



PROJECT MANAGEMENT CENTER FOR EXCELLENCE

A.J. CLARK SCHOOL OF ENGINEERING
Civil & Environmental Engineering Department



MONITORING & CONTROLLING YOUR PROJECT SCHEDULE WITH THE GODDARD SCHEDULE ANALYSIS TOOL (GSAT)

Jason Houston & Zac Dolch

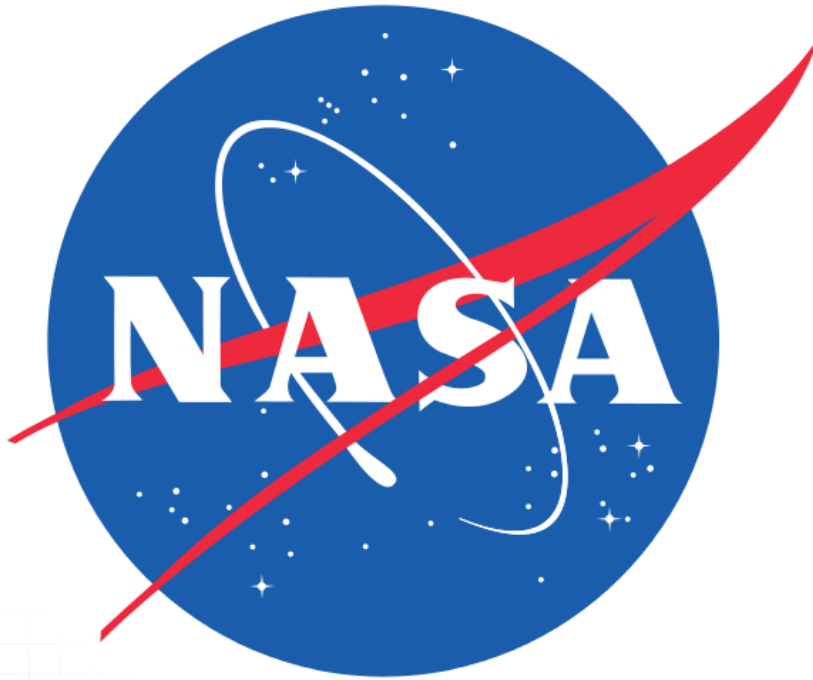
2017 Project Management Symposium



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Monitoring & Controlling Your Project Schedule with the GSAT
UMD Project Management Symposium
May 4-5, 2017
Slide 2



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Monitoring & Controlling Your Project Schedule with the GSAT
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Agenda

- Goddard Schedule Analysis Tool Overview
- GSAT Features
 - Baseline Execution Index (BEI)
 - Hit/Miss Index (HMI)
 - Current Execution Index (CEI)
 - Schedule Comparison
 - Cumulative Milestones
- Advanced Users & Tools
 - GSAT Forecasting
 - Analysis by Elements
- Reporting Formats
- Contacts



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Monitoring & Controlling Your Project Schedule with the GSAT

GODDARD SCHEDULE ANALYSIS TOOL OVERVIEW



What is Goddard Schedule Analysis Tool (GSAT)?



Goddard Space Flight Center's (GSFC) Flight Project's Directorate (FPD), through the Business Change Initiative, developed the GSAT in hopes of providing an automated solution for Goddard Projects to comply with the Goddard Scheduling Procedure and Guidelines (400-PG-7120).

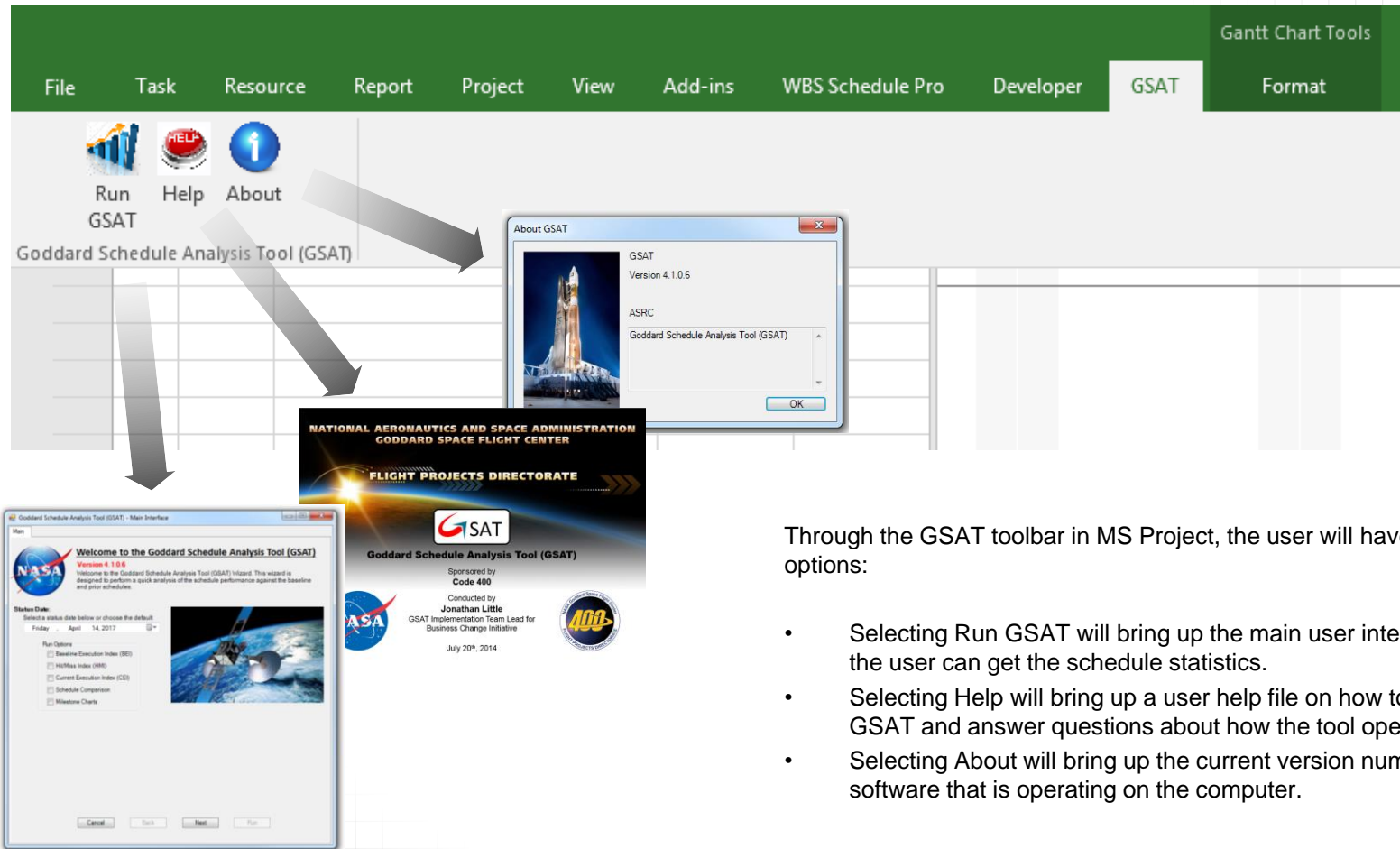
Baseline Execution Index (BEI), Hit/Miss Index (HMI), and Current Execution Index (CEI) were selected as metrics to objectively track baseline and forecasted schedule performance. The tool also augments existing performance indicators such as Schedule Performance Index (SPI), cumulative milestones, slack and schedule margin erosion.

The GSAT is a MS Project (2010/2013/2016) add-in, which was developed in house at Goddard. At the time, no COTS software tool was available to provide the desired functionality.

The GSAT was designed and built to be flexible to handle any GSFC MS Project file and has the capability to expand to incorporate new GSFC requirements as necessary. The GSAT eliminates subjective reporting, allows project management to quickly gauge status against proficiency standards or other projects, and provides an enterprise-wide metrics-based performance management solution.

Access to GSAT is limited to those who have a NASA.gov email address or have a current working contract with NASA.

GSAT Tab in MS Project



The image shows a screenshot of the Microsoft Project software interface. The ribbon is set to the 'GSAT' tab, which is highlighted in green. The ribbon contains three buttons: 'Run GSAT', 'Help', and 'About'. Below the ribbon, three arrows point from these buttons to three separate windows:

- Run GSAT:** A window titled 'Goddard Schedule Analysis Tool (GSAT)' showing a main interface with a 'Status Date' field set to 'Friday, April 14, 2017' and several checkboxes for analysis options like 'Baseline Execution Index (BEI)', 'HiRisk Index (HRI)', 'Current Execution Index (CEI)', 'Schedule Comparison', and 'Milestone Charts'.
- About GSAT:** A window titled 'About GSAT' displaying the version number 'Version 4.1.0.6', the acronym 'ASRC', and the full name 'Goddard Schedule Analysis Tool (GSAT)'. It includes an 'OK' button.
- Main GSAT Interface:** A splash screen for the 'Goddard Schedule Analysis Tool (GSAT)' featuring the NASA logo, the text 'Welcome to the Goddard Schedule Analysis Tool (GSAT) Version 4.1.0.6', and logos for the 'NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GODDARD SPACE FLIGHT CENTER' and 'FLIGHT PROJECTS DIRECTORATE'. It also mentions 'Sponsored by Code 409' and 'Conducted by Jonathan Little, GSAT Implementation Team Lead for Business Change Initiative, July 20th, 2014'.

Through the GSAT toolbar in MS Project, the user will have three basic options:

- Selecting Run GSAT will bring up the main user interface where the user can get the schedule statistics.
- Selecting Help will bring up a user help file on how to operate GSAT and answer questions about how the tool operates.
- Selecting About will bring up the current version number for the software that is operating on the computer.



