

Advantages of making a dashboard with a Business Intelligence platform compared to other reporting software¹

Piero Anticono

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

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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.

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.
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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.

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.

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?

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

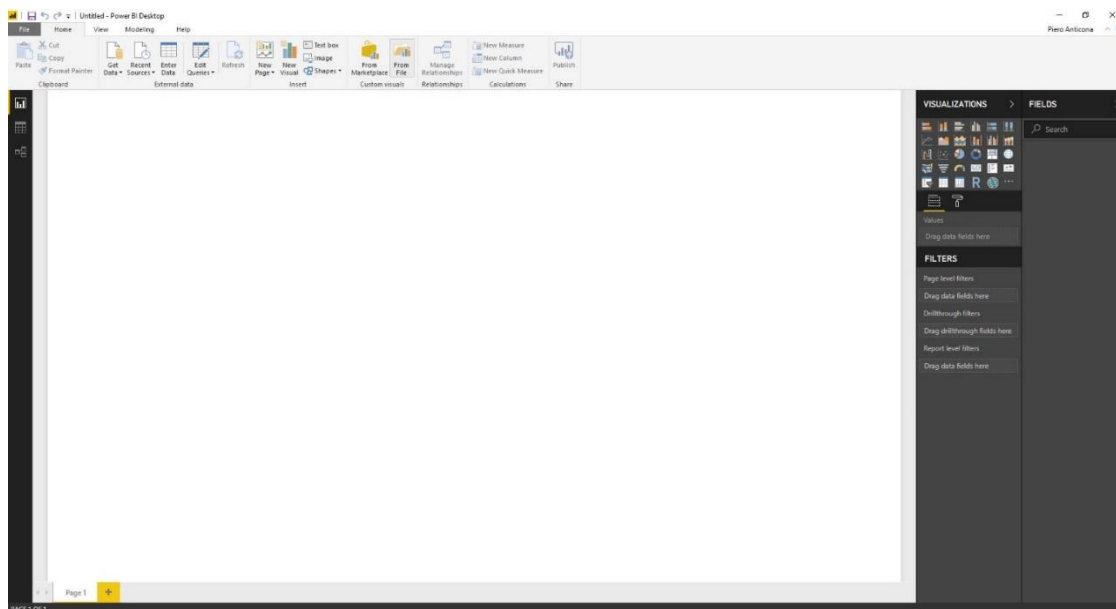


Figure 1 Print Screen of Power BI Desktop²

² By the author

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

2. IBM Cognos Online

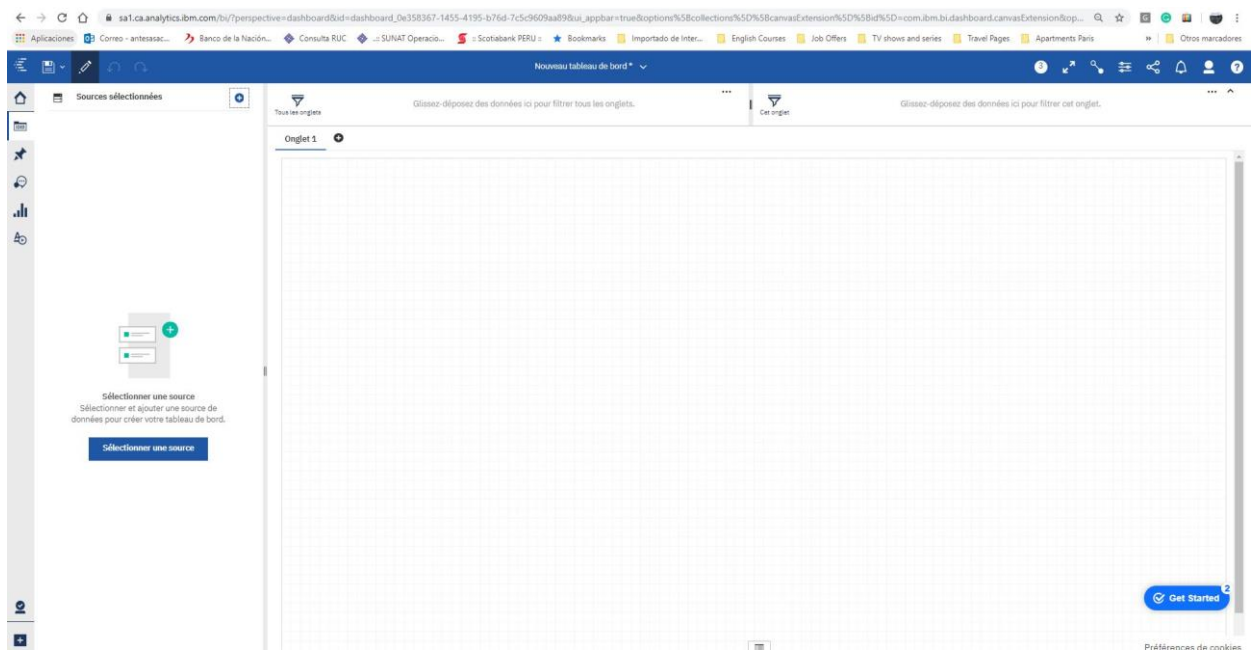


Figure 2 Print Screen IBM Cognos Online³

Based on the following list of charts:

- Column Charts
- Line Charts
- Pie Charts
- Bar Charts
- Area Charts
- Point Charts
- Combination Charts
- Scatter Charts
- Bubble Charts
- Quadrant Charts
- Bullet Charts
- Gauge Charts
- Pareto Charts
- Progressive Column Charts

³ By the Author

- Micro charts
- Marimekko Charts
- Radar Charts
- Polar Charts
- Range Indicator Charts

3. Dundas BI Online

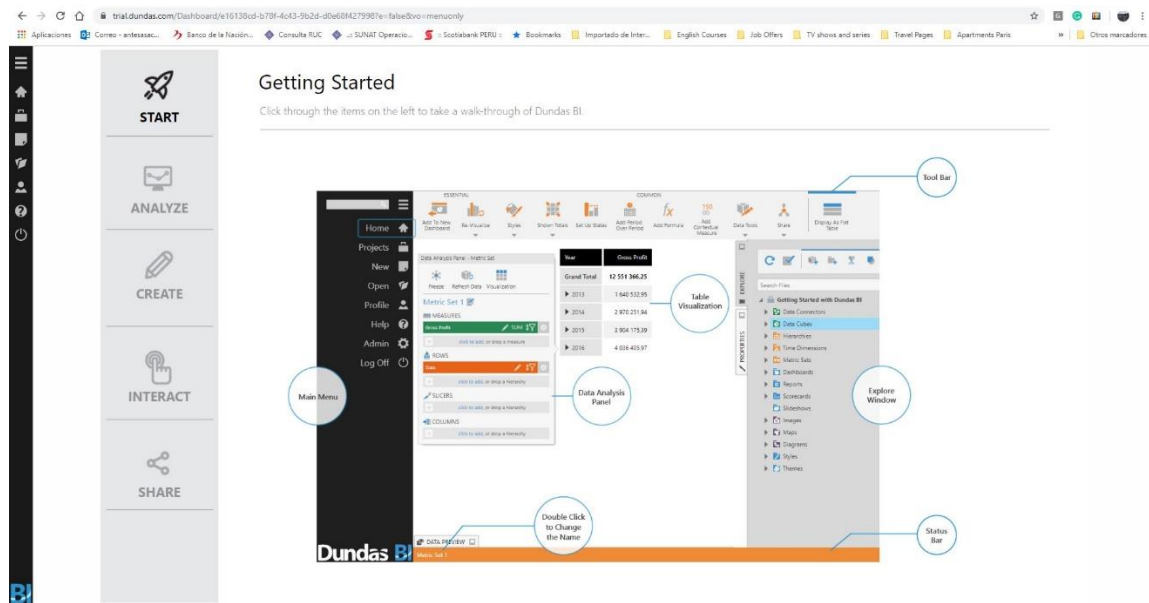


Figure 3 Print Screen Dundas BI Online⁴

Based on the following list of charts:

- Bubble Chart
- Data Bar Table
- Table
- Calculate Box Plot
- Parallel Coordinates
- Treemap
- Add Trend Line
- Bar
- Stacked Bar

⁴ By the Author

- 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 [Icons]

Layout: PRJ A-0007-11 Trevor Project
 Object: 500040 To: 731600 UPCC Sales Local...
 Cost Element: * To: *
 Posting Date

Doc. Date	Posting Date	Project def.	WBS elem.	Object	Year	Per	COCr	E. Value	COCur	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			
14.04.2014	14.04.2014	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...							

Figure 4 Print Screen Transaction CJ13⁵

5. MS Excel

⁵ By the Author

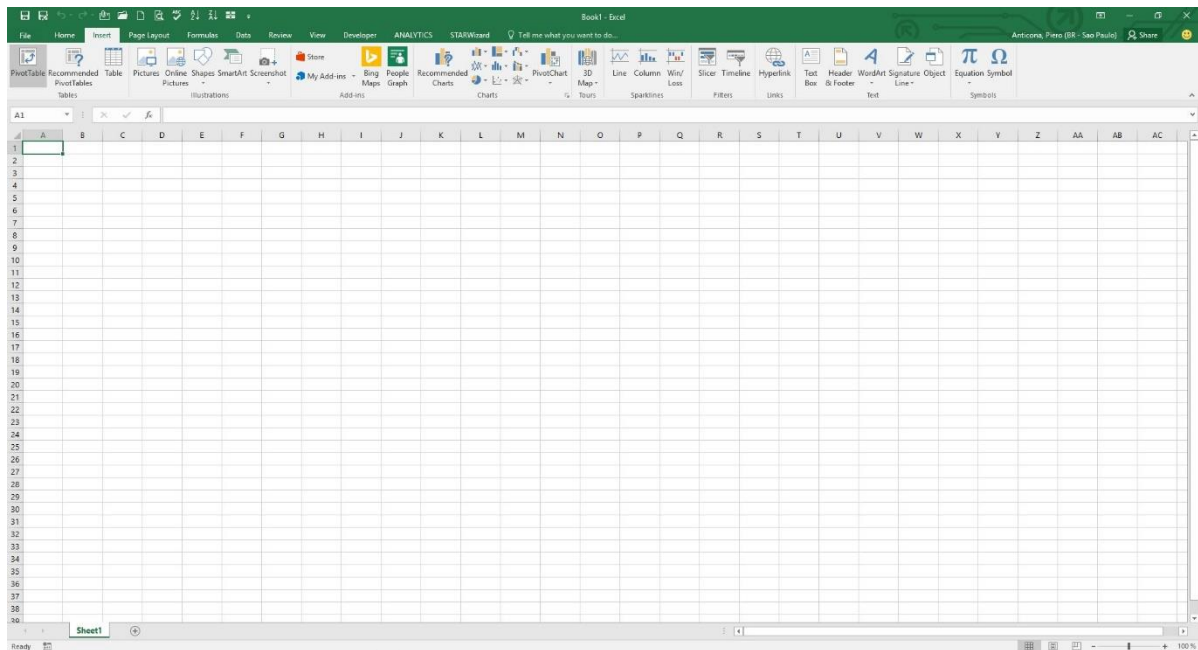


Figure 5 Print Screen MS Excel⁶

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:

⁶ 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. Paterson⁷

- 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

⁷ 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.

