



Release Notes

TruePlanning16 SR3

PRICE Systems, L.L.C.

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TruePlanning® 16 SR3 Release Notes

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TruePlanning® 16 SR3

Installation Guidelines

This installation includes new versions of PRICE® TruePlanning®. All PRICE Systems' products require that the user performing the installation have sufficient system privileges to install software.

Please refer to the Installation Guide for detailed information on installing TruePlanning. To access the Installation Guide, navigate to the PRICE TruePlanning 16.3 directory from the Start menu, and select "Support Manuals."

New Installations

Insert the TruePlanning 16 SR3 disk and follow the instructions displayed on the screen. A license file is required before any PRICE Systems' products can be used. To contact PRICE for a license file, please dial 1-800 43 PRICE (1-800 437-7423) or 1-856 608-7212.

Side-by-Side Installations

TruePlanning can be installed alongside any previous version. This means that you can have multiple versions of TruePlanning installed on your computer. It is not necessary to uninstall the previous version of TruePlanning and you will NOT be asked to upgrade. Installing the new release will not affect your data in prior releases. This feature allows you to preserve old estimates by keeping original answers. Newer versions of the software will continually change answers because of economic updates and cost research updates. See the Help for additional information on working with multiple versions of TruePlanning.

Upgrade Considerations

Removed Support for Windows 7 and Windows 8

TruePlanning no longer supports installations on Microsoft® Windows 7 or Microsoft® Windows 8.

Removed Multiplier and Distribution from Worksheet Sets and Added to Input Sheet Views

The Multiplier and Distribution inputs have been removed from the Worksheet Sets dialog and can now be accessed through the various Input Sheet views. Specifically, the "Activity" and "Resource" input views will allow you to easily examine Multiplier and Distribution values across each cost object as well as set these values per individual activity or resource.

Note: Multipliers will also be transferred over to TrueFindings when copying and pasting data between applications.

For more information, refer to the "Activity View" and "Resource View" Help topics.

Microsoft Project Updates

Several updates have been made to the Microsoft Project integration which include moving the Microsoft Project export functionality to the File menu and removing the ability to import data from Microsoft Project.

For more information, refer to the "Microsoft Project Export" Help topic.

Updates to Mapping Structures When Opening Files in TruePlanning 16.3

Three new columns will automatically be added to your mapping structure when opening files in TruePlanning 16.3. These new columns are "WBS," "Task ID," and "Task/Resource." These columns have been added to allow you to re-create specific BOE reports as a result of the "WBS Activity/Resource" check-box being removed from the TrueBOE Options dialog. These new columns will also be used for the ProPricer export functionality.

Note: In order to re-create your BOE reports in TruePlanning 16.3, make sure you keep the "Report Type" set to "Task Id" in the TrueBOE Options dialog.

Updated Input, Activity, and Resource Names

Several input, activity, and resource names have been updated in TruePlanning to provide better consistency across all models. The name changes are included in the tables below:

Inputs:

16 SR2 and older	16 SR3+
Vendor Product Complexity	Vendor and Product Maturity

16 SR2 and older	16 SR3+
Development Team Complexity	Development Team Assessment
Vendor and Application Complexity	Vendor and Application Maturity
Development Team Expertise	Development Team Assessment

Activities:

16 SR2 and older	16 SR3+
Equipment Maintenance and Configuration	Equipment Maintenance
Iteration 0	Release Planning
Replenishment Spares	Replenishment Spares Procurement
Training Services	Training

Resources:

16 SR2 and older	16 SR3+
Amount For Software	Amount for Software
Sys Assm Configuration Manager	Configuration Manager
Cost of Construction	Facilities Costs
Design Engineering	Design Engineer
Manufacturing Engineering	Manufacturing Engineer
Quality Assurance	Quality Engineer
System Architect/Engineering	System Architect/Engineer
Software Engineering	Software Engineer
Software QA Engineering	Software QA Engineer
Support Engineering	Support Engineer
System Engineering	System Engineer
Test Engineering	Test Engineer
Tooling and Test Engineering	Tooling and Test Engineer

New Features

TruePlanning® Improvements

Activity View on the Input Sheet

The former "Schedule" view on the Input Sheet has been renamed to "Activity" view and has been enhanced in several ways to allow you to easily access and edit the activities in your project. In previous versions, the Schedule view only allowed you to edit activity start and end dates. All other activity data had to be edited one at a time in the Activity Properties dialog. With this updated "Activity" view, you can edit activity start and end dates as well as activity properties such as Predecessor, Predecessor Type, Predecessor Lag, Schedule Penalty, etc., for all activities on a cost object. The Find and Replace dialog has also been updated to allow you to easily access and edit activity data.

Note: The Activity Properties dialog is no longer available on an activity's right-click menu.

For more information, refer to the "Editing Activities" and "Using Find and Replace" Help topics.

Resource View on the Input Sheet

A new "Resource" view has been added to the Input Sheet that allows you to easily access and edit the resources in your project. With this view, you can edit resource multipliers, distribution, and minimum staff as well as examine relevant Worksheet Set data, for all resources on a cost object. The Find and Replace dialog has also been updated to allow you to easily access and edit resource data.

For more information, refer to the "Resource View" and "Using Find and Replace" Help topics.

Updated Worksheet Set/Escalation Table Import

In previous versions, if you imported a Worksheet Set or Escalation Table that had the same name as an existing Worksheet Set or Escalation Table, TruePlanning would create a copy. In this version, you now have the option of creating a copy or updating the data of an existing Worksheet Set or Escalation Table when importing a file with the same name.

For more information, refer to the "Creating Worksheet Sets" Help topic and the "Escalation" Help topic.

Software Size Conversions

A new Software Size Conversion editor has been added to the Options dialog that allows you to enter custom conversion rates by software size unit and language. In previous versions, you could set custom conversions by language in the Language calculator, or you could set conversions for ALL languages in the Options dialog; however, issues with data being passed correctly throughout the TruePlanning framework prevented some outputs from updating correctly. The new Software Size Conversion editor combines these two separate functionalities and can be accessed from the Project Defaults tab of the Options dialog. Additionally, the Language input has been converted from a calculator to a drop-down that allows you to select the programming language that you plan to use for coding the software.