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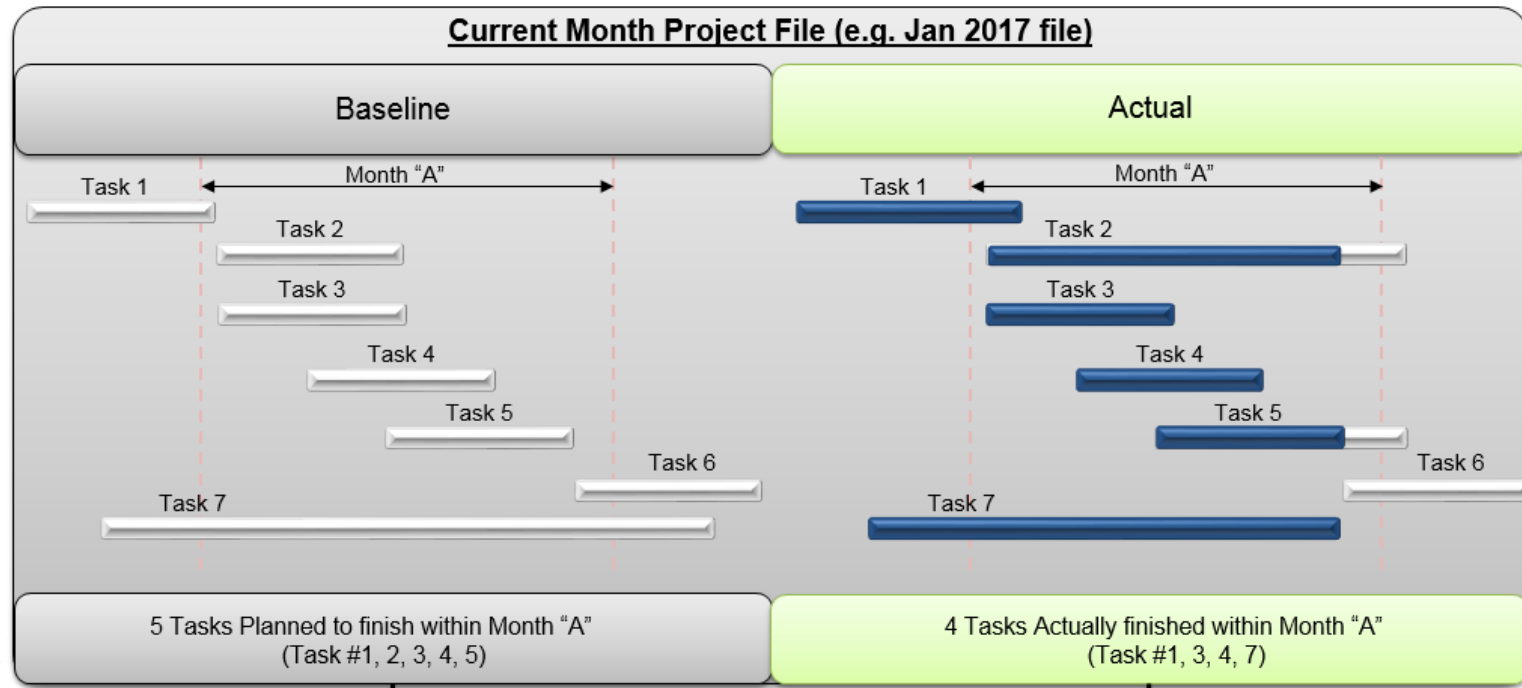
GSAT FEATURES – BASELINE EXECUTION INDEX (BEI)



BEI

What is Baseline Execution Index (BEI) and how does it work?

Basic Level: $BEI = \frac{\sum \# \text{Tasks Actually completed}}{\sum \# \text{Baseline Tasks Planned to be completed}}$



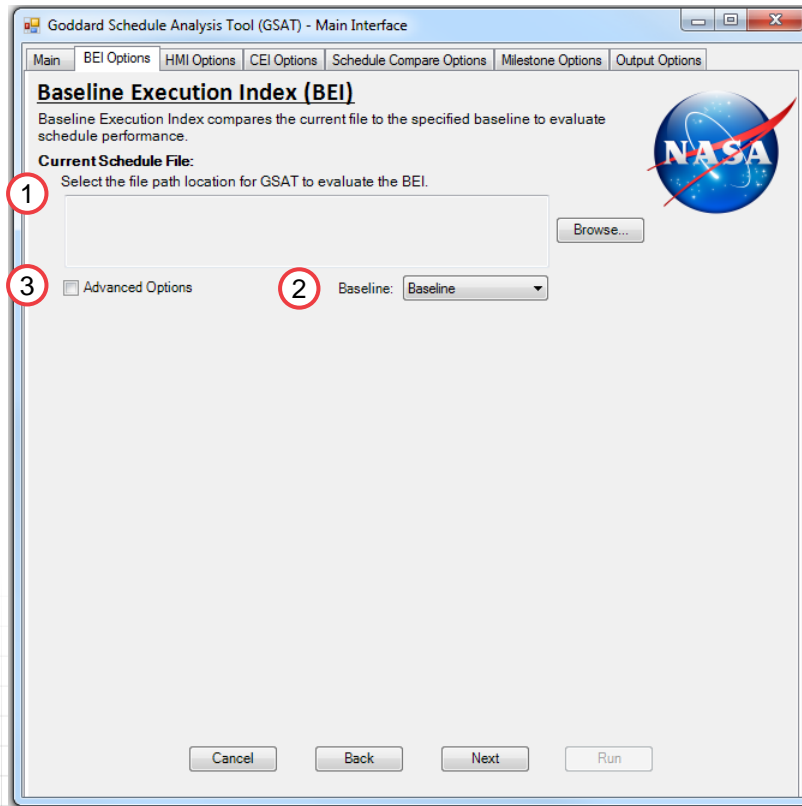
BEI: $\frac{4}{5} = 0.80$

*Note: BEI can go over 1.

http://pmsymposium.umd.edu/pm2017/

Basics of the User Interface for BEI

BEI



- ① **Schedule Files:**
This field is automatically set to the MS Project open user's file. If one is not open or the user would like to change the file, the user can select the Browse button to change the file.
- ② **Baseline:**
Users can select the correct baseline to compare their files for BEI and HMI.
- ③ **Advanced Options (Optional):**
Advanced options allow the user to run the tool with different options that so that the GSAT can better represent their project.



Advanced Options

BEI

Advanced Options:

1	Specify the Unique ID for the file:	Unique ID
2	<input type="checkbox"/> Include Milestones	
3	<input checked="" type="checkbox"/> Perform Analysis by Element	WBS
4	<input checked="" type="checkbox"/> Exclude Level of Effort (LOE) Task	Flag1
	LOE Identifier	Yes
5	<input checked="" type="checkbox"/> Display Notes Field in output data	Notes
6	<input checked="" type="checkbox"/> Display Test Thresholds	0.80

- 1 Unique ID:**
If the project file does not use the MS Project default UID, then the user can specify the correct UID for the GSAT to use during its analysis.
- 2 Include Milestones:**
While excluding milestones is the default value, there could be a need for some projects to include milestones during their analysis.

- 3 Analysis by Element:**
This option allows the user to run the metrics by a given field in MS Project and will output separate reports for each option in that field. An example of this would be running the metrics by a project sub-system or by critical. This option is limited to run only on fields with no more than 20 options.

By default, the GSAT will run the desired metrics over the entire project file.

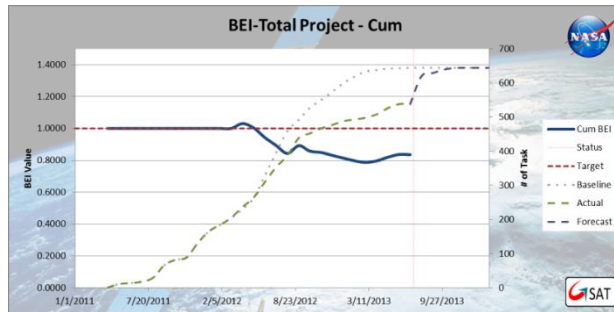
- 4 Excluding Level of Effort (LOE):**
This option allows users to exclude the LOE from their schedule. Using this field removes all data with the LOE identifier from the calculations. Note: Users must specify LOE tasks identifier.

- 5 Display Notes Field in Output Data:**
This option allows users to have an additional field in the output display.

- 6 Display Test Thresholds:**
This option allows users to have an additional line on the metrics to show the current limit for the metric.

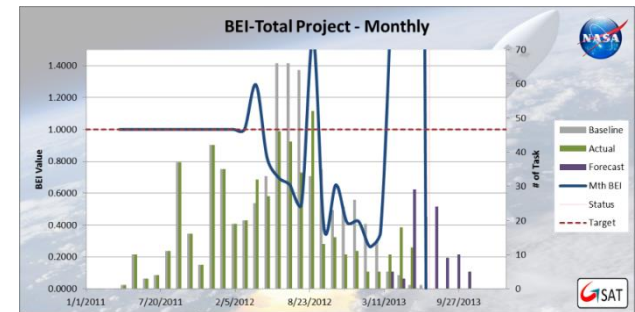
What are the Outputs from the Tool?

BEI

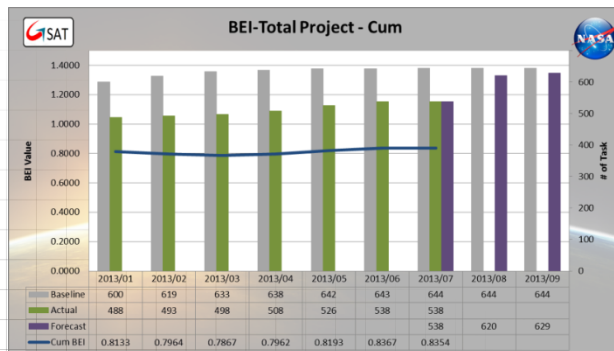


Cumulative Full Project View:
This view shows the BEI performance over the entire length of the project.

Monthly Project View:
This view shows the BEI performance calculated on a month-by-month basis over the entire length of the project.



Cumulative Zoomed Project View:
This view shows the BEI performance over the 9-month window.





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What are the Outputs from the Tool? (cont'd)

BEI

		GSAT_Results_2013-07-10_1359.xlsx								
		Cumm				Monthly				
Time Frame	xDate	Baseline	Actual	Forecast	Cum BEI	Baseline	Actual	Forecast	Month BEI	Target
2011/01	1/1/2011									1
2011/02	2/1/2011									1
2011/03	3/1/2011									1
2011/04	4/1/2011	1	1		1.0000	1	1	0	1.0000	1
2011/05	5/1/2011	11	11		1.0000	10	10	0	1.0000	1
2011/06	6/1/2011	14	14		1.0000	3	3	0	1.0000	1
2011/07	7/1/2011	18	18		1.0000	4	4	0	1.0000	1
2011/08	8/1/2011	29	29		1.0000	11	11	0	1.0000	1
2011/09	9/1/2011	66	66		1.0000	37	37	0	1.0000	1
2011/10	10/1/2011	82	82		1.0000	16	16	0	1.0000	1
2011/11	11/1/2011	89	89		1.0000	7	7	0	1.0000	1
2011/12	12/1/2011	131	131		1.0000	42	42	0	1.0000	1
2012/01	1/1/2012	166	166		1.0000	35	35	0	1.0000	1
2012/02	2/1/2012	185	185		1.0000	19	19	0	1.0000	1
2012/03	3/1/2012	205	205		1.0000	20	20	0	1.0000	1
2012/04	4/1/2012	230	237		1.0304	25	32	0	1.2800	1
2012/05	5/1/2012	263	264		1.0038	33	27	0	0.8182	1
2012/06	6/1/2012	329	310		0.9422	66	46	0	0.6970	1

Calculation Results:

This report outputs all the necessary data used to create the graphs for the GSAT.

