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## Release Notes

TruePlanning16 SR2

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# TruePlanning® 16 SR2 Release Notes

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# TruePlanning® 16 SR2

## 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 16.2 directory from the Start menu, and select "Support Manuals."

## New Installations

Insert the TruePlanning 16 SR2 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

## Hardware Lifecycle Model

In previous versions, the Hardware Lifecycle modeling capability was embedded within the Hardware Component and the Hardware COTS models. In this version, Hardware Lifecycle has been restructured into its own model.

Users that have projects from previous versions with Hardware Lifecycle applied (i.e., projects that have a Hardware Component or a Hardware COTS with a Maintenance Concept set to a value other than "No Maintenance") can open their projects in the new version, and TruePlanning will add a linked Hardware Lifecycle cost object to every Hardware Component/COTS that has a valid Maintenance Concept. Any lifecycle values from the original project will be mapped to the new Hardware Lifecycle cost object.

## Updated Labor Rates

In TruePlanning 16 SR2, the PRICE 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.

## Restore Rates

When opening a project that was created in a previous version of TruePlanning, the project will only contain economic factors from the release it was created in. Users have the option to reset rates in order to show the latest economic factors that are included in the TruePlanning 16 SR2 Economic Update.

For more information, refer to the "Multinational Currencies" Help topic.

## Edit Favorite Dialog Updates

The "Inputs," "Metrics," and "Attributes" selections of the Row/Column drop-downs in the Edit Favorite dialog have been consolidated into a new "Data" selection. When opening a project from a previous version that uses either of those selections, the favorites will be updated to use the new "Data" selection, and the report produced will be exactly the same.

The "Project" and "None" selections of the Row/Column drop-downs in the Edit Favorite dialog are no longer available when the Data drop-down is set to Inputs-Metrics. When opening a project from a previous version that uses either of those selections, the favorites will be updated to use the "Cost Object" selection. The report produced will provide similar information; however, it will not be the same exact report.

## **Manage Data Dialog**

The Manage Findings dialog that was used in previous versions has been converted to the Manage Data dialog. Any imported findings will be converted into a Data Set that contains one finding. The name of the Data Set will match the finding name.

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

# New Features

## TrueBOE™

TrueBOE™, a new product offering within the PRICE Cost Analytics™ suite of applications, allows users to produce Basis of Estimate (BOE) reports from existing TruePlanning® projects. TrueBOE™ generates Microsoft Word BOE documents and Microsoft Excel fully-executable versions of estimates. BOE documents can be folded into proposal bids, and the Excel workbooks satisfy requirements for government electronic-bid submissions.

For more information, refer to the "TrueBOE Overview" Help topic.

## TruePlanning® Improvements

### Cost Object Linking

It is now possible to link cost objects to one another in the Product Breakdown Structure. When you link cost objects together, TruePlanning has the ability to use information about the source cost object to propose input values for the linked cost object. For example, you can link a Hardware Lifecycle to a Hardware Component and TruePlanning will use information about the Hardware Component such as Manufacturing Complexity, Unit Production Cost, Operating Specification, and other inputs and metrics to determine input values for the Hardware Lifecycle.

Cost objects that can be linked include:

- Hardware Component/COTS to Hardware Lifecycle
- Assembly to Hardware Lifecycle
- VTOL Component to Hardware Lifecycle
- Software Component to Software Maintenance Component
- Software COTS to Software Maintenance COTS
- Assembly to Software Maintenance Component
- Assembly to Software Maintenance COTS

For more information, refer to the "Linking Cost Objects" Help topic.

### Managing Categories

It is now possible to create and assign categories to the cost objects and inputs of your project. Categories can be created for a variety of reasons, such as to assign a specific department to an item (e.g., engineering, manufacturing, programming) or to provide the status of an item (e.g., started, in review, completed). Categories are a great way to stay organized and keep your project on track.

For more information on creating categories, refer to the "Managing Categories" Help topic.