It is important to recognize that the purpose of the software size conversion is to roll software size from Software Component, Software COTS, Agile Software, Software Maintenance Component, and Software Maintenance COTS to Assembly and IATC cost objects in one consistent unit. The Language conversion has no impact on the cost/effort estimate at the component level.

Note: These enhancements will impact definition data for inputs and metrics in TrueFindings. For more information, refer to the "Supported Definitions" Help topic.

For more information, refer to the "Options Dialog" Help topic.

Updated Manage Data Dialog to Separate Findings and Data Points

The Manage Data dialog has been updated with three windows to provide a clear separation between Data Sets, Findings, and the data points contained within the Findings.

For more information, refer to the "Interaction with TruePlanning" Help topic.

Include Cost Object, Activity, and Resources Names with Exported Worksheet Set Files

When a Worksheet Set is exported to Excel, three new columns will be available in the Excel file that include the cost object name, activity name, and resource name for easier reference to those project items.

Mapping Structure Import Validation

When you are importing TrueMapper files into TruePlanning, you will be alerted if the following mapping structure issues are identified:

- Duplicate mapping IDs
- Missing Parents
- Duplicate names
- Renamed cost objects, activities, or resources

If any of these issues are encountered, TruePlanning will allow you to continue importing the TrueMapper file and will provide you with an error message instructing you to visit the Calculation Log for more information. It is important to review the Calculation Log immediately after receiving the error message because the log will be cleared once the project is calculated.

Note: These validations will also be performed in TrueMapper and any issues will be reported in the Log file.

Multi-Select Escalation Tables

Updates have been made to the Escalations dialog that will allow you to multi-select Escalation Tables to perform various operations such as export, copy, or delete. In previous versions, TruePlanning would export all Escalation Tables in the Project or Shared tabs as well as only allow you to copy or delete one Escalation Table at a time. In this version, you can select exactly which Escalation Tables you want to export and you can also copy or delete multiple Escalation Tables at the same time.

Note: When you multi-select Escalation Tables, you will not be able to edit their values.

For more information, refer to the "Escalation" Help topic.

TrueFindings® Improvements

Updated Findings Tab to Separate Findings and Data Points

The Findings tab has been updated with two windows to provide a clear separation between Findings and the data points contained within those Findings.

For more information, refer to the "Creating Findings" Help topic.

Validation on Findings

Validation has been added to TrueFindings to ensure that Findings values align with input and metric ranges defined in TruePlanning. You will now receive a validation warning on the Findings tab whenever a Finding is created that contains data that is out of range. You can also hover over a column header in TrueFindings to view important information such as min and max values, units, and data types.

Define Language with Software Size Columns

It is now possible to define a language with your Software Size columns in TrueFindings. When adding a language to the Software Size column, you will need to include the name of the Language in the column header. For example, if the Language you are adding is Visual C++ and the Size Units are Source Lines of Code, your column header should look like this: "Input Software Size (Software Size; Source Lines of Code (SLOC), Visual C++; Input)." You can also use the Normalize dialog in TrueFindings to change the Language that is associated with the Software Size.

For more information, refer to the "Normalization and Other Options" Help topic.

TrueMapper Improvements

Include Attribute Data

It is now possible to include columns of Attribute data with your TrueMapper files such as, CLIN, WBS, OBS, Description, Task ID, etc. These attributes can be saved with a TrueMapper file and used in TruePlanning and TrueBOE reports as well as external applications, such as ProPricer.

For more information, refer to the "Guidelines for Creating a WBS File in Excel" Help topic, the "Edit Mapping Window" Help topic, and the "Viewing Mapping Results" Help topic.

Error Logging

A new Log button has been added to the Help ribbon of TrueMapper that allows you to track any operations performed within the application or any errors encountered when opening or importing mappings. When this option is turned on, a log file will be saved in the Documents\TrueMapperLog directory.

For more information, refer to the "Error Logging" Help topic.

Export Mapping Template

It is now possible to export a mapping template from the Manage Mappings dialog in TruePlanning to an Excel file. In previous versions, when you exported the WBS, TruePlanning created an Excel file with only one worksheet that contained the WBS structure. In this version, when you export the WBS, TruePlanning will create an Excel file with two worksheets. The first worksheet will contain the WBS structure, and the second worksheet will contain a mapping template which will allow you to create mapping assignments in Excel.

For more information, refer to the "Manage Mappings" Help topic.

Updated Mapping Structure Import

The mapping structure import has been updated to allow you to import mapping structures into TruePlanning that do not start with single digit IDs.

For more information, refer to the "Guidelines for Creating a WBS File in Excel" Help topic.

Updated Open Dialog

The Open dialog of TrueMapper has been updated to only allow you to open projects from the currently installed version of TruePlanning.

For more information, refer to the "Managing Projects" Help topic.

Improved TrueMapper Export

The export functionality between TrueMapper and TruePlanning has been improved and will now export files with the same structure and column definition/information.

TrueBOE Improvements

Renamed Column Headers in Detailed Settings Dialog and BOE Excel Report

The first two column headers in the Detailed Settings dialog of TrueBOE and in the "Mapping_WBS" worksheet of the TrueBOE Excel report have been renamed to "Mapping ID" and "Mapping Name." These column headers will no longer include the user's custom mapping names to ensure that the names remain consistent between project files and mappings.

Select Files for ProPricer Export

It is now possible to choose which ProPricer files you want to export from TrueBOE. In previous versions, you were required to export all five ProPricer files. In this version, you have the flexibility of selecting the files you want to export from the Options dialog.

For more information, refer to the "Export to ProPricer" Help topic.

Improved Performance of ProPricer Export

The performance of the ProPricer Export has been optimized so that the files will now generate much faster.

Create Excel or Word File Separately when Generating BOE Report

Two new check-boxes have been added to the Options dialog of TrueBOE that allow you to control whether or not the Excel file or the Word file is created when generating the BOE report.

Report Options - Show Summary in Word Report

A new "Show Summary in Word Report" check-box has been added to the Options dialog of TrueBOE that allows you to control whether the generated Word file contains Summary tables of labor hours and cost throughout the report.

Report Options - Show Cost in Summary Table

A new "Show Cost in Summary Table" check-box has been added to the Options dialog of TrueBOE that allows you to control whether the cost column is included in the Summary tables.