Step 5

The dashboards elaborated by the different platforms are as follows:

1. Business Intelligence Software

a. Power BI Desktop

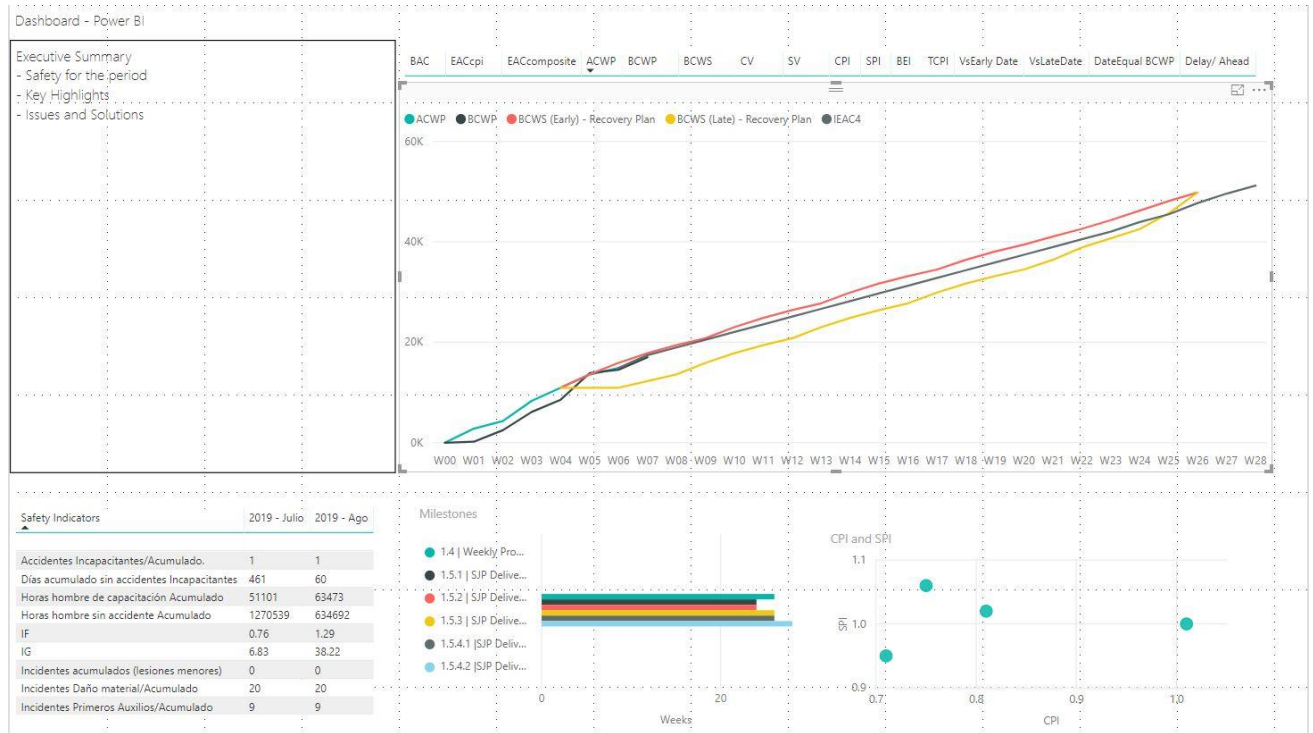


Figure 7 Dashboard developed with Power BI Desktop⁸

⁸ By the Author

b. IBM Cognos Online

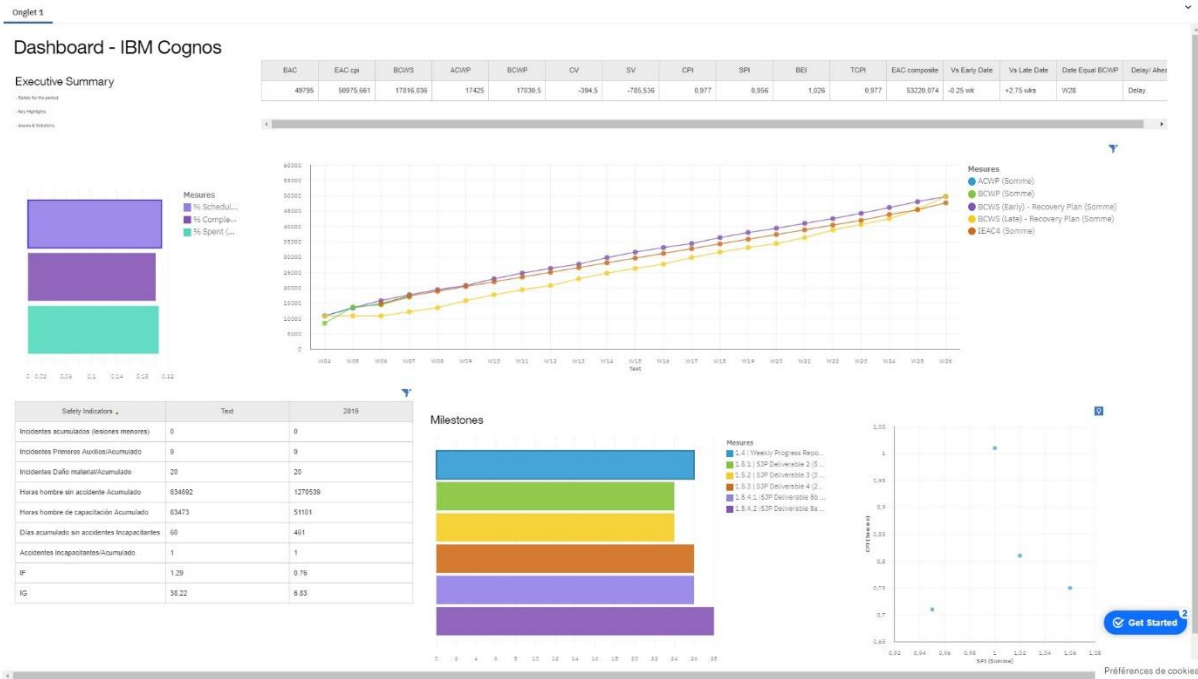


Figure 8 Dashboard elaborated with IBM Cognos online⁹

c. Dundas BI Online

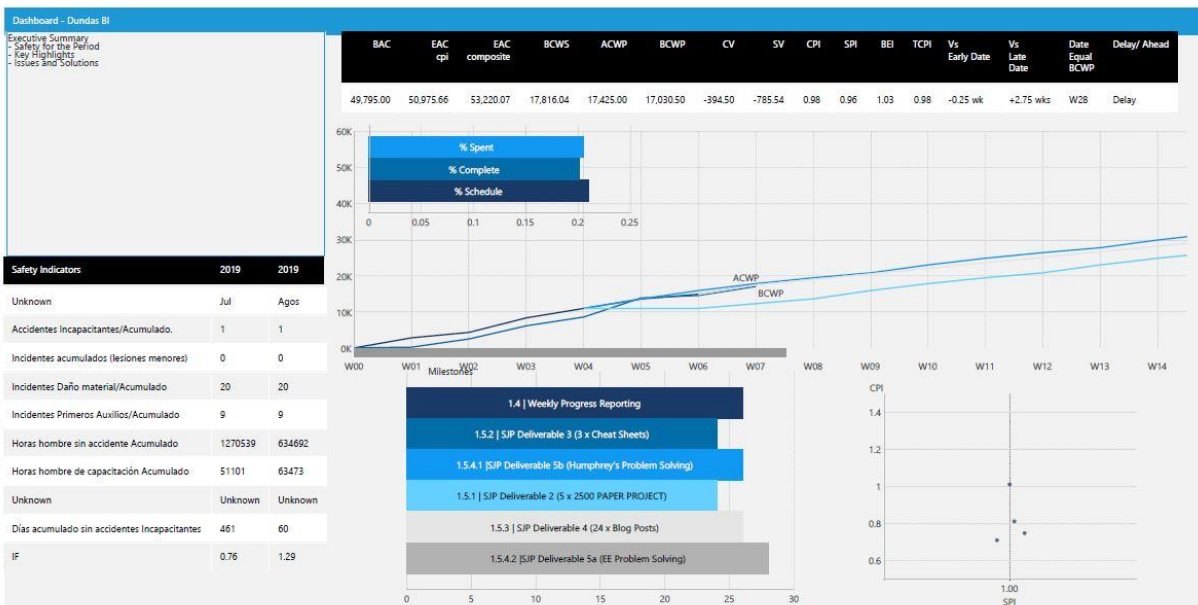


Figure 9 Dashboard designed with Dundas BI online¹⁰

⁹ By the Author

¹⁰ 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.

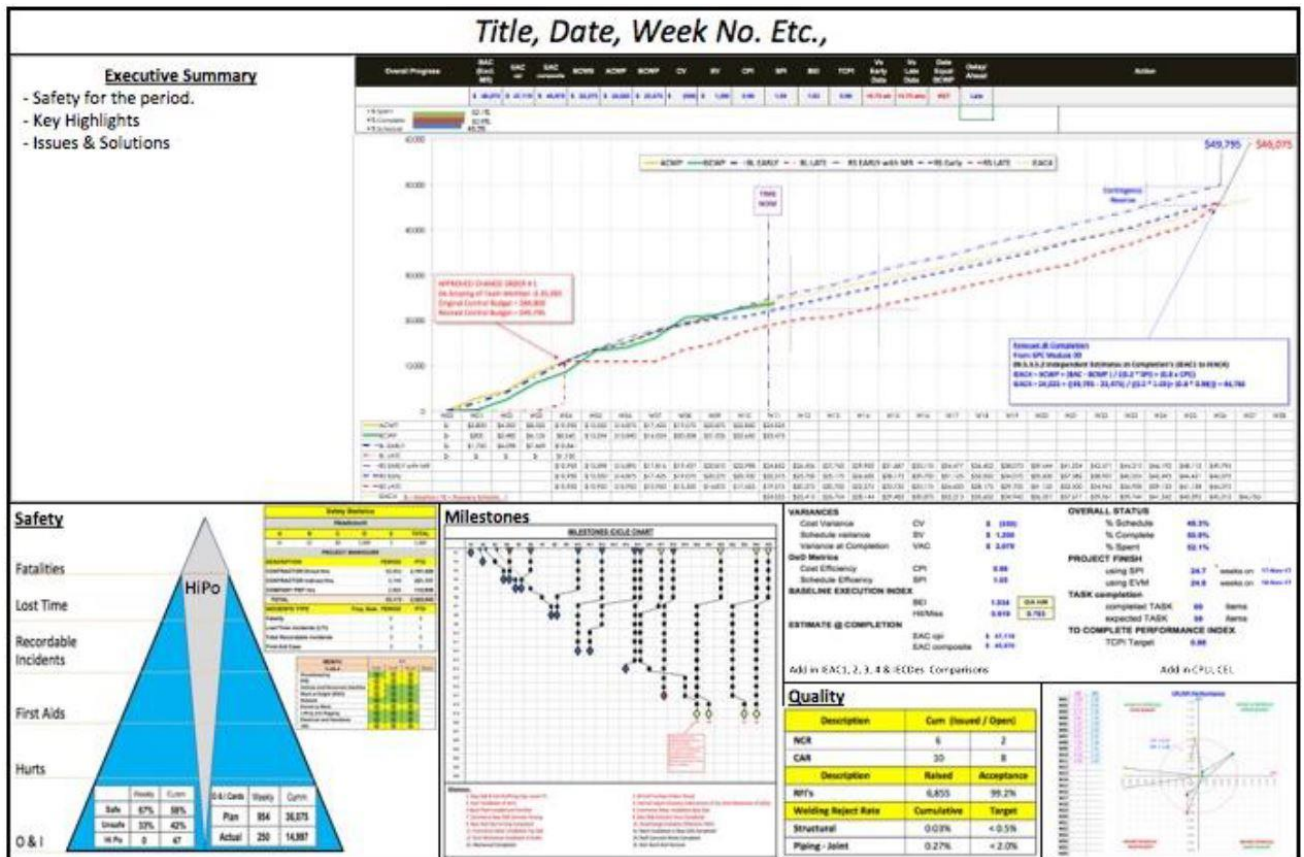


Figure 10 First Page Template Dashboard by S. Paterson¹¹

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.

