



Figure 19 IBM Cognos - Dashboard 3¹⁹



Figure 20 IBM Cognos - Dashboard 4²⁰

¹⁹ By the Author

²⁰ By the Author

c. Dundas BI Online

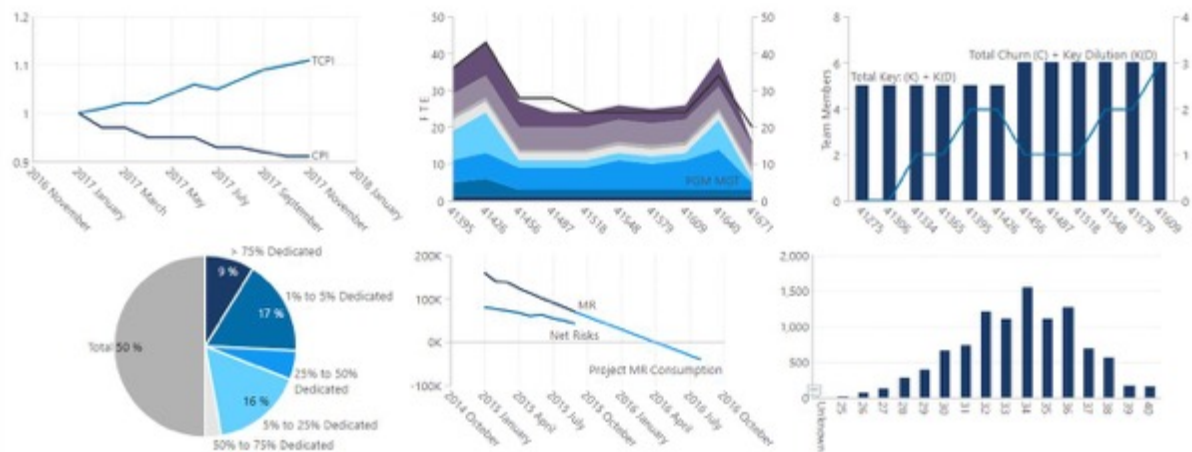


Figure 21 Dundas - Dashboard 1²¹

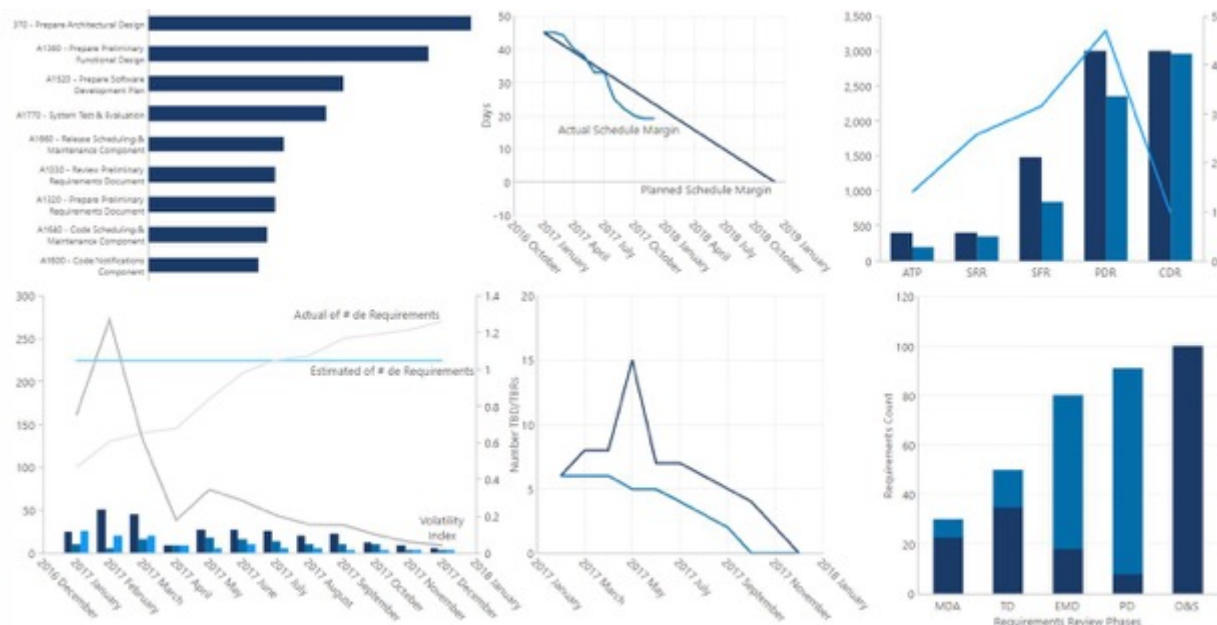


Figure 22 Dundas - Dashboard 2²²

²¹ By the Author

²² By the Author

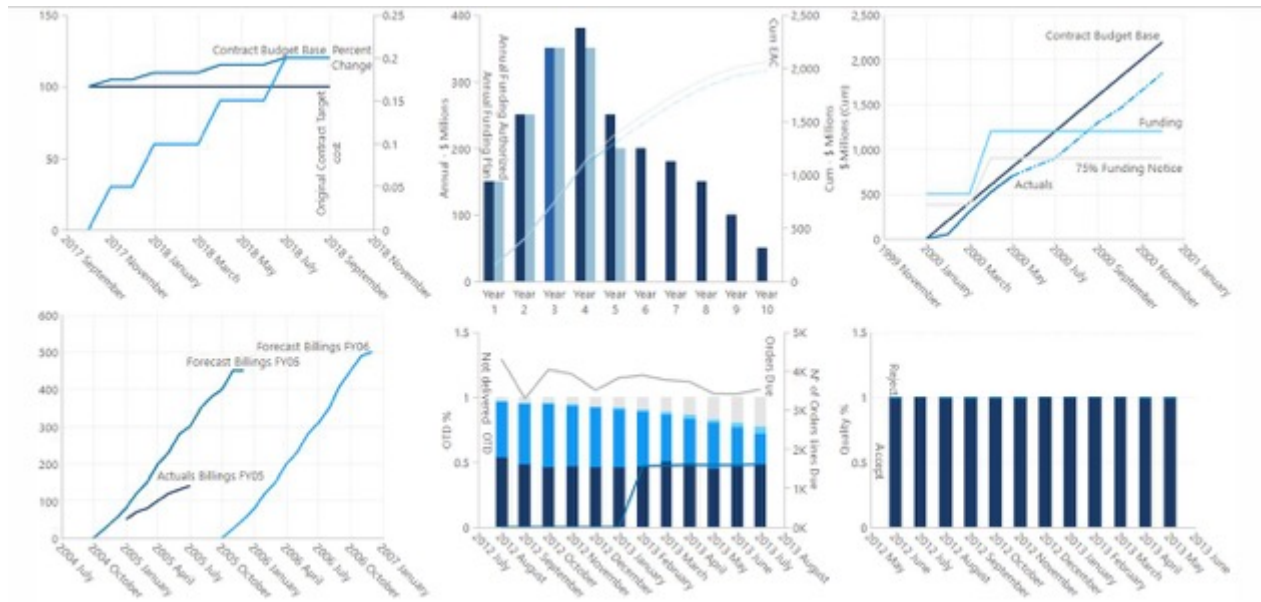


Figure 23 Dundas - Dashboard 3²³

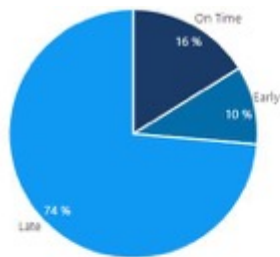


Figure 24 Dundas - Dashboard 4²⁴

²³ By the Author

²⁴ 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)

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

Red: The chart is not replicable.