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What are the Outputs from the Tool? (cont'd)

Task w/ %Complete < 100% behind the Status Date:															
ID	Unique ID	Name	% Complete	Duration	Start	Finish	Baseline Start	Baseline Finish	Predecessors	Successors	WBS	Summary	Milestone	Critical	Total Slack
446	1657	Final Draft	0%	80 d	Thu 12/6/12	Mon 4/1/13	Wed 9/19/12	Wed 10/17/12	445,264	447	1.3.3.5.7.3	No	No	No	144.5 d
447	1658	Copy providec	0%	10 d	Tue 4/2/13	Mon 4/15/13	Wed 10/17/12	Wed 10/31/12	446	448	1.3.3.5.7.4	No	No	No	144.5 d

Task w/ %Complete < 100% behind the Status Date:
The GSAT identifies all the tasks with a “% Complete” less than 100% behind the status date.

Task Excluded due to missing Baselines:															
ID	Unique ID	Name	% Complete	Duration	Start	Finish	Baseline Start	Baseline Finish	Predecessors	Successors	WBS	Summary	Milestone	Critical	Total Slack
656	4151	EC Redline Mc	0%	10 d	Wed 3/27/13	Wed 4/10/13	NA	NA	646	657	1.4.2.6.4.2.3	No	No	No	88.32 d
676	4152	EC Redline Mc	0%	10 d	Fri 4/19/13	Fri 5/3/13	NA	NA	673	684	1.4.2.7.4.1.1	No	No	No	71.75 d
702	4153	EC Redline Mc	100%	10 d	Wed 1/16/13	Tue 1/29/13	NA	NA	700	703	1.4.2.8.17	No	No	No	0 d
728	4154	EC Redline Mc	50%	10 d	Tue 4/9/13	Mon 4/22/13	NA	NA	718	729	1.4.2.9.4.2.3	No	No	No	80 d

Task Excluded due to Missing Baselines:
This report shows all the task that were excluded from the calculations due to missing baselines. Planners should confirm why tasks don't contain baselines in the schedule.



What are the Outputs from the Tool? (cont'd)

BEI

BEI Task Detractors:															
ID	Unique ID	Name	% Complete	Duration	Start	Finish	Baseline Start	Baseline Finish	Predecessors	Successors	WBS	Summary	Milestone	Critical	Total Slack
401	3797	Final Draft	0%	10 d	Mon 10/21/13	Fri 11/1/13	Wed 3/20/13	Wed 4/3/13	1119	402	1.3.3.4.23.1	No	No	No	7 d
1125	3773	ATTC2S ORR P	0%	5 d	Thu 10/10/13	Wed 10/16/13	Thu 3/28/13	Thu 4/11/13	#####	1126	1.8.11.4.4.9	No	No	No	28.5 d

BEI Task Detractors:

This report outputs all the tasks from the beginning of the last month (e.g. Aug. 1) to the status date (e.g. Aug. 21) that did not reach 100% complete by the status date.

BEI Task Adders:															
ID	Unique ID	Name	% Complete	Duration	Start	Finish	Baseline Start	Baseline Finish	Predecessors	Successors	WBS	Summary	Milestone	Critical	Total Slack
380	3623	NASA Review	100%	15 d	Wed 3/13/13	Tue 4/2/13	Fri 8/17/12	Fri 9/7/12	379	381	1.3.3.4.20.2	No	No	No	0 d
717	3233	WSGT/STGT F1	100%	130 d	Tue 9/25/12	Mon 4/1/13	Tue 7/3/12	Mon 7/23/12	716	718	1.4.2.9.3.3	No	No	No	0 d
877	3862	Pseudo SSC	100%	216 d	Mon 4/2/12	Fri 4/5/13	Fri 6/1/12	Wed 6/20/12	874	879	1.5.1.9.2.2.1.1	No	No	No	0 d

BEI Task Adders:

This report outputs all the task outside of the beginning of the last month (e.g. Aug. 1) to the status date (e.g. Aug. 21) that did reach 100% complete by the status date.

Slide 8 (Example slide) – Task 2 and 5 are BEI Detractors, Task 7 is a BEI Adder.

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Frequently Asked Questions

BEI

What happens to added/deleted tasks?

- The GSAT only uses one MS Project file for its calculations; therefore, it will not be able to determine which tasks have been added or deleted from the prior files. The calculation is only based on the file submitted to the tool.

What happens to unbaselined tasks in the schedule file?

- MS Project by default does not baseline tasks. The GSAT tool will exclude these tasks from the calculation. However, the GSAT does output a separate report to the user identifying all tasks that were excluded from the calculations due to missing baseline data.

How does the GSAT use the status date on the main menu?

- The GSAT uses the status date in the menu to determine the cutoff for where the calculations stop. All data after the status date will be considered forecast.

What dates does the GSAT use for the calculations?

- It uses the finish date, percent complete, and the baseline finish the user selects.

Does the GSAT use start dates?

- The GSAT only uses finishes for its formulas. Tracking starts and finishes was viewed as double-counting the same task and it was determined that the GSAT would only track finishes.

What constitutes a baseline?

- Baseline definitions are determined at a project level. All the GSAT requires to perform BEI/HMI calculations is that the baseline data is maintained in the project file.

What is an acceptable BEI?

- Your organizational best practices should be taken into account when determining thresholds. Later slides provide examples of dashboard thresholds.



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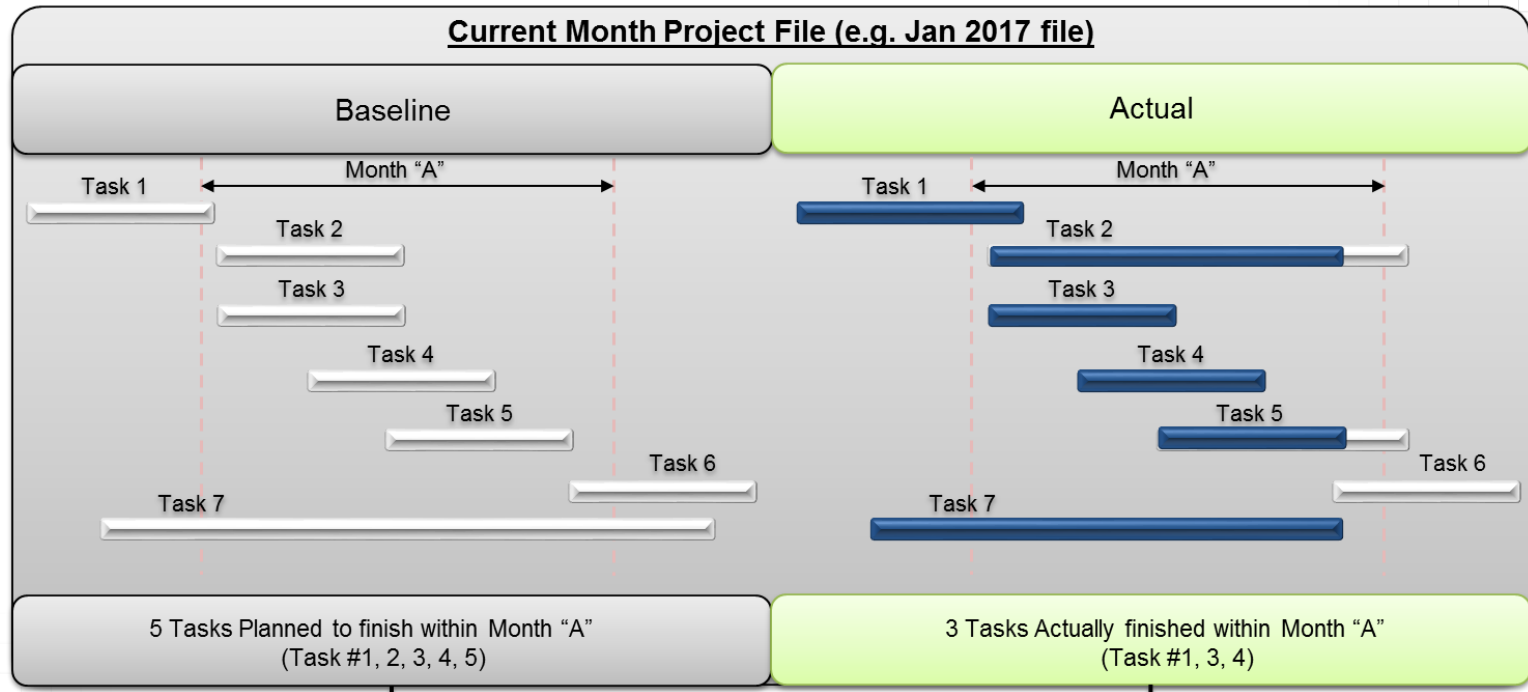
GSAT FEATURES – HIT/MISS INDEX (HMI)



HMI

What is Hit/Miss Index (HMI) and How Does it Work?

Basic Level: $HMI = \frac{\sum \# \text{Tasks Actually completed on or before their baseline this month}}{\sum \# \text{Baseline Tasks Planned to be completed this month}}$



HMI: $\frac{3}{5} = 0.60$

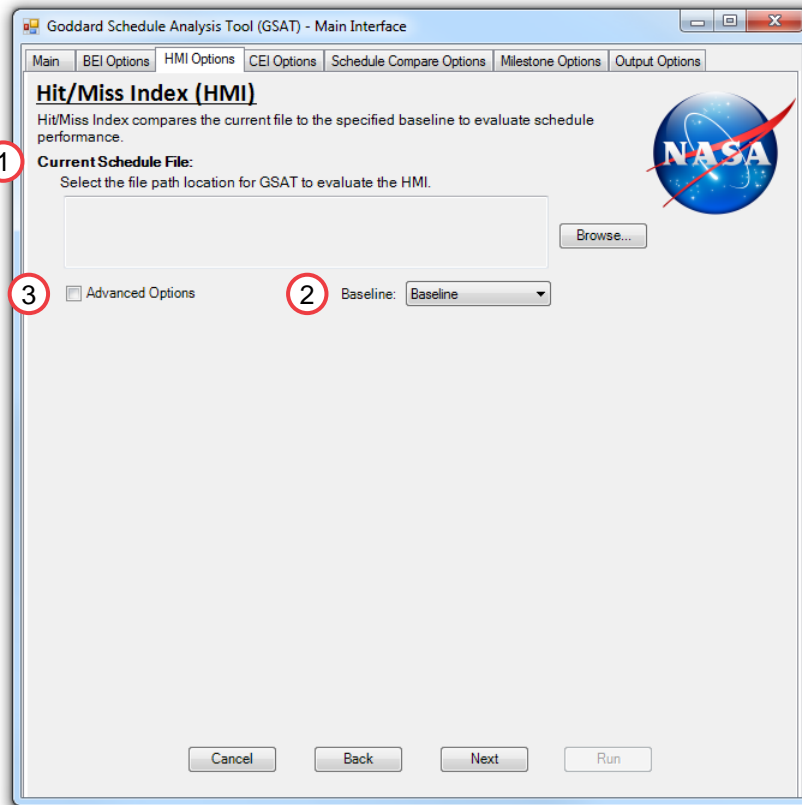
* Note: HMI can't go over 1.