¹¹ 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/pmworld63-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
	Baseline Execution Index	x	x	x		x
CPI	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 SAP¹²

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:

¹² By the Author

Metrics		Definition	
Schedule	1	SPit vs TSPled	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 NDIA¹³

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

¹³ 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

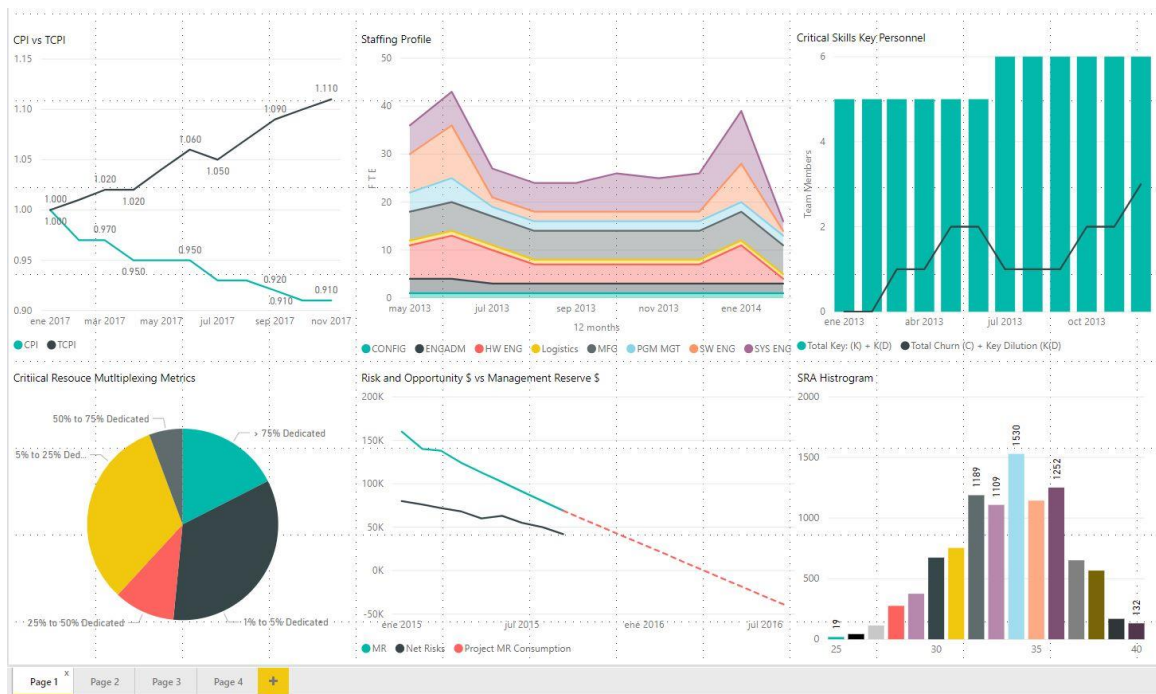


Figure 13 Power BI - Dashboard 1¹⁴

¹⁴ By the Author

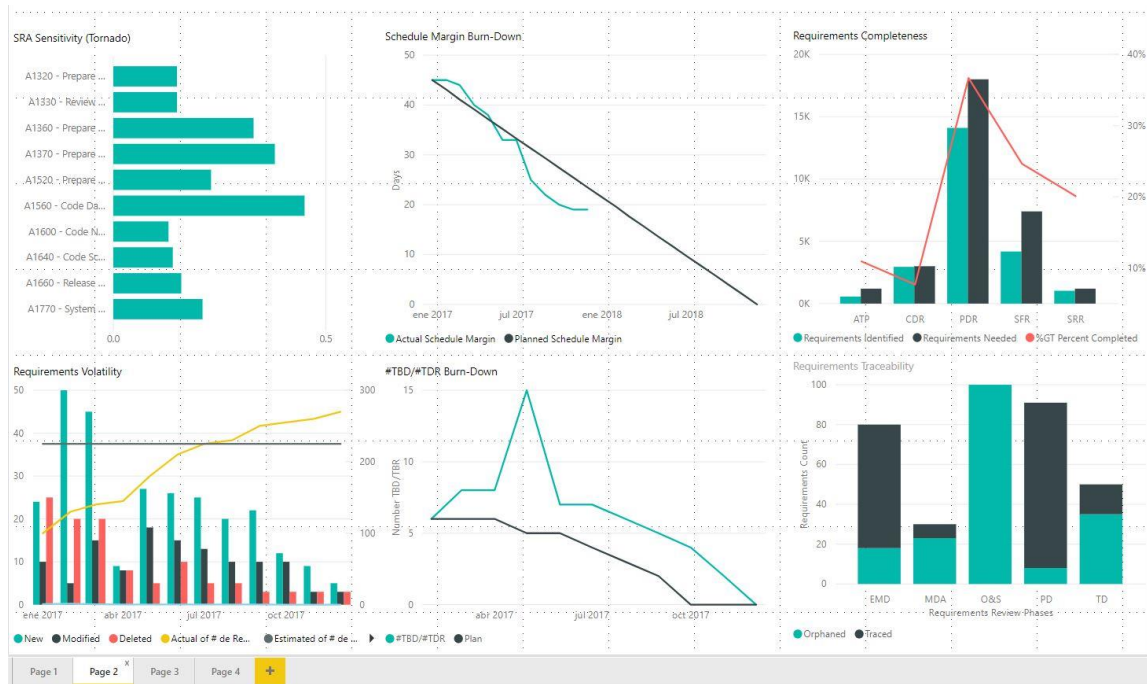


Figure 14 Power BI - Dashboard 2¹⁵

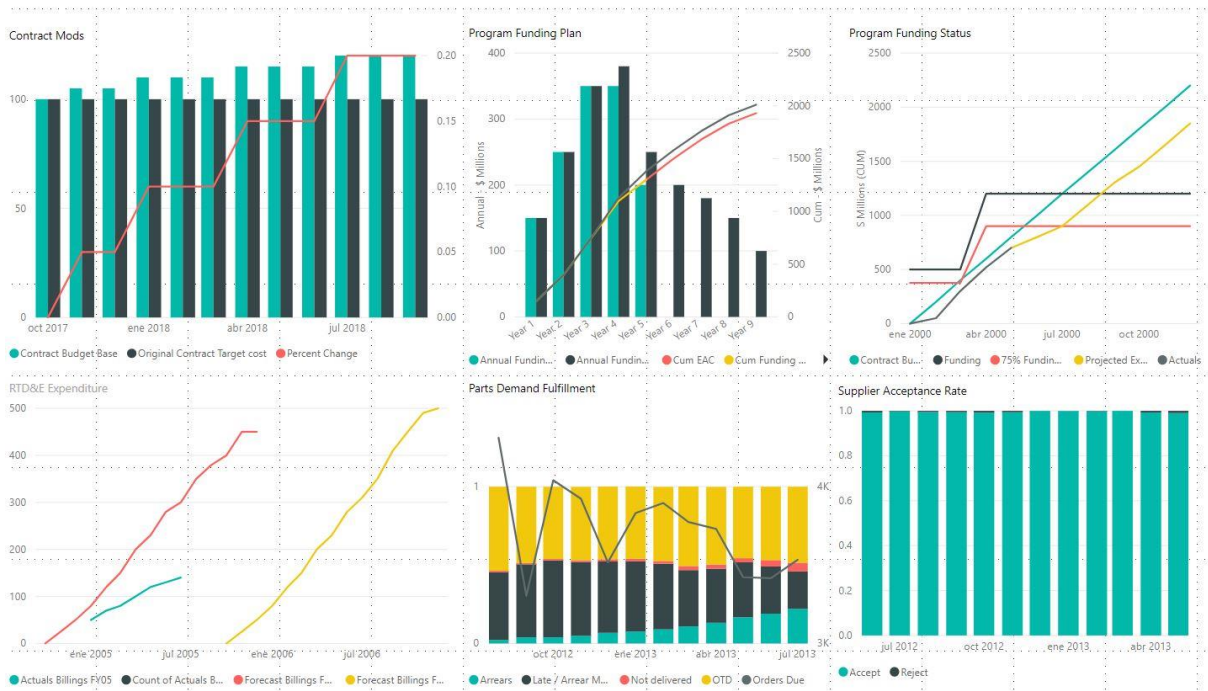


Figure 15 Power BI - Dashboard 3¹⁶

¹⁵ By the Author

¹⁶ By the Author

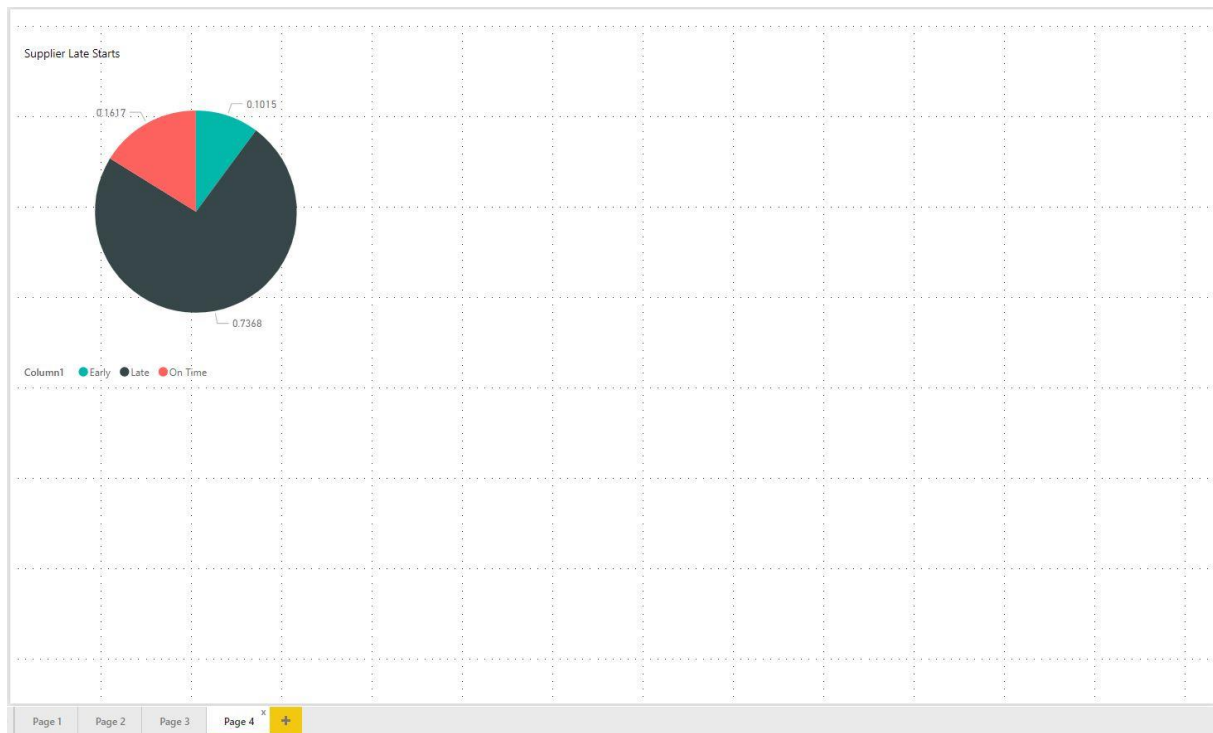


Figure 16 Power BI - Dashboard 4¹⁷

b. IBM Cognos Online

¹⁷ By the Author



Figure 17 IBM Cognos - Dashboard 1¹⁸



Figure 18 IBM Cognos - Dashboard 2¹⁹

¹⁸ By the Author
¹⁹ By the Author



Figure 19 IBM Cognos - Dashboard 3²⁰

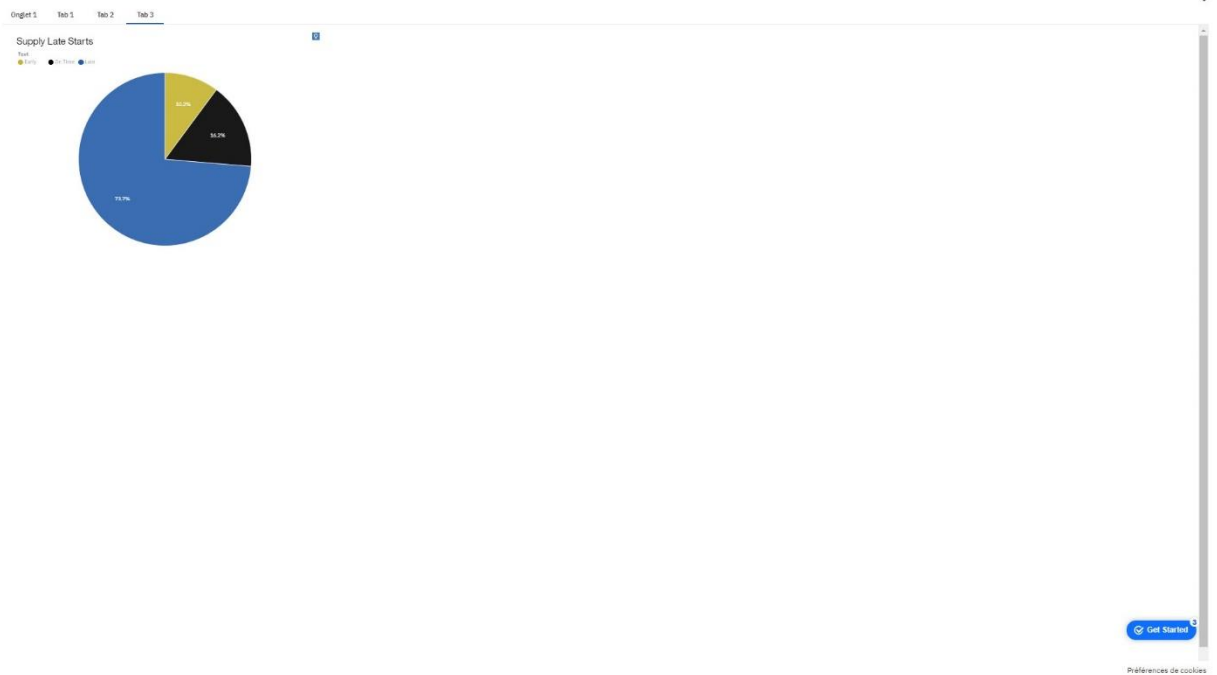


Figure 20 IBM Cognos - Dashboard 4²¹

²⁰ By the Author

²¹ By the Author

c. Dundas BI Online

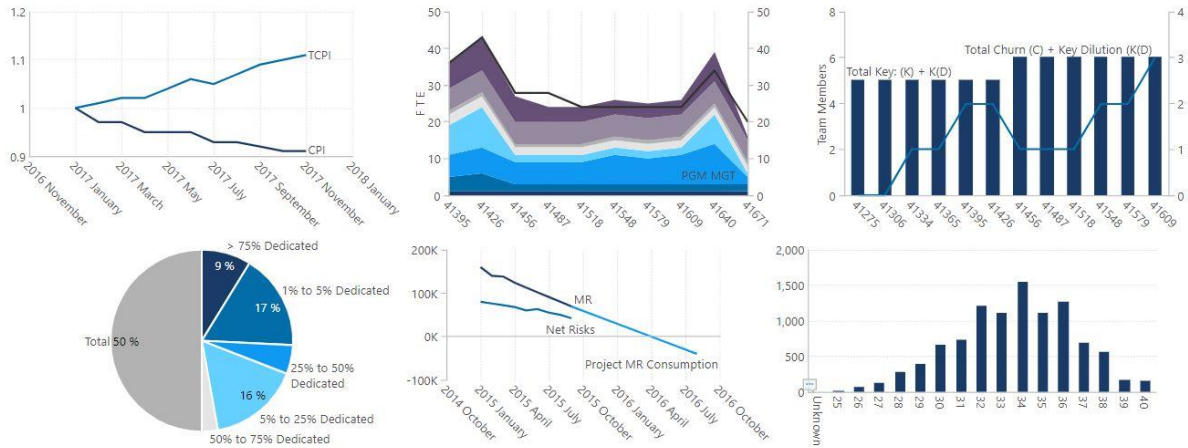


Figure 21 Dundas - Dashboard 1²²

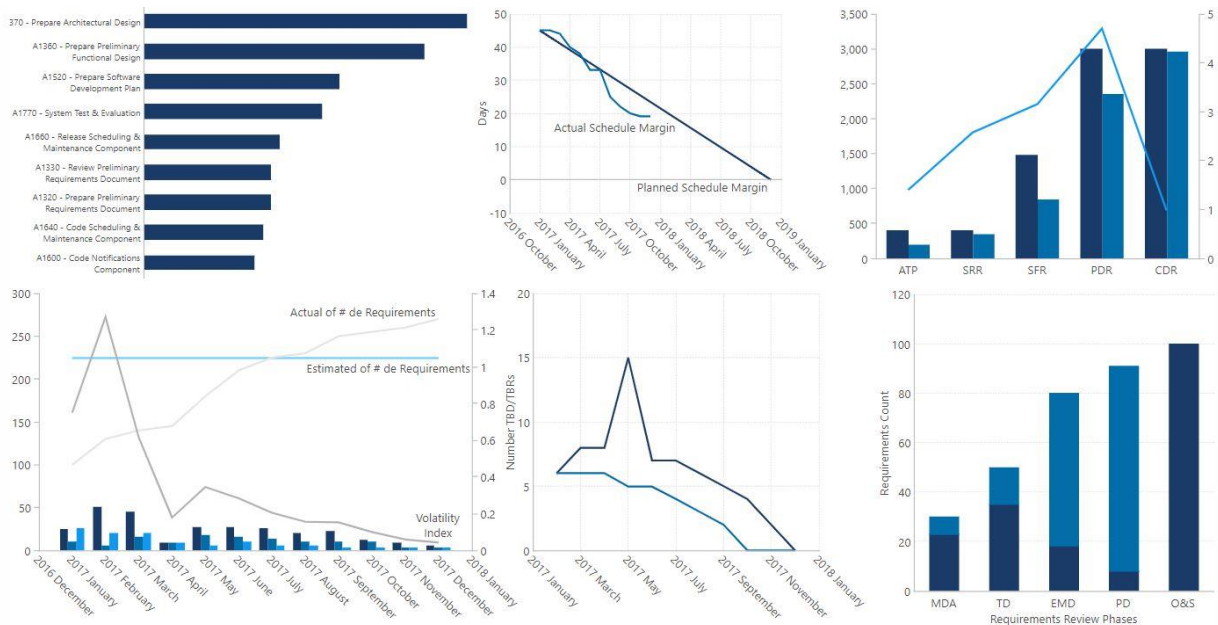


Figure 22 Dundas - Dashboard 2²³

²² By the Author

²³ By the Author

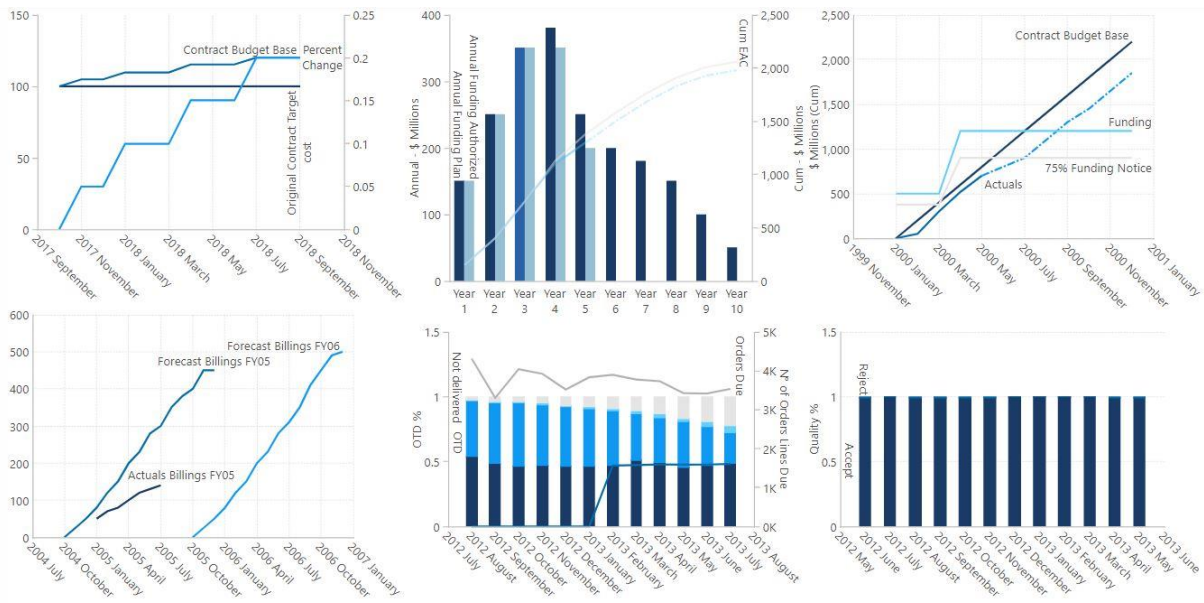


Figure 23 Dundas - Dashboard 3²⁴

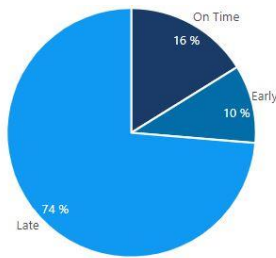


Figure 24 Dundas - Dashboard 4²⁵

²⁴ By the Author

²⁵ By the Author

2. MS Excel

MS Excel can elaborate on most of the metrics listed in Step 4.

As a result, we can summarize in the table below the replicated metrics. The author has considered three colors:

Green: If the chart contains the same information as the example (except for the title of the chart)

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		Power BI	Dundas BI	IBM Cognos		
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	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				
	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				
	Production Line of Balance	A nonlinear function used to model cumulative cost accrual in research and development (R&D) contracts.				
Other	Rayleigh Estimator					
			11	16	12	20
			9	4	8	2
			3	3	3	1

Step 6

As shown in the table above, not all the metrics are replicable by a BI platform. The best BI Platform that can replicate most of the charts is Dundas BI.

Maybe a better knowledge of each BI Platform might help to include or add more information missing for the yellow metrics. We also have to consider that two BI platforms were trial versions. Therefore, some features might be restricted or might be available only for a fully downloaded version.

It seems that for these unique metrics, MS Excel is still the best platform to elaborate on them. It offers better flexibility and a more intuitive way to develop charts.

CONCLUSIONS

This research was undertaken to find answers to the following questions:

- To determine the advantages of Business Intelligence over other report software

Based on the analysis conducted above, it is clear that Business Intelligence platforms did not reproduce all the charts with the metrics suggested by S. Paterson and NDIA. The BI platform that can replicate most of the graphs is Dundas BI online version. Therefore, for these metrics, BI platforms do not offer any advantage over MS Excel.