## Find and Replace Enhancements

The Find and Replace dialog has been updated to allow you to perform a Find and Replace on categories and cost object links.

For more information, refer to "Using Find and Replace" Help topic.

## Manage Data Dialog

The Manage Data dialog (formerly the Manage Findings dialog) has been updated with the following enhancements:

- When you import a TrueFindings® file (\*.tpfkb) into the Manage Data dialog, the file will now include the original data source. This will allow you to access the project's full data set when you edit the Finding from TruePlanning.
- The Project and Shared tabs of the Manage Data dialog now contain a "Data Set" window and a "Finding" window. The "Data Set" window contains all the imported TrueFindings files (\*.tpfkb files and \*.tpfnd files). The "Finding" window contains all the Findings associated with a particular TrueFindings file.
- When you edit a data set, all the Findings contained in that TrueFindings file will be available on the Findings tab. In previous versions, only the Finding you were editing was available. This change allows you to edit more than one Finding at a time, rather than having to switch back and forth between TruePlanning and TrueFindings to edit multiple Findings.
- From the Manage Data dialog, you can now create new TrueFindings project files (.tpfkb) that can be brought back into TruePlanning without having any saved Findings within them.

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

## Attaching Historical Data to Projects

It is now possible to attach historical data sets to your project and use those data sets to justify input values. Historical data sets are created in TrueFindings and can be imported into TruePlanning through the Manage Data dialog. Once the data sets are in TruePlanning, they can be attached to the cost objects in your Product Breakdown Structure. When a data set is attached to a cost object, a marker will display in the Analyzer column on the Input Sheet to indicate that there are historical data points associated with that input. The data sets can be examined within the Sensitivity Analyzer as well as in TrueBOE reports.

For more information on attaching historical data to projects, refer to the "Creating Data Sets" Help topic.

## Edit Favorite Dialog Enhancements

The Edit Favorite dialog has been restructured to promote increased clarity and overall ease of use. Options within the dialog have been grouped according to how they will affect different aspects of the results and charts.

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

## Charting Data Over Time

It is now possible to graph multiple inputs or metrics that are temporal (i.e., spread over a period of time) on the various predefined chart types in TruePlanning. Some of the temporal inputs/metrics you can graph include Number of Operational Hours and Number of Systems Deployed.

For more information, refer to the "Viewing Data Over Time" Help topic.

## Viewing Uncertainty on Metrics

Previously, Uncertainty Analysis results could only be analyzed on Costs or Labor Requirements. In this version, you can now analyze uncertainty results on any numerical metric in your project. For example, you can view uncertainty on metrics such as Development Cost, Unit Production Cost, Equivalent Source Lines of Code, etc.

This enhancement takes advantage of the same FRISK model used in previous versions with the only difference being that you can now view uncertainty on metrics. Metric uncertainty can be examined at the component level or at the System/Assembly levels.

Note: You can only analyze the uncertainty of numerical metrics, not text-based metrics or metrics with dates.

For more information on performing Uncertainty Analysis and viewing Uncertainty Analysis results, refer to the following Help topics: "Entering Uncertainty Data" and "Viewing Uncertainty Analysis."

## Sensitivity Analyzer Enhancements

In previous versions of the Sensitivity Analyzer, users would choose an input and an output that they wanted to perform the analysis on, and the Sensitivity Analyzer would generate a graph that plotted the input on the x-axis and the output on the y-axis while varying the input's value across the specified range. In this version, the Sensitivity Analyzer varies the input, but it now allows users to graph almost any combination of cost object data on the x and y-axis, including inputs against outputs, outputs against outputs, and activities against resources. A key benefit of this enhancement is that users can now plot two computed values against one another such as ESLOC vs. Estimated Cost or Unit Production Cost vs. Production Quantity.

For more information on using the Sensitivity Analyzer, refer to the "Using Sensitivity Analyzer" Help topic.