Added Table of Contents to Navigation Pane

The Table of Contents can now be accessed from the Navigation Pane of the Word report.

TruePlanningXL Improvements

Activities and Resources Sheets

A new "Resources" sheet is available in TruePlanningXL that displays all resource instance data (e.g., multipliers, distribution, minimum staff). Additionally, some of the Worksheet Set data has been moved to the "Activities" and "Resources" sheets to match changes made in the TruePlanning application.

For more information, refer to the "Selecting Project Data" Help topic.

Generate Import Sheet Updates

Several updates have been made to the "Generate Import Sheet" functionality that include resolving issues with column header information not matching and adding columns for activity and resource multipliers.

For more information, refer to the "Generating Findings Sheets" Help topic.

A1 Value Warning

TruePlanningXL will now provide a warning if you have multiple sheets with the same A1 cell value in order to prevent potential issues when calculating and saving the project.

Companion Application Improvements

Parametric Data Form

The following enhancements have been made to the Parametric Data Form:

- Improved Performance
- Removed template and instruction sheets for every cost object type
- Added support for all TruePlanning cost objects

ModelCenter Improvements

It is now possible to include and exclude cost objects in ModelCenter.

DevSecOps Engineering Model

New DevSecOps Engineering Estimating Guidance

A new DevSecOps Engineering model is available in TruePlanning that allows you to estimate DevSecOps (Development, Security, and Operations) projects. This new cost model is intended for use with other TruePlanning cost objects and combines cultural philosophies, practices, and tools, increasing the chances of delivery quality with high velocity. The DevSecOps approach merges the skills of 'development' (Dev) with those of 'Operations' (Ops), shifting 'security' (Sec) to the left so that security is incorporated into the product from its inception.

The DevSecOps cost object is an analog to the Assembly cost object in function, tailored to the activities, inputs and metrics relevant to the DevSecOps project. It delineates an assembled unit of integrated sub-elements which will be incorporated with other assembled units or individual elements, to result in a finished product.

The DevSecOps cost object models all technical development and operation and support activities that occur during the development of a system consisting of software, hardware or some combination of hardware and software to deliver specific platforms or capabilities. The activities deal with those technical decisions and oversights that encompass multiple system components.

The DevSecOps cost object must have at least one TruePlanning cost object as a descendant in order to run and can contain an unlimited number of child cost objects. The calculations made at the DevSecOps level are a function of its inputs, as well as information that is rolled up from the children.

For more information, refer to the "DevSecOps Engineering" Help section.

Systems Improvements

Assembly - Split “Design Engineering” resource into “Mechanical Design Engineer” and “Electrical Design Engineer”

Design Engineers for mechanical and electrical equipment are typically from different teams, with potentially different labor rates, levels of experience, budgets, etc. There may also be a need to calibrate model results separately for the mechanical and structural portions of the item being estimated. As such, the design engineering resource has been split into separate mechanical/electrical instances.

When importing older projects, all relevant Worksheet Set settings (labor rates, overheads, etc.) and WBS mappings from the original Design Engineering resource will be applied to each of the new resources. The sum of labor hours estimated for these two new resources will equal the original Design Engineering labor hours (except for impacts of model updates unrelated to this change). This update applies to the Design Engineering resources found in the Hardware Component, Hardware COTS, Assembly, and IATC (Integration Assembly Test and Checkout) models.

Assembly - Combined “Assembler” and “Fabricator” Resources and Split into “Mechanical/Electrical Assembler and Fabricator”

In the Production Manufacturing activity, the “Assembler” and “Fabricator” resources have been combined into one resource. Assembly and Fabrication for mechanical items are typically a different team (with different labor rates) than Assembly and Fabrication for electronic items. Therefore, these resources have been split into “Mechanical Assembler and Fabricator” (which addresses the portion of the item associated with Weight of Structure) and “Electrical Assembler and Fabricator” (which addresses the portion of the item associated with Weight of Electronics).

When importing TruePlanning projects from prior versions, the following rules will be applied to both “Mechanical Assembler and Fabricator” and “Electrical Assembler and Fabricator”:

1. The “Unit Cost” will be determined as follows:
 - If the Units (\$/Hour or \$/Year) match for both Assembler and Fabricator, then those Units will be used. If they do not match, values will be converted to \$/Year.
 - If the Economic Base Year associated with the Assembler’s Unit Cost and the Fabricator’s Unit Cost are the same, then the average Unit Cost value will be used.
 - If the Economic Base Year is not the same, then the higher Unit Cost value of the two will be used (along with its base year and units).
2. All other data will match the original “Assembler” resource’s data. This includes all Worksheet Set data (Fringe, Overhead, Overtime, G&A, Fee or Profit, Cost of Money, Time Worked, Availability, and Escalation Set), all resource input data (Multiplier, Distribution, and Minimum Staff) and any WBS mappings used by TrueMapper. If WBS mappings exist for Fabricator only (none for Assembler), then Fabricator’s WBS mappings will be used.

Assembly - Added Inputs “Engineering Complexity for Structure/Electronics”

The “Engineering Complexity” input has been split into the “Engineering Complexity for Structure” input and the “Engineering Complexity for Electronics” input. Engineering Complexity has been updated so that structure and electronics cost/effort can be calibrated separately and also because the engineering teams for structural and electronic portions of an item are typically different teams, which may have different levels of experience (and thus different values for Engineering Complexity).

When importing older projects, the value for these two new inputs should match the value of the original Engineering Complexity input, which should yield the same model results (except for possible differences due to unrelated changes).

