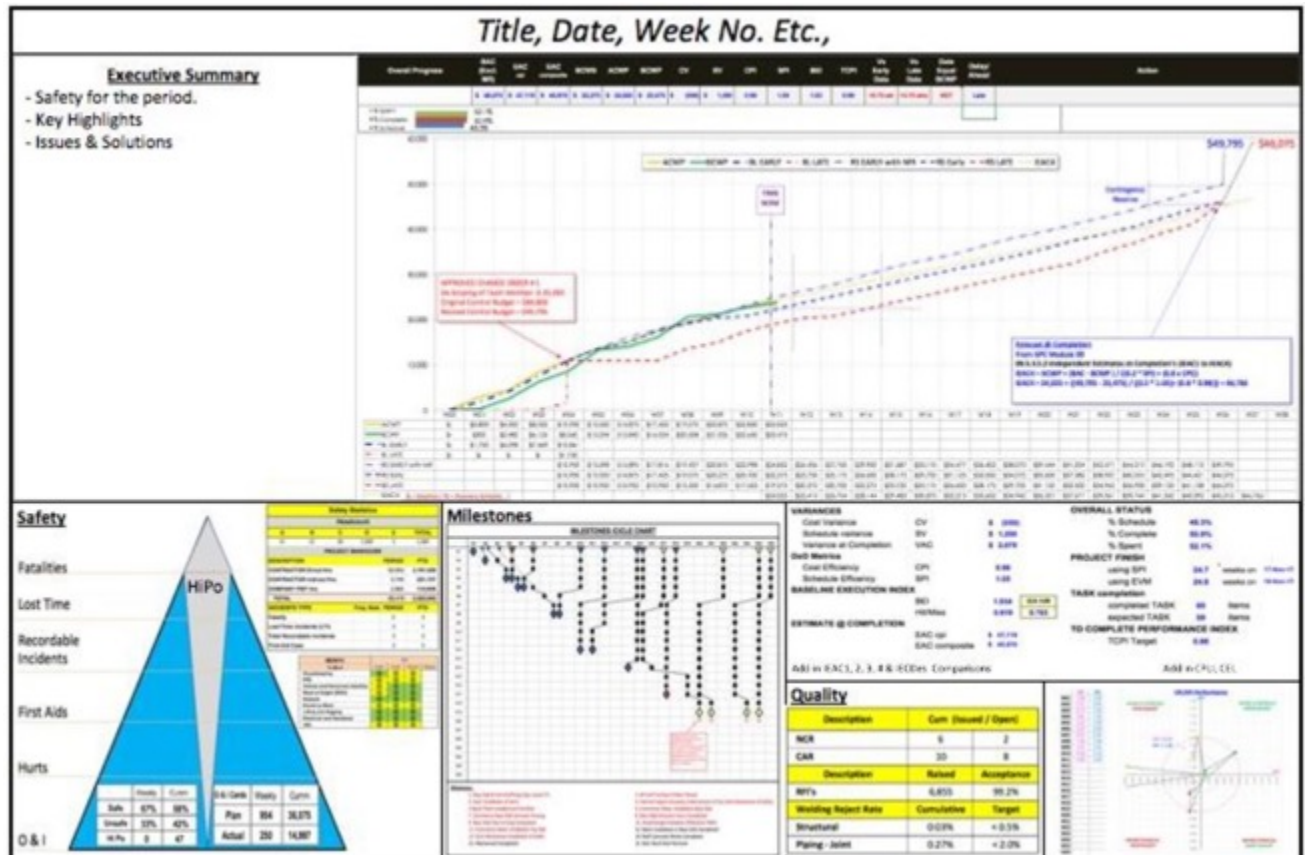


Figure 10 First Page Template Dashboard by S. Paterson¹⁰

As a result, we can summarize it in the table below using the colors as follows:

Green: If the dashboard contains the same information as the example (except for the titles of the charts)

Yellow: If some lines, curves, bars, axis, and other information is missing.

Red: The chart is not replicable.

¹⁰ Paterson, S. (2017, October). Best in Class – Dashboards for Oil and Gas Projects. Retrieved September 27, 2019, from <https://pmworldlibrary.net/wp-content/uploads/2017/10/pmwj63-Oct2017-Paterson-Best-in-Class-Dashboards-for-OG-Projects.pdf>, Page 16.