## Default Unit will always respect Options dialog settings

Previously, when you changed the Default Measurement Unit in the Options dialog, and if the unit you selected was not a "recommended" unit in the Units list on the Input Sheet, then the change would not be applied when you added a new cost object to the PBS. Now, whatever unit you set in the Options dialog will be the default when the cost object is first added to the project.

## Point Value Added to Uncertainty Chart

A star representing the current value of the estimate will now display on the Uncertainty Analysis chart.



## **Merged Inputs/Metrics/Attributes into "Data" Selection**

The "Inputs," "Metrics," and "Attributes" selections of the Row/Column drop-downs in the Edit Favorite dialog have been consolidated into a new "Data" selection. When opening a project from a previous version that uses either of those selections, the favorites will be updated to use the new "Data" selection, and the report produced will be exactly the same.

## **Removed Project and None Selections**

The "Project" and "None" selections of the Row/Column drop-downs in the Edit Favorite dialog have been removed. When opening a project from a previous version that uses either of those selections, the favorites will be updated to use the "Cost Object" selection. The report produced will provide similar information; however, it will not be the same exact report.

## **Save As \*.JSON File**

A new option has been added to the Save As dialog that will allow you to save your TruePlanning project as a \*.json file. This option allows you to open and report on your TruePlanning project in Microsoft Power BI.

## **COM Enhancements**

The following updates have been made to the TruePlanning COM functionality:

- Findings are now grouped into a "FindingDataSets" property. You can now access Findings from the Project (local) object or the Application (shared/global) object.

## **TruePlanningXL Enhancements**

### **Maintenance Concept Optimizer**

New features have been added to TruePlanningXL to aid in Maintenance Concept optimization studies with the Hardware Lifecycle model. These features allow you to analyze the results of all available Maintenance Concepts and find the best value maintenance concepts – the ones that minimize cost while maximizing operational readiness. This solution is geared towards managing and analyzing Hardware Lifecycle results for large, complex projects (tested up to 1,000 cost objects) in an automated fashion.

For more information, refer to the "Maintenance Concept" Help topic.

### **Select Inputs/Metrics Updates**

Two new selections have been added to the "Input" section of the "Select Inputs and Metrics" tree. These new selections are "Link" and "Include." The Link selection will display a column on PBS sheet that allows you to view the path of the existing links. The Include selection will display a column on the PBS sheet that allows you to include or exclude a cost object from the calculations.

### **Updated Calculated and Project Saved Indicators**

Updates have been made to the "Calculated" and "Project Saved" indicators of the Status section.

## **Delete Notes**

It is now possible to delete notes from the Notes sheet.

## **Resolved issues with brackets in cost object name**

Issues have been resolved where cost objects with square brackets “[]” in their name would cause Create Project and Calculate to have unexpected results.

# Systems Improvements

## **Resolved Issues with Hardware Size**

An issue has been resolved where Hardware Size was not passing through nested Assembly to System cost objects. This update results in cost/effort changes for System cost objects with multiple levels of nested Assembly children.

## **Fixed Purchased Good's impact on Assembly UPC/AUPC**

The Purchased Good rolls up its Unit Production Cost (UPC) to its parent so that it can inform the parent's total UPC/Amortized UPC calculations. In prior versions, it incorrectly used the input "Unit Cost" value. This issue has been resolved to use the economics-adjusted Unit Production Cost that is displayed on the Metrics tab.

# Hardware Improvements

## Hardware Lifecycle Updates

In previous versions of TruePlanning, the Hardware Lifecycle modeling capability was embedded within the Hardware Component and the Hardware COTS models. In this version, Hardware Lifecycle has been restructured into its own model that can run independent of other models or link to other models (such as Hardware Component, Hardware COTS, Assembly, and VTOL Component).

The new Hardware Lifecycle model has been designed to help establish hardware product operation and support (O&S) cost drivers and to estimate direct system operating and support (maintenance) costs.