Metrics	Definition or Formula	Business Intelligence			MS EXCEL
		Power BI	Dundas BI	IBM Cognos	
Schedule	SPI vs TSPed				
Cost	CPI vs TCPlac				
Staffing	Staffing Profile				
	Critical Skills Key Personnel "Churn"/Dilution Metrics				
	Critical Resource Multiplexing Metric				
	Risk and Opportunity \$ vs Management Reserve \$				
Risk and Opportunity	SRA Histogram (Frequency Distribution Graph)				
	Sra Sensitivity (Tornado) Graphs				
	Schedule Margin Burn-down				
	Requirements completeness				
Requirements	Requirements volatility				
	TBD/TBR Burn Down				
	Requirements Traceability				
	Technical Performance Measure Compliance				
Technical Performance Measures	Contract Mods				
Contract Health	Baseline Revisions				
	Program Funding Plan				
	Program Funding Status				
	Research, Development, Test, and Evaluation - Actual Billings vs Forecast Billings				
Supply Chain	Parts Demand Fulfillment				
	Supplier Acceptance Rate				
	Supplier Late Starts				
	Production Line of Balance				
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.



BIBLIOGRAPHY-

1. Hitachi Solutions Canada. (2014, June 26). *What is Business Intelligence (BI)?* [Video file]. Retrieved from <https://www.youtube.com/watch?v=hDJdkcdG1iA>
2. OLAP. (2013, October 30). What is Business Intelligence? BI Definition [Web log post]. Retrieved from <http://olap.com/learn-bi-olap/olap-bi-definitions/business-intelligence/>
3. Koeppel, H. (2013, March 1). The history of business intelligence and analytics and what comes next [Web log post]. Retrieved from <https://searchcio.techtarget.com/opinion/The-history-of-business-intelligence-and-analytics-and-what-comes-next>
4. Techtarget. (2014, June). DIY BI: A guide to self-service business intelligence implementation [Web log post]. Retrieved from <https://searchbusinessanalytics.techtarget.com/essentialguide/DIY-BI-A-guide-to-self-service-business-intelligence-implementation>
5. Klipfolio. (n.d.). What is Business Intelligence? Understand BI for Your Company [Web log post]. Retrieved from <https://www.klipfolio.com/resources/articles/what-is-business-intelligence>
6. Anna. (2017, November 29). Chartio. The 10 Point Scorecard to Pick Your Next Business Intelligence Tool [Web log post]. Retrieved from <https://blog.openbridge.com/chartio-the-10-point-checklist-to-pick-your-next-business-intelligence-tool-f876c694f6c1>
7. Conrad, A. (2018, November). Top Business Intelligence Requirements & Checklist Template for 2019 [Web log post]. Retrieved from <https://selecthub.com/business-intelligence/top-business-intelligence-requirements/>
8. Spicer, T. (2019, March 22). The Definitive 10-Point Scorecard Before Choosing a BI Solution - DZone Big Data [Web log post]. Retrieved from <https://dzone.com/articles/the-definitive-10-point-checklist-before-arriving>
9. Lebled, M. (2018, August 15). Top 6 BI Dashboard Best Practices in the Digital Age [Web log post]. Retrieved from <https://www.datapine.com/blog/bi-dashboard-best-practices/>
10. Pells, D. (2009, June). Global Business Intelligence for Managers of Programs, Projects, and Project-oriented Organizations - Project Management World Journal. Retrieved from <https://pmworldjournal.net/article/global-business-intelligence-for-managers-of-programs-projects-and-project-oriented-organizations/>
11. Smartsheet. (2018, May 4). Data Dashboards: The One Crucial Tool for Making Better Decisions, Faster. Retrieved February 10, 2019, from <https://www.cio.com/article/3269792/analytics/data-dashboards-the-one-crucial-tool-for-making-better-decisions-faster.html>
12. Lebled, M. (2019, January 4). How To Make a Dashboard That Leads To Better Decisions. Retrieved from <https://www.datapine.com/blog/how-to-make-a-dashboard-with-ease/>
13. Johnson, W. (2016, December 22). Top Usage of Dashboards in Business Intelligence and Decision Making. Retrieved from <https://www.templatemonster.com/blog/top-usage-of-dashboards-business-intelligence-decision-making/>
14. Raftree, L. (2015, June 9). 13 Tips for Creating Data Dashboards for Decision-Making - Technology Salon. Retrieved from <http://technologysalon.org/13-tips-for-creating-data-dashboards-for-decision-making/>
15. Khan, M. E. (2014). Business intelligence in project portfolios: enabling informed decisions. Paper presented at PMI® Global Congress 2014—EMEA, Dubai, United Arab Emirates. Newtown Square, PA: Project Management Institute. Retrieved from <https://www.pmi.org/learning/library/business-intelligence-project-portfolios-decisions-1489>
16. SAP Analytics Cloud. (n.d.). The Data Visualization Handbook. Retrieved from <https://www.sap.com/documents/2018/04/8cb8821e-fc7c-0010-87a3-c30de2ffd8ff.html>
17. The Chartered Institute of Management Accountants. (2008, September). Improving decision making in organizations. Retrieved from http://www.cimaglobal.com/Documents/ImportedDocuments/cid_execrep_unlocking_business_intelligence_Feb09.pdf



18. Zenko, J. (2018, May 23). Dundas BI: The Case for Business Intelligence vs. Excel [PART 1] | Blog.
 Retrieved from <https://www.dundas.com/support/blog/dundas-bi-the-case-for-business-intelligence-vs.-excel-part-1>
19. Zenko, J. (2018, May 31). Dundas BI: The Case for Business Intelligence vs. Excel [PART 2] | Blog.
 Retrieved from <https://www.dundas.com/support/blog/dundas-bi-the-case-for-business-intelligence-vs.-excel-part-2>
20. 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>
21. 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>

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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. TCPIeac²⁵