Metrics		Business Intelligence			ERP SAP	MS EXCEL
		Power BI	Dundas BI	IBM Cognos		
1. A brief executive narrative		x	x	x		x
2. Common Metrics						
SPI	Schedule Performance Index (SPI)	x	x	x		x
	Schedule Variance (SV)	x	x	x		x
	Schedule Variance % (SV%)	x	x	x		x
	%Schedule	x	x	x		x
	% Complete	x	x	x		x
CPI	Baseline Execution Index	x	x	x		x
	Cost Performance Index	x	x	x		x
	Cost Variance	x	x	x		x
	Cost Variance %	x	x	x		x
	%Spent	x	x	x		x
	Variance at Completion	x	x	x		x
	Variance at Completion %	x	x	x		x
	Estimate at Complete	x	x	x		x
	To Complete Performance Index	x	x	x		x
3. Unique Metrics						
Safety		x	x	x		x
Hit Tasks		x	x	x		x
Critical Path Length Index (CPLI)		x	x	x		x
Current Execution Index (CEI)		x	x	x		x
Milestones		x	x	x		x
IEAC's		x	x	x		x

Figure 11 Table of Comparison among BI Platforms, Excel and SAP¹¹

Step 6

From the table above, we can discard ERP SAP to elaborate dashboards. It requires an additional interface to prepare a data source and then load it to develop a dashboard.

Comparing BI Platforms against MS Excel, we can elaborate on a dashboard for managers for a first page on each platform. The visualization is different because it requires time to master BI platforms. The logic to build charts and set parameters are also different from each other.

Step 7

For a first page dashboard for the oil and gas sector suggested by S. Paterson, we could elaborate with BI platforms the same charts as in MS Excel. We should analyze if BI Platforms can develop on other metrics.

The author will use the same alternatives, as mentioned in Step 2 and Step 3.

Step 4

Stephen J.C. Paterson mentions that NDIA offers other metrics, such as:

¹¹ By the Author

Metrics			Definition
Schedule	1	SPI vs TSPied	A comparison of past and future schedule efficiency
Cost	2	CPI vs TCPleac	Forecast Efficiency Rate
Staffing	3	Staffing Profile	A time-phased, 12 months rolling full-time equivalent (FTE) headcount by product, organizational, or functional area of individuals required on the Project Team members are considered a Critical Skill if the loss of those individuals would directly or indirectly impact program technical requirements, compliance, cost or schedule performance, customer commitments, or program deliverables.
	4	Critical Skills Key Personnel "Churn"/Dilution Metrics	% of personnel dedicated to the program vs the % that is spread across multiple programs.
	5	Critical Resource Multiplexing Metric	Visual gauge of the rate at which MR is being expended against the estimated risk exposure on a project
Risk and Opportunity	6	Risk and Opportunity \$ vs Management Reserve \$	Calculates the probability of achieving a specific schedule completion date
	7	SRA Histogram (Frequency Distribution Graph)	Used to identify that the activities most likely to drive the outcomes
	8	Sra Sensitivity (Tornado) Graphs	A tangible representation of the time associated with the risks to an end-item deliverable or contract event
	9	Schedule Margin Burn-down	Indicates progress in eliciting and documenting all the requirements necessary for a final, completed system design. It compares planned completion with actual completion
Requirements	10	Requirements completeness	Measure of a not-yet-stable requirements baseline
	11	Requirements volatility	"To-Be-Determined" (TBD) or "To-Be-Resolved" (TBR) refers to the system, subsystem, or products requirements that have not been finalized, as listed or specified in the requirements documents or models
	12	TBD/TBR Burn Down	A measure that determines how accurately a program's requirements are maturing to support a baseline solution at various Acquisition Phases
	13	Requirements Traceability	Involves predicting the future values of a key technical performance parameter of the high-level end product under development based on current assessments of products lower in the system structure.
Technical Performance Measures	14	Technical Performance Measure Compliance	The trending contract modifications which helps predict the accuracy of the Performance Measurement Baseline (PMB) and ensures that the contract was written correctly
Contract Health	15	Contract Mods	Indicates lack of control to the PMB in the near term is when the percent change of baseline dollars approaches 6% or more. This metric, similar to contract modifications, helps to validate the integrity of the PMB.
	16	Baseline Revisions	A measure of the funding stability on the program
	17	Program Funding Plan	Actual and projected cumulative program funding compared to projected program expenditures plus potential termination liability
	18	Program Funding Status	Measures how well the contractor is performing against forecast or planned billings
	19	Research, Development, Test, and Evaluation - Actual Billings vs Forecast Billings	Tied to On-Time Delivery (OTD), the percent measurement of total items received at the agreed upon Due Date.
Supply Chain	20	Parts Demand Fulfillment	The percentage of acceptable versus rejected delivered parts in a month for approved suppliers
	21	Supplier Acceptance Rate	A Supplier Late Starts is any course of events that prevent a supplier from being able to begin manufacturing the items on a Purchase Order
	22	Supplier Late Starts	Means of integrating the flow of materials and components into the manufacture of end items in accordance with time-phased delivery requirements
	23	Production Line of Balance	A nonlinear function used to model cumulative cost accrual in research and development (R&D) contracts.
Other	24	Rayleigh Estimator	