Users that have projects from previous versions with Hardware Lifecycle applied (i.e., projects that have a Hardware Component or a Hardware COTS with a Maintenance Concept input set to a value other than "No Maintenance") can open their projects in the new version, and TruePlanning will add a linked Hardware Lifecycle cost object to every Hardware Component/COTS that has a valid Maintenance Concept. Any lifecycle values from the original project will be mapped to the new Hardware Lifecycle cost object.

The following are benefits of the new Hardware Lifecycle model:

- Allows for modeling Hardware Lifecycle at any level, not just at the Hardware Component (or Hardware COTS) level
- Improved Schedule Maintenance
- Improved performance for projects that only model Hardware development and production, as size of the Hardware models are significantly reduced with the lifecycle modeling portion removed.

The following are new Hardware Lifecycle features implemented in TruePlanning 16 SR2:

- Maintenance Concept Optimization – Built capability in TruePlanningXL to run and manage Maintenance Concept Optimization for an entire system, tested on large projects (1000+ objects).
- Maintenance Concept Mix – Added ability to model a hybrid maintenance concept that is a mixture of the 28 predefined concepts.
- Lock Inputs – Allow user to decide which HL inputs to estimate via "Fill from H," and others which are "locked" at the user-input value. Those inputs estimated via "Fill from H" are sensitive to locked input values.
- Assembly as LRU – Capability added to estimate Hardware Lifecycle costs at an Assembly level. "Fill from H" feature implemented for linking with an Assembly cost object.
- Improved Scheduled Maintenance – Link multiple Hardware Lifecycle model instances to a single component/assembly, so that users can address both corrective maintenance and any number of scheduled maintenance activities on the same component.
- Maintain Initial Spares – The HL model tries to replenish the number of spares so that, at the end of deployment, there are no spares remaining. A feature has been added to modify this assumption, so that spares stock is maintained through the end of deployment.
- Deployment Years for calculation of Initial Spares – The HL model, by default, fills the supply pipeline sufficient to provide two years worth of spares at peak deployment levels. A feature has been added

to modify these assumptions, so that users can have initial spares sufficient for a user-input number of years, sensitive to the deployment levels.

- Added “Optimal Maintenance Concept” Option – Added an option to use the maintenance concept found to be optimal. Added an input to enable/disable specific maintenance concepts from consideration when determining the optimal maintenance concept.
- Added Global Inputs:
  - Scrap Rates for Failed Equipment
  - Attempted Repair Success Rates
  - Separate Learning Curves for LRUs/Modules/Parts
  - Storage Space Costs for LRUs/Modules/Parts
  - Maintenance Crew Sizes
  - Cost of Part Replaced on Equipment

## **New Composite Materials Research and Estimating Guidance**

A new “Composite Manufacturing” calculator is available for assessing the Manufacturing Complexity of composite parts, including a wide range of carbon fiber composites, fiberglass, ceramic and boron composites. The calculator is based on 7 inputs, with key drivers such as material type, fabrication process, part geometric complexity, and number of layers. The guidance is based on extensive research and validation that is discussed in detail in the Composites Research Whitepaper.

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

## **Manufacturing Complexity for Structure – Calculators Updated with new Machinability Guidance**

The following new materials have been added to the Machinability guidance in the “Detailed” and “Conceptual” calculators attached to the “Manufacturing Complexity for Structure” input:

| Material                        | Machinability |
|---------------------------------|---------------|
| Stainless Steel 301             | 70            |
| Stainless Steel 455             | 52            |
| Stainless Steel 13-8 Mo         | 41            |
| Stainless Steel 15-7 Mo         | 46            |
| Stainless Steel 17-4 PH         | 46            |
| Stainless Steel 15-5 PH         | 46            |
| 21-6-9 Stainless Steel (Tubing) | 50            |
| Aluminum Alloy A357.0           | 140           |
| Aluminum 2124                   | 250           |

| Material                        | Machinability |
|---------------------------------|---------------|
| Aluminum Alloy QQ-A-250/4       | 150           |
| Aluminum 7050 (T7451)           | 120           |
| Aluminum Alloy 7475             | 250           |
| CRES 21CR-6NI-9MN (AMS5561)     | 50            |
| CRES 17CR-7.1NI-1.1AL (AMS5678) | 46            |
| CRES MP35N (AMS5844)            | 25            |
| Inermet (Tungsten Alloy)        | 8             |
| Nimonic 90                      | 10            |

## Added Throughput Option for Raw Material Costs

When the raw material required to create a Hardware Component has a known weight and cost, this information can now be input directly into the model. If provided, the model will use this information instead of estimating these costs.

