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Overview

Schedule Performance Metrics and Indices, measure how closely the project is performing to the plan (per its baseline or "snapshot"). Knowing specific tasks or task groups with variances is helpful when explaining and recovering from project cost and schedule variances.
SSI Tools has several performance reporting tools that range from very simple reports to complex earned value reports. The user can decide what level of detail they want to measure their schedule performance.

Importance of setting Baseline and Snapshot dates
Setting a baseline and maintaining its integrity is a requirement for all tasks that are used in the performance measurement data set. Taking a "snapshot" of the schedule before posting status in each period is also required if the CEI measurement is needed. A good reference for these indices of project performance is the Planning & Scheduling Excellence Guide (PASEG) section 10.4 and specifically, 10.4.3 for SPI, 10.4.4 for BEI and 10.4.5 for CEI.

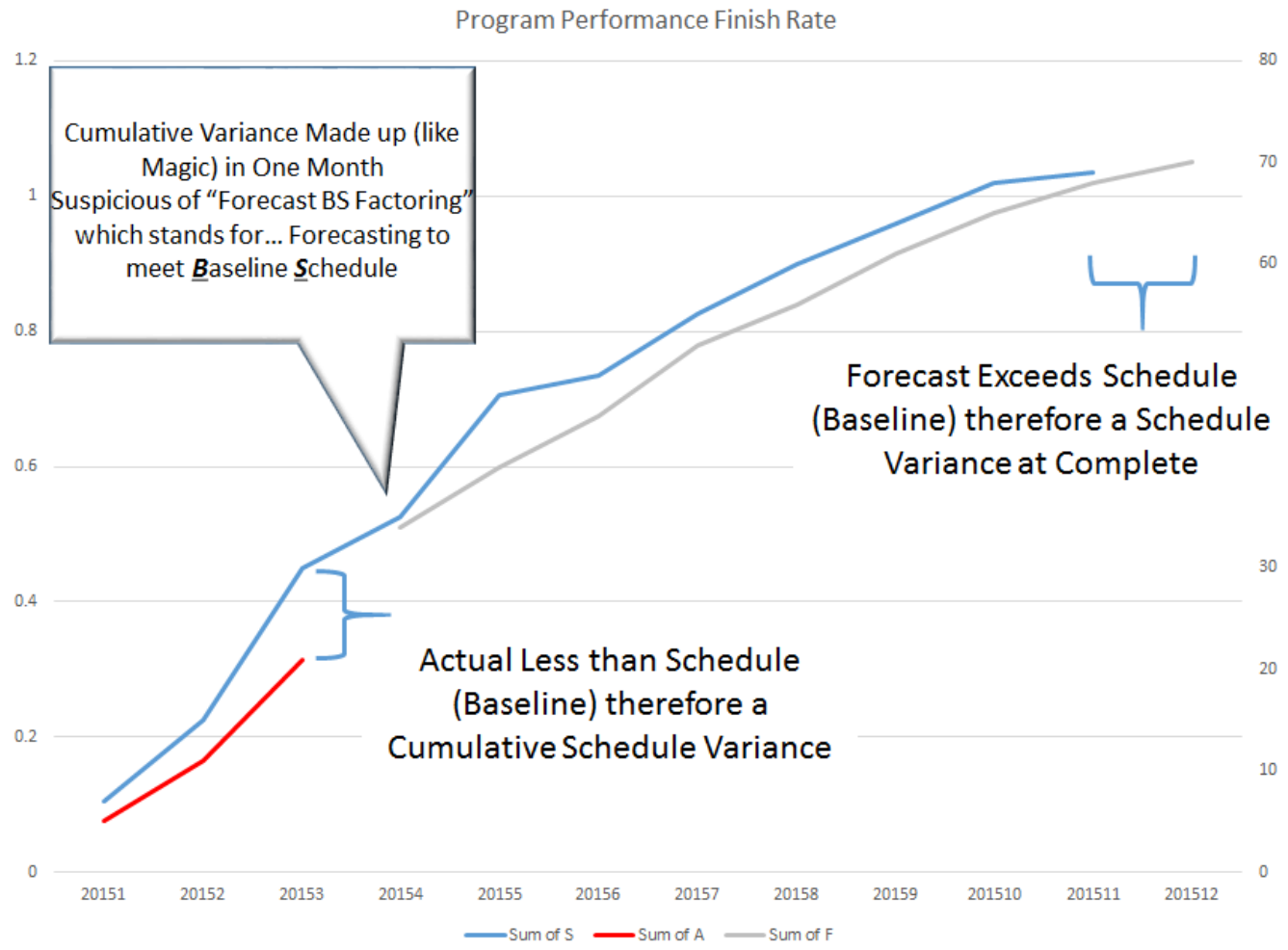
"S" Curve Report

The S-Curve Report is one of the most valuable tools for assessing project performance over time. It provides a visual representation of the number of tasks originally planned to be completed throughout the project's duration. By comparing this baseline plan to the number of tasks that have actually been completed as of the current status date, as well as the current forecast of future task completions, project managers can quickly determine whether the project is on schedule, experiencing delays, or trending toward recovery.

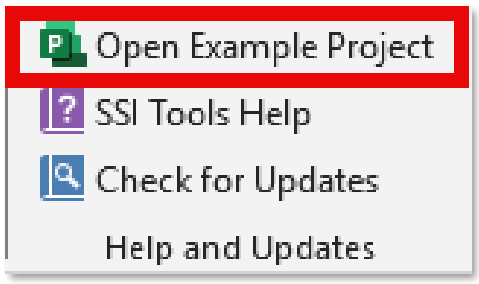
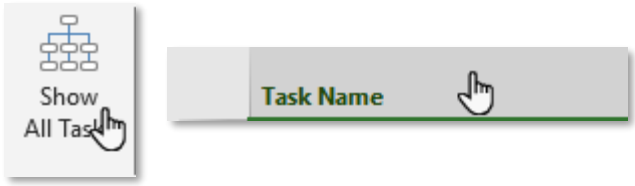
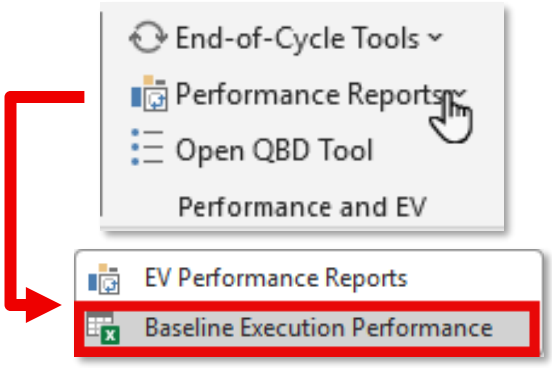
This report not only offers a clear and intuitive understanding of schedule performance but also serves as the foundation for calculating key performance metrics, such as the Actual and Forecasted **Baseline Execution Index (BEI)**.

Consider how much you can tell about a project from just one chart:

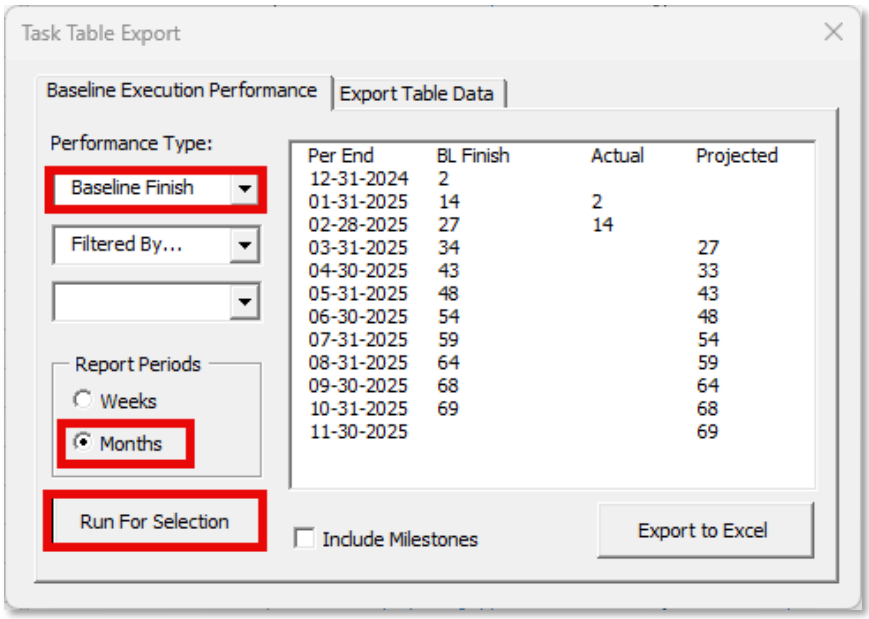
- More tasks were schedule to finish in the first 3 months of the project than were actual finished
- The performance gap (between the blue line and red line) is growing – the project is accumulating negative variances to the baseline plan
- The forecast shown the project finishing late by about one month – the difference between the end of the blue line and the end of the gray line
- The forecast is optimistic – perhaps too optimistic – notice how the beginning of the gray forecast line does not follow the trajectory of the red actual line
- We may have created a "bow wave" of tasks that continue to be "nudged" forward



Exercise 1 - Creating the Simple "S" Curve Performance Report

1. Open the Example Project file in the SSI Analysis Tools ribbon	
2. Select ALL the tasks in the schedule by clicking the "Show All Tasks" button and selecting the Task Name field header.	
3. Open the Baseline Execution Performance Report Tool.	