The dashboard produced by the BI platform helps the top management level of the organization, but for other supporting areas that require more detail in the charts, the information is not replicable as MS Excel does it.

The author has not perceived any advantage elaborating the charts because it was not intuitive to set the figures and also to find the correct parameters to create the same curves or tables as MS Excel. Some features are not available or do not exist.

Besides, the imported data required modifications or a specific format because when creating and assigning values to the axis, sometimes the platform did not recognize them at all.

- To define the main attributes to choose a Business Intelligence dashboard tool.

These are the main attributes that any BI dashboard tool needs to include. Based on the experience in elaborating the dashboard for the oil and gas sector and other unique metrics, a BI dashboard tool should:

- Modify arrangements or formats of the data source. Only Power BI Desktop has this feature available. Online versions do not allow this feature. Maybe with a fully downloaded version.
- Provide more charts. Online versions do not offer all the maps, tables, curves, lines, and other metrics.
- In online versions, it was not possible to assign more than one value for a secondary vertical axis.
- Be more intuitive in setting the parameters or assigning values to a different axis.

- To decide what challenges executive managers have to overcome to use a Business Intelligence dashboard.

To summarize, these are the challenges executive managers have to overcome to be able to get the full value out of BI dashboards:

- 1) Not all the information is replicable in BI platforms. It might be necessary to create new charts or metrics, especially for supporting areas. If information is missing, managers would not have any interest in these reports from BI platforms.

- 2) BI platforms are not very intuitive. Even if the manager has an advanced level using MS Excel, this will discourage the use of BI platforms.
- 3) Data source formats from different managing and supporting areas should be standard. Modification of data could lead to thinking that it is required additional resources to treat data. Therefore, it will also discourage the use of BI platforms.
- 4) Managers or supporting areas should know using a significant amount of data or database with several dimensions. These skills will help to use different charts that are more interactive with users in selecting and in filtering to report specific indicators.

Based on this analysis, these are the author's SPECIFIC recommendations:

- 1) Adapt information to what charts from each BI platform can produce. It might be necessary to create new reports or split information to get different metrics and make decisions based on modern figures.
- 2) Excel remains a powerful tool as any of the dedicated BI “solutions” provided.
- 3) Dundas BI is the highest scoring option after Excel. A full downloaded version might include more features to elaborate on all the charts for metrics suggested.
- 4) Standardize data source format for each BI platform.
- 5) BI platforms should be more intuitive in setting charts and assigning values to the axis.
- 6) All the project team should train using big data and how to use other charts and features from BI platforms to obtain an added value from different data dimensions.