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

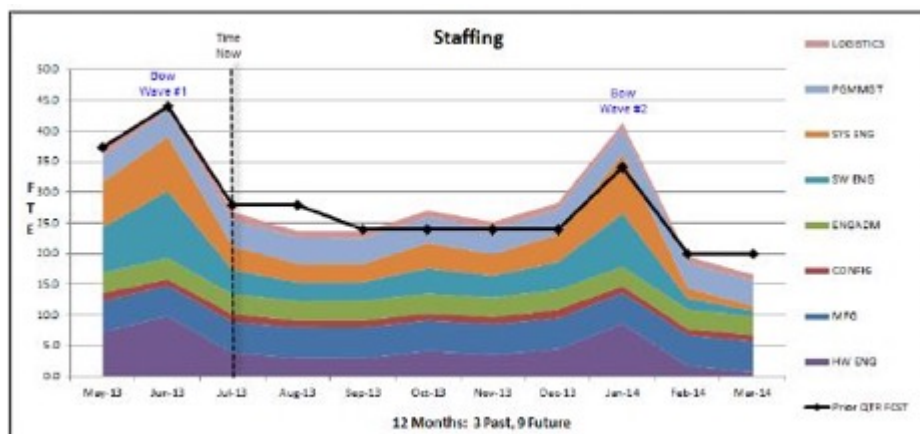


Figure 26 Staffing Profile²⁵

²⁵ 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.