This information can be entered directly on the Input Sheet, into the two new inputs “Raw Material Weight” and “Raw Material Weighted Average Cost.” Typically, this feature will be used by users of the Manufacturing Complexity for Structure “Detail” calculator. This calculator allows users to model the various components of the end-item, which can be made of various materials. For each component, users can enter the raw material cost. Users can also provide its raw material weight in the “Composite or Slug Weight” input, or if left at 0, the model will calculate the raw material weight based on the “Percent Total” by weight and the “Percent Hogout” inputs. The calculator will fill out the total raw material weight and a weighted average raw material cost based on the information provided in the calculator. Costs are assumed to be entered in the economic base year corresponding to the Start Date and in the cost object’s default currency/weight units; however, these units can be changed on the Input Sheet.

## Hardware COTS - Evaluation and Selection / Analysis and Preparation Updates

New research has been conducted into estimating costs for "Evaluation and Selection" and "Analysis and Preparation" activities (formerly Configuration and Tailoring) of a Hardware COTS item.

This new method is now the default estimating approach, although the original method is still available. Users can toggle between methods using the global input “HW COTS Evaluation/Selection Method.” Imported projects that used the older method will continue using the older method so that costs do not change unexpectedly. Some differences between the methods are:

- The new method asks questions about the two activities individually, as the latest research suggests they have unique cost drivers (the original method only has one set of shared cost drivers).
- The new method looks at the item as a whole (the original method looks at structure and electronics separately).
- There are similar but somewhat different sub-activities. The new sub-activities have much more detailed notes/descriptions.

## **Touch Labor Metrics**

Two new metrics were added to the Metrics tab of the Hardware Component and Hardware COTS cost objects. These metrics are for the cost and labor hours associated with “Touch Labor,” the labor making direct contact to the end item application. This comprises the sum of costs/labor produced by the fabricators and assemblers during the Production Manufacturing stage of the project.

## **Weight of Structure Value**

The Weight of Structure input on the Hardware Component and Hardware COTS has been defaulted to 0. Validation indicators on the Input Sheet and the PBS signify that changes are required to make the cost object run valid.

# Software Improvements

## Provider and Product Complexity

An input called "Provider and Product Complexity" was implemented in the Software Component. It appears in the Input Sheet when "Reused Size" is greater than zero. This input acts like a multiplier that affects Software Requirements Analysis, Configuration and Tailoring, and Software Adaptation activities. It also affects aspects of Software Maintenance calculations.

## Software Component - Vendor and Product Complexity

The "Provider and Product Complexity" input has been renamed to "Vendor and Product Complexity" to be more consistent with the Software COTS input. The impact of this input remains the same as in previous versions.

## New Size Value

The New Size input on the Software Component, the Software COTS and the Software Data has been defaulted to 0. Validation indicators on the Input Sheet and the PBS signify that changes are required to make the cost object run valid.

## Design Repeat Applies to Reused Size

A new global input, "Design Repeat Applies to Reused Size," has been added to the Software Component. When this input is enabled, the Reused Size that is rolled up to influence the parent Assembly cost object is adjusted by the Design Repeat value.

## Custom Size Units

A "Custom Size Units" option has been added to the Size Units drop-down on the Software Component and the Software COTS. When "Custom Size Units" are selected, an input for "Custom Size Unit Name" will appear on the Input Sheet. Selecting the calculator on this input will allow the user to specify a Custom Size Unit Name (for example 'Story Points') and to