FOLLOW ON RESEARCH

As shown in step 5, other metrics suggested by NDIA are not replicable as MS Excel does it. It was not easy for the author to intuitively determine how to elaborate on the charts for some metrics. It might be necessary to analyze if there is another way to report the same information based on what the BI platform can produce.

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List of Figures

Figure 1 Print Screen of Power BI Desktop.....	4
Figure 2 Print Screen IBM Cognos Online.....	6
Figure 3 Print Screen Dundas BI Online.....	7
Figure 4 Print Screen Transaction CJ13	8
Figure 5 Print Screen MS Excel	9
Figure 6 Common Metrics for a Dashboard by S. Paterson	10
Figure 7 Dashboard developed with Power BI Desktop.....	11
Figure 8 Dashboard elaborated with IBM Cognos online.....	12
Figure 9 Dashboard designed with Dundas BI online.....	12
Figure 10 First Page Template Dashboard by S. Paterson.....	13
Figure 11 Table of Comparison among BI Platforms, Excel and SAP.....	14
Figure 12 Unique Metrics by NDIA	15
Figure 13 Power BI - Dashboard 1	16
Figure 14 Power BI - Dashboard 2	17
Figure 15 Power BI - Dashboard 3	17
Figure 16 Power BI - Dashboard 4	18
Figure 17 IBM Cognos - Dashboard 1	19
Figure 18 IBM Cognos - Dashboard 2	19
Figure 19 IBM Cognos - Dashboard 3	20
Figure 20 IBM Cognos - Dashboard 4	20
Figure 21 Dundas - Dashboard 1	21
Figure 22 Dundas - Dashboard 2	21
Figure 23 Dundas - Dashboard 3	22
Figure 24 Dundas - Dashboard 4	22
Figure 25 CPI vs. TCPIeac.....	29
Figure 26 Staffing Profile ²⁵	29
Figure 27 Critical Skills Key Personnel ²⁵	30
Figure 28 Critical Resource Multiplexing Metric ²⁵	30

Figure 29 Risk and Opportunity vs. Management Reserve²⁵31

Figure 30 SRA Histogram (Frequency Distribution Graph)²⁵31

Figure 31 SRA Sensitivity (Tornado)²⁵32

Figure 32 Schedule Margin Burn-Down²⁵32

Figure 33 Requirements Completeness²⁵33

Figure 34 Requirements volatility²⁵33

Figure 35 TBD/TBR Burndown²⁵34

Figure 36 Requirements Traceability²⁵34

Figure 37 Technical Performance Measure Compliance²⁵35

Figure 38 Contract Mods²⁵35

Figure 39 Baseline Revisions²⁵36

Figure 40 Program Funding Plan²⁵36

Figure 41 Program Funding Status²⁵37

Figure 42 Research, Development, Test, and Evaluation²⁵37

Figure 43 Parts Demand Fulfillment²⁵38

Figure 44 Supplier Acceptance Rate²⁵38

Figure 45 Supplier Late Starts²⁵39

Figure 46 Production Line of Balance²⁵39

Figure 47 Rayleigh Estimator²⁵40

APPENDICES

Appendix 1 – NDIA Unique Metrics

1. SPIt vs. TSPIed: A comparison of past and future schedule efficiency

The chart should be similar to the graph of CPI vs. TCPIeac. See below.

1. Cost
 - b. CPI vs. TCPIeac: Forecast Efficiency Rate

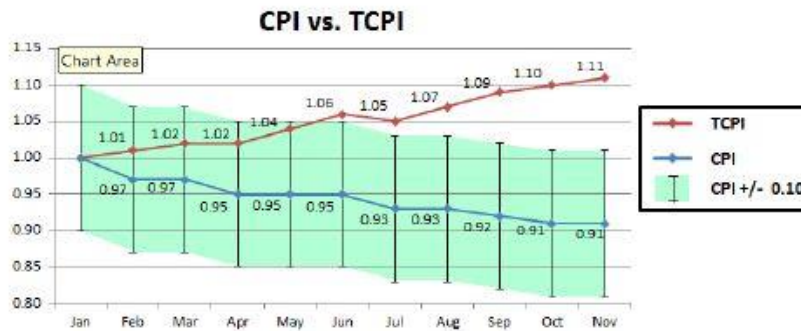


Figure 25 CPI vs. TCPIeac²⁶

2. Staffing

- c. Staffing Profile: A time-phased, 12 months rolling full -time equivalent (FTE) headcount by-product, organizational, or functional area of individuals required on the program

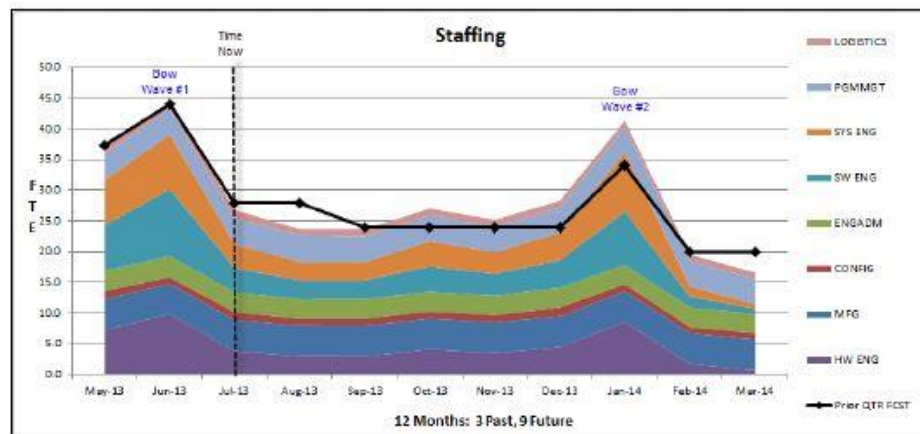


Figure 26 Staffing Profile²⁵

²⁶ National Defense Industrial Association. (2017, September 12). A Guide to Managing Programs Using Predictive Measures. Retrieved October 1, 2019, from <https://www.ndia.org/-/media/sites/ndia/divisions/ipmd/ndia-ipmd-predictivemeasuresguide-rev-2-july312017.ashx?la=en>

- d. Critical Skills Key Personnel - "Churn"/Dilution Metrics: Project Team members are a Critical Skill if the loss of those individuals would directly or indirectly impact technical program requirements, compliance, cost or schedule performance, customer commitments, or program deliverables.

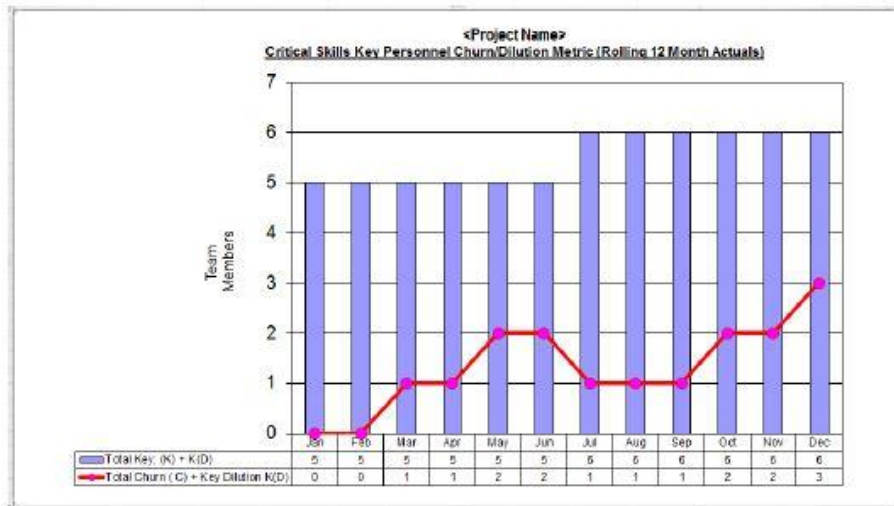


Figure 27 Critical Skills Key Personnel²⁵

- e. Critical Resource Multiplexing Metric: % of personnel dedicated to the program vs. the % that spread across multiple programs.

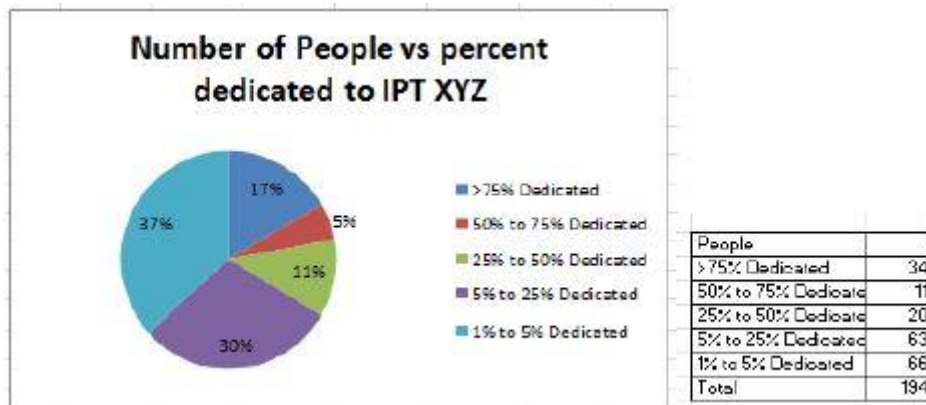


Figure 28 Critical Resource Multiplexing Metric²⁵

3. Risk and Opportunity

- f. Risk and Opportunity \$ vs. Management Reserve \$: Visual gauge of the rate at which MR expends against the estimated risk exposure on a project

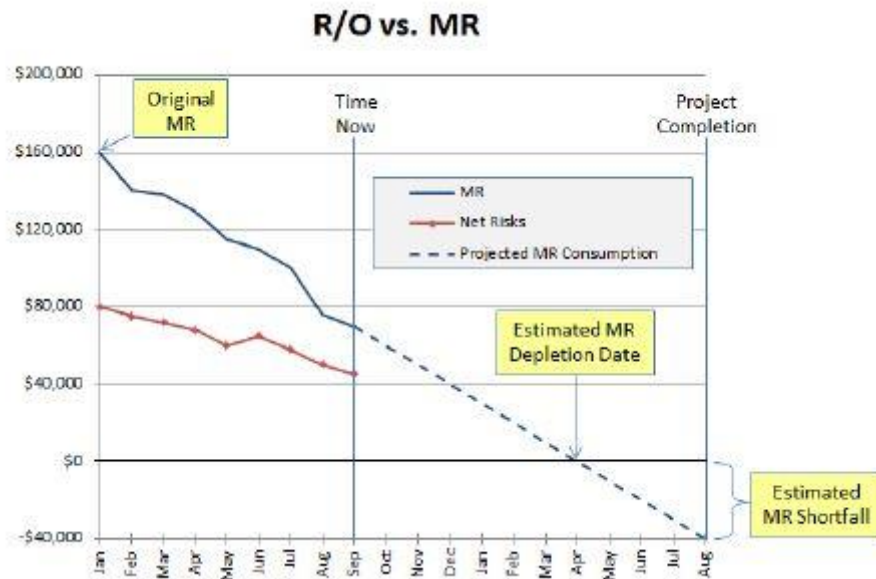


Figure 29 Risk and Opportunity vs. Management Reserve²⁵

- g. SRA Histogram (Frequency Distribution Graph): Calculates the probability of achieving a specific scheduled completion date

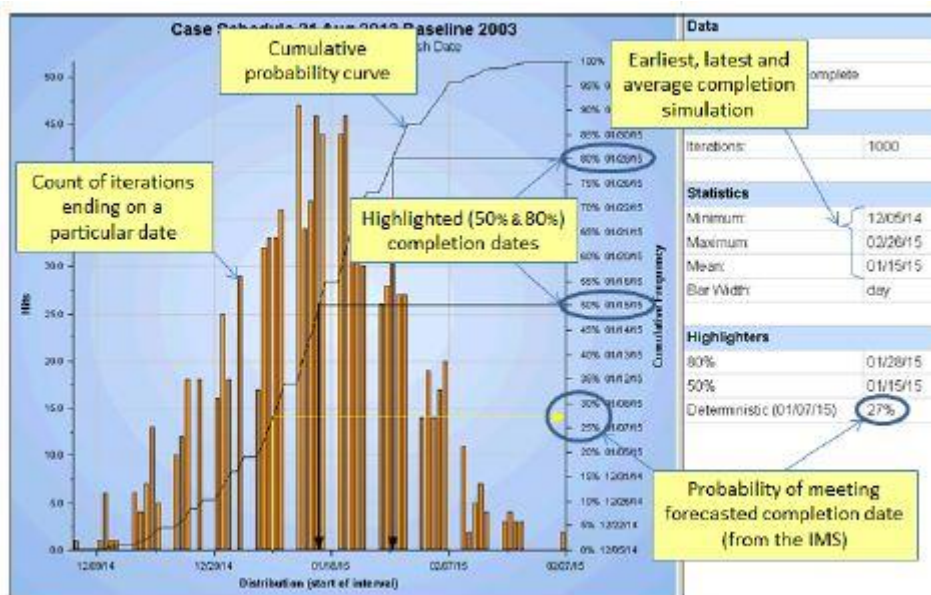


Figure 30 SRA Histogram (Frequency Distribution Graph)²⁵

- h. SRA Sensitivity (Tornado) Graphs: Used to identify the activities most likely to drive the outcomes