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Basics of the User Interface for HMI

HMI



- 1 **Schedule Files:**
This field is automatically set to the MS Project open user's file. If one is not open or the user would like to change the file, the user can select the Browse button to change the file.
- 2 **Baseline:**
Users can select the correct baseline to compare their files for BEI and HMI.
- 3 **Advanced Options (Optional):**
Advanced options allow the user to run the tool with different options that so that the GSAT can better represent their project.

* Note: All options selected from one metric will be used for other metrics, where applicable.



Advanced Options

Advanced Options:

- 1 Specify the Unique ID for the file: Unique ID
- 2 Include Milestones
- 3 Perform Analysis by Element WBS
- 4 Exclude Level of Effort (LOE) Task Flag1
- LOE Identifier Yes
- 5 Display Notes Field in output data Notes
- 6 Display Test Thresholds 0.80

- 1 Unique ID:
If the project file does not use the MS Project default UID, then the user can specify the correct UID for the GSAT to use during its analysis.
- 2 Include Milestones:
While excluding milestones is the default value, there could be a need for some projects to include milestones during their analysis.

- 3 Analysis by Element:
This option allows the user to run the metrics by a given field in MS Project and will output separate reports for each option in that field. An example of this would be running the metrics by a project sub-system or by critical. This option is limited to run only on fields with no more than 20 options.

By default, the GSAT will run the desired metrics over the entire project file.

- 4 Excluding Level of Effort (LOE):
This option allows users to exclude the LOE from their schedule. Using this field removes all data with the LOE identifier from the calculations. Note: Users must specify LOE tasks identifier.

- 5 Display Notes Field in Output Data:
This option allows users to have an additional field in the output display.

- 6 Display Test Thresholds:
This option allows users to have an additional line on the metrics to show the current limit for the metric.



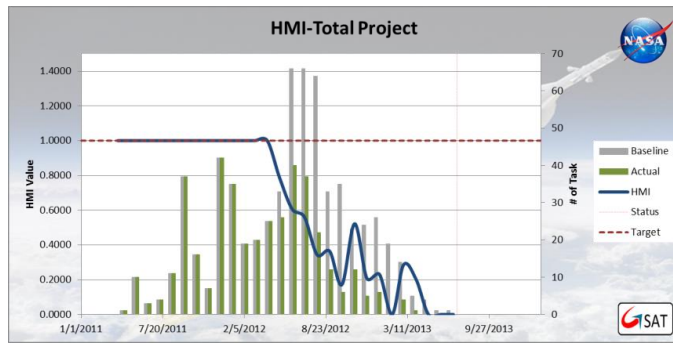
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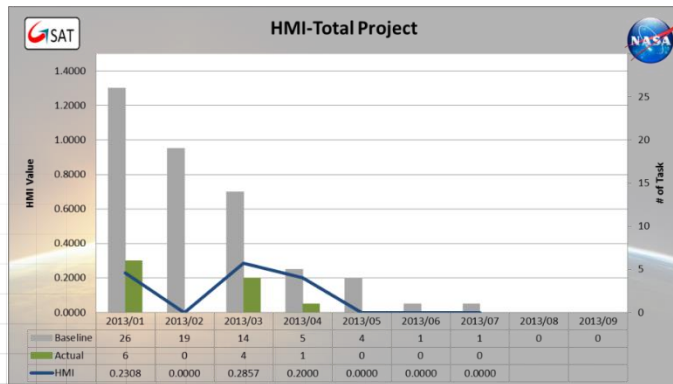


What are the Outputs from the Tool?

<http://pmsymposium.umd.edu/pm2017/>



Monthly Project View:
This view shows the HMI performance calculated on a month-by-month basis over the entire length of the project.



Zoomed Project View:
This view shows the HMI performance over the 9-month window.



What are the Outputs from the Tool? (cont'd)

http://pmsymposium.umd.edu/pm2017/

GSAT_Results_2013-07-10_1359.xlsx					
Monthly					
Time Frame	xDate	Baseline	Actual	Month HMI	Target
2011/01	1/1/2011				1
2011/02	2/1/2011				1
2011/03	3/1/2011				1
2011/04	4/1/2011	1	1	1.0000	1
2011/05	5/1/2011	10	10	1.0000	1
2011/06	6/1/2011	3	3	1.0000	1
2011/07	7/1/2011	4	4	1.0000	1
2011/08	8/1/2011	11	11	1.0000	1
2011/09	9/1/2011	37	37	1.0000	1
2011/10	10/1/2011	16	16	1.0000	1
2011/11	11/1/2011	7	7	1.0000	1
2011/12	12/1/2011	42	42	1.0000	1
2012/01	1/1/2012	35	35	1.0000	1
2012/02	2/1/2012	19	19	1.0000	1
2012/03	3/1/2012	20	20	1.0000	1
2012/04	4/1/2012	25	25	1.0000	1
2012/05	5/1/2012	33	26	0.7879	1
2012/06	6/1/2012	66	40	0.6061	1

Calculation Results:
This report outputs all the necessary data used to create the graphs for the GSAT.



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What are the Outputs from the Tool? (cont'd)

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Task Failing HMI:																	
ID	Unique ID	Name	% Complete	Duration	Start	Finish	Baseline Start	Baseline Finish	Predecessors	Successors	WBS	Summary	Milestone	Critical	Total Slack	Late Finish	Text20
630	10984	Complete cod	97%	88 d	Mon 10/24/16	Fri 3/3/17	Tue 8/16/16	Thu 9/15/16	629,628	632	3.4.6.13	No	No	No	243.5 d	Thu 2/22/18	
632	12463	Complete veri	0%	5 d	Mon 3/6/17	Fri 3/10/17	Fri 9/16/16	Fri 10/14/16	630,631	634	3.4.6.15	No	No	No	243.5 d	Thu 3/1/18	
633	12462	Compete SWI!	90%	83 d	Mon 11/7/16	Fri 3/10/17	Mon 10/17/16	Thu 11/3/16	628	634	3.4.6.16	No	No	No	243.5 d	Thu 3/1/18	
634	12461	Complete Acc	0%	3 d	Mon 3/13/17	Wed 3/15/17	Fri 11/4/16	Thu 11/10/16	633,632	635	3.4.6.17	No	No	No	243.5 d	Tue 3/6/18	
635	12460	Deliver to TAS	0%	5 d	Thu 3/16/17	Wed 3/22/17	Mon 11/14/16	Thu 11/17/16	634	636	3.4.6.18	No	No	No	243.5 d	Tue 3/13/18	
2232	11259	Flt Spare MS -	100%	5 d	Tue 12/27/16	Tue 1/3/17	Tue 5/24/16	Tue 5/31/16	2231	2236	6.5.2.8	No	No	No	0 d	Tue 1/3/17	
2236	11258	Flt Spare MS -	100%	10 d	Fri 1/6/17	Fri 1/20/17	Wed 6/1/16	Tue 6/14/16	#####	2242	6.5.2.12	No	No	No	0 d	Fri 1/20/17	
2237	11257	Flt Spare MS -	100%	14 d	Tue 1/17/17	Fri 2/3/17	Wed 6/15/16	Wed 7/6/16	2235	2242	6.5.2.13	No	No	No	0 d	Fri 2/3/17	
2239	12775	Flt Spare MS -	100%	3 d	Tue 1/10/17	Thu 1/12/17	Mon 12/12/16	Wed 12/14/16	2238	2240	6.5.2.15	No	No	No	0 d	Thu 1/12/17	

Task-failing HMI:
The GSAT identifies all the task-failing HMI results pages.

Task W/O Baselines:															
ID	Unique ID	Name	% Complete	Duration	Start	Finish	Baseline Start	Baseline Finis	Predecessors	Successors	WBS	Summary	Milestone	Critical	
656	4151	EC Redline Mc1		10 d	3/27/13 2:26 P	4/10/13 2:26 P	NA	NA	646	657	1.4.2.6.4.2	No	No	No	
676	4152	EC Redline Mc1		10 d	4/19/13 10:00	5/3/13 10:00 A	NA	NA	673	684	1.4.2.7.4.1	No	No	No	
702	4153	EC Redline Mc1		10 d	1/16/13 8:00 A	1/29/13 5:00 P	NA	NA	700	703	1.4.2.8.17	No	No	No	
728	4154	EC Redline Mc1		10 d	4/9/13 8:00 AM	4/22/13 5:00 P	NA	NA	718	729	1.4.2.9.4.2	No	No	No	
746	4155	EC Redline Mc0		10 d	6/18/13 8:00 A	7/1/13 5:00 PM	NA	NA	745	747	1.4.2.10.1	No	No	No	
854	4158	EC Redline Mc1		10 d	5/31/13 3:00 P	6/14/13 12:00	NA	NA	853	855	1.4.2.15.0	No	No	No	

Task Excluded due to Missing Baselines:
This report shows all the task that were excluded from the calculations due to missing baselines. Planners should confirm why task don't contain baselines in the schedule.



Frequently Asked Questions

HMI

How does HMI differ from BEI?

- Baseline are the same for both HMI and BEI.
- HMI can not go over 1, but BEI can.
- Actuals for HMI are counted in the month they are baselined vs. BEI is counted in the month they are completed.
 - HMI example: If a task is baselined for September but gets completed in July, it will only be counted in September.
 - BEI example: If a task is baselined in September but gets completed in July, it will be counted in July.

Is HMI a hard metric to pass?

- Yes, HMI is the most difficult metric to maintain performance on. On most projects, HMI is the first metric to show degraded performance.

What is an acceptable HMI?