Assembly - Learning Curve Enhancements

The learning curve calculations in the Assembly cost object were refactored to improve integration of all learning-curve-related features, improve run speed, and fix various issues. Specific examples include:

- Fixed an issue in the learning curve factor estimation function that caused slight cost differences (<1%) compared to a perfect calculation. The learning curve factor estimation function is a curve fit equation that represents the total impact of learning curve improvements for a production lot. This is used to improve model execution speed as compared to calculating the cost of every individual unit, then summing them up. The scenarios where this function is used was also modified to reduce error or improve run speed. Slight differences to Production Manufacturing and Production Tooling and Test costs in many scenarios can be expected due to this change.
- An issue was resolved that causes significant cost changes to the Material cost within the Production Manufacturing activity. The fix causes calculations for this resource to much more closely match results for Assembly I&T - Production Manufacturing - Material costs from our legacy tool, PRICE H.
- When entering Number of Production Units as yearly lot quantities (input using the spread dialog as opposed to inputting a single value), there were two changes. First, an issue has been resolved that caused incorrect results when different values were entered for Labor and Material learning curve percentages. Second, the model now runs much more quickly, and no longer places limits on total quantity that can be run in this mode.
- In prior versions, when modeling a follow-on lot (inputting Beginning Production Unit >1) the First Piece Cost metrics would sometimes reflect the first piece cost of the production lot being modeled. Now, the First Piece Cost metric always reflects the theoretical cost of the very first production unit. The corrected First Piece Cost metric also directly effects the calculation of Nth Unit Cost metrics.
- B Factor is a feature that enables learning improvements from building prototypes to transfer to the production phase, typically applied when the ratio of prototypes to production units is large. The behavior of B Factor was modified to allow shifting costs down the learning curve by a non-integer quantity, which can be significant in cases such as modeling 1 prototype and 1 production unit. The new behavior matches that of our legacy tool, PRICE H.

Total Ownership Cost - Sustainment Modifications Activity

A new "Sustainment Modifications" activity has been added to the Total Ownership Cost model that allows for the estimation of sustainment-phase hardware modification kit procurement and installation costs with cost estimating relationships based on the USAF algorithm (Regulation AF173-13).

Total Ownership Cost - Updated Metrics

The Total Ownership Cost metrics have been updated to represent mappings to the most recent version of the OSD CAPE's Operation and Support Cost-Estimating Guide (September 2020) .

Purchased Good - Updated Influence on Parent Cost Objects

The Purchased Good cost object has been updated to influence parent cost objects (such as, System and Assembly) in order to closely match the influence of Hardware COTS with similar input values.

Hardware Improvements

Hardware Component/COTS - Combined “Assembler” and “Fabricator” Resources and Split into “Mechanical/Electrical Assembler and Fabricator”

In the Production Manufacturing activity, the “Assembler” and “Fabricator” resources have been combined into one resource. Assembly and Fabrication for mechanical items are typically a different team (with different labor rates) than Assembly and Fabrication for electronic items. Therefore, these resources have been split out into “Mechanical Assembler and Fabricator” (which addresses the portion of the item associated with Weight of Structure) and “Electrical Assembler and Fabricator” (which addresses the portion of the item associated with Weight of Electronics).

When importing TruePlanning projects from prior versions, the following rules will be applied to both “Mechanical Assembler and Fabricator” and “Electrical Assembler and Fabricator”:

1. The “Unit Cost” will be determined as follows:
 - If the Units (\$/Hour or \$/Year) match for both Assembler and Fabricator, then those Units will be used. If they do not match, values will be converted to \$/Year.
 - If the Economic Base Year associated with the Assembler’s Unit Cost and the Fabricator’s Unit Cost are the same, then the average Unit Cost value will be used.
 - If the Economic Base Year is not the same, then the higher Unit Cost value of the two will be used (along with its base year and units).
2. All other data will match the original “Assembler” resource’s data. This includes all Worksheet Set data (Fringe, Overhead, Overtime, G&A, Fee or Profit, Cost of Money, Time Worked, Availability, and Escalation Set), all resource input data (Multiplier, Distribution, and Minimum Staff) and any WBS mappings used by TrueMapper. If WBS mappings exist for Fabricator only (none for Assembler), then Fabricator’s WBS mappings will be used.

Hardware Component/COTS - Split “Design Engineering” resource into “Mechanical Design Engineer” and “Electrical Design Engineer”

Design Engineers for mechanical and electrical equipment are typically from different teams, with potentially different labor rates, levels of experience, budgets, etc. There may also be a need to calibrate model results separately for the mechanical and structural portions of the item being estimated. As such, the design engineering resource has been split into separate mechanical/electrical instances.

When importing older projects, all relevant Worksheet Set settings (labor rates, overheads, etc.) and WBS mappings from the original Design Engineering resource will be applied to both new resources. The sum of labor hours estimated for these two new resources will equal the original Design Engineering labor hours (except for impacts of model updates unrelated to this change). This update applies to the Design Engineering resources found in the Hardware Component, Hardware COTS, Assembly, and IATC (Integration Assembly Test and Checkout) models.

Hardware Component/COTS - Split "Engineering Complexity" input into "Engineering Complexity for Structure" and "Engineering Complexity for Electronics"

The "Engineering Complexity" input has been split into the "Engineering Complexity for Structure" input and the "Engineering Complexity for Electronics" input. Engineering Complexity was changed so that structure and electronics cost/effort can be calibrated separately and also because the engineering teams for structural and electronic portions of an item are typically different teams, which may have different levels of experience (and thus different values for Engineering Complexity).

When importing older projects, all input data (for example, uncertainty and attachments) and linkages for these two new inputs should match the value of the original Engineering Complexity input, which should yield the same model results (except for possible differences due to unrelated changes). If you have any Excel linkages, you will need to re-attach the Excel files in order to update the values for these new inputs.

Hardware Component/COTS - Added New Global Input "Legacy Switch - Development Engineering for Electromechanical Equipment"

A new global input "Legacy Switch - Development Engineering for Electromechanical Equipment" has been added to the Hardware Component and Hardware COTS cost objects. This switch, when turned on, will fix an issue that caused incorrect costs for electromechanical items (those containing both Weight of Structure and Weight of Electronics). The issue was caused by misapplying a weighting of structure vs. electronic for intermediate calculations at the wrong step in the development engineering estimating algorithm.

If you model the Structure and Electronics in separate instances of the Hardware model, and add together their estimated Development Engineering efforts, you should expect to have roughly the same result as if you had modeled them as a single Hardware item. With this issue resolved, you will now see this expected behavior.

If you set this input to "Off," the model will duplicate results from prior versions where this issue was still in place.

Hardware COTS Production Manufacturing (Modification) - Issue Resolved

For scenarios where users are making modifications to a COTS item, an issue has been identified that affects the cost impacts of "Percent of Structure/Electronics Modified" on the Production Manufacturing activity. The new results better align with the original CERs as applied in the legacy PRICE H model.