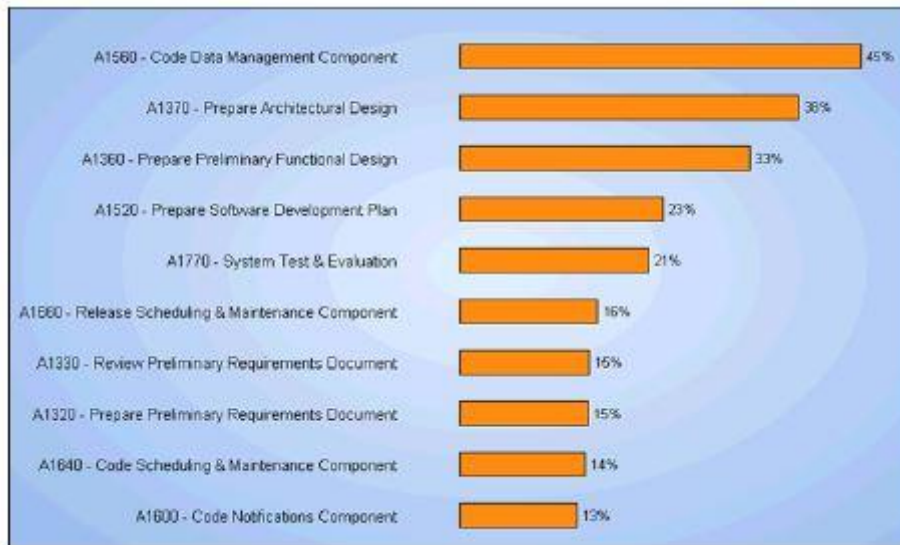


Figure 31 SRA Sensitivity (Tornado)²⁵

- i. Schedule Margin Burn-down: A tangible representation of the time associated with the risks to an end-item deliverable or contract event

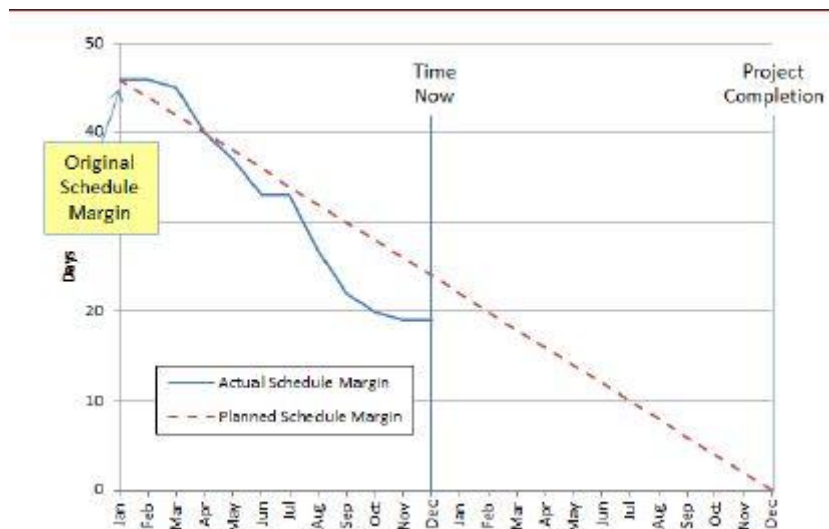


Figure 32 Schedule Margin Burn-Down²⁵

4. Requirements

- j. Requirements completeness: Indicates progress in eliciting and documenting all the requirements necessary for final, completed system design. It compares planned completion with the actual completion

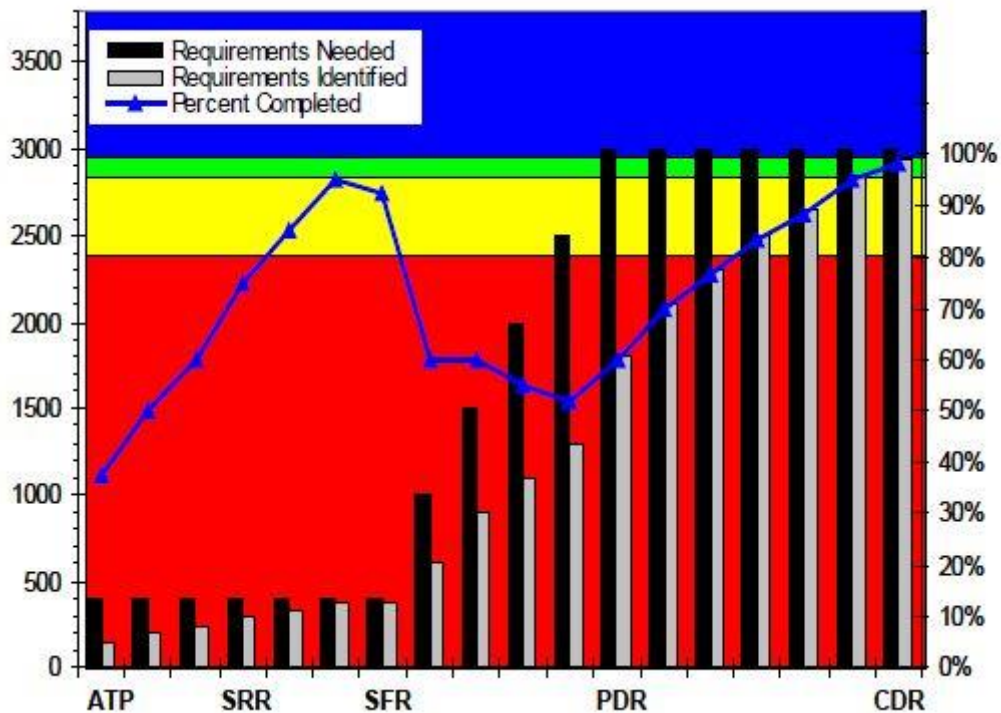


Figure 33 Requirements Completeness²⁵

k. Requirements volatility: Measure of a not-yet-stable requirements baseline

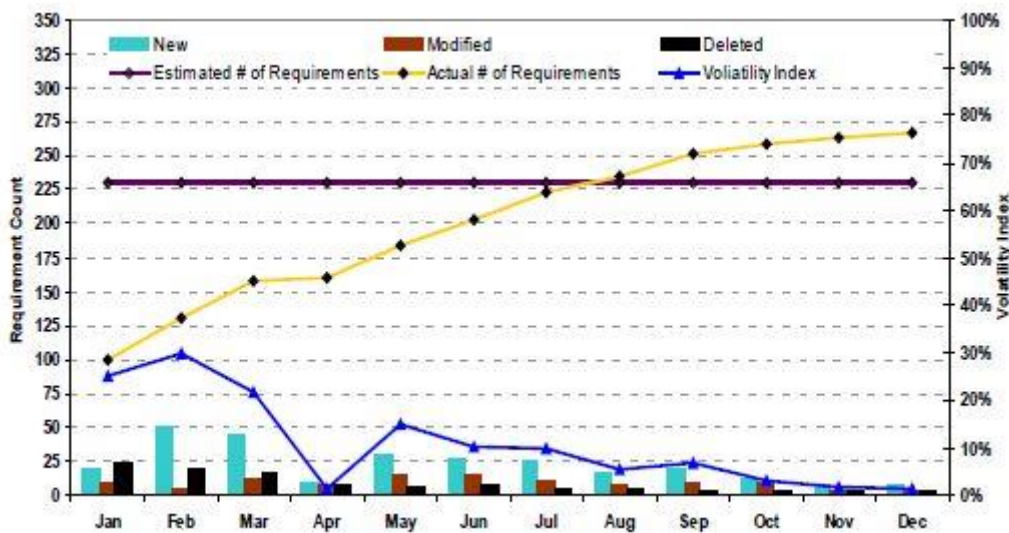


Figure 34 Requirements volatility²⁵

l. TBD/TDR Burn Down: "To-Be-Determined" (TBD) or "To-Be-Resolved" (TBR) refers to the unfinalized system, subsystem, or products requirements, as listed or specified in the requirements documents or models

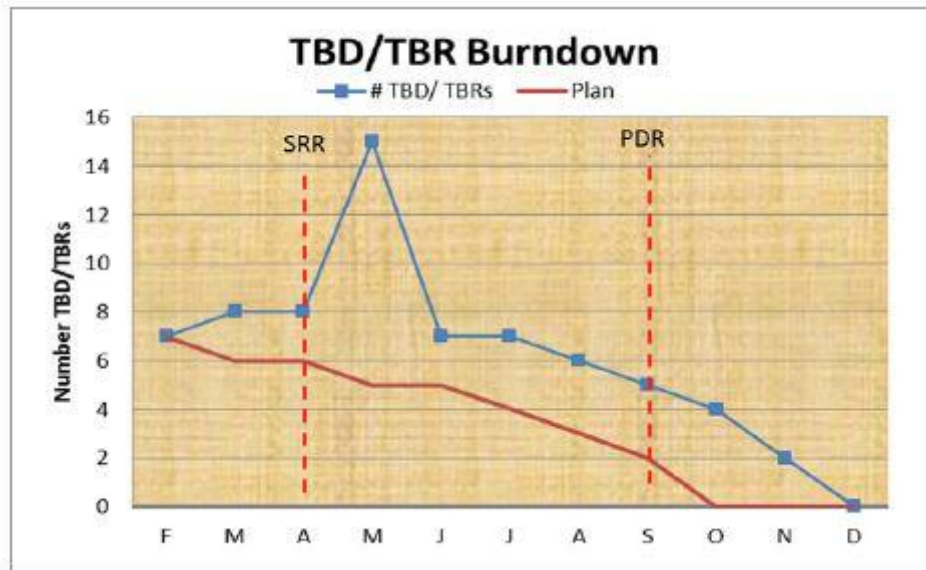


Figure 35 TBD/TBR Burndown²⁵

- m. Requirements Traceability: A measure that determines how accurately a program's requirements are maturing to support a baseline solution at various Acquisition Phases

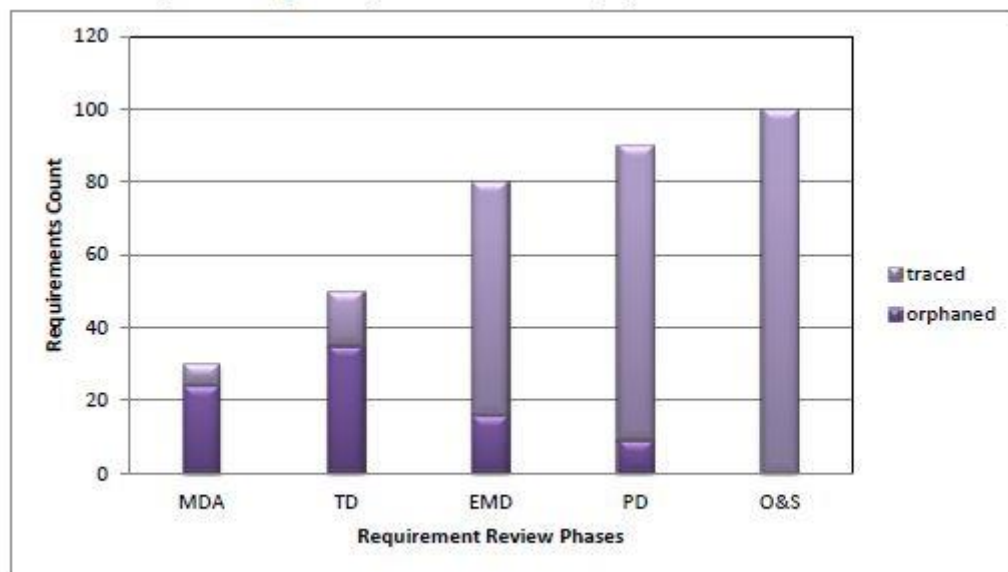


Figure 36 Requirements Traceability²⁵

5. Technical Performance Measures

- n. Technical Performance Measure Compliance: 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.