- Your organizational best practices should be taken into account when determining thresholds. Later slides provide examples of dashboard thresholds.



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Monitoring & Controlling Your Project Schedule with the GSAT

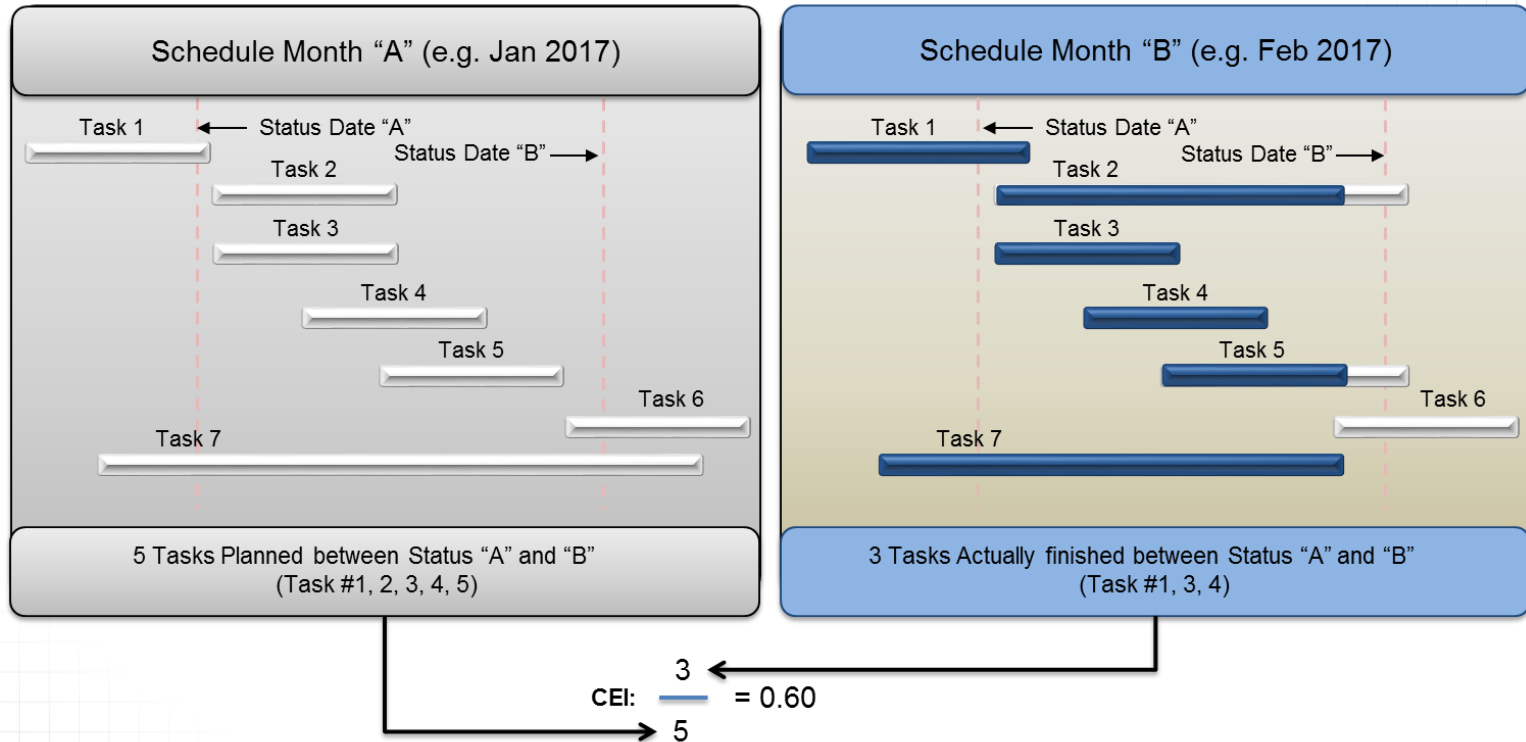
GSAT FEATURES – CURRENT EXECUTION INDEX (CEI)



What is Current Execution Index (CEI) and how does it work?

CEI

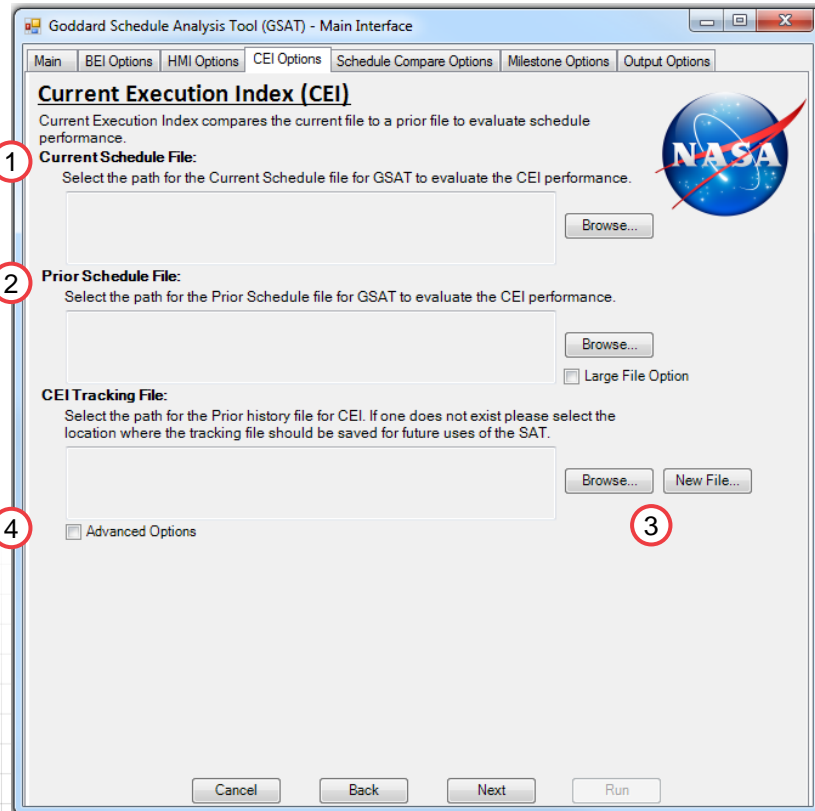
$$\text{Basic Level: } CEI = \frac{\sum \# \text{ Tasks Actually Completed in Month "A" (from Month "B" Schedule)}}{\sum \# \text{ Tasks planned in Month "A"}}$$



* Note: CEI can't go over 1.

Basics of the User Interface for HMI

CEI



- 1 Current Schedule Files:
This field is automatically set to the MS Project open user's file. If one is not open or the user would like to change the file, the user can select the Browse button to change the file.
- 2 Prior Schedule Files:
The user can use the Browse system to select the prior schedule file to compare for CEI calculations.
- 3 CEI Tracking File:
Browse: If a CEI tracking file already exists, use the Browse button to select the file location.
New File: If a CEI tracking file doesn't already exist, use the New File button to select the location where the file will be saved.
- 4 Advanced Options (Optional):
Advanced options allow the user to run the tool with different options that so that the GSAT can better represent their project.

* Note: All options selected from one metric will be used for other metrics, where applicable.



Advanced Options

CEI

Advanced Options:

1	Specify the Unique ID for the file:	Unique ID
2	<input type="checkbox"/> Include Milestones	
3	<input checked="" type="checkbox"/> Perform Analysis by Element	WBS
4	<input checked="" type="checkbox"/> Exclude Level of Effort (LOE) Task	Flag1
	LOE Identifier	Yes
5	<input checked="" type="checkbox"/> Display Notes Field in output data	Notes
6	<input checked="" type="checkbox"/> Display Test Thresholds	0.80

- 1 Unique ID:
If the project file does not use the MS Project default UID, then the user can specify the correct UID for the GSAT to use during its analysis.
- 2 Include Milestones:
While excluding milestones is the default value, there could be a need for some projects to include milestones during their analysis.

- 3 Analysis by Element:
This option allows the user to run the metrics by a given field in MS Project and will output separate reports for each option in that field. An example of this would be running the metrics by a project sub-system or by critical. This option is limited to run only on fields with no more than 20 options.

By default, the GSAT will run the desired metrics over the entire project file.

- 4 Excluding Level of Effort (LOE):
This option allows users to exclude the LOE from their schedule. Using this field removes all data with the LOE identifier from the calculations. Note: Users must specify LOE tasks identifier.

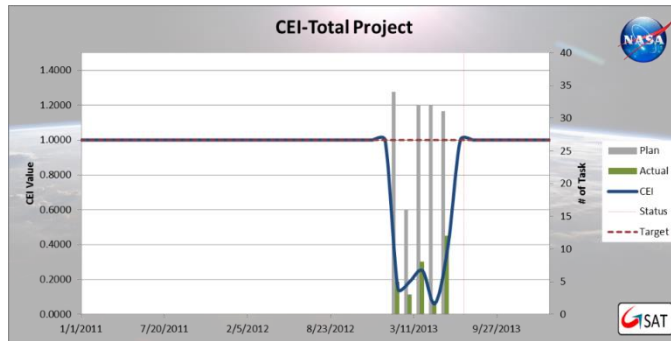
- 5 Display Notes Field in Output Data:
This option allows users to have an additional field in the output display.

- 6 Display Test Thresholds:
This option allows users to have an additional line on the metrics to show the current limit for the metric.

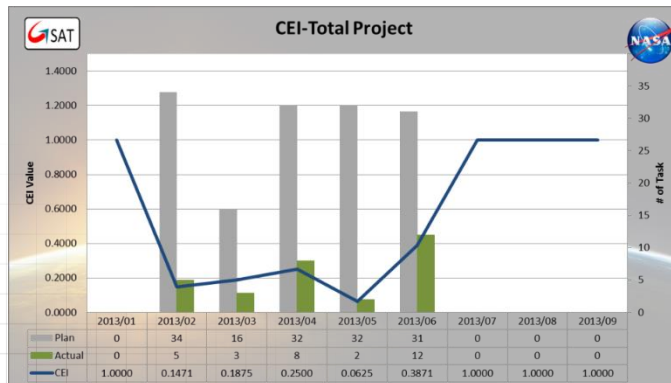


What are the Outputs from the Tool?

<http://pmsymposium.umd.edu/pm2017/>



Monthly Project View:
This view shows the CEI performance calculated on a month-by-month basis over the entire length of the project.



Zoomed Project View:
This view shows the CEI performance over the 9-month window.