This update can be toggled on/off by the global input "Legacy Switch - Impact of Percent Modified on Production Manufacturing." By default, new projects will set this input to "New," which will apply the update. When importing projects from prior versions, this input will be set to "Legacy," which will maintain the results from prior versions.

Development Engineering for Electromechanical Items - Issue Resolved

An issue has been resolved that caused a difference in estimated Development Engineering effort for electromechanical items (those containing both Weight of Structure and Weight of Electronics). The issue

was caused by misapplying a weighting of structure vs. electronic for intermediate calculations at the wrong step in the development engineering estimating algorithm.

If you model the Structure and Electronics in separate instances of the Hardware model and added together their estimated Development Engineering efforts, you should expect to have roughly the same result as if you had modeled them as a single Hardware item. With this issue resolved, you will now see this expected behavior.

This update can be toggled on/off by the global input “Legacy Switch - Development Engineering for Electromechanical Equipment.” By default, new projects will set this input to “On” which will apply the update. When importing projects from prior versions, this input will be set to “Off,” which will maintain the results from prior versions.

Added Controls for Schedule Effects on Hardware Costs

Two new global inputs have been added to the Hardware model that control the impact to the cost and labor of entering schedule dates on Hardware Component and Hardware COTS production activities.

The “Schedule Penalty Multiplier - Hardware Production” input controls the magnitude of “schedule penalty” applied to the Production Manufacturing activity of the Hardware Component/COTS models. A multiplier of 1 will apply the normal amount of schedule penalty. A multiplier of 0 will turn off schedule penalty completely. This algorithm is the same one applied in the legacy PRICE H model.

The “Cost Effects of Hardware Schedule Durations” input can toggle on/off all direct cost effects of modifying the schedule durations of Hardware Component/COTS objects. This allows schedules to be set for the purpose of redistributing cost/labor over the input timeline. The original cost/effort calculations will be based on the default model-generated schedule durations. Example effects that are controlled by this switch are the calculations of production rates, engineering changes (during production), and schedule penalties. This switch does not impact the effects of escalation.

Technology Obsolescence Control – Changed Behavior for Increased Flexibility

The behavior of the “Technology Obsolescence Control” input has been changed to be completely independent from the “Technology Improvement Control” input. Previously, if you set Technology Improvement Control to any value other than 1, it would also affect the behavior of the obsolescence model. With this update, you can now control the magnitude of changes associated with improvement/obsolescence separately.

Hardware Component/Hardware COTS - Learning Curve Enhancements

The learning curve calculations the Hardware Component and Hardware COTS cost objects were refactored to improve integration of all learning-curve-related features, improve run speed, and fix various issues. Specific examples include:

- Fixed an issue in the learning curve factor estimation function that caused slight cost differences (<1%) compared to a perfect calculation. The learning curve factor estimation function is a curve fit equation that represents the total impact of learning curve improvements for a production lot. This is used to improve model execution speed as compared to calculating the cost of every individual unit, then summing them up. The scenarios where this function is used was also modified to reduce

error or improve run speed. Slight differences to Production Manufacturing and Production Tooling and Test costs in many scenarios can be expected due to this change.

- When entering Number of Production Units as yearly lot quantities (input using the spread dialog as opposed to inputting a single value), there were two changes. First, an issue has been resolved that caused incorrect results when different values were entered for Labor and Material learning curve percentages. Second, the model now runs much more quickly, and no longer places limits on total quantity that can be run in this mode.
- In prior versions, when modeling a follow-on lot (inputting Beginning Production Unit >1) the First Piece Cost metrics would sometimes reflect the first piece cost of the production lot being modeled. Now, the First Piece Cost metric always reflects the theoretical cost of the very first production unit. The corrected First Piece Cost metric also directly effects the calculation of Nth Unit Cost metrics.
- B Factor is a feature that enables learning improvements from building prototypes to transfer to the production phase, typically applied when the ratio of prototypes to production units is large. The behavior of B Factor was modified to allow shifting costs down the learning curve by a non-integer quantity, which can be significant in cases such as modeling 1 prototype and 1 production unit. The new behavior matches that of our legacy tool, PRICE H.

Hardware Lifecycle Improvements

Mean Time Between Failures Changed to Temporal Input

The "Mean Time Between Failures" input has been changed to a temporal input so that its value can be updated for different time periods. This allows for modeling of changing failure rates associated with mid-life upgrades/service-life extension programs, early burn-in failures/wearout failures, or a changed operating environment that affects failure rate.

Split "Spares" Resource into "Spare LRUs," "Spare Modules," and "Spare Parts"

The "Spares" resource has been split into three new resources: "Spare LRUs," "Spare Modules," and "Spare Parts." This update will allow you to view spares and shipment services separately.

When importing older projects, all relevant Worksheet Set settings (labor rates, overheads, etc.) and WBS mappings from the original "Spares" resource will be applied to the three new resources. The sum of the labor hours estimated for these new resources will equal the original "Spares" labor hours (except for impacts of model updates unrelated to this change).

Split "Shipment Services" Resource into "LRU Shipping Costs," "Module Shipping Costs," and "Part Shipping Costs"

The "Shipment Services" resource has been split into three new resources: "LRU Shipping Costs," "Module Shipping Costs," and "Part Shipping Costs." This update will allow you to view spares and shipment services separately.

When importing older projects, all relevant Worksheet Set settings (labor rates, overheads, etc.) and WBS mappings from the original "Shipment Services" resource will be applied to the three new resources. The sum of the labor hours estimated for these new resources will equal the original "Shipment Services" labor hours (except for impacts of model updates unrelated to this change).

Software Improvements

Software Size Conversions

A new Software Size Conversion editor has been added to the Options dialog that allows you to enter custom conversion rates by software size unit and language. In previous versions, you could set custom conversions by language in the Language calculator, or you could set conversions for ALL languages in the Options dialog; however, issues with data being passed correctly throughout the TruePlanning framework prevented some outputs from updating correctly. The new Software Size Conversion editor combines these two separate functionalities and can be accessed from the Project Defaults tab of the Options dialog. Additionally, the Language input has been converted from a calculator to a drop-down that allows you to select the programming language that you plan to use for coding the software.

It is important to recognize that the purpose of the software size conversion is to roll software size from Software Component, Software COTS, Agile Software, Software Maintenance Component, and Software Maintenance COTS to Assembly and IATC cost objects in one consistent unit. The Language conversion has no impact on the cost/effort estimate at the component level.