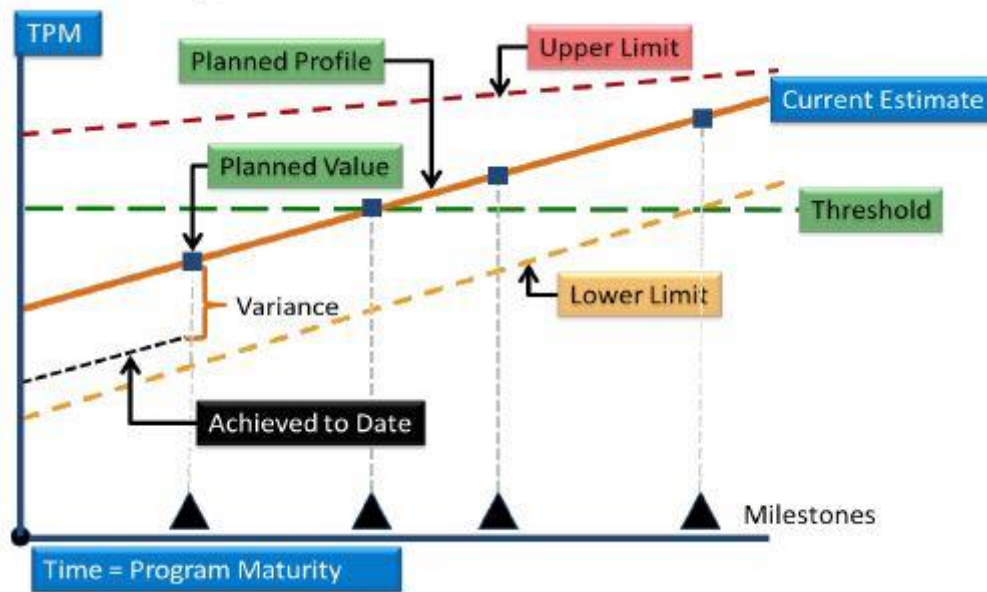


Figure 37 Technical Performance Measure Compliance²⁵

6. Contract Health

- o. Contract Mods: The trending contract modifications which help predict the accuracy of the Performance Measurement Baseline (PMB) and ensures that the text of the contract is correct.

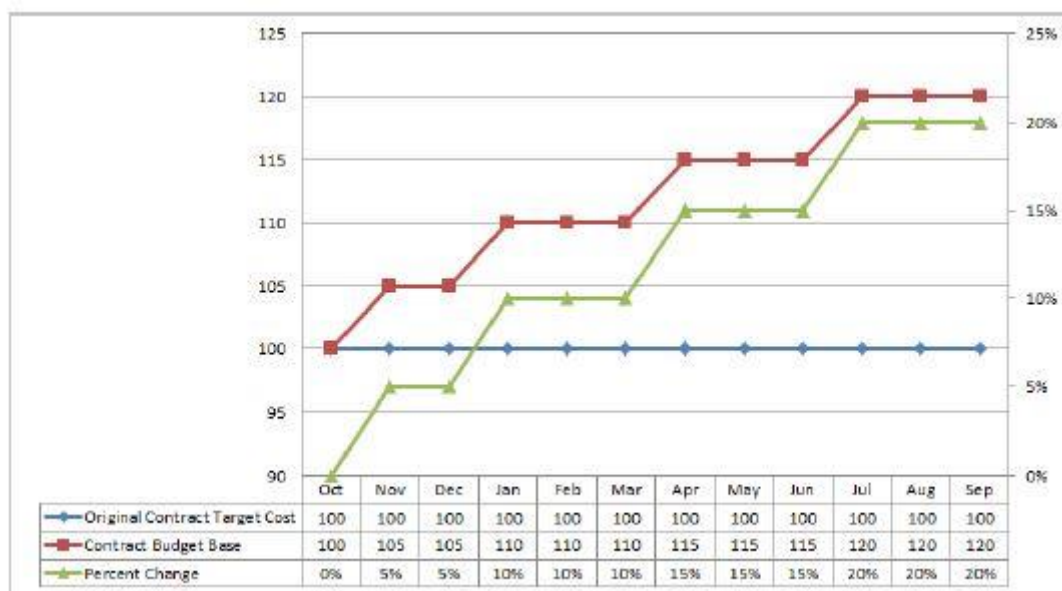


Figure 38 Contract Mods²⁵

- p. Baseline Revisions: 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.

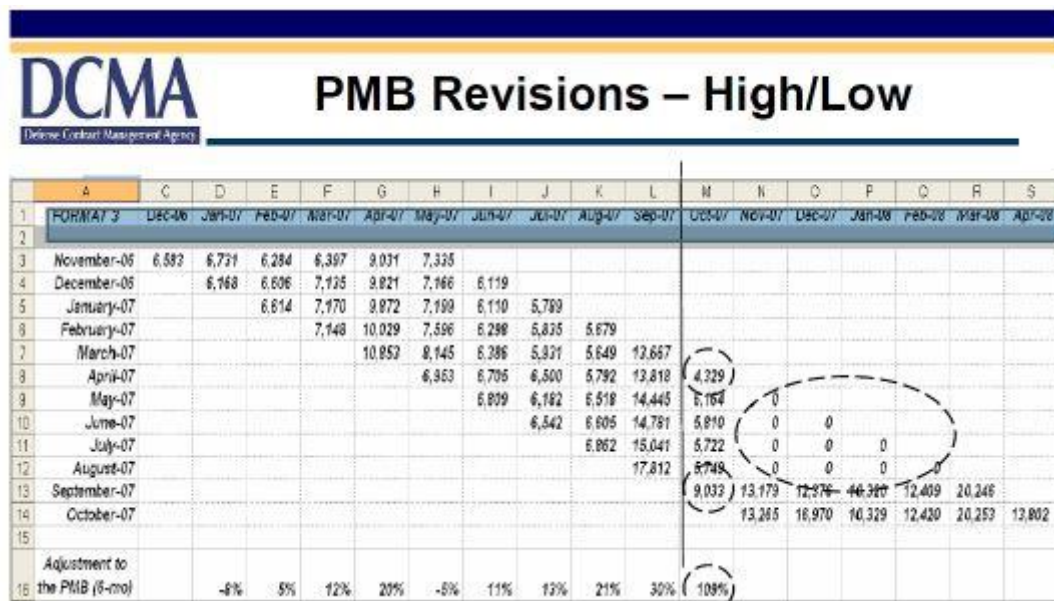


Figure 39 Baseline Revisions²⁵

q. Program Funding Plan: A measure of the funding stability on the program

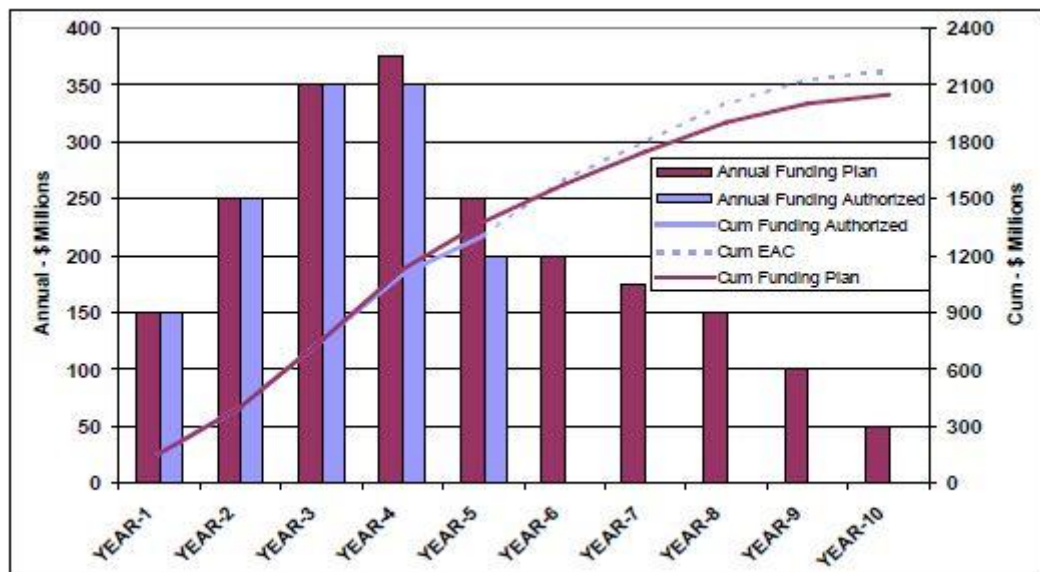


Figure 40 Program Funding Plan²⁵

r. Program Funding Status: Actual and projected cumulative program funding compared to projected program expenditures plus potential termination liability

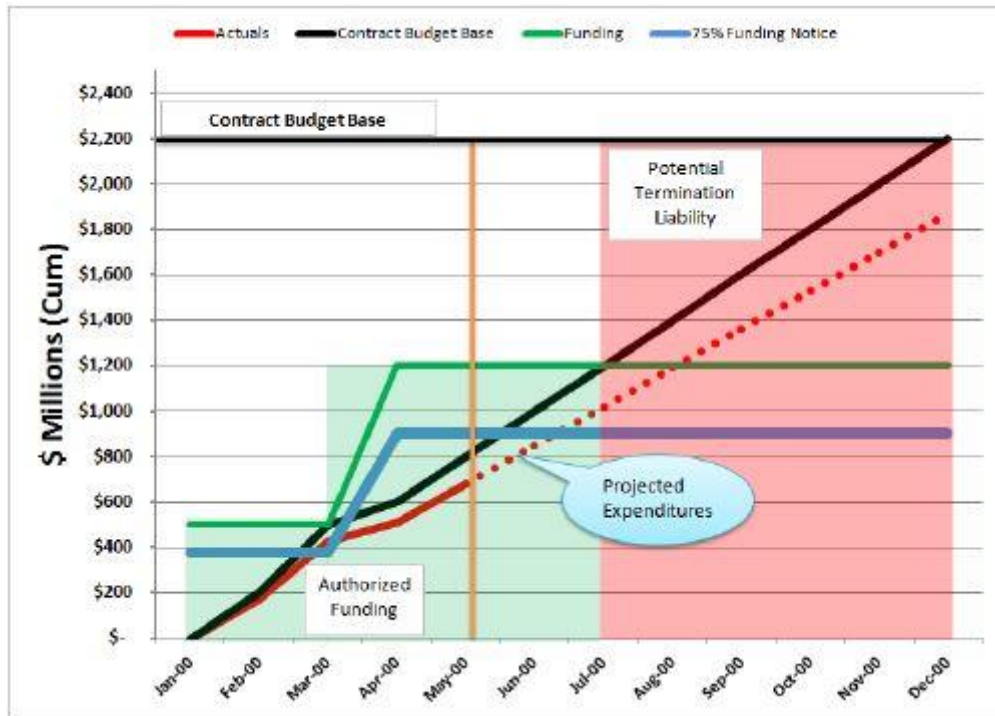


Figure 41 Program Funding Status²⁵

- s. Research, Development, Test, and Evaluation - Actual Billings vs. Forecast Billings: Measures how well the contractor is performing against forecast or planned billings

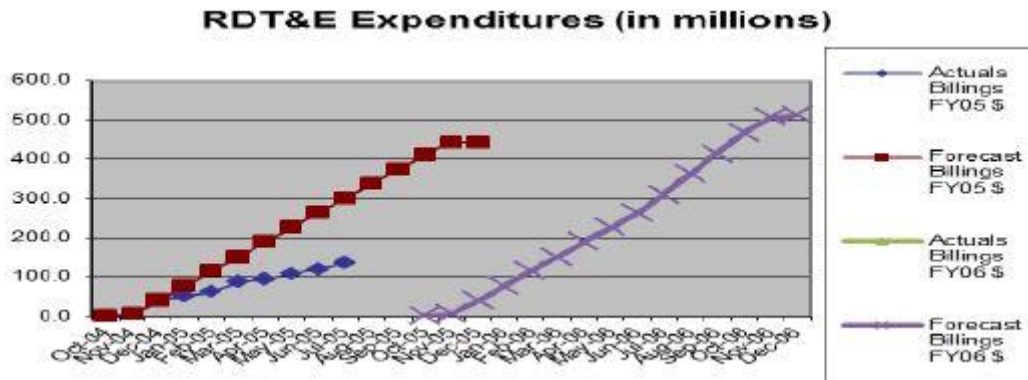


Figure 42 Research, Development, Test, and Evaluation²⁵

7. Supply Chain

- t. Parts Demand Fulfillment: Tied to On-Time Delivery (OTD), the percent measurement of total items received at the agreed-upon Due Date.