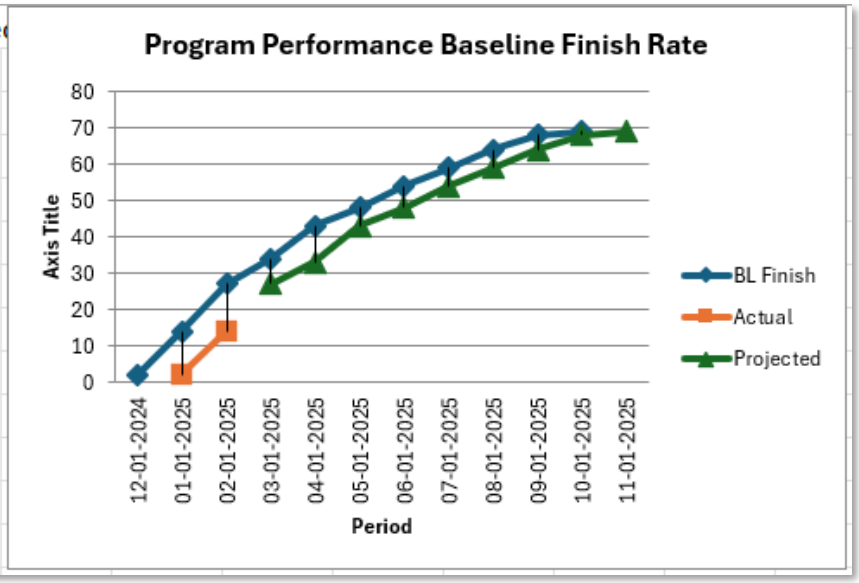
4. On the **Baseline Execution Performance** Tab, Select **Baseline Finish** as the Performance Type and **Months** as the Report Periods. Then click the **Run for Selection** button. Observe the Results in the Table.



5. Now click the button that says ***Export* to Excel.**

6. View and Analyze the Report in Excel

Per End	BL Finisl	Actual	Projecte
12-31-2024	2		
01-31-2025	14	2	
02-28-2025	27	14	
03-31-2025	34		27
04-30-2025	43		33
05-31-2025	48		43
06-30-2025	54		48
07-31-2025	59		54
08-31-2025	64		59
09-30-2025	68		64
10-31-2025	69		68
11-30-2025			69



End of Exercise

Earned Value vs Earned Schedule

In many contractual environments, particularly those governed by government or defense standards, **Earned Value Management (EVM)** is a mandatory project control method. EVM integrates cost, schedule, and scope to objectively assess project performance and progress.

Earned Value

Earned Value is traditionally expressed in monetary units. It measures the value of work performed against the project's planned value (baseline) and the actual costs incurred. Because EV is monetized, it requires a **resource loaded schedule**, meaning all activities must have assigned labor or material resources with associated cost rates.

Earned Schedule

However, in many cases, Project Managers may opt not to resource load their schedules. In such cases, where dollarized data is unavailable or unnecessary, **Earned Schedule** provides a compelling alternative. Earned Schedule applies the same foundational logic as Earned Value but replaces monetary units with **time-based units**, typically **task days**.

Common "Earned Schedule" Terminology:

- ***Earned Schedule (P)*** is the same as ***Earned Value (EV or BCWP)*** except Baseline Duration is used as the basis "Earned" unit of measure. [Earned Schedule = Baseline Duration * Percent Complete]
- ***Planned Scheduled (S)*** is the same as ***PV*** or ***BCWS,*** the amount of baseline duration in each period.
- ***Actual Duration (A)*** is the same as ***AV*** or ***ACWP,*** the number of days taken to perform the earned duration.

- **Budget at Complete (BAC)** is equal to the total Baseline Duration for a task or collection of tasks.
- ***Estimate to Complete (ETC)*** is equal to the number of days remaining for a task or collection of tasks.
- ***Estimate at Complete (EAC)*** is equal to the number of days remaining for a task or collection of tasks plus its actual duration so far.
- ***Variance at Complete (VAC)*** is the difference between one task's or a collection of tasks baseline duration and its current Estimate at Complete. [VAC=BAC-EAC]

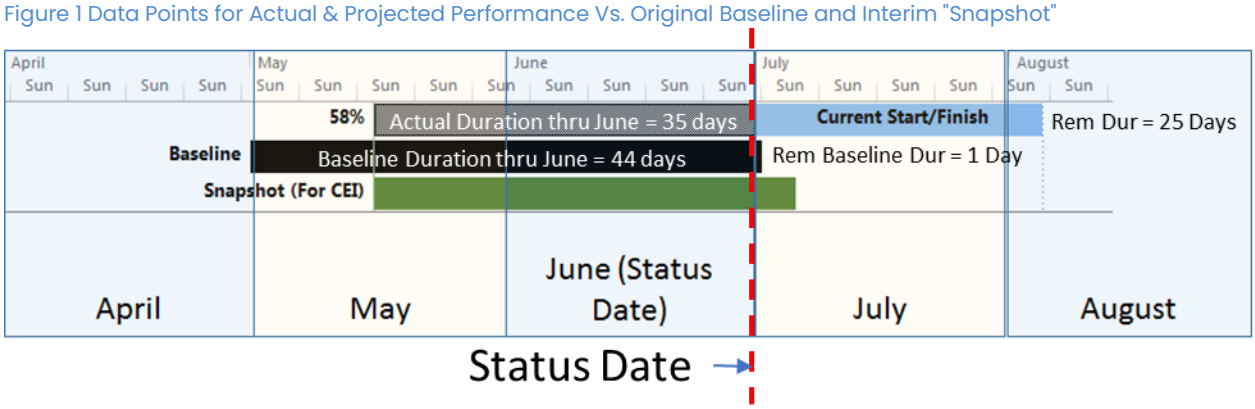
Earned Schedule Metrics and Indices:

- ***Schedule Variance (SV)*** is the difference between workdays performed and workdays planned (per its baseline). If a task has a negative SV, it is behind schedule.
- ***Actual Variance (AV or CV*)*** is the difference between workdays performed and workdays actually consumed. If a task has a negative AV, it is taking longer to finish than originally planned (per its baseline) schedule.
  *Note – in some reporting this is called Cost Variance (CV) since it can be a measurement of Days, Work or Cost. If it is labeled CV, think of "cost" in terms of days – it cost more or less days to complete a task or project
- ***Schedule Performance Index (SPI)*** is the ratio of work or task days performed vs. the amount planned.
- ***Schedule Performance Index (Time) SPI(t)*** is the ratio of work or task days performed vs. the amount of days actually consumed. (remember to think of cost in terms of days)
- ***Baseline Execution Index (BEI)*** is the number of tasks that actually finished through the current status date vs. the number baselined to finish.
- ***Current Execution Index (CEI)*** identifies all the tasks that were forecasted to finish when the reporting period began to determine which of those actually did finish by the end of the same period.

Earned Schedule Example

Unlike BEI, which gives equal weight to all tasks since it only counts finish dates, Earned Schedule data ***weights*** each activity based on its duration.

Figure 1 Data Points for Actual & Projected Performance Vs. Original Baseline and Interim "Snapshot"



Getting Earned Schedule data for the task shown in ***Figure 1*** can be determined by its current values in the schedule. As of June 30th, the task in the image below has the following and performance values:

- The task is ***58% complete***
- ***BCWP or Earned Schedule*** = 26 days (Total Baseline Duration (45 days) x 58%)
- ***BCWS*** = 44 days (The task's ***Scheduled Duration*** through June 30th)
- ***ACWP*** = 35 days (The task's ***Actual Duration***)

SPA values are: **Scheduled** = 44 days, ***Performed*** = 26 days, ***Actual*** = 35 days

- ***SV = -18 days*** (26 days performed minus 44 days planned)
- ***AV = -9 days*** (26 days performed minus 35 days actually consumed)
- ***SPI*** = .59 (26 days performed / 44 days planned)
- ***CPI*** = .74 (26 days performed / 35 days actually consumed)

- ***ETC*** = 25 days remaining
- ***EAC =*** 60 days (25 days remaining plus 35 actual days consumed)
- **BAC** = 45 days (The task's total ***Baseline Duration***)
- ***VAC = -15*** days (45 days baselined minus 60 days EAC)

- **BEI** – The Baseline Finish is after the Status date so this would not count towards BEI
- **HMI** - The Baseline Finish is after the Status date so this would not count towards HMI
- **CEI** – The Snapshot Finish is after the Status date so this would not count towards CEI

Baseline Execution Index (BEI) and Hit/Miss Index (HMI)

Baseline Execution Index (BEI) and **Hit/Miss Index** are common ways to measure schedule performance. You don't need to have your schedule configured for formal Earned Value Management to calculate these metrics. If a **baseline has been set** for all activities in the project, you can determine both the **Baseline Execution Index (BEI)** and **Hit/Miss Index** using standard schedule data! These metrics help assess how well a project is performing against its **baseline plan**.

The formula for **Baseline Execution Index (BEI)** is as follows:

$$BEI = \frac{\text{total number of tasks ACTUALLY finished}}{\text{total number of tasks BASELINED to finish}}$$

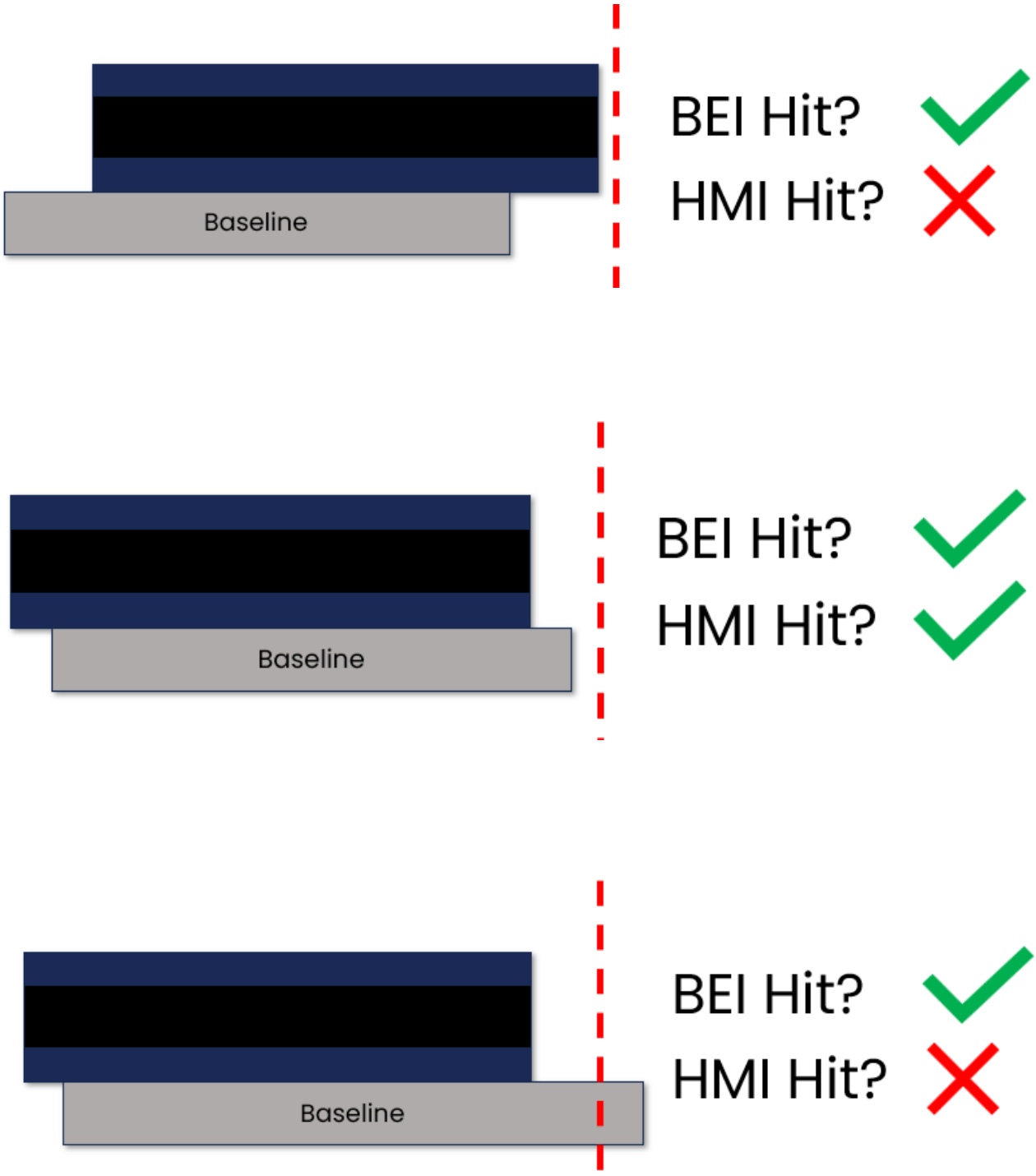
- **BEI = 1.0** - You're exactly on track.
- **BEI > 1.0** - You're ahead of schedule.
- **BEI < 1.0** - You're behind schedule.

Hit/Miss Index (HMI)

Hit/miss index, is a more strick version of BEI. It measures the ratio of tasks that finished within the current reporting period that were either on or before their exact baseline finish date. The formula is as follows:

$$HMI = \frac{\text{total number of tasks ACTUALLY finished on/before its baseline finish } \textit{in the period}}{\text{total number of tasks BASELINED to finish } \textit{in the Period}}$$

- **HMI = 1.0** - All tasks this period completed on or before their baseline finish date
- **HMI < 1.0** – Some amount tasks that finished this period finished later than their baseline finish date.


Baseline
BEI Hit?
HMI Hit?
Baseline
BEI Hit?
HMI Hit?
Baseline
BEI Hit?
HMI Hit?

Current Execution Index (CEI)

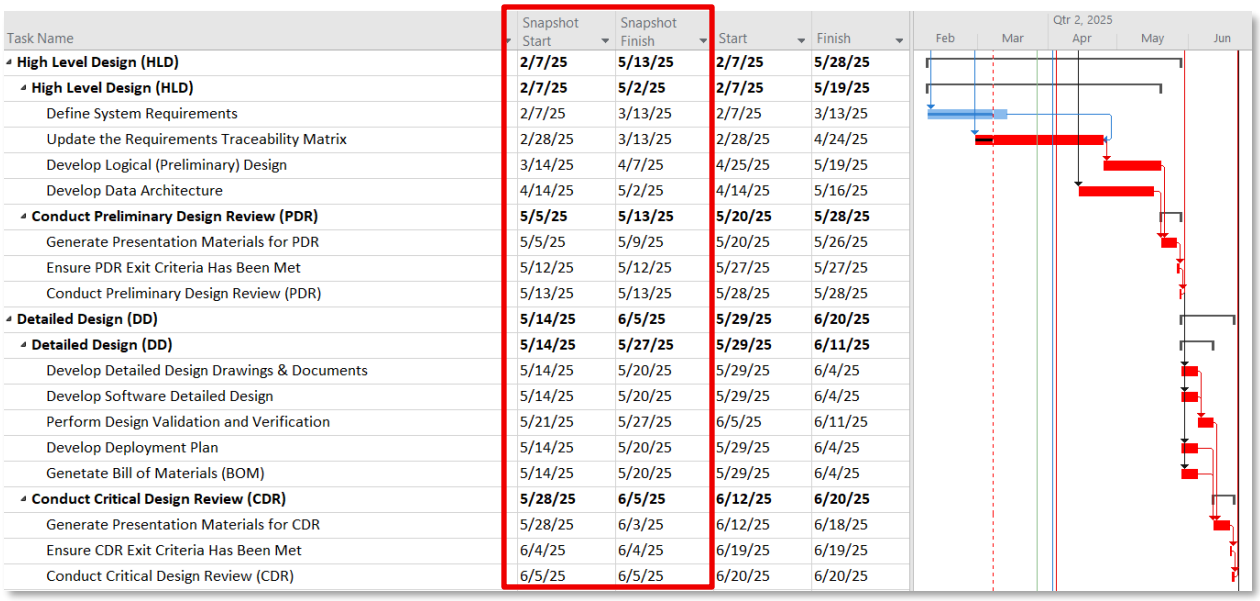
The **Current Execution Index (CEI)** provides insight into how effective the project is at forecasting the work that will be completed in the following period. It serves as a valuable measure of the project team's ability to accurately update its forecast.

$$CEI = \frac{\text{total number of tasks ACTUALLY finished } \textit{in the period}}{\text{total number of tasks FORECASTED to finish } \textit{in the period (last period)}}$$

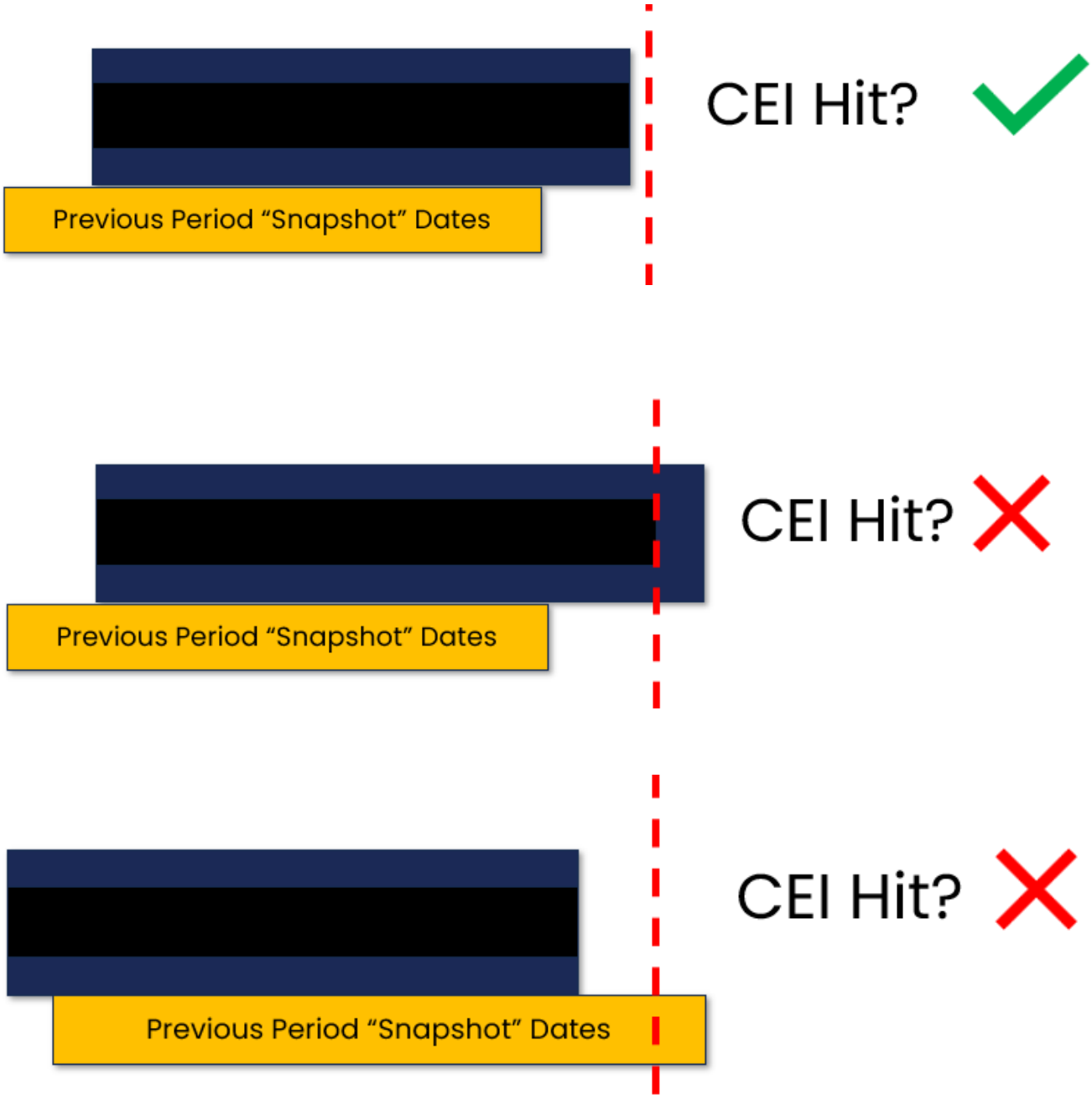
- **CEI = 1.0** – All tasks that were forecasted to be completed in this period were completed.
- **CEI < 1.0** – Some tasks that were forecasted to be completed this period were not completed.

For CEI, ONLY tasks that were forecasted to finish in the prior period are counted in the numerator. So tasks finishing early do NOT count.

To calculate CEI you must establish an **Interim Plan.** This interim plan also called a "snapshot" is just a copy of the Start and Finish dates of the activities in the schedule into any of the reference Start/Finish 1-10 fields. In other words, you can save the **start and finish dates** at the end of the current reporting period, then compare them to the updated dates at the end of the next period.

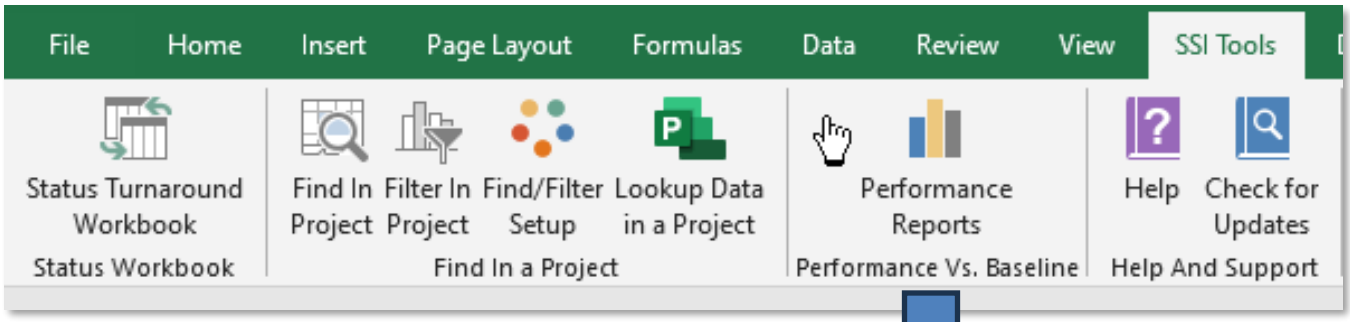


Task Name	Snapshot Start	Snapshot Finish	Start	Finish
High Level Design (HLD)	**2/7/25**	**5/13/25**	**2/7/25**	**5/28/25**
High Level Design (HLD)	**2/7/25**	**5/2/25**	**2/7/25**	**5/19/25**
Define System Requirements	2/7/25	3/13/25	2/7/25	3/13/25
Update the Requirements Traceability Matrix	2/28/25	3/13/25	2/28/25	4/24/25
Develop Logical (Preliminary) Design	3/14/25	4/7/25	4/25/25	5/19/25
Develop Data Architecture	4/14/25	5/2/25	4/14/25	5/16/25
Conduct Preliminary Design Review (PDR)	**5/5/25**	**5/13/25**	**5/20/25**	**5/28/25**
Generate Presentation Materials for PDR	5/5/25	5/9/25	5/20/25	5/26/25
Ensure PDR Exit Criteria Has Been Met	5/12/25	5/12/25	5/27/25	5/27/25
Conduct Preliminary Design Review (PDR)	5/13/25	5/13/25	5/28/25	5/28/25
Detailed Design (DD)	**5/14/25**	**6/5/25**	**5/29/25**	**6/20/25**
Detailed Design (DD)	**5/14/25**	**5/27/25**	**5/29/25**	**6/11/25**
Develop Detailed Design Drawings & Documents	5/14/25	5/20/25	5/29/25	6/4/25
Develop Software Detailed Design	5/14/25	5/20/25	5/29/25	6/4/25
Perform Design Validation and Verification	5/21/25	5/27/25	6/5/25	6/11/25
Develop Deployment Plan	5/14/25	5/20/25	5/29/25	6/4/25
Genetate Bill of Materials (BOM)	5/14/25	5/20/25	5/29/25	6/4/25
Conduct Critical Design Review (CDR)	**5/28/25**	**6/5/25**	**6/12/25**	**6/20/25**
Generate Presentation Materials for CDR	5/28/25	6/3/25	6/12/25	6/18/25
Ensure CDR Exit Criteria Has Been Met	6/4/25	6/4/25	6/19/25	6/19/25
Conduct Critical Design Review (CDR)	6/5/25	6/5/25	6/20/25	6/20/25

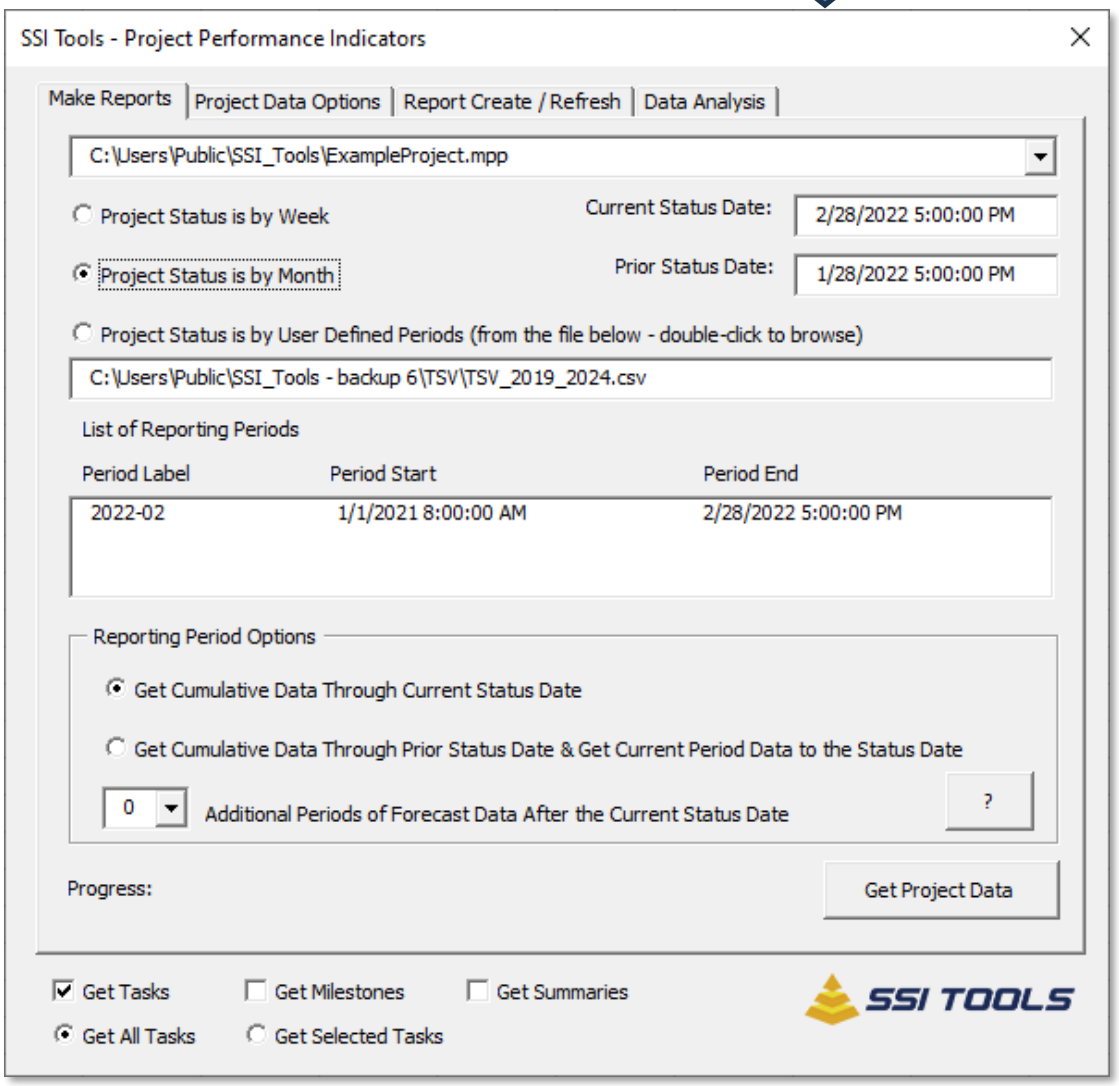

CEI Hit?
Previous Period "Snapshot" Dates
CEI Hit?
Previous Period "Snapshot" Dates
CEI Hit?
Previous Period "Snapshot" Dates

SSI Performance Reports in Excel

The SSI Performance Reports Add-in for Excel generates a table named **"PerformanceData"** within the active workbook, along with pivot tables and charts representing **Earned Schedule** performance metrics for the active project.



Make Reports tab



Step1 - The project selection list on the top of the form will show the active project and *current* ***Status Date*** will be populated.

Step 2 – Select your status period option:

- Project Status is by Week
- Project Status is by Month
- Project Status is by User Defined Periods

**Prior* Status Date will be determined based on the status period option selected.

Step 3 – Select your Reporting Period Options:

1. Get Cumulative Data Through Current Status Date

Accumulate Baseline, Snapshot and Actual data through the current status date in the project.

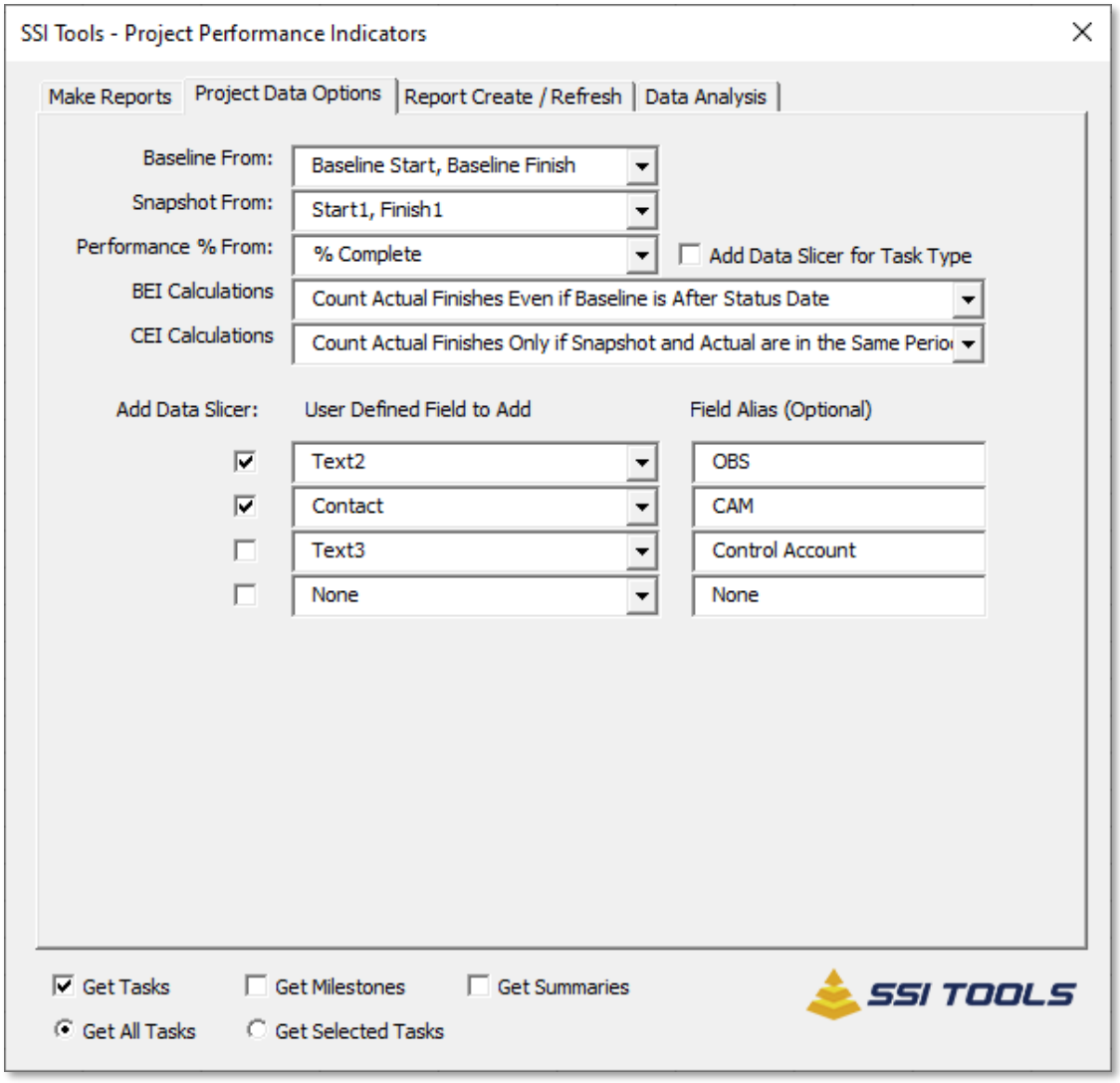
* Use ***Additional Period*** for Forecast Data After the Current Status date with this option to include Baseline and Snapshot performance forecasts in periods after the project's status date

2. Get Cumulative Data Through Prior Status Date & Get Current Period Data to the Status Date

Accumulate Baseline, Snapshot and Actual data through the end of the ***prior*** reporting period ***and*** show Baseline, Snapshot and Actual data separately for the ***current*** reporting period.

* Use ***Additional Period*** for Forecast Data After the Current Status Date with this option to include Baseline and Snapshot performance forecasts in periods after the project's status date.

Project Data Options Tab

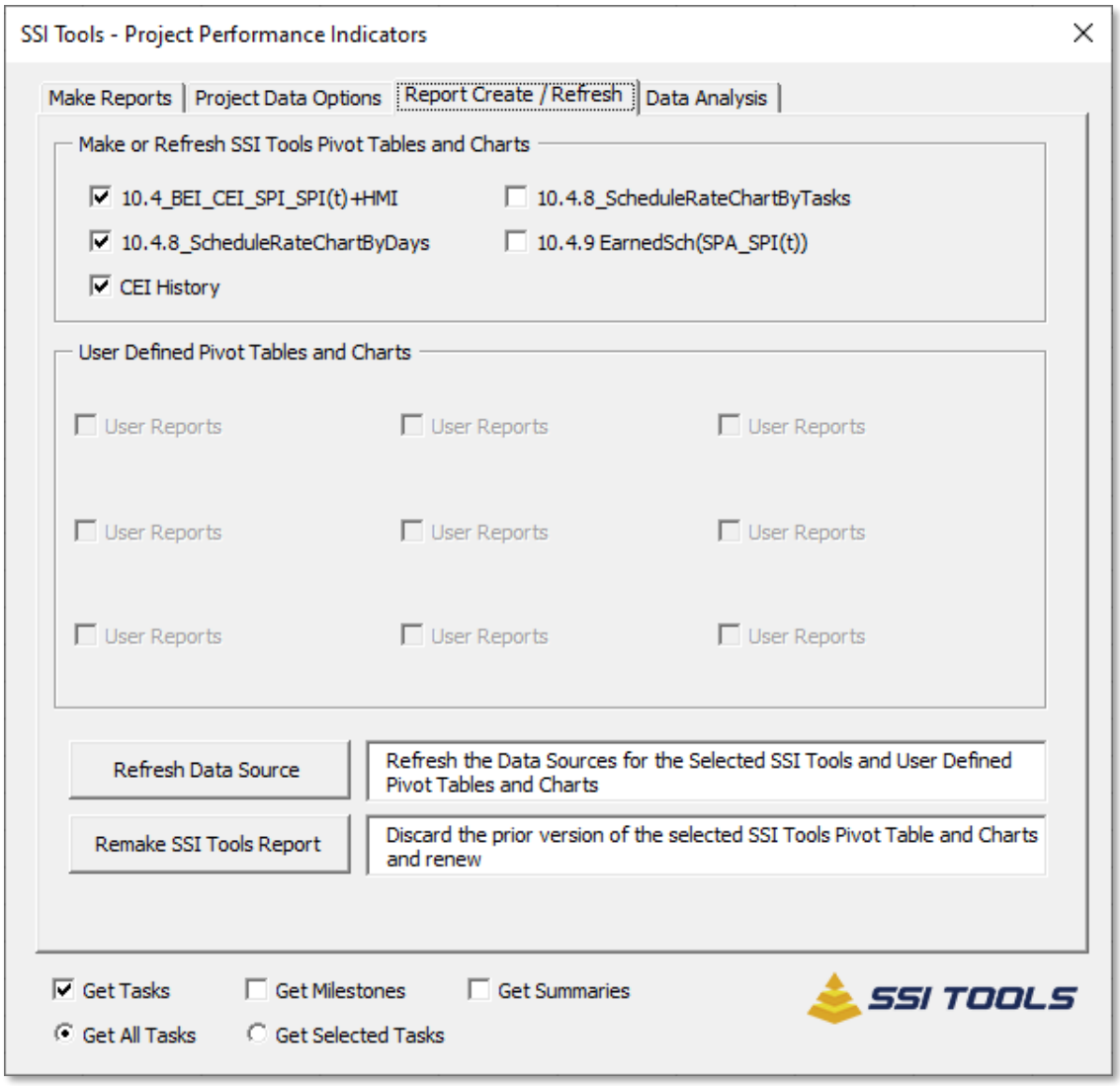


- Select the Project fields being used for **Baseline** dates & **Snapshot** dates. (Start / Finish 1-10 or Baseline 1-10)
- Select the field being used for **Performance %Complete**.

BEI and CEI calculation options allow for accounting of tasks completed ahead of their Baseline or Snapshot period (allowing BEI and CEI to be greater than 1.0)
* OR a stricter approach which only counts finished tasks if their Baseline or Snapshot date occurs before the end of the reporting period.

User Defined Fields
Add up to 4 user defined Text fields to the report worksheet named "PerformanceData".

Report Create / Refresh Tab



Shows the 5 standard reports. Check the report you need and Refresh or Remake the report using these options:

- Press ***Refresh Data Source*** to use the refresh an existing pivot table or chart using data collected from the project Remake SSI Tools Report
- Press ***Remake SS Tools Report*** to discard an old version of a pivot table or report and make a new one using the standard configuration and formats

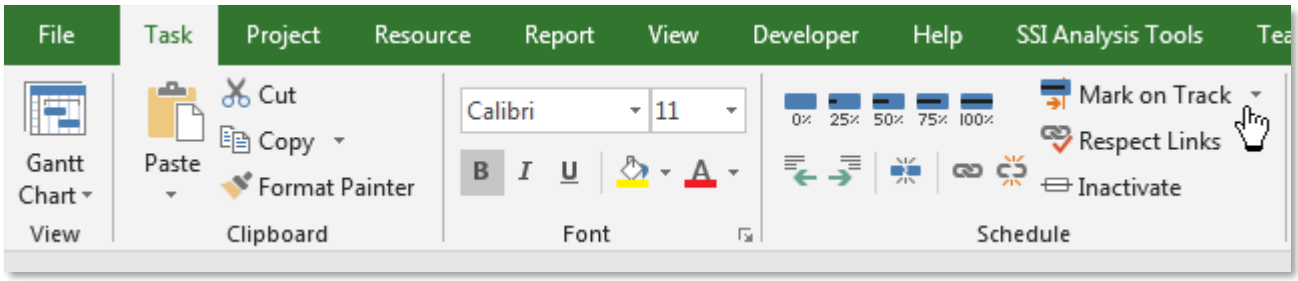
User Defined Pivot Tables and Charts include any pivot table or pivot chart you created in the current workbook using the data in the sheet named "PerformanceData". You can select any of these custom reports and refresh the pivots using current project data.

Class Exercise – Performance Reports Add-in for Excel

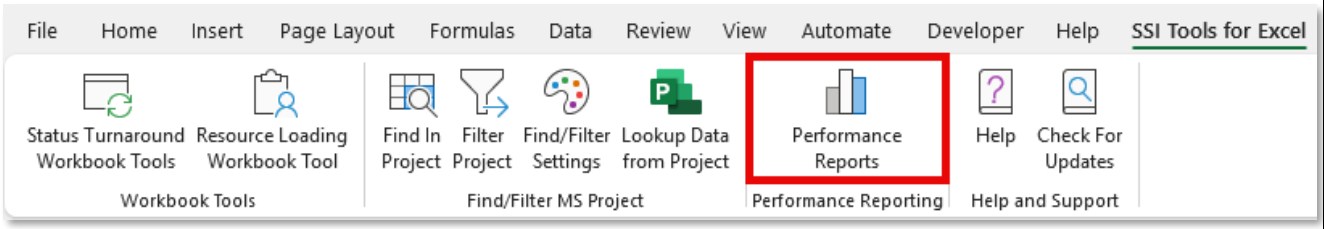
1. Download and Open the ***Example Project for Performance Reports:***
   Example Project for Performance Reporting Exercises

2. Start Microsoft Excel and open the class file named PerformanceReportsExercise.xlsx. This workbook contains sample data for 2 reporting periods in the Example Project (Jan - Feb 2021)
   https://ssitools.com/classfiles/exercisefiles/xlperformance/PerformanceReportsExercise.xlsx

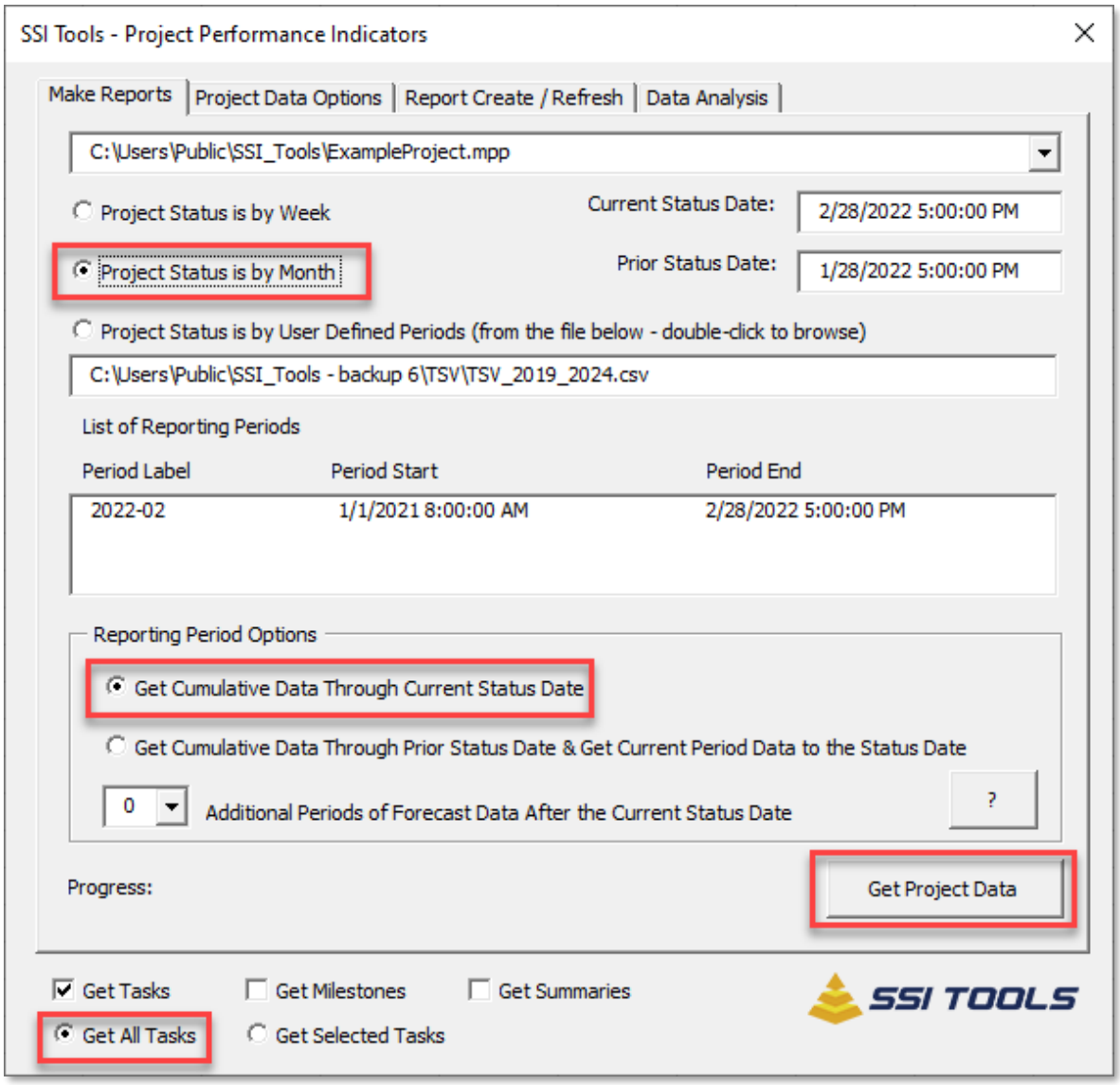
3. Select all the tasks in the Example Project and click ***Mark on Track*** on the ***Task*** / ***Schedule*** menu in Microsoft Project



4. Click ***Performance Reports*** on the ***SSI Tools*** menu in Excel

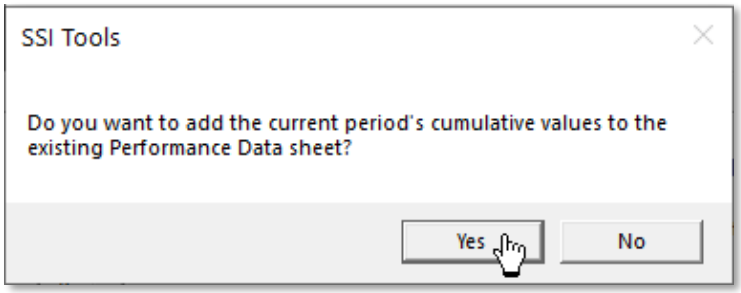


5. Make the selections shown below and click ***Get Project Data***

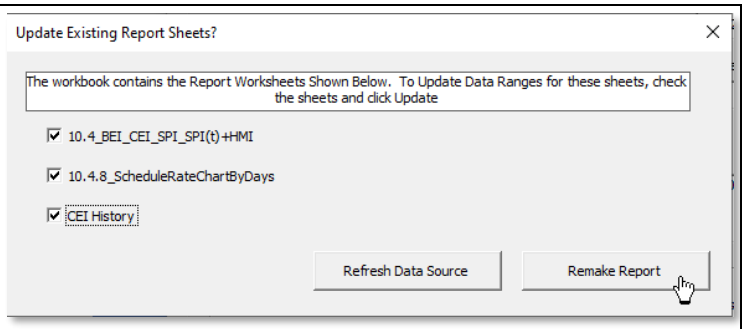


6. Since the active workbook already has a sheet named "PerformanceData" Click Yes to add data from the active project to data from prior periods.

Note – you can replace data for a period by removing its data in the PerformanceData sheet. SSI Tools may prompt you to add or replace data in a period if it detects existing data for the same period ending date.

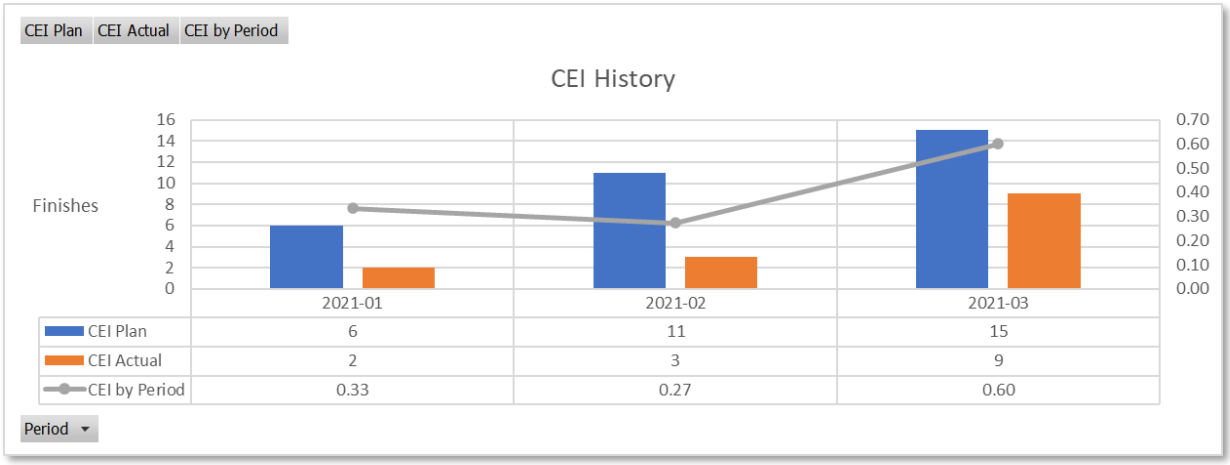


7. ***Remake*** all three pivot tables and charts by checking the chart names and pressing ***Remake Reports***



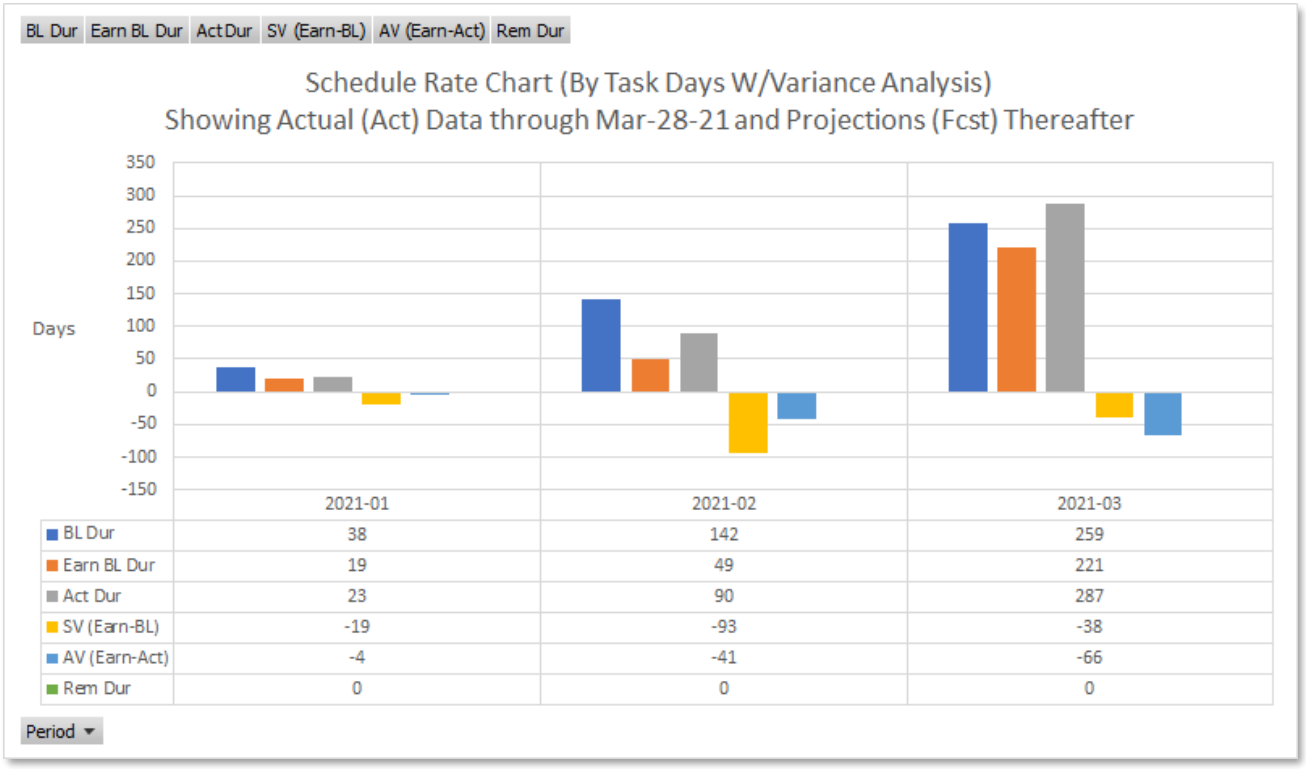
The updated CEI History Report looks like this:

- ***CEI Plan*** is the number of tasks having a Snapshot Finish date in its respective period
- ***CEI Actual*** is (depending on the option selected on the tab named ***Project Data Options***) the ***Count of Actual Finishes Only if Snapshot and Actual are in the Same Period*** or it is the count of ***Count Actual Finishes Even if Snapshot and Actual are in Different Periods***
- ***CEI by Period*** is CEI Actual / CEI Plan. The scale for CEI by Period is on the right side of the chart



The updated Schedule Rate Chart looks like this:

- ***BL Dur*** (Baseline Duration) is the sum of Task baseline days planned in each period
- ***Earn BL Dur*** (Earned Baseline Duration) is equal to the sum of each task's Percent Complete (according to the ***Performance % From*** option on the tab named ***Project Data Options***) times its Baseline Duration.
- ***Act Dur*** (Actual Duration) is the sum of each task's actual duration
- ***SV*** (Schedule Variance) = ***Earn BL Duration*** minus ***BL Dur***
- ***AV*** (Actual Variance) = ***Earn BL Duration*** minus ***Act Dur***
- ***Rem Dur*** (Remaining Duration) is the number of unfinished task days left behind the status date in each period. If any value shows for ***Rem Dur***, the project had incomplete or invalid status in the period.



BEI_CEI_SPI_SPI(t)+HMI is a pivot table of data and indices by period. Follow this link for a detailed description of each column in this report:
https://ssitools.com/helpandsuport/ssiait/10_4_8_scheduleratechartbydays.htm

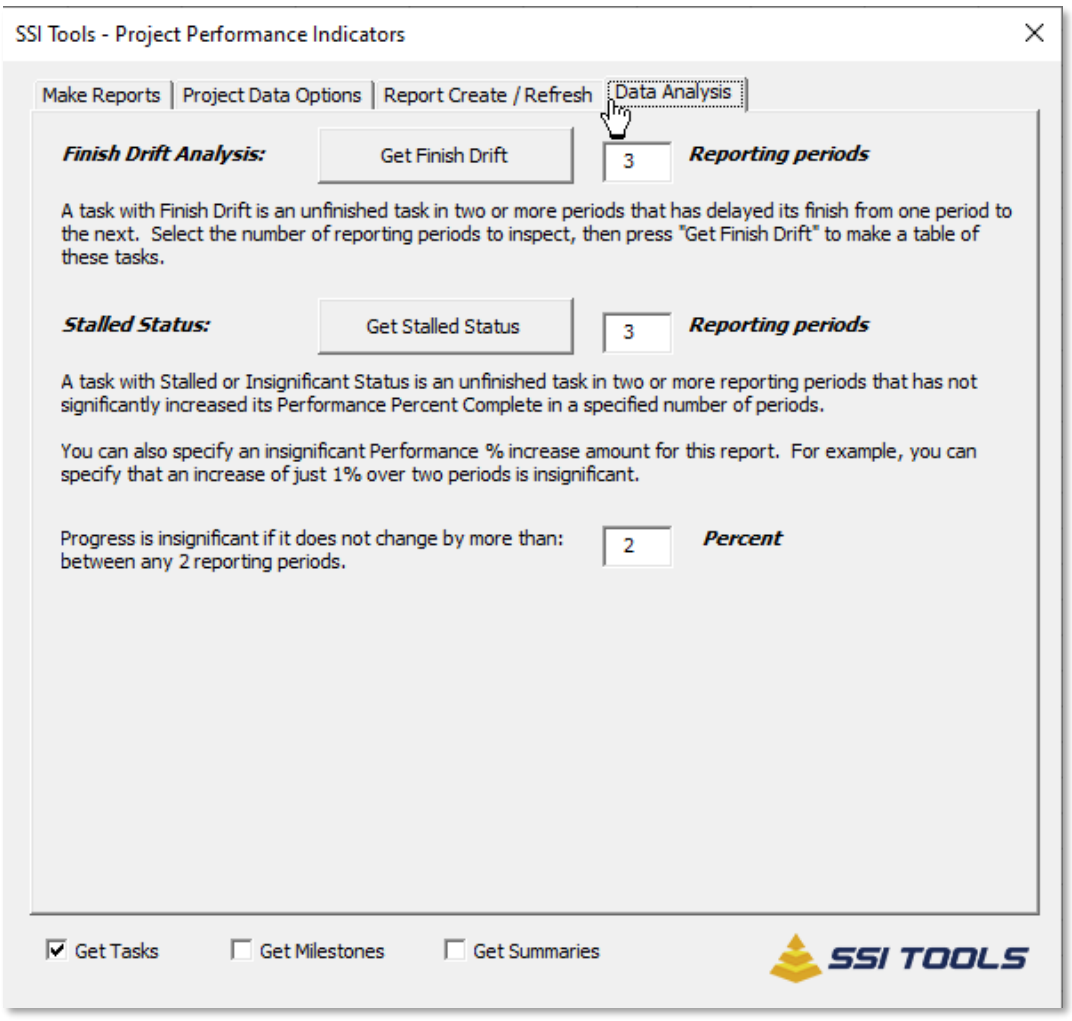
End of Class Exercise

Finish Drift and Stalled Status Reports

When the "***PerformanceData***" sheet includes status from 2 or more reporting periods you can check for ***Finish Drift*** and ***Stalled Status***.

Finish Drift is an unfinished task in two or more periods that has delayed its finish from one period to the next. Select the number of reporting periods to inspect, then press "***Get Finish Drift***" to make a table of these tasks.

Stalled Status is an unfinished task in two or more reporting periods that has not significantly increased its ***Performance Percent Complete*** in a specified number of periods. You can also specify an insignificant Performance % increase amount for this report. For example, you can specify that an increase of just 1% over two periods is insignificant.



Example Finish Drift in 2 periods

Period End	Unique ID	Name	Start	Finish	Pct Cmp	Condition
1/31/2021	17	Generate Analysis of Alternatives (AoA) Study Plan	1/29/2021	2/4/2021	20%	Finish Drift
2/28/2021	17	Generate Analysis of Alternatives (AoA) Study Plan	1/29/2021	3/2/2021	91%	Finish Drift
1/31/2021	18	Perform AoA Study Plan Review	2/5/2021	2/17/2021	0%	Finish Drift
2/28/2021	18	Perform AoA Study Plan Review	2/26/2021	3/12/2021	4%	Finish Drift
1/31/2021	19	Develop Life Cycle Cost Estimate (LCCE)	2/5/2021	2/11/2021	0%	Finish Drift
2/28/2021	19	Develop Life Cycle Cost Estimate (LCCE)	3/3/2021	3/9/2021	0%	Finish Drift
1/31/2021	20	Define Operations Requirements	2/5/2021	2/11/2021	0%	Finish Drift
2/28/2021	20	Define Operations Requirements	3/3/2021	3/9/2021	0%	Finish Drift
1/31/2021	22	Develop the Integrated Logistics Support Plan (ILSP)	2/5/2021	2/11/2021	0%	Finish Drift
2/28/2021	22	Develop the Integrated Logistics Support Plan (ILSP)	3/3/2021	3/9/2021	0%	Finish Drift
1/31/2021	23	Establish Acquisition Program Baseline (APB)	2/5/2021	2/11/2021	0%	Finish Drift
2/28/2021	23	Establish Acquisition Program Baseline (APB)	3/3/2021	3/9/2021	0%	Finish Drift
1/31/2021	32	Review CONOPS & Requirements Documents	1/29/2021	2/1/2021	95%	Finish Drift
2/28/2021	32	Review CONOPS & Requirements Documents	1/29/2021	3/1/2021	95%	Finish Drift

Example Stalled Status in 2 periods by <=2%

Period End	Unique ID	Name	Start	Finish	Pct Cmp	Condition
1/31/2021	19	Develop Life Cycle Cost Estimate (LCCE)	2/5/2021	2/11/2021	0%	Stalled Pct
2/28/2021	19	Develop Life Cycle Cost Estimate (LCCE)	3/3/2021	3/9/2021	0%	Stalled Pct
1/31/2021	20	Define Operations Requirements	2/5/2021	2/11/2021	0%	Stalled Pct
2/28/2021	20	Define Operations Requirements	3/3/2021	3/9/2021	0%	Stalled Pct
1/31/2021	22	Develop the Integrated Logistics Support Plan (ILSP)	2/5/2021	2/11/2021	0%	Stalled Pct
2/28/2021	22	Develop the Integrated Logistics Support Plan (ILSP)	3/3/2021	3/9/2021	0%	Stalled Pct
1/31/2021	23	Establish Acquisition Program Baseline (APB)	2/5/2021	2/11/2021	0%	Stalled Pct
2/28/2021	23	Establish Acquisition Program Baseline (APB)	3/3/2021	3/9/2021	0%	Stalled Pct
1/31/2021	32	Review CONOPS & Requirements Documents	1/29/2021	2/1/2021	93%	Stalled Pct
2/28/2021	32	Review CONOPS & Requirements Documents	1/29/2021	3/1/2021	95%	Stalled Pct

Class Exercise – Finish Drift and Stalled Status Analysis

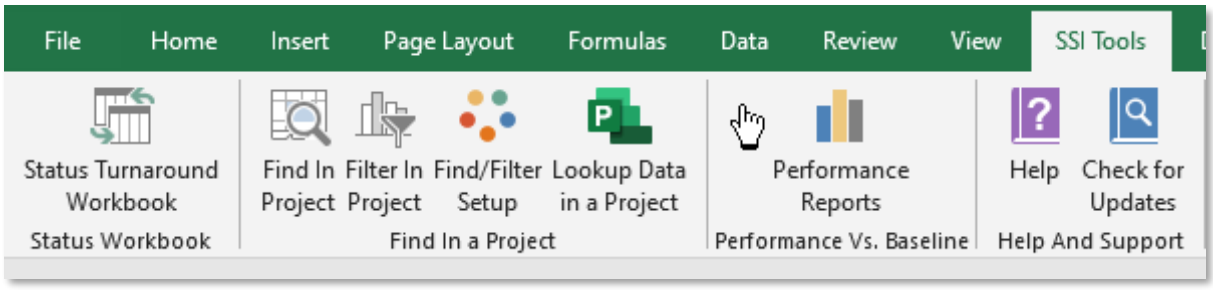
Continue using the project and Excel files from the previous exercise
or:

1. Open the ***Example Project for Performance Reports (ExampleProjectMarch.mpp)****

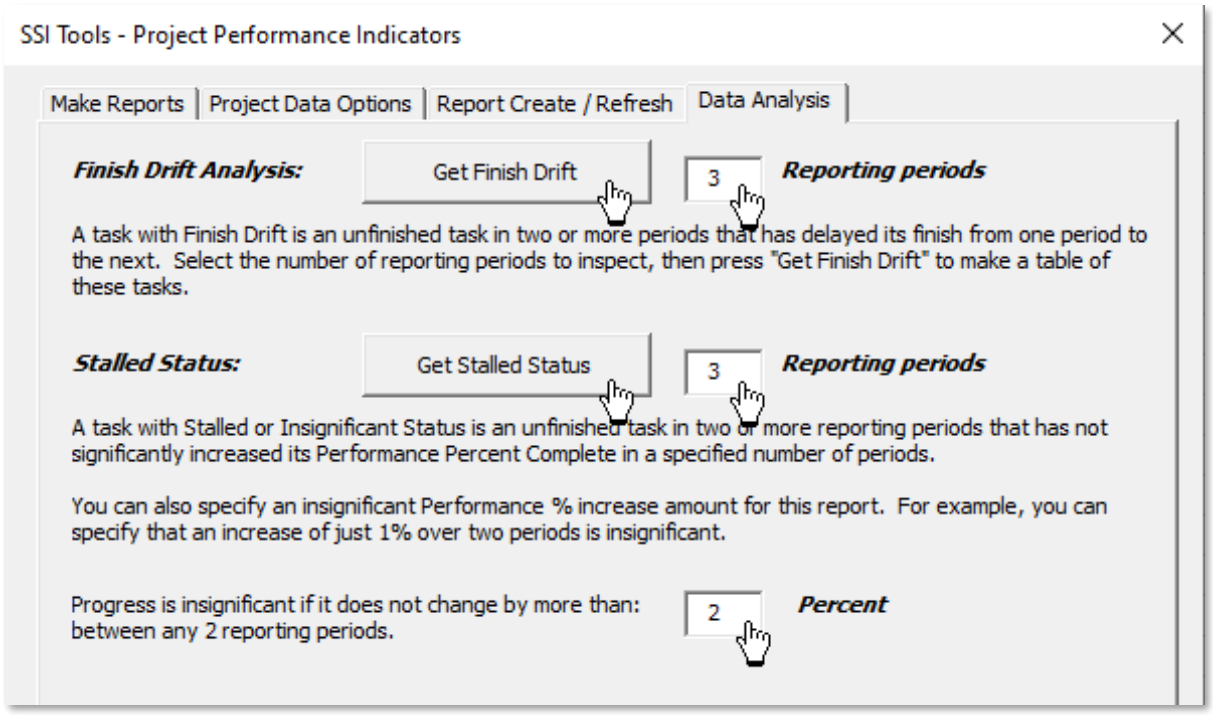
*If needed, download the Example Project at: Example Project for Performance Reporting Exercises
https://ssitools.com/classfiles/exercisefiles/xlperformance/ExampleProjectMarch.mpp

2. Start Microsoft Excel and open the class file named PerformanceReportsExercise-March.xlsx

3. Click ***Performance Reports*** from the ***Performance Reporting*** group of the ***SSI Tools*** menu in Excel.



4. On the **Data Analysis** Tab:
   Set ***Reporting periods*** to 3 for ***Finish Drift Analysis***
   Set ***Reporting periods*** to 3 and ***Percent*** to 2 for ***Stalled Status***



5. Click ***Get Finish Drift*** and ***Get Stalled Status.*** Observe the results.

The ***DriftTasks*** sheet should look like this:

Period End	Unique ID	Name	Start	Finish	Pct Cmp	Condition
2/28/2021	32	Review CONOPS & Requirements Documents	1/29/2021	3/1/2021	95%	Finish Drift
3/31/2021	32	Review CONOPS & Requirements Documents	1/29/2021	4/1/2021	95%	Finish Drift

The ***StalledTasks*** sheet should look like this:

Period End	Unique ID	Name	Start	Finish	Pct Cmp	Condition
2/28/2021	32	Review CONOPS & Requirements Documents	1/29/2021	3/1/2021	95%	Stalled Pct
3/31/2021	32	Review CONOPS & Requirements Documents	1/29/2021	4/1/2021	95%	Stalled Pct
2/28/2021	35	Develop System Software Requirements	3/30/2021	4/5/2021	0%	Stalled Pct
3/31/2021	35	Develop System Software Requirements	4/1/2021	4/9/2021	0%	Stalled Pct

End of Class Exercise

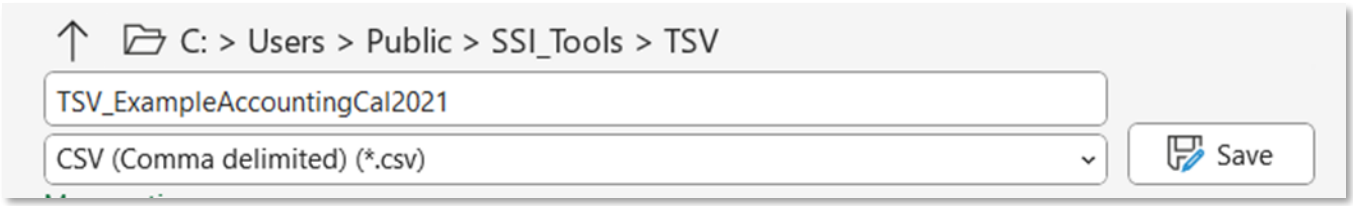
Creating User Defined Periods

Defined Periods are intervals of time that do not correspond to any standard calendar period and are defined by the user. These periods can be anything but are most often used to represent an organization's fiscal calendar.

The easiest way to create your own defined periods is in *Excel*. In an Excel worksheet, Column A will represent the ***Period Label***, column B is the ***Start date*** of the period and column C is the ***End date*** of the period. A Period's ***start date*** must be the next day after the prior period ***end date.***

	A	B	C
1	2019-01	12/29/2018	2/1/2019
2	2019-02	2/2/2019	3/1/2019
3	2019-03	3/2/2019	3/29/2019
4	2019-04	3/30/2019	5/3/2019
5	2019-05	5/4/2019	5/31/2019
6	2019-06	6/1/2019	6/28/2019
7	2019-07	6/29/2019	8/2/2019
8	2019-08	8/3/2019	8/30/2019

When finished creating the defined periods, there are 2 requirements in saving the file that must be followed:

1. The file **MUST** be saved as a .csv file.
2. The file name **MUST** be prefixed with "**TSV_**".

If these conventions are not followed, SSI will not be able to recognize the file as a defined periods file. Save the file in the TSV folder of the SSI Tools folder (most likely C:\Users\Public\SSI_Tools\TSV). This is the default location the Time Scaled Values tool will look to when the Defined Periods option is selected.