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What are the Outputs from the Tool? (cont'd)

CEI

<http://pmsymposium.umd.edu/pm2017/>

GSAT_Results_2017-03-02_1117.xlsx							
Monthly							
Time Frame	xDate	WBS / Element	Status Date Range	Prior	Current	CEI	Target
2014/01	1/1/2014	CEI-Total Project		0	0	1.0000	1
2014/02	2/1/2014	CEI-Total Project		0	0	1.0000	1
2014/03	3/1/2014	CEI-Total Project		0	0	1.0000	1
2014/04	4/1/2014	CEI-Total Proj	3/31/2014 - 4/	91	41	0.4505	1
2014/05	5/1/2014	CEI-Total Proj	4/30/2014 - 5/	79	32	0.4051	1
2014/06	6/1/2014	CEI-Total Proj	5/31/2014 - 6/	125	65	0.5200	1
2014/07	7/1/2014	CEI-Total Proj	6/30/2014 - 7/	121	48	0.3967	1
2014/08	8/1/2014	CEI-Total Proj	7/24/2014 - 8/	111	59	0.5315	1
2014/09	9/1/2014	CEI-Total Proj	8/31/2014 - 9/	76	31	0.4079	1
2014/10	10/1/2014	CEI-Total Proj	9/26/2014 - 10/	78	20	0.2564	1
2014/11	11/1/2014	CEI-Total Proj	10/31/2014 - 1	66	24	0.3636	1
2014/12	12/1/2014	CEI-Total Proj	11/30/2014 - 1	79	37	0.4684	1
2015/01	1/1/2015	CEI-Total Proj	12/31/2014 - 1	76	41	0.5395	1
2015/02	2/1/2015	CEI-Total Proj	1/31/2015 - 2/	70	20	0.2857	1
2015/03	3/1/2015	CEI-Total Proj	2/28/2015 - 3/	79	22	0.2785	1
2015/04	4/1/2015	CEI-Total Proj	3/31/2015 - 4/	75	33	0.4400	1
2015/05	5/1/2015	CEI-Total Proj	4/30/2015 - 5/	94	34	0.3617	1
2015/06	6/1/2015	CEI-Total Proj	5/31/2015 - 6/	87	53	0.6092	1

Calculation Results:
This report outputs all the necessary data used to create the graphs for the GSAT.



What are the Outputs from the Tool? (cont'd)



Task Failing CEI:																		
Schedule Filter	ID	Unique ID	Name	% Complete	Duration	Start	Finish	Baseline Start	Baseline Finish	Predecessor	Successor	WBS	Summary	Milestone	Critical	Total Slack	Late Finish	Text2
Prior	630	10984	Complete cod	94%	70 d	Mon 10/24/16	Mon 2/6/17	Tue 8/16/16	Thu 9/15/16	629,628	632 3.4.6.13	No	No	No	No	259.5 d	Tue 2/20/18	
Current	630	10984	Complete cod	97%	88 d	Mon 10/24/16	Fri 3/3/17	Tue 8/16/16	Thu 9/15/16	629,628	632 3.4.6.13	No	No	No	No	243.5 d	Thu 2/22/18	
Prior	632	12463	Complete veri	0%	7 d	Tue 2/7/17	Wed 2/15/17	Fri 9/16/16	Fri 10/14/16	630,631	634 3.4.6.15	No	No	No	No	259.5 d	Thu 3/1/18	
Current	632	12463	Complete veri	0%	5 d	Mon 3/6/17	Fri 3/10/17	Fri 9/16/16	Fri 10/14/16	630,631	634 3.4.6.15	No	No	No	No	243.5 d	Thu 3/1/18	
Prior	633	12462	Compete SWI!	93%	60 d	Mon 11/7/16	Mon 2/6/17	Mon 10/17/16	Thu 11/3/16	628	634 3.4.6.16	No	No	No	No	266.5 d	Thu 3/1/18	
Current	633	12462	Compete SWI!	90%	83 d	Mon 11/7/16	Fri 3/10/17	Mon 10/17/16	Thu 11/3/16	628	634 3.4.6.16	No	No	No	No	243.5 d	Thu 3/1/18	

Task-failing CEI:
GSAT identifies all the task-failing CEI results pages for the specific time interval.



Frequently Asked Questions

How does CEI differ from BEI/HMI?

- CEI does not use any baseline data. It is solely based off of comparing two schedule files over a date range.

How does the status date range work?

- The GSAT identifies all the tasks in Schedule A between the two status dates and treats these task as the denominator in the formula. It then goes to Schedule B to look at the completion of those specific tasks to calculate the actuals.

Why does my CEI report only show one month of data?

- CEI is only calculated over a time interval; therefore, without a method to store this data, the results are only on a single-point basis. The GSAT's CEI method uses a tracking file, this allows the scheduler to store data month/month to create a more detailed trend.

What is an acceptable CEI?

- Your organizational best practices should be taken into account when determining thresholds. Later slides provide examples of dashboard thresholds.

How does the tracking file work?

- The GSAT uses the tracking file to calculate the CEI over the desired metrics. As the GSAT updates the calculations, it appends/overwrites the necessary data to create the graphs.

Time Frame	xDate	WBS / Element	Status Date Range	Prior	Current	CEI
2013/06	6/1/2013	CEI-Overall	5/15/2013 - 6/14/2013	31	12	0.3871
2013/05	5/1/2013	CEI-Overall	4/15/2013 - 5/15/2013	32	2	0.0625
2013/04	4/1/2013	CEI-Overall	3/15/2013 - 4/15/2013	32	8	0.2500
2013/03	3/1/2013	CEI-Overall	2/15/2013 - 3/15/2013	16	3	0.1875
2013/02	2/1/2013	CEI-Overall	1/10/2013 - 2/15/2013	34	5	0.1471
2013/06	6/1/2013	CEI-Text1-Element A	5/15/2013 - 6/14/2013	15	12	0.8000
2013/06	6/1/2013	CEI-Text1-Element A	4/15/2013 - 5/15/2013	12	4	0.3333
2013/06	6/1/2013	CEI-Text1-Element A	3/15/2013 - 4/15/2013	13	8	0.6154
2013/06	6/1/2013	CEI-Text1-Element A	2/15/2013 - 3/15/2013	6	3	0.5000
2013/06	6/1/2013	CEI-Text1-Element A	1/10/2013 - 2/15/2013	4	4	1.0000
2013/06	6/1/2013	CEI-Text1-Element B	5/15/2013 - 6/14/2013	20	15	0.7500
2013/06	6/1/2013	CEI-Text1-Element B	4/15/2013 - 5/15/2013	24	18	0.7500
2013/06	6/1/2013	CEI-Text1-Element B	3/15/2013 - 4/15/2013	3	3	1.0000
2013/06	6/1/2013	CEI-Text1-Element B	2/15/2013 - 3/15/2013	8	4	0.5000
2013/06	6/1/2013	CEI-Text1-Element B	1/10/2013 - 2/15/2013	10	6	0.6000

CEI Tracking File Example

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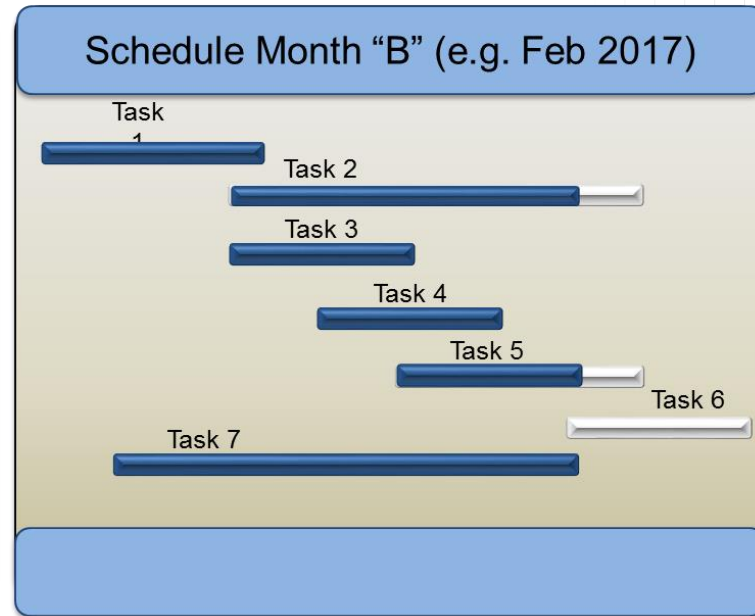
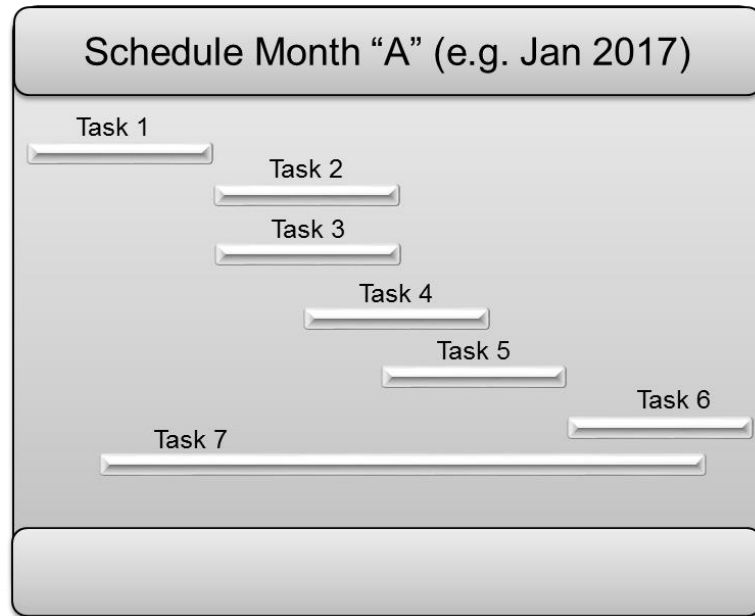
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GSAT FEATURES - SCHEDULE COMPARISON



Schedule Comparison

Schd. Compare



Compares line-by-line the two schedules based on the Unique ID.

<http://pmsymposium.umd.edu/pm2017/>



What are the Outputs from the Tool?

Schd. Compare

ID			Unique ID			Name			% Complete		
Current	Prior	Delta	Current	Prior	Delta	Current	Prior	Delta	Current	Prior	Delta
0	0	Same	0	0	Same	TO097_GARS	TO097_GARS	Same	29%	20%	Changed
1	1	Same	1	1	Same	Technical Management and Administra	Technical Management and Adn	Same	99%	58%	Changed
2	2	Same	1794	1794	Same	Project Milestones	Project Milestones	Same	99%	99%	Same
3	3	Same	2559	2559	Same	TO-97 Project Award	TO-97 Project Award	Same	100%	100%	Same
4	4	Same	1800	1800	Same	Antenna Drive System (ADS) Replacem	Antenna Drive System (ADS) Re	Same	0%	0%	Same
5	5	Same	5148	5148	Same	ADS RSD	ADS RSD	Same	100%	0%	Changed

The GSAT identifies the changes from the current file compared to the prior file by the user-selected Unique ID. By using the filter option built into MS Excel, users can easily identify changes to the schedules for given fields.