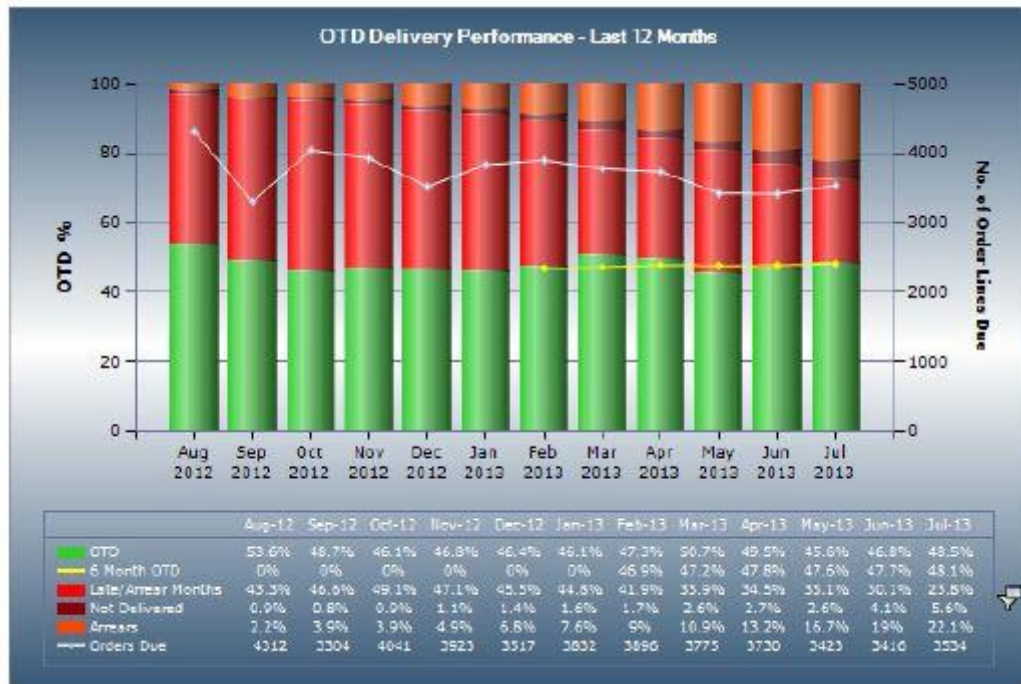


Figure 43 Parts Demand Fulfillment²⁵

- u. Supplier Acceptance Rate: The percentage of acceptable versus rejected delivered parts in a month for approved suppliers

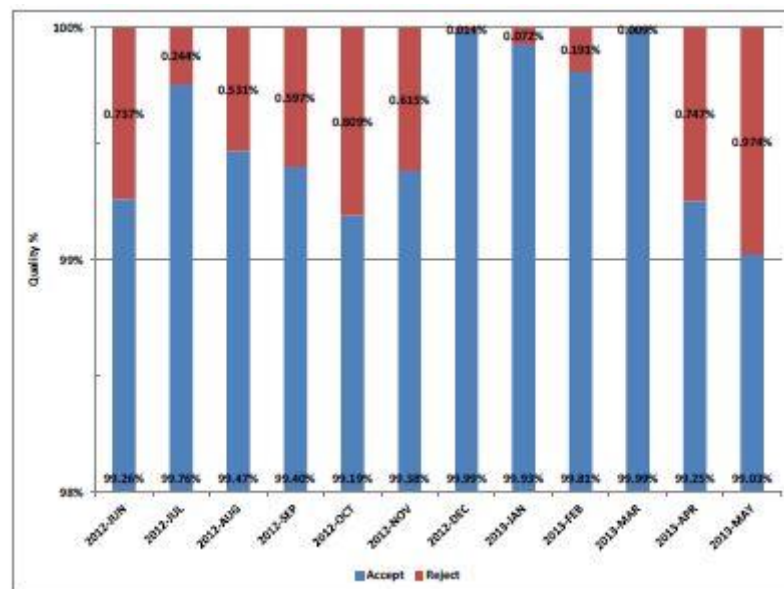


Figure 44 Supplier Acceptance Rate²⁵

- v. Supplier Late Starts: 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

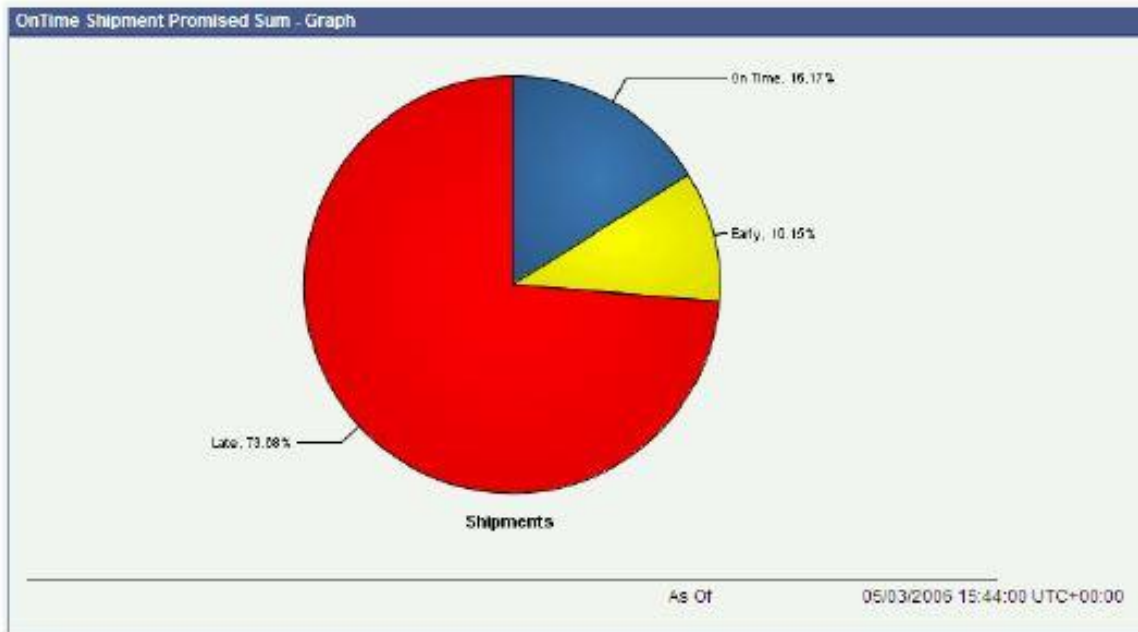


Figure 45 Supplier Late Starts²⁵

- w. Production Line of Balance: Means of integrating the flow of materials and components into the manufacture of end items by time-phased delivery requirements

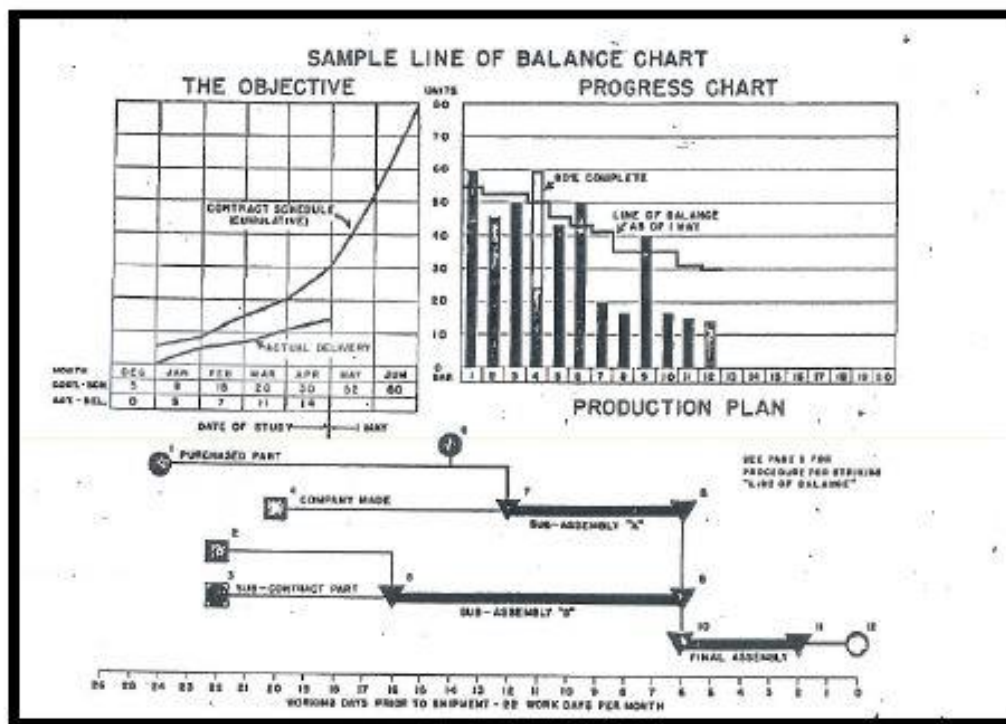


Figure 46 Production Line of Balance²⁵

8. Other

- x. Rayleigh Estimator: A nonlinear function used to model cumulative cost accrual in research and development (R&D) contracts.

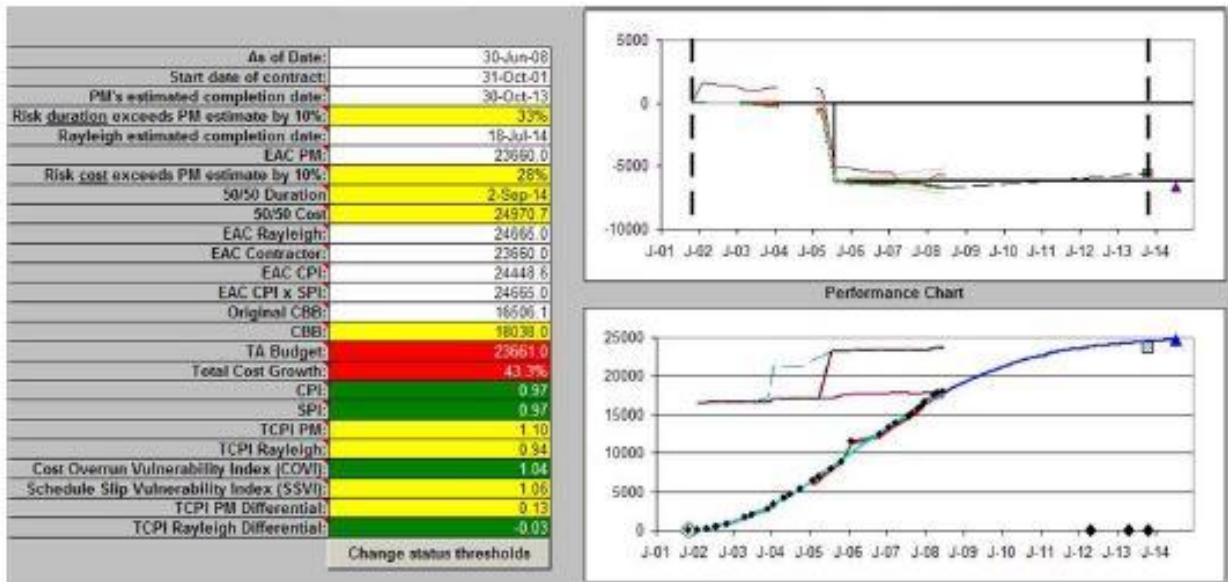


Figure 47 Rayleigh Estimator²⁵

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