Note: These enhancements will impact definition data for inputs and metrics in TrueFindings. For more information, refer to the "Supported Definitions" Help topic.

For more information, refer to the "Options Dialog" Help topic.

Software Component/COTS - Year of Technology Updates

The Year of Technology input on the Software Component and the Software COTS has been updated from a Date type input to a Year type input to allow users to perform Sensitivity Analysis.

Software Component - Hid Reused Size Non-Executable Input

The "Reused Size Non-Executable" input has been hidden on the Software Component for new projects. When importing projects from previous versions that have a value greater than 0 for "Reused Size Non-Executable," the input will continue to display on the Input Sheet.

Software Component/COTS - Updated Security Level Input

The Security Level input on the Software Component and the Software COTS has been updated to address each EAL level individually and its impact has been updated with the latest research data available in this area. The Security Level Options are:

- Low
- EAL 1 – Functionally Tested
- EAL 2 – Structurally Tested
- EAL 3 – Methodically Tested and Checked
- EAL 4 – Methodically Designed, Tested and Reviewed High

- EAL 5 – Semi-Formerly Verified, Designed and Tested
- EAL 6 – Semi-Formally Verified, Designed and Tested (more comprehensive analysis)
- EAL 7 – Formally Verified, Designed and Tested

Software Component/COTS - New Automation Information Inputs

The following inputs have been added to the Software Component & the Software COTS to help you describe the amount of automation that has been incorporated into your development and delivery processes.

- **Software Integration and Test Automation Factor** - This value indicates the extent and quality of automation of software integration and test activities. It incorporates the percent of coverage of automated software integration and testing as well as an indication of the quality - what degree of manual intervention is required outside that automated testing. There is a calculator to help with selecting the correct value for the Software Integration and Test Automation Factor.
- **Validation Test Automation Factor** - This value indicates the extent and quality of automation of validation test activities. It incorporates the percent of coverage of automated validation tests as well as an indication of the quality - what degree of manual intervention is required outside that automated testing. There is a calculator to help with selecting the correct value for the Validation Test Automation Factor.
- **Deployment Automation Factor** - This value indicates the extent and quality of automation of deployment activities. It incorporates the percent of coverage of automated deployment tests as well as an indication of the quality - what degree of manual intervention is required outside that automated testing. There is a calculator to help with selecting the correct value for the Deployment Automation Factor.
- **Delivery Performance Factor** - Over the last 10 Years DARA has studied DevOps projects to determine best practices and to identify what DevOps Success metrics differentiate high performing DevOps Teams with respect to software delivery performance. The metrics identified are Deployment Frequency, Lead Time to Change, The Mean Time to Recovery, and Change Failure Rate. DARA has provided definitions for Low, Medium and High Performing Teams with each of these metrics as well as metrics that indicate productivity impacts. The calculator includes detailed definitions of these metrics and criteria for selection of the right performance level.

The default value of 1 for each of these factors is 1, having no impact on the cost or effort of the cost objects. There is a calculator to support the selection of appropriate values for each of these inputs.

Software COTS - New Language Object Oriented Input

A new "Language Object Oriented" input has been added to the Software COTS that allows you to indicate whether or not you plan to use the selected software programming language as an object-oriented tool. Although the language may have object-oriented capability, when analysis and design techniques are not object-oriented, the capability might be irrelevant. The use (or non-use) of the object-oriented capability of a language impacts productivity calculations.

Software Maintenance Improvements

Software Maintenance Component - Updated Initial Defects Calculation

The Initial Defects calculation on the Software Maintenance Component has been updated to include the impact of the percent of adapted code in the delivered software.

Common Elements Improvements

Integration Assembly Test and Checkout - Split “Design Engineering” resource into “Mechanical Design Engineer” and “Electrical Design Engineer”

Design Engineers for mechanical and electrical equipment are typically from different teams, with potentially different labor rates, levels of experience, budgets, etc. There may also be a need to calibrate model results separately for the mechanical and structural portions of the item being estimated. As such, the design engineering resource has been split into separate mechanical/electrical instances.

When importing older projects, all relevant Worksheet Set settings (labor rates, overheads, etc.) and WBS mappings from the original Design Engineering resource will be applied to both new resources. The sum of labor hours estimated for these two new resources will equal the original Design Engineering labor hours (except for impacts of model updates unrelated to this change). This update applies to the Design Engineering resources found in the Hardware Component, Hardware COTS, Assembly, and IATC (Integration Assembly Test and Checkout) models.

Integration Assembly Test and Checkout - Combined “Assembler” and “Fabricator” Resources and Split into “Mechanical/Electrical Assembler and Fabricator

In the Production Manufacturing activity, the “Assembler” and “Fabricator” resources have been combined into one resource. Assembly and Fabrication for mechanical items are typically a different team (with different labor rates) than Assembly and Fabrication for electronic items. Therefore, these resources have been split out into “Mechanical Assembler and Fabricator” (which addresses the portion of the item associated with Weight of Structure) and “Electrical Assembler and Fabricator” (which addresses the portion of the item associated with Weight of Electronics).

When importing TruePlanning projects from prior versions, the following rules will be applied to both “Mechanical Assembler and Fabricator” and “Electrical Assembler and Fabricator”:

1. The “Unit Cost” will be determined as follows:
 - If the Units (\$/Hour or \$/Year) match for both Assembler and Fabricator, then those Units will be used. If they do not match, values will be converted to \$/Year.
 - If the Economic Base Year associated with the Assembler’s Unit Cost and the Fabricator’s Unit Cost are the same, then the average Unit Cost value will be used.
 - If the Economic Base Year is not the same, then the higher Unit Cost value of the two will be used (along with its base year and units).
2. All other data will match the original “Assembler” resource’s data. This includes all Worksheet Set data (Fringe, Overhead, Overtime, G&A, Fee or Profit, Cost of Money, Time Worked, Availability, and Escalation Set), all resource input data (Multiplier, Distribution, and Minimum Staff) and any WBS mappings used by TrueMapper. If WBS mappings exist for Fabricator only (none for Assembler), then Fabricator’s WBS mappings will be used.