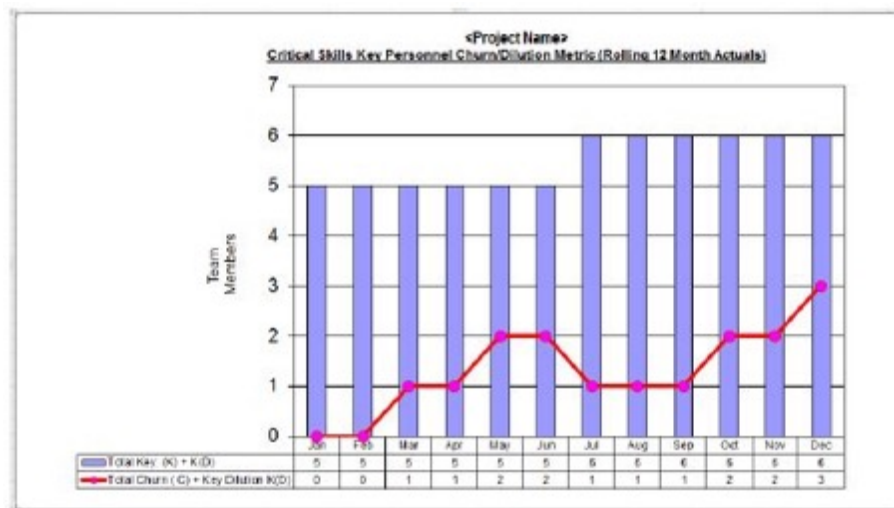


Figure 27 Critical Skills Key Personnel²⁵

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

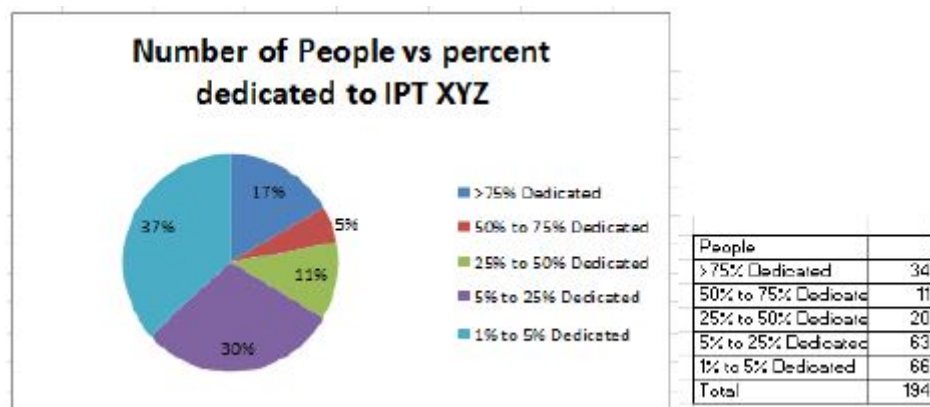


Figure 28 Critical Resource Multiplexing Metric²⁵

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

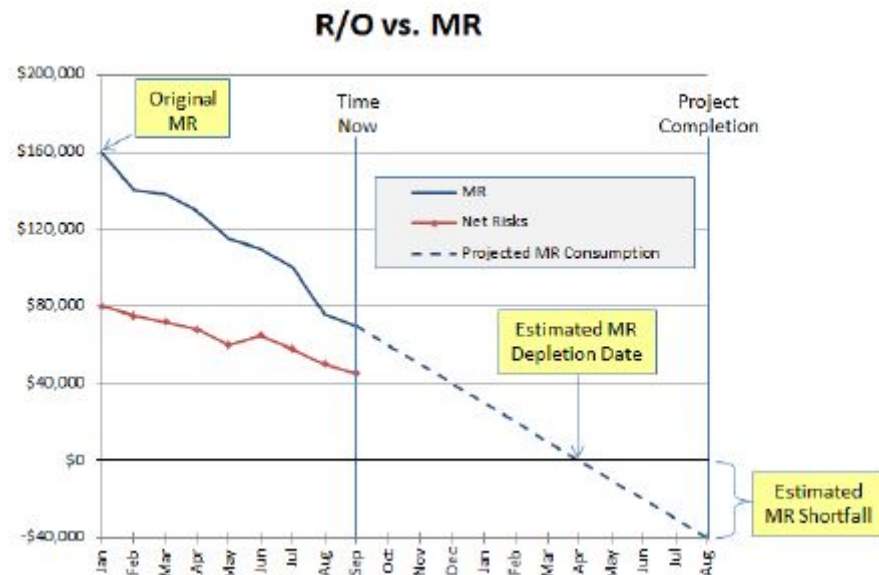


Figure 29 Risk and Opportunity vs. Management Reserve²⁵

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

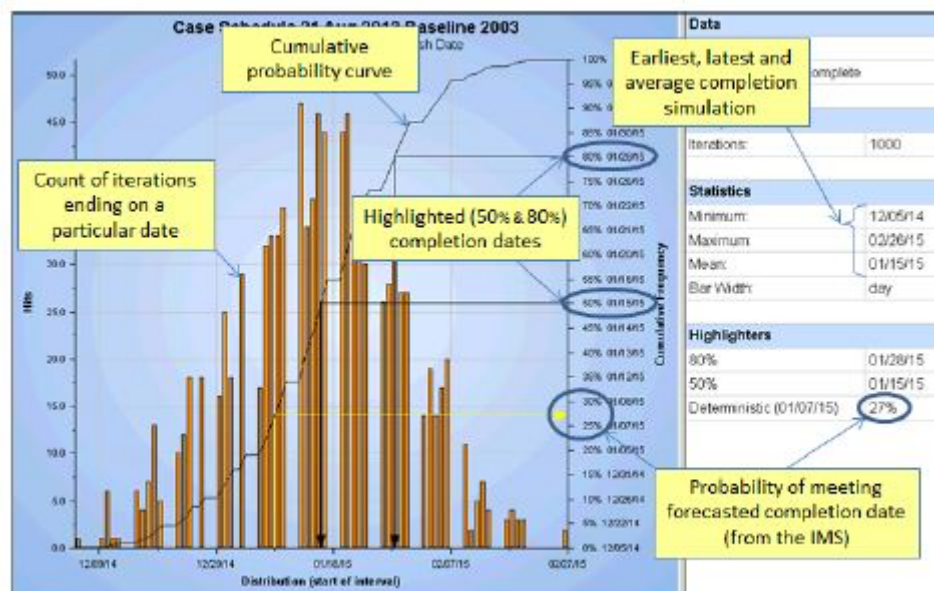


Figure 30 SRA Histogram (Frequency Distribution Graph)²⁵

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

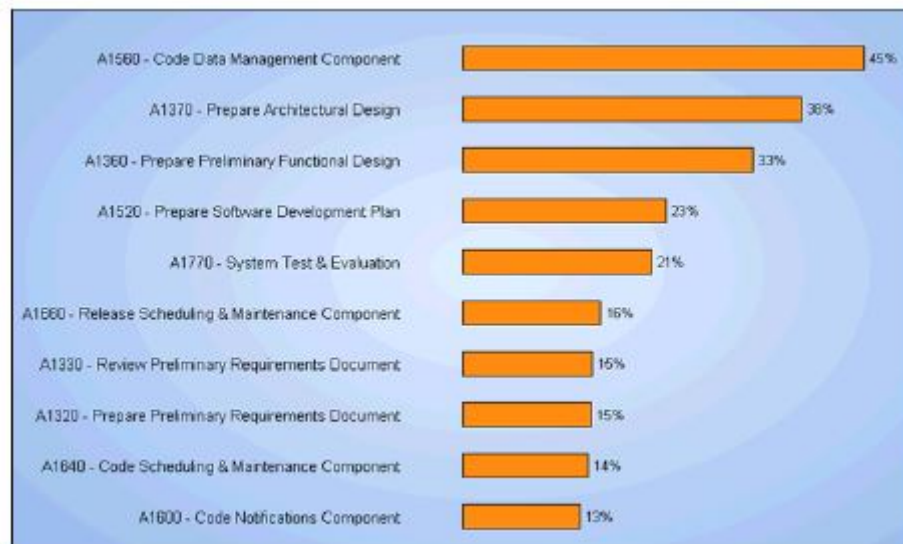


Figure 31 SRA Sensitivity (Tornado)²⁵

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

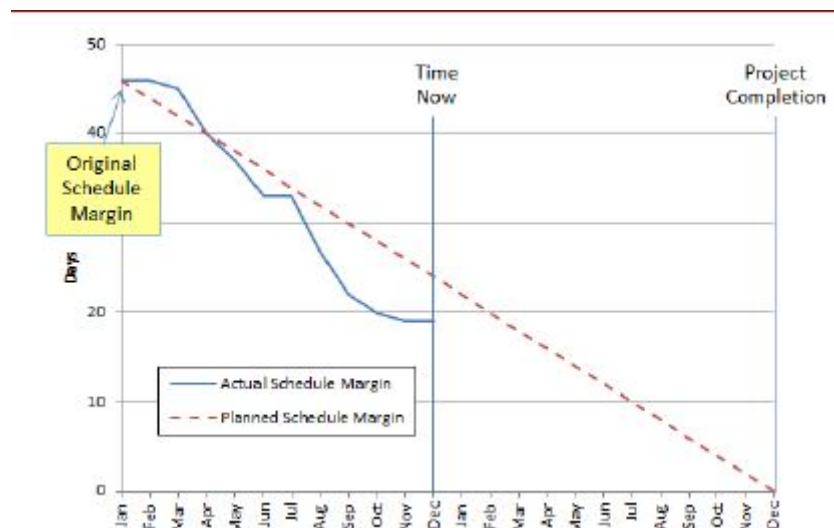