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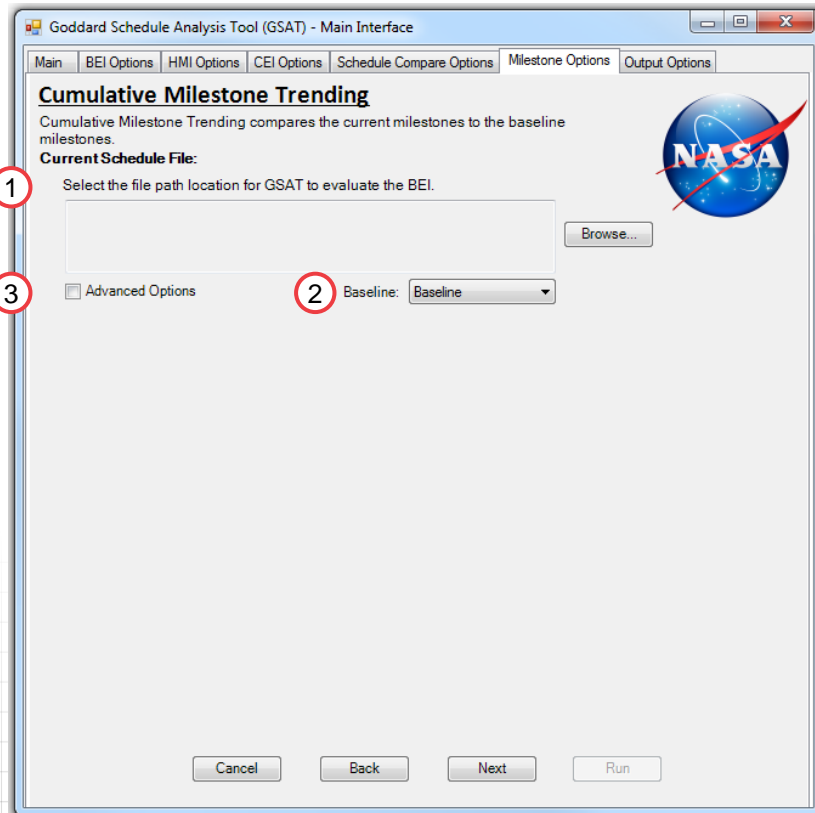
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Monitoring & Controlling Your Project Schedule with the GSAT

GSAT FEATURES - CUMULATIVE MILESTONES

Basics of the User Interface for Cumulative Milestones

Cum.
Milestone



- ① **Schedule Files:**
This field is automatically set to the MS Project open user's file. If one is not open or the user would like to change the file, the user can select the Browse button to change the file.
- ② **Baseline:**
Users can select the correct baseline to compare their files for cumulative milestone.
- ③ **Advanced Options (Optional):**
Advanced options allow the user to run the tool with different options that so that the GSAT can better represent their project.

* Note: All options selected from one metric will be used for other metrics, where applicable.



Cum. Milestone

Advanced Options

Advanced Options:

1 Specify the Unique ID for the file: Unique ID

2 Milestone Field For Analysis: Milestone
Milestone Identifier: Yes

3 Perform Analysis by Element: WBS

4 Exclude Level of Effort (LOE) Task: Flag1
LOE Identifier: Yes

Graph Alternate Date 1: Date1

5 Graph Alternate Date 2: Baseline1 Finish

Graph Alternate Date 3: Early Finish

6 Display Notes Field in output data: Notes

1 Unique ID:
If the project file does not use the MS Project default UID, then the user can specify the correct UID for the GSAT to use during its analysis.

2 Milestone Field for Analysis:
This option allows the user to select an alternative milestone field to perform the cumulative milestone analysis on.

3 Analysis by Element:
This option allows the user to run the metrics by a given field in MS Project and will output separate reports for each option in that field. An example of this would be running the metrics by a project sub-system or by critical. This option is limited to run only on fields with no more than 20 options.

By default, the GSAT will run the desired metrics over the entire project file.

4 Excluding Level of Effort (LOE):
This option allows users to exclude the LOE from their schedule. Using this field removes all data with the LOE identifier from the calculations.

5 Graph Alternative Date 1-3:
This option allows users to plot up to 3 additional date fields to the overall cumulative milestone charts.

6 Display Notes Field in Output Data:
This option allows users to have an additional field in the output display.

http://pmsymposium.umd.edu/pm2017/

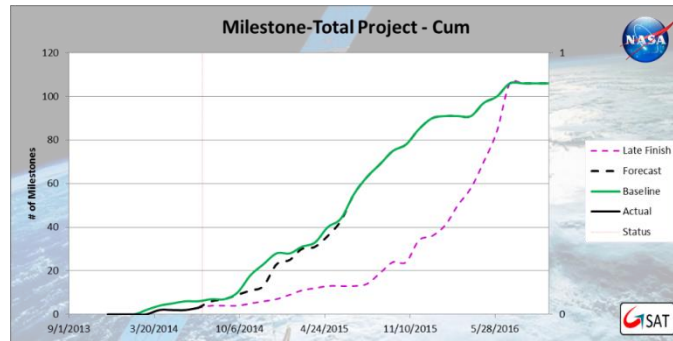


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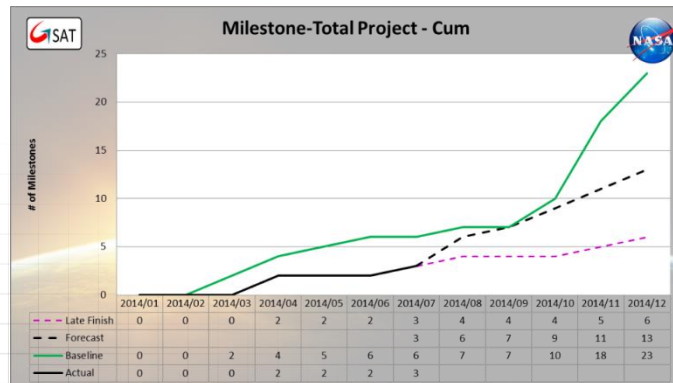
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Cum. Milestone

What are the Outputs from the Tool?



Monthly Project View:
This view shows the cumulative milestones calculated on a month-by-month basis over the entire length of the project.



Zoomed Project View:
This view shows the cumulative milestones over the 12-month window.



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What are the Outputs from the Tool? (cont'd)

Cum.
Milestone

GSAT Results 2014-07-20_2335.xlsx										
Time Frame	xDate	Cum				Monthly				
		Cum Baseline	Cum Actual	Cum Forecast	Cum Late Finish	Baseline	Actual	Forecast	Post Status	Late Finish
2013/09	9/1/2013									
2013/10	10/1/2013									
2013/11	11/1/2013									
2013/12	12/1/2013	0	0		0	0	0	0	0	0
2014/01	1/1/2014	0	0		0	0	0	0	0	0
2014/02	2/1/2014	0	0		0	0	0	0	0	0
2014/03	3/1/2014	2	0		0	2	0	0	0	0
2014/04	4/1/2014	4	2		2	2	2	0	0	2
2014/05	5/1/2014	5	2		2	1	0	0	0	0
2014/06	6/1/2014	6	2		2	1	0	0	0	0
2014/07	7/1/2014	6	3	3	3	0	1	1	1	1
2014/08	8/1/2014	7		6	4	0	0	2	0	1
2014/09	9/1/2014	7		7	4	0	0	1	0	0
2014/10	10/1/2014	10		9	4	3	0	2	0	0
2014/11	11/1/2014	18		11	5	8	0	2	0	1

Calculation Results:
This report outputs all the necessary data used to create the graphs for the GSAT.

Task W/O Baselines:														
ID	Unique ID	Name	% Complete	Duration	Start	Finish	Baseline Start	Baseline Finish	Predecessors	Successors	WBS	Summary	Milestone	Critical
656	4151	EC Redline Mc1		10 d	3/27/13 2:26 P	4/10/13 2:26 P	NA	NA	646	657	1.4.2.6.4.2	No	No	No
676	4152	EC Redline Mc1		10 d	4/19/13 10:00 A	5/3/13 10:00 A	NA	NA	673	684	1.4.2.7.4.1	No	No	No
702	4153	EC Redline Mc1		10 d	1/16/13 8:00 A	1/29/13 5:00 P	NA	NA	700	703	1.4.2.8.17	No	No	No
728	4154	EC Redline Mc1		10 d	4/9/13 8:00 A	4/22/13 5:00 P	NA	NA	718	729	1.4.2.9.4.2	No	No	No
746	4155	EC Redline Mc0		10 d	6/18/13 8:00 A	7/1/13 5:00 P	NA	NA	745	747	1.4.2.10.1	No	No	No
654	4158	EC Redline Mc1		10 d	5/21/13 1:00 P	6/14/13 12:00 P	NA	NA	653	655	1.4.2.15.0	No	No	No

Task Excluded due to Missing Baselines:

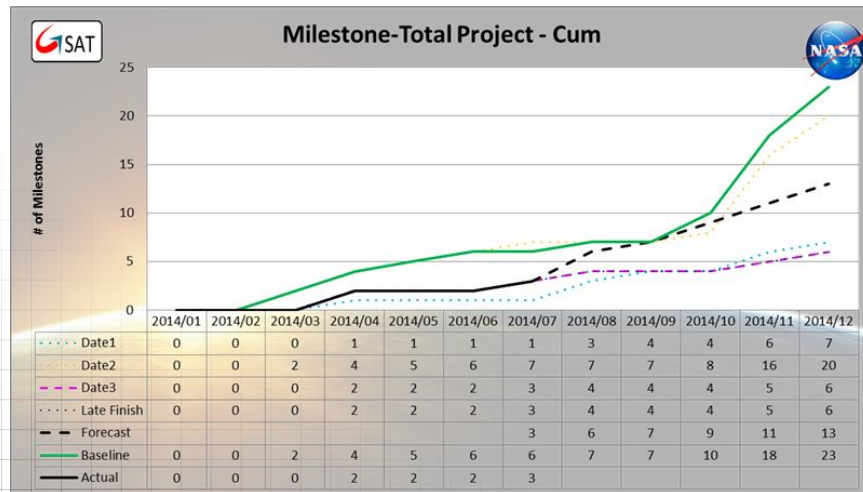
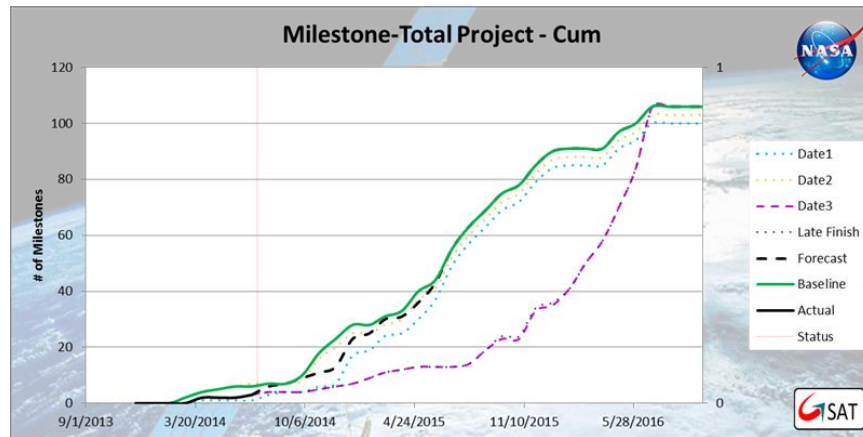
This report shows all the tasks that were excluded from the calculations due to missing baselines. Planners should confirm why these tasks don't contain baselines in the schedule.

http://pmsymposium.umd.edu/pm2017/



Cum.
Milestone

What do the Additional Date Options Show?