Figure 12 Unique Metrics by NDIA¹²

The charts are in Appendix 1.

We are going to replicate with BI Platforms the metrics mentioned in the list above.

Step 5

It is necessary to elaborate on a database to create all those charts in any BI Platform. The author has used the same information shown in the images inserted above. The reader can download the database here

¹² By the Author. Source: NDIA Guide to Managing Programs using Predictive Measures



Metrics and Comparison BI Load

The reader can practice the elaboration of the same charts on a different platform.

The dashboards elaborated by the different platforms are as follows:

1. Business Intelligence Software

a. Power BI Desktop

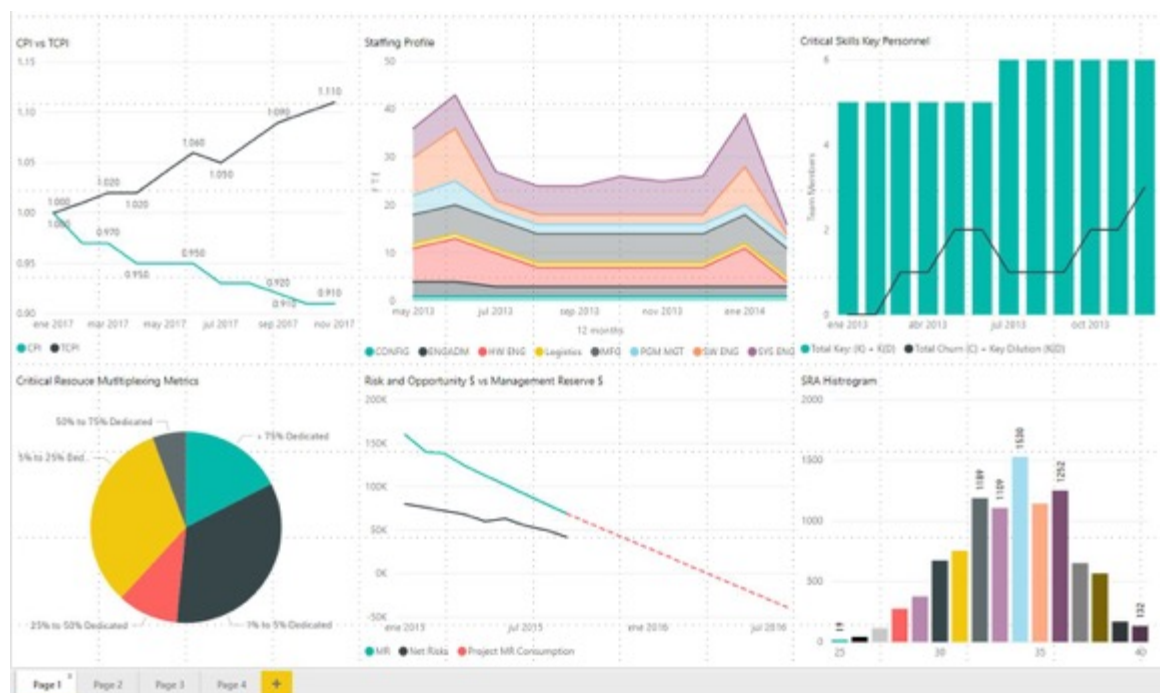


Figure 13 Power BI - Dashboard 1¹³

¹³ By the Author