Figure 32 Schedule Margin Burn-Down²⁵

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

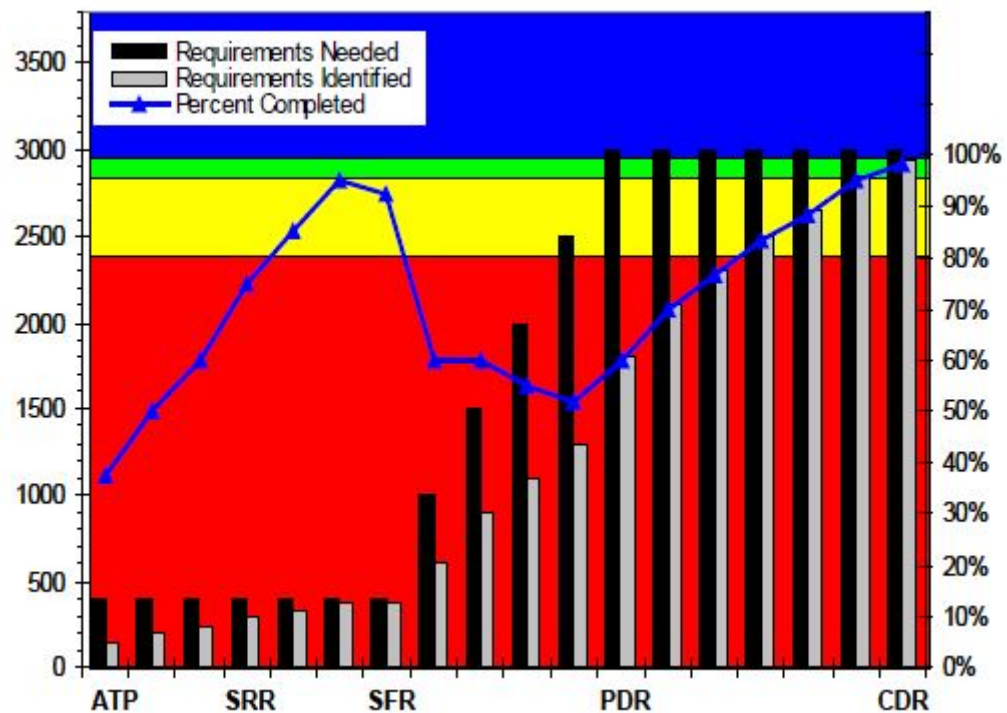


Figure 33 Requirements Completeness²⁵

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

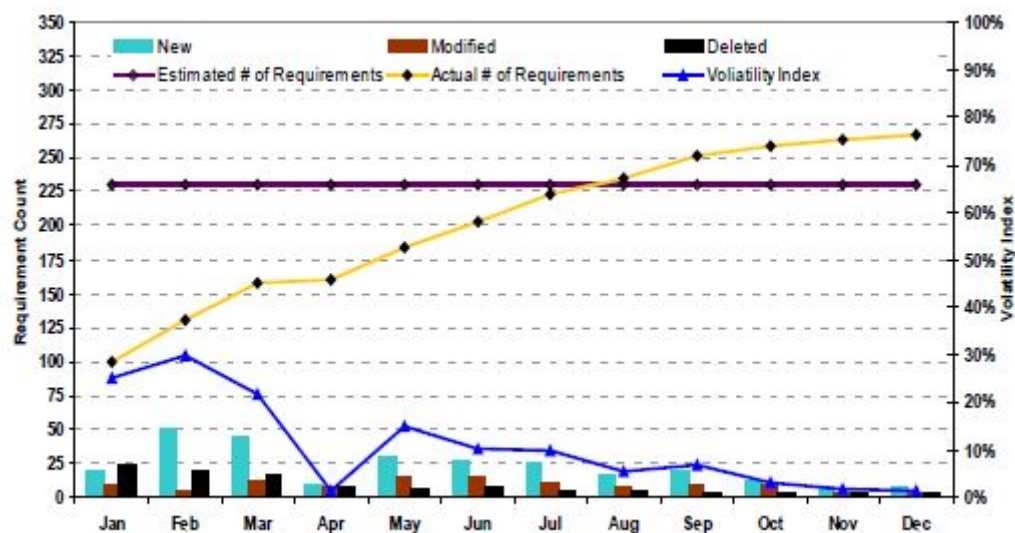


Figure 34 Requirements volatility²⁵

- 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

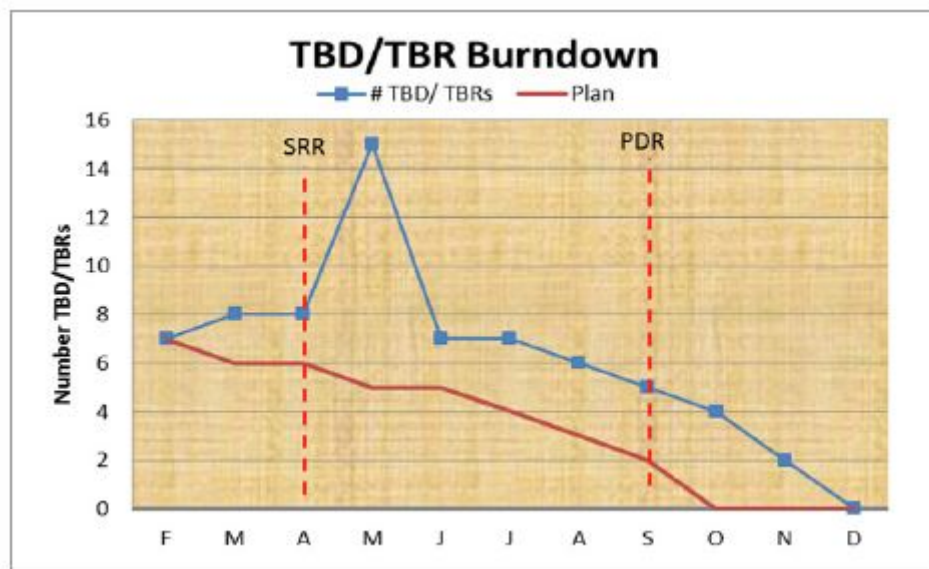


Figure 35 TBD/TBR Burndown²⁵

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

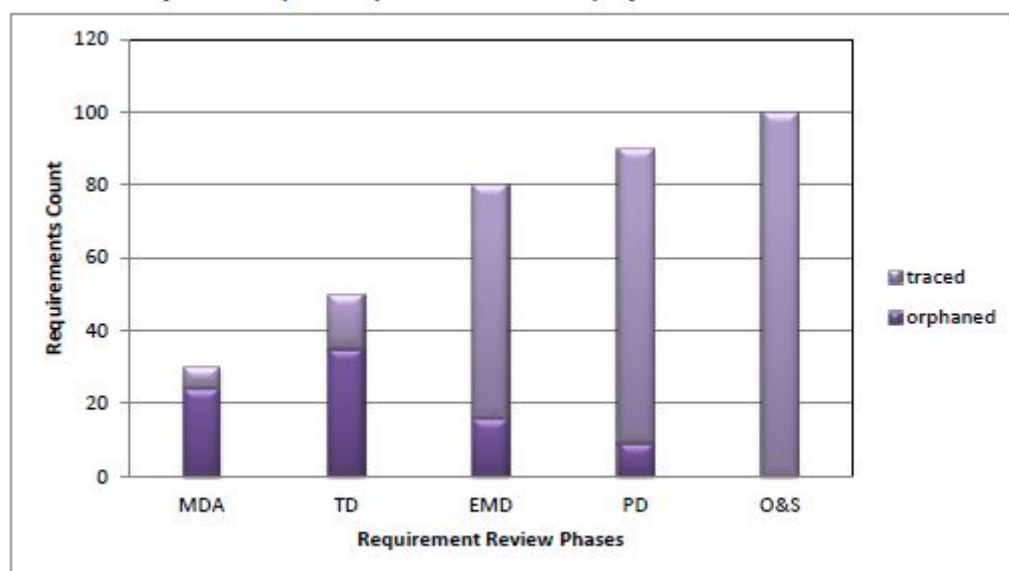


Figure 36 Requirements Traceability²⁵

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.

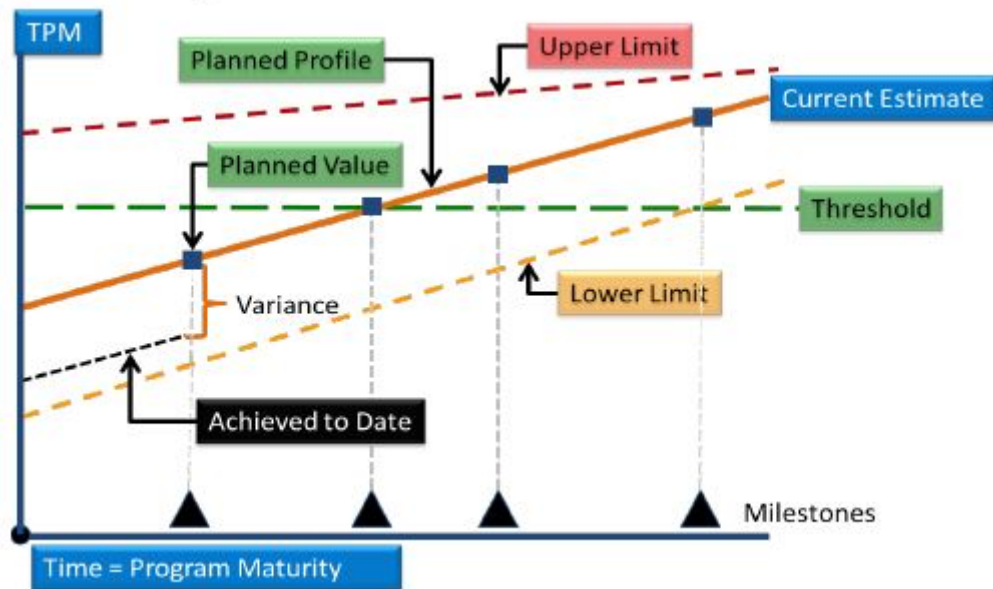


Figure 37 Technical Performance Measure Compliance²⁵

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.