The GSAT has the ability to plot up to 3 additional date fields on the cumulative milestone chart.

These additional field can show items such as re-plans, what-ifs, multiple baselines and more.



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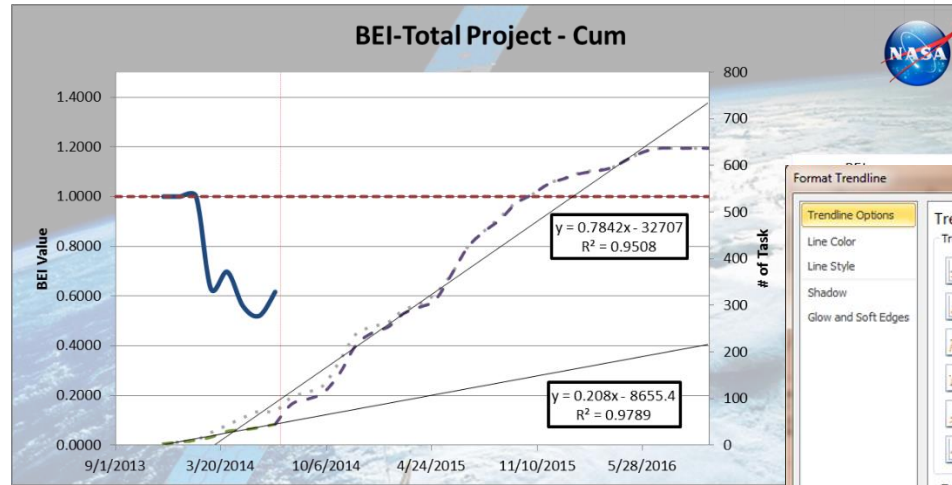
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Monitoring & Controlling Your Project Schedule with the GSAT

ADVANCED USERS & TOOLS

Schedule Forecasting

While there are a variety of ways to forecast future schedule outcomes, the schedule performance metrics generated by the GSAT can provide a basis for extrapolating past performance into the future.

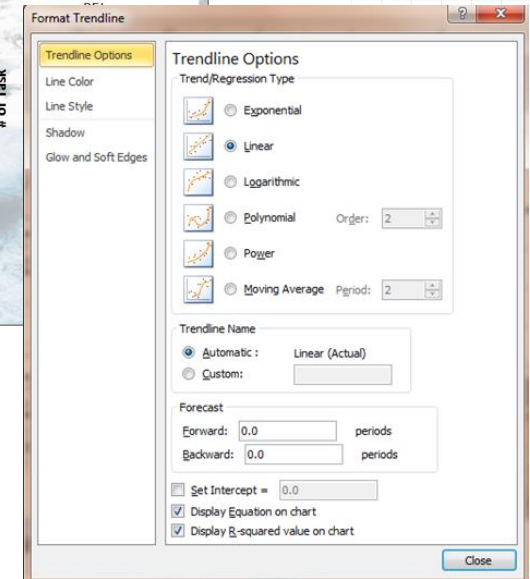


Since the GSAT outputs are produced in MS Excel, adding trend lines is a straightforward way to calculate a simple trend that indicates when the project (or other element) could finish based on past performance.

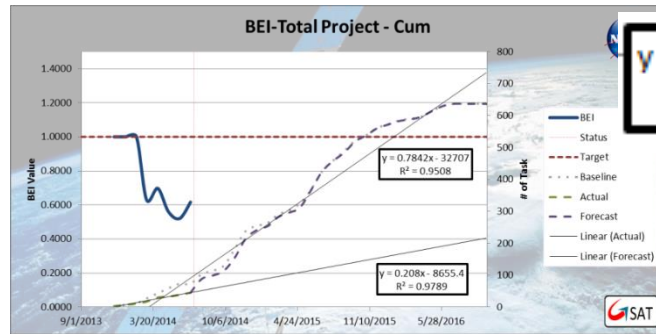
Schedule forecasting using the GSAT data and MS Excel adds another technique to the Planner's analysis methods.

Adding Trend Lines in Excel:

By right clicking on the desired datasets, you can add trend lines to a given dataset. Within the menu, you can also add "Display Equation on Chart" and "Display R-Squared Value on Chart."



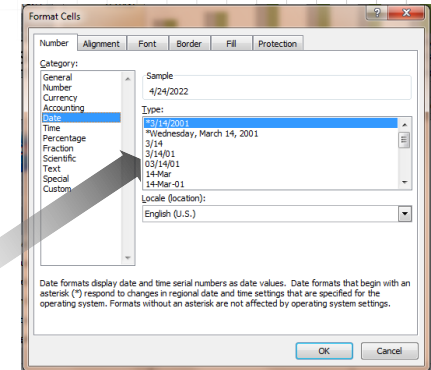
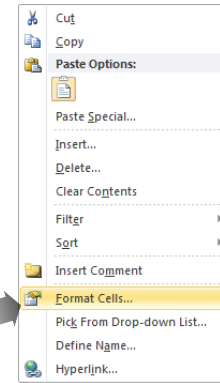
Using GSAT to Forecast?



$$y = 0.208x - 8655.4$$

$$R^2 = 0.9789$$

Y (Max)	637
m	0.208
b	-8655.4
x (Num)	44675
x (Date)	4/24/2022



Equation for a line is: $y = mx + b$

- y = number of tasks → To calculate the forecast at the end of the project, this value must be set to the total number of tasks in the data set (e.g. cum baseline task maximum).
- x = date (in numeric) → The equation above must be solved for “ x ” and “ x ” will need to be converted to date format.
- m = slope (average completion rate) → This value is calculated from MS Excel automatically.
- b = y intercept → This value is calculated from MS Excel automatically.
- When solving for $x = (y - b) / m$
- To convert the $x =$ number to $x =$ date → Right mouse on the number value and change format to a date format. (See above for example.)

What is R-Squared and why do we care?

- R-Squared is a calculation that shows how well your data correlates to the equation for the line. R-Squared ranges from 0 (bad) to 1 (perfect) and the closer the dataset is to R-Squared = 1, then the more likely the forecast is realistic.



Using GSAT to Perform Analysis by Elements

While there are a variety of ways to use the GSAT, one of the most beneficial is performing your analysis by elements. The GSAT provides analysis for the overall schedule and by each division of the user-specified element.

Elements can be anything, including text, a number, flag, or several other optional fields. This option allows for metrics to be calculated for each of the fields within the element field.

A common use of the element field is WBS groupings, contractors, critical path, and any other way the data needs to be analyzed.

Advanced Options:

Specify the Unique ID for the file:

Include Milestones

Perform Analysis by Element

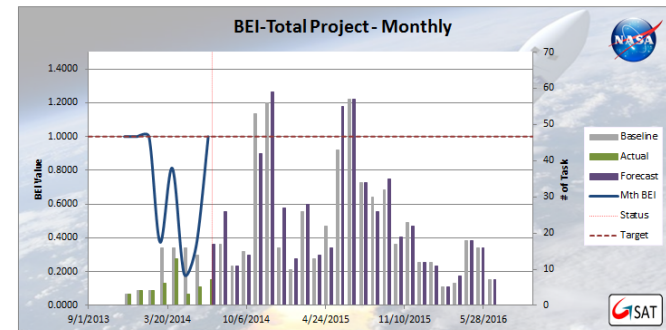
Exclude Level of Effort (LOE) Task

Display Notes Field in output data

All selected metrics are run for the entire project and each option in the element field.

Using the Advanced Option "Perform Analysis by Element":

- Users can get any of the GSAT metric to perform the data analysis by a given element
- Elements are any field with less than 20 items in the dataset
- Examples include: WBS, OBS, teams, individuals, critical/non-critical path, etc.





Examples of Schedule Metrics Goals/Thresholds

Baseline Execution Index (BEI)

Threshold	Indicator	Explanation
≥ .95	Blue	DCMA/NDIA Goal
≥ .80	Green	FPD Goal
.70 - .79	Yellow	Watch
≤ .69	Red	Caution

Hit or Miss Index (HMI)

Threshold	Indicator	Explanation
≥ .75	Blue	DAU Goal
≥ .50	Green	FPD Goal
.40 - .49	Yellow	Watch
≤ .39	Red	Caution

Current Execution Index (CEI)

Threshold	Indicator	Explanation
≥ .75	Blue	NDIA Goal
≥ .60	Green	FPD Goal
.50 - .59	Yellow	Watch
≤ .49	Red	Caution

Notes

FPD Goal: Code 400 performance expectation

Watch: Monitor for change in trend

Caution: Potential for problems

DCMA: Defense Contract Management Association

NDIA: National Defense Industrial Association

DAU: Defense Acquisition University

*Multiple variables can influence thresholds (baselining philosophy, project phase, project constraints/environment, agile vs. long term, etc.)



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CONTACTS



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GSAT Contacts

If you have further questions regarding GSAT's functionality, suggestions for improvements, or another GSAT-related request:

Jason Houston - jason.w.houston@nasa.gov

Zac Dolch - zachary.m.dolch@nasa.gov



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QUESTIONS ...