Integration Assembly Test and Checkout - Split "Engineering Complexity" input into "Engineering Complexity for Structure" and "Engineering Complexity for Electronics"

The "Engineering Complexity" input has been split into the "Engineering Complexity for Structure" input and the "Engineering Complexity for Electronics" input. Engineering Complexity was changed so that structure and electronics cost/effort can be calibrated separately and also because the engineering teams for structural and electronic portions of an item are typically different teams, which may have different levels of experience (and thus different values for Engineering Complexity).

When importing older projects, the value for these two new inputs should match the value of the original Engineering Complexity input, which should yield the same model results (except for possible differences due to unrelated changes).

Integration Assembly Test and Checkout - Learning Curve Enhancements

The learning curve calculations in the Assembly cost object were refactored to improve integration of all learning-curve-related features, improve run speed, and fix various issues. Specific examples include:

- Fixed an issue in the learning curve factor estimation function that caused slight cost differences (<1%) compared to a perfect calculation. The learning curve factor estimation function is a curve fit equation that represents the total impact of learning curve improvements for a production lot. This is used to improve model execution speed as compared to calculating the cost of every individual unit, then summing them up. The scenarios where this function is used was also modified to reduce error or improve run speed. Slight differences to Production Manufacturing and Production Tooling and Test costs in many scenarios can be expected due to this change.
- An issue was resolved that causes significant cost changes to the Material cost within the Production Manufacturing activity. The fix causes calculations for this resource to much more closely match results for Assembly I&T - Production Manufacturing - Material costs from our legacy tool, PRICE H.
- When entering Number of Production Units as yearly lot quantities (input using the spread dialog as opposed to inputting a single value), there were two changes. First, an issue has been resolved that caused incorrect results when different values were entered for Labor and Material learning curve percentages. Second, the model now runs much more quickly, and no longer places limits on total quantity that can be run in this mode.
- In prior versions, when modeling a follow-on lot (inputting Beginning Production Unit >1) the First Piece Cost metrics would sometimes reflect the first piece cost of the production lot being modeled. Now, the First Piece Cost metric always reflects the theoretical cost of the very first production unit. The corrected First Piece Cost metric also directly effects the calculation of Nth Unit Cost metrics.
- B Factor is a feature that enables learning improvements from building prototypes to transfer to the production phase, typically applied when the ratio of prototypes to production units is large. The behavior of B Factor was modified to allow shifting costs down the learning curve by a non-integer quantity, which can be significant in cases such as modeling 1 prototype and 1 production unit. The new behavior matches that of our legacy tool, PRICE H.
- Added missing features, including the "Cost Sharing Units" and "Additional Units" input sections.

Resolved Issues with Calibration on Common Elements

Issues have been resolved related to calibrating some Common Element cost objects in the presence of other Common Element cost objects. In this version, all necessary cost objects are forced to run during the calibration process similar to a regular calculation.

Space Missions Improvements

Space Missions - Resolved Issue with Assembly Integration and Test Roll-Up

An issue has been resolved where the Space Missions model was incorrectly rolling-up Assembly Integration and Test as production rather than development.

IT Services Improvements

Infrastructure Services New Projects & Operations Updates

Several enhancements have been made to the Infrastructure Services New Projects & Operations cost objects. Specifically, the range of compatible hardware types for the Purchasing Model has been expanded and further varieties of cloud services are now available. Following is a detailed description of the changes that have been made to the Infrastructure Services New Projects & Operations cost objects.

Purchasing Model Input -Purchase & Lease Updates:

Type of Device Input - Server & Storage Device:

- Replaced all “Setup and Installation Time per Device” inputs with “Installation Time per Server” or “Installation Time per Storage Device” input.
- Reorganized the "Type of Device" input to provide two options: "Server" and "Storage Device." The other three options ("Supporting Hardware," "Server & Supporting Hardware," and "Storage Devices & Supporting Hardware") have been removed.
- Changed the format of the “Supporting Hardware Inputs” section. Now, if the number of supporting hardware is not zero for any inputs under this section, users will see additional inputs added for each type of supporting hardware. For example, if the "Number of Switches" is 1, users will see inputs for “Installation Time per Switch,” “Switch Maintenance Hours per Year,” “Switch Unit Lifetime,” and “Switch Unit Purchase Price.”
- Added three additional Supporting Hardware options: Hubs, Gateways, and Wireless Access Points.
- Added a new input “Maintenance Hours per Year” in the “Server Inputs” section.
- Added a new input "Labor Learning Curve" under the “Project Details” section, and set up a range between 50%-100%.
- Added default values for installation time, maintenance hours per year, and unit purchase price for Sever, Storage Devices, and Supporting Hardware.

Purchasing Model Input - Infrastructure as a Service Updates:

Type of Cloud Service Input - Storage:

- Updated the default values of “Monthly Object Storage Price” and “Monthly File Storage Price.”

Type of Cloud Service Input - Virtual Machine:

- Replaced the “Monthly Price Per Virtual Machine” input with “Monthly Price Per Virtual Machine (Linux)” and “Monthly Price Per Virtual Machine (Windows)” inputs.

Type of Cloud Service Input - Relational Database Service:

- Added a new "Relational Database Service" as a "Type of Cloud Service" under the "Infrastructure as a Service" Purchasing Model.
- Added six new inputs under "Relational Database Service": "Number of Instance(s)," "Time Period of RDS Service (in Months)," "Engine Type," "Monthly Relational Database Service Price," "Monthly RDS Proxy Price," and "Monthly RDS Storage Price."
- Added new calculators for "Monthly Relational Database Service Price," "Monthly RDS Proxy Price," and "Monthly RDS Storage Price."

Type of Cloud Service Input - Container Service:

- Added a new "Container Service" as a "Type of Cloud Service" under the "Infrastructure as a Service" Purchasing Model.
- Added four new inputs under "Container Service": "Base Cost of Container Service," "Runtime of Container Service (in Months)," "Number of Container Instances," and "Monthly Container Service Cost."
- Added a new calculator for "Monthly Container Service Cost."

2023 Economic Update

TruePlanning has been updated to reflect new labor rates, exchange rates, PPP rates, and escalation data.

Country-Based Economic Data Sources:

Data from these sources were collected in May 2023 and represent the most up-to-date information available from that organization at that time.