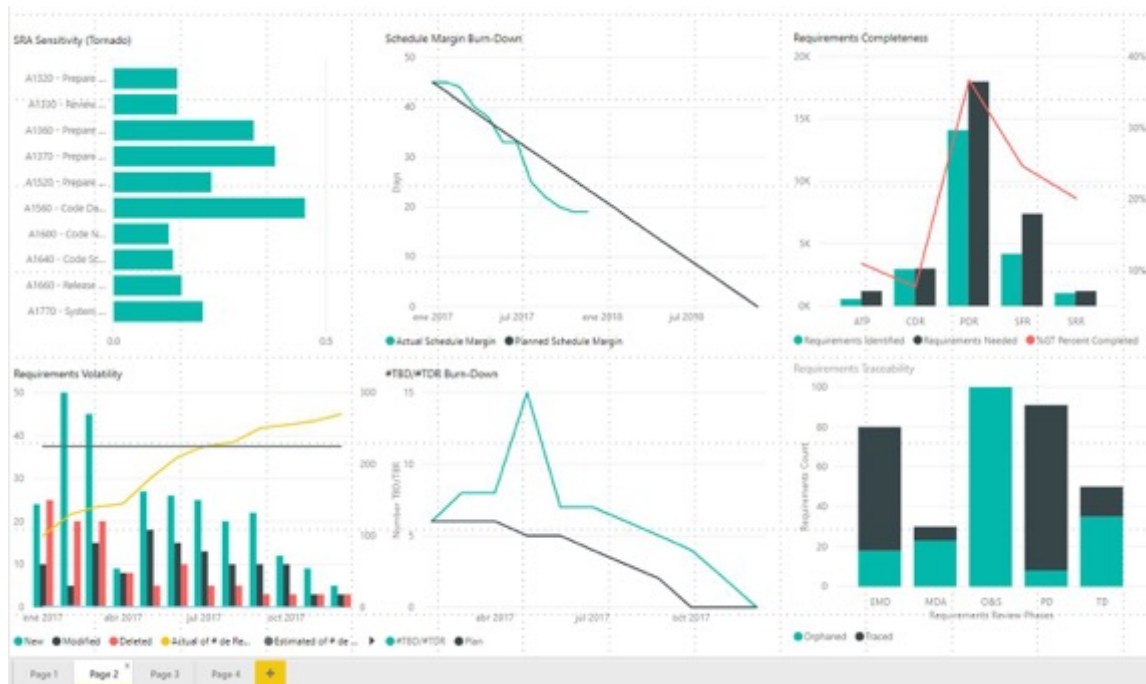


Figure 14 Power BI - Dashboard 2¹⁴

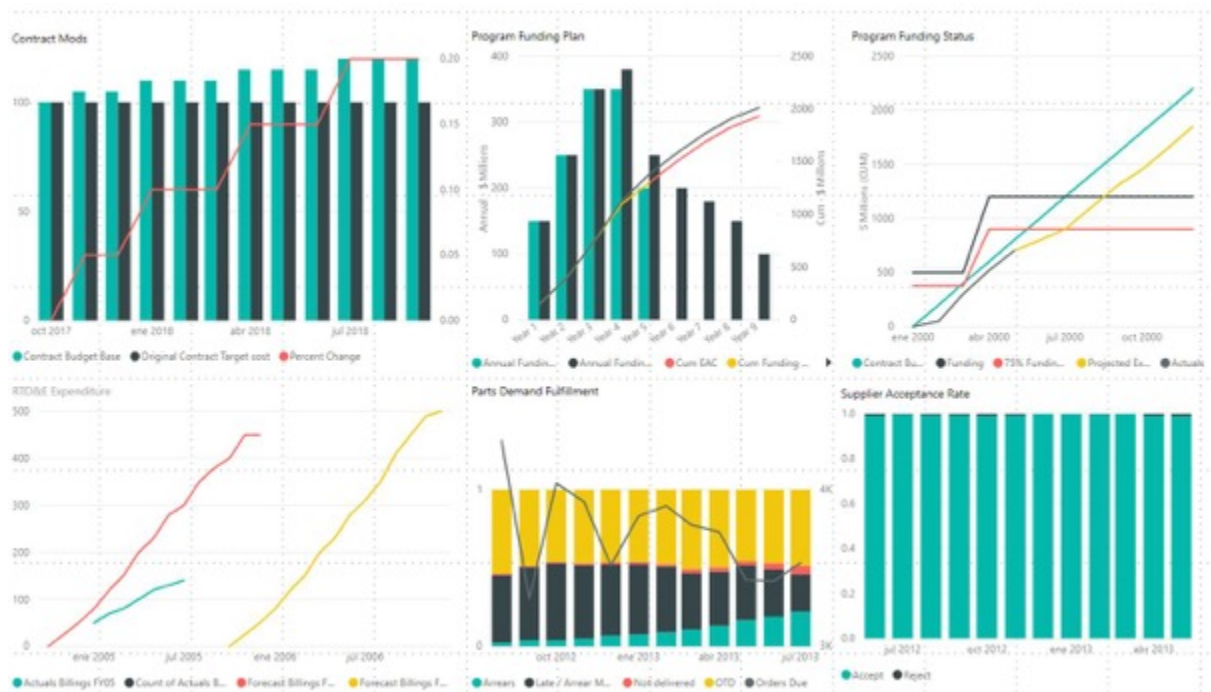


Figure 15 Power BI - Dashboard 3¹⁵

¹⁴ By the Author

¹⁵ By the Author

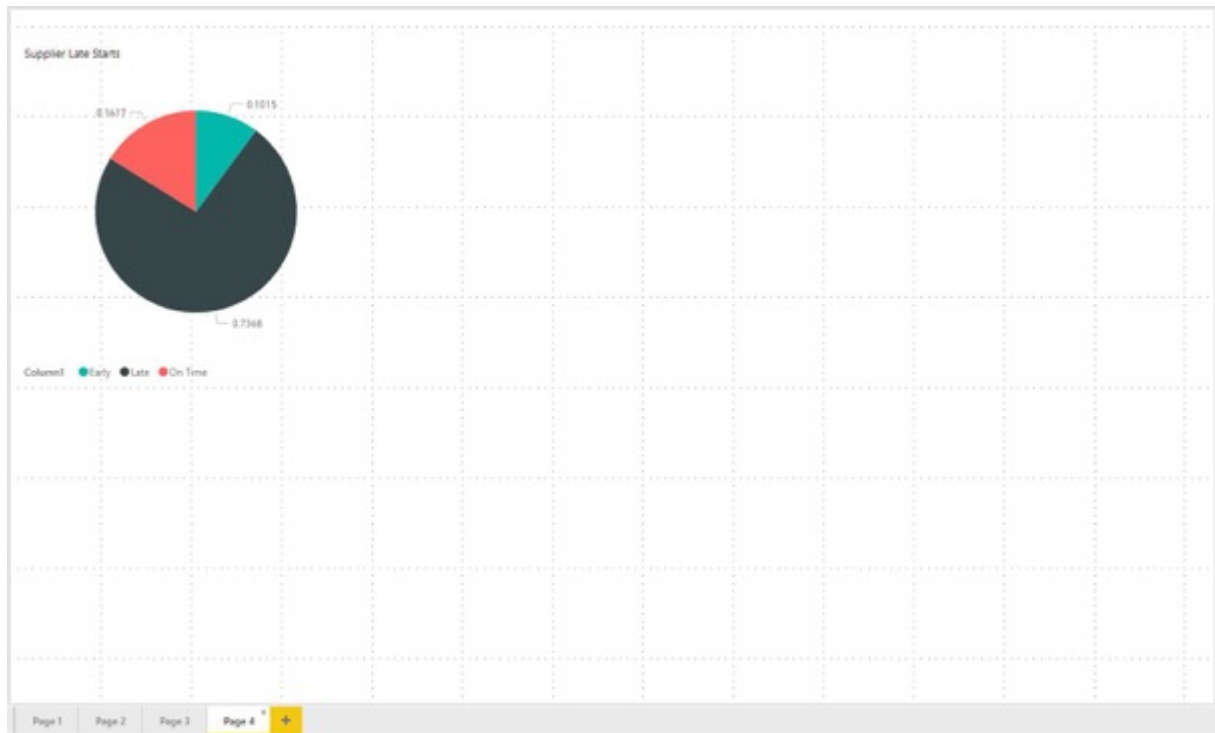


Figure 16 Power BI - Dashboard 4¹⁶

b. IBM Cognos Online

¹⁶ By the Author



Figure 17 IBM Cognos - Dashboard 1¹⁷



Figure 18 IBM Cognos - Dashboard 2¹⁸

¹⁷ By the Author

¹⁸ By the Author