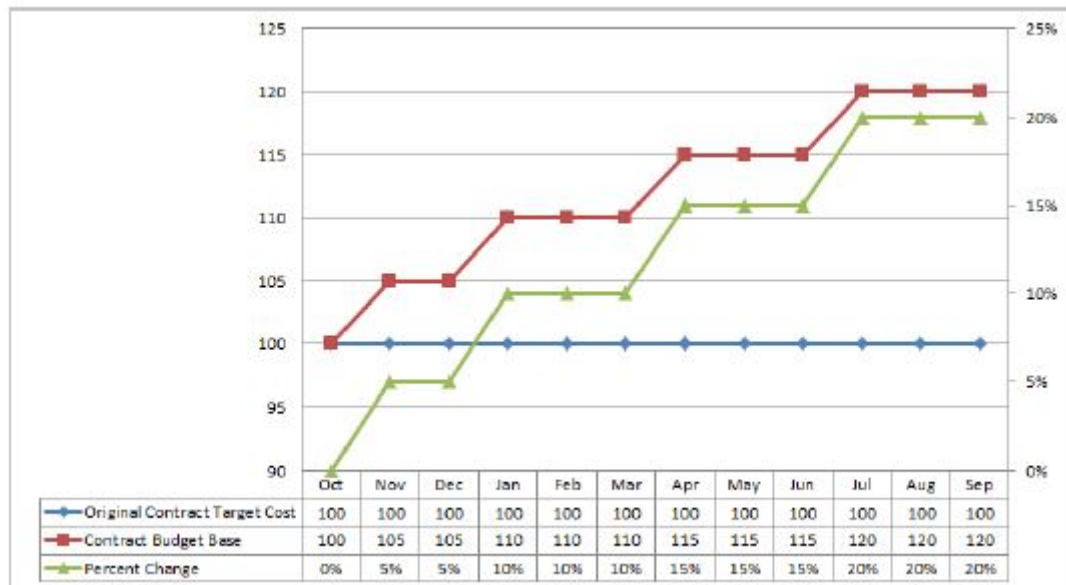


Figure 38 Contract Mods²⁵

- 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.

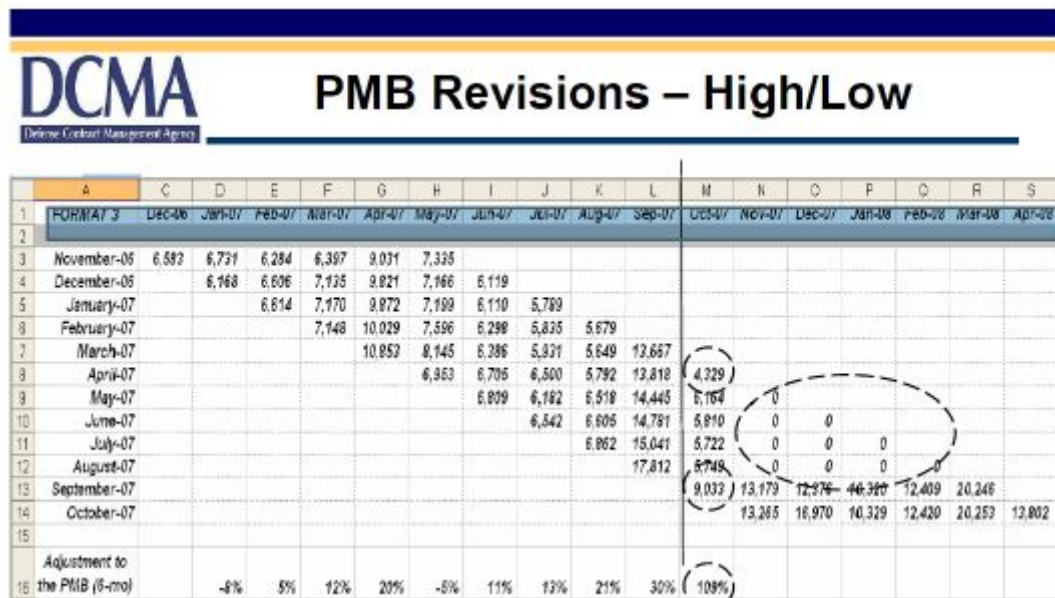


Figure 39 Baseline Revisions²⁵

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

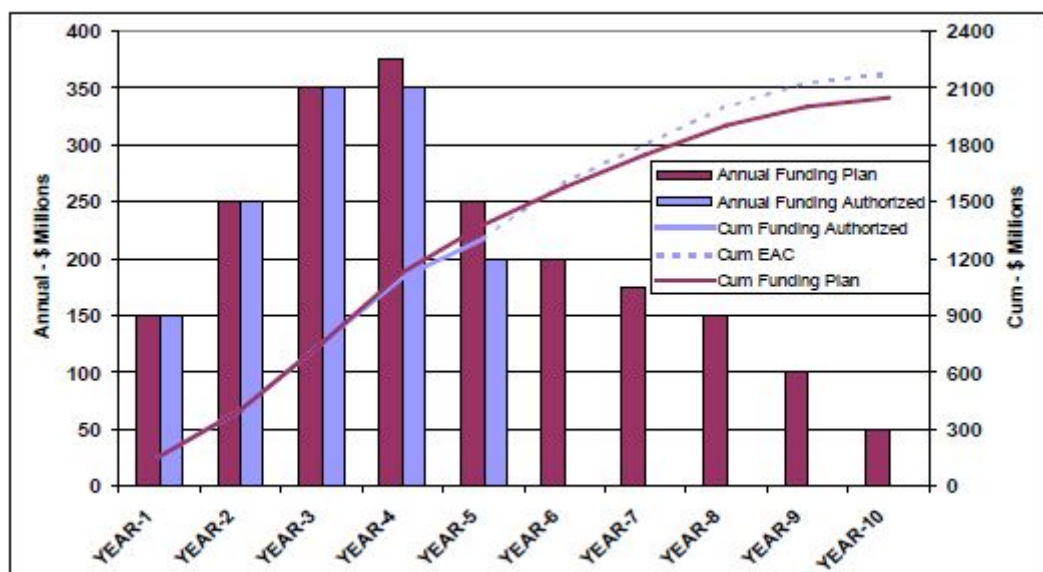


Figure 40 Program Funding Plan²⁵

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

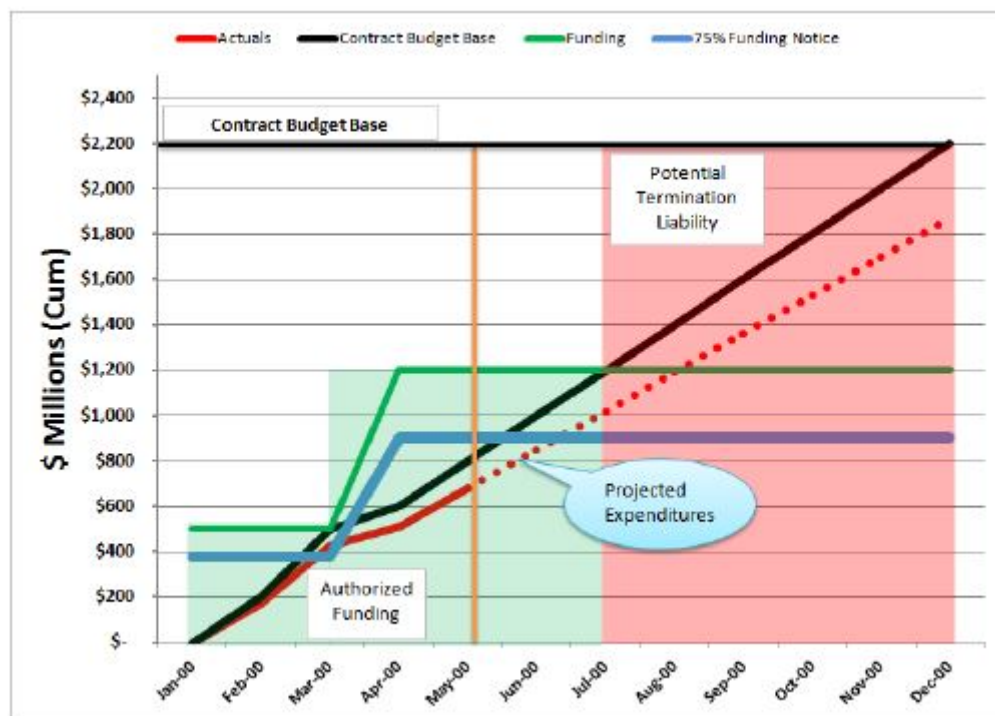


Figure 41 Program Funding Status²⁵

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

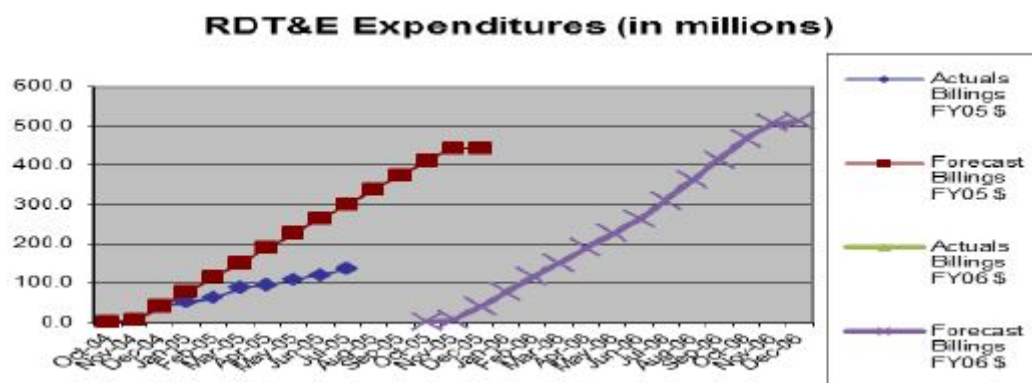


Figure 42 Research, Development, Test, and Evaluation²⁵

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.

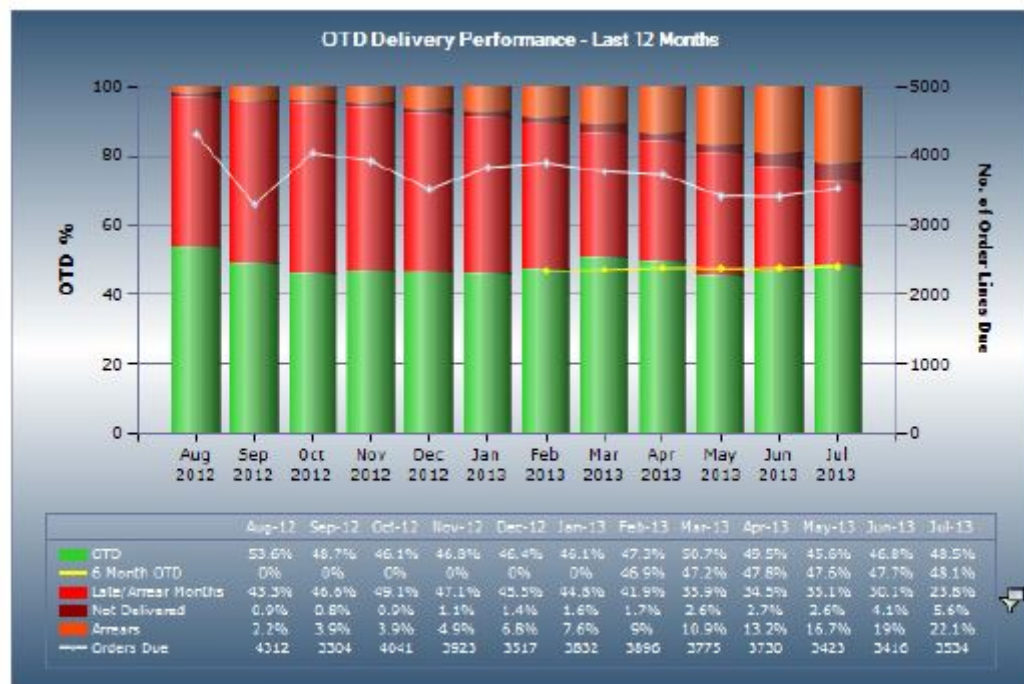


Figure 43 Parts Demand Fulfillment²⁵

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

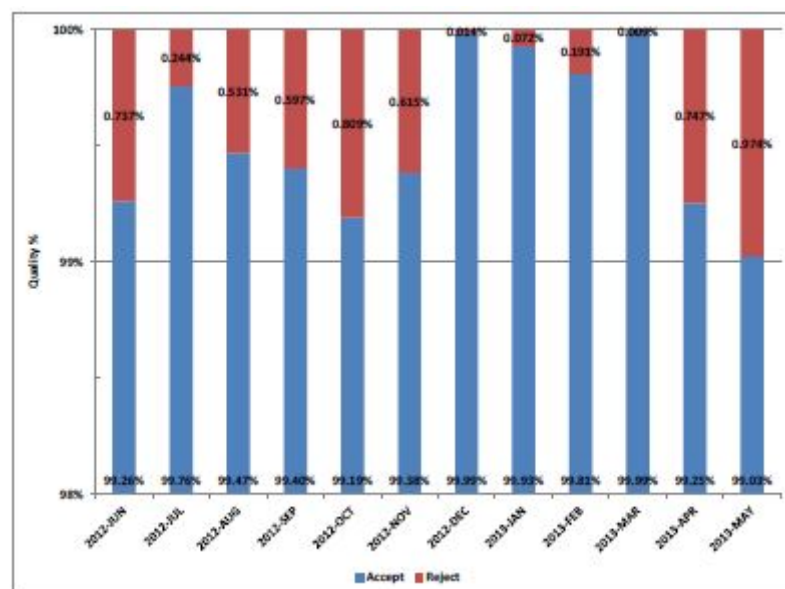


Figure 44 Supplier Acceptance Rate²⁵

- 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

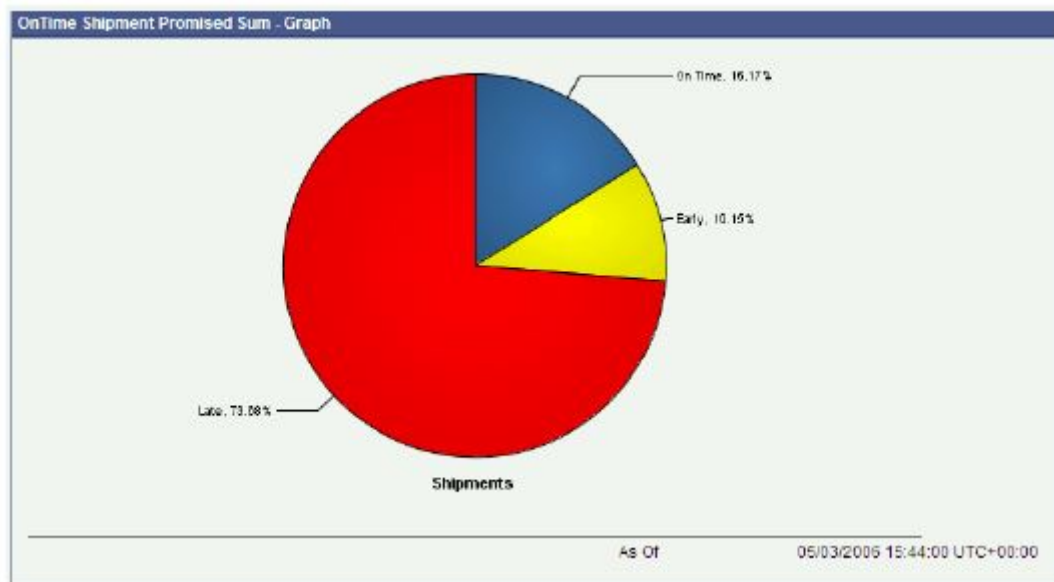


Figure 45 Supplier Late Starts²⁵

- 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

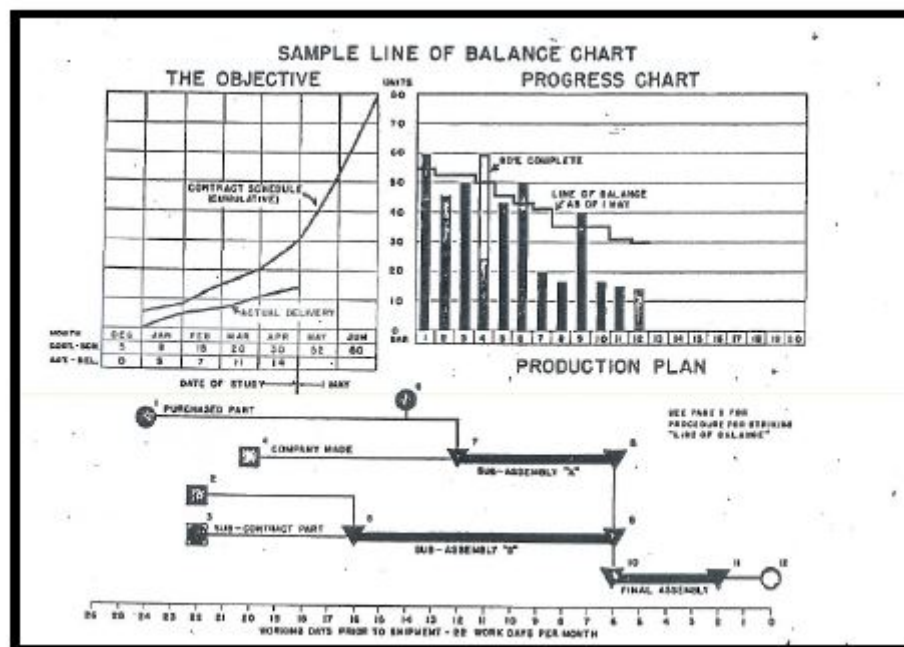


Figure 46 Production Line of Balance²⁵

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

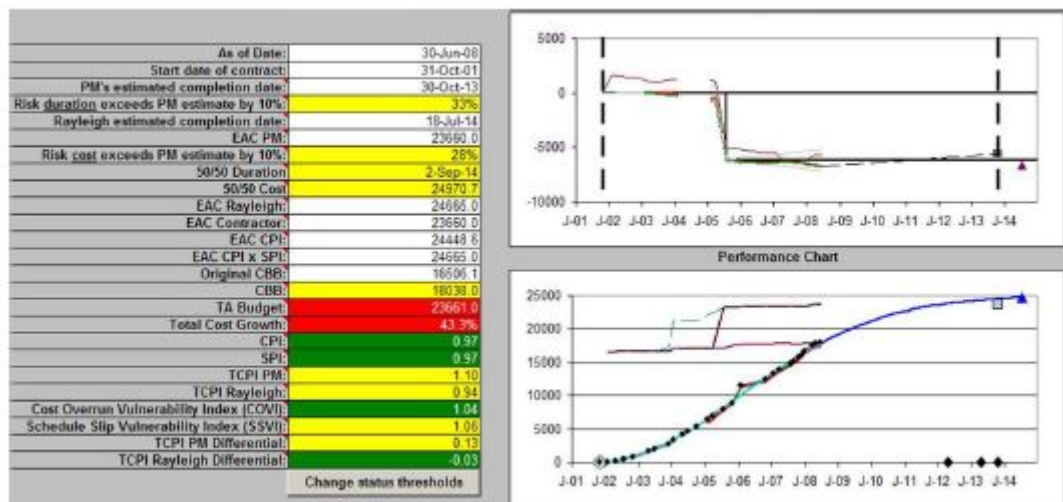


Figure 47 Rayleigh Estimator²⁵