- Escalation Tables - International Monetary Fund (IMF) & Eurostat
- Purchasing Power Parities (PPP) - Organization for Economic Co-operation and Development (OECD) & IMF
- Exchange Rates - OECD, IRS, X-rates, & OFX

Changed Method of Applying Escalation to Non-Labor CERs for Non-US Projects

For non-labor type resources (Material or Other Direct Cost) which are estimated via a cost-estimating relationship (CER), the method of applying escalation to this result has been updated. This will produce changes to the material cost estimated for projects performed outside of the U.S. These changes are usually minor but can be large if the project was performed in a country that had significantly different levels of inflation over the relevant time period (the time period from the date associated with the CER to the "PPP Year" which is chosen when you create a new project).

Every material CER is associated with an economic base date (for example, the CER might provide a material cost result in 1/1/2020 US Dollars). In prior versions, TruePlanning would apply the escalation values from the worksheet set (based on the country where the project took place) to escalate the value from the CER's economic base date to the date in which the project took place. With this change, TruePlanning will instead apply default US escalation rates to escalate the CER results to January 1st of the "PPP Year," which is chosen when you create a new project.

This change fixes an issue where the labor/material split would differ significantly for some countries as compared to US projects, with the material tending to be higher than expected. The PPP value already tends to reflect changes due to inflation, so now TruePlanning will apply default US escalation rates to escalate the estimated cost up to the PPP-year first, and then apply the PPP conversion, in order to avoid any double counting of inflation-related differences.

Updated Labor Rates

In TruePlanning 16 SR3, the Cost Research team updated all the default US pay rates for all labor resources in the major TruePlanning models. These TruePlanning labor resources were mapped to various labor categories from the US Bureau of Labor Statistics (BLS) and other sources. Data including the number of people employed in each category and their average salaries were used to determine a weighted average labor rate for each TruePlanning labor resource.

Labor rate defaults for all other countries are based on the US labor rates, adjusted for purchasing power parity (PPP) values published by the Organization for Economic Cooperation and Development.

More details on the Labor Rate Study can be found in the "Labor Rate Study" Help topic.

Issues Resolved

Resolved Issue with Resources when Parent Activity Multiplier is Set to Zero

An issue has been resolved where resources were contributing cost and labor when their parent's activity multiplier was set to zero.

Resolved Issue with Component Type Calculator and Input Sheet

The Component Type calculator on the Space Component cost object will no longer affect the Input Sheet unless applied with the OK button.

Resolved Issue with Zeros in Mapping IDs

An issue has been resolved in TrueBOE and TrueMapper where zeros were being removed from the end of Mappings IDs.

Resolved Issue with Help Dialog in TrueBOE

An issue has been resolved in TrueBOE where if you opened the Help dialog, you were no longer able to return to the application until you closed the Help. In this version, you will be able to keep the Help dialog open while using any TruePlanning application.

Resolved Issue with Calibrations on Integration Assembly Test and Checkout Cost Object

An issue has been resolved where the calibration was failing anytime the Manufacturing Complexity for Structure or Manufacturing Complexity for Electronics inputs on the Integration Assembly Test and Checkout cost object were set to 0.

Display Error Message when Launching TrueBOE without a License

Previously, if you launched TrueBOE without a license, the application would not open and an error message was not provided. In this version, launching TrueBOE without a license will generate an error message stating that your license is missing.

Using Phase Sets to set the Start Date does not impact Year of Technology

An issue has been resolved in the Hardware and Software models where using Phase Sets was not impacting Year of Technology. In this version, the earliest Phase Set date will be used as the Start Date and will be applied to the Year of Technology calculation.

Resolved Issue with TruePlanning Splash Screen

When you launch TruePlanning, the Splash Screen will no longer be forced to the front of all the other applications that you have open. This will allow you to continue working in other applications while TruePlanning is loading.

Updated Right-Click Menus

All non-applicable options that were previously available on the PBS right-click menus have been removed.

Linked Cost Object Warning

TruePlanning now provides a warning anytime you link a cost object that has an invalid relationship (e.g., if you make a linked cost object a child of the cost object it is linked to).

TrueBOE - Resolved Issues Opening Projects with Uninstalled Cost Objects

TrueBOE will no longer crash when you try to open a project containing a cost object that has not been installed.

TrueBOE - Resolved Issues Generating Word Reports

Issues have been resolved related to generating Word reports where chart settings were not saved, data were not included, and Material and Other Direct Costs were missing from resource tables after generating the Word report.

TrueBOE - Historical Data Missing From Word Report

An issue has been resolved where historical data were missing from the Word report.

Resolved Issues with Input and Metric Names When Copying and Pasting from TruePlanning to TrueFindings

Copying and pasting data from TruePlanning to TrueFindings will now show the input and metric names as they appear in TruePlanning.

TruePlanningXL - Resolved Issue with Resource Type in Select Inputs/Metrics Dialog

An issue has been resolved where selecting "Resource Type" in the "Select Inputs/Metrics" dialog was not displaying a value in the Resource Type column of the PBS sheet.

TruePlanningXL - Resolved Issue with Input Validation

An issue has been resolved with input validation that was preventing projects from working with values that are allowed in TruePlanning.

Resolved Issues with Multi-Row Calculators

Issues have been resolved when re-opening some calculators that have multi-row functionality.

Resolved Issues Opening Projects with Missing Attachments

Previously, if there were any issues locating an attachment while trying to open a project, an error would occur, and the project would not open. In this version, TruePlanning allows you to open a project with a missing attachment and provides you with an error message instructing you to visit the Calculation Log for more information. It is important to review the Calculation Log immediately after receiving the error message because the log will be cleared once the project is calculated.

Resolved Issue with Common Element Conversion Mappings

An issue has been resolved with Common Element conversions where Worksheet Set data were not being mapped from the System and Assembly to the Common Elements.

Resolved Issue with Project Properties and System Folder Notes

The Project Properties and System Folder Notes have been updated to allow the same amount of characters as other Notes' fields in TruePlanning.

Resolved Issue with Min/Max Values Not Adjusting in Sensitivity Analyzer

An issue has been resolved in the Sensitivity Analyzer where the Min and Max values were not being adjusted when you changed the Units on the Input Sheet (e.g., from lbs to kg).

Resolved Issues Applying Attributes/Categories

Issues have been resolved when trying to apply an attribute or category to a cost object or input when there were more than 20 attributes/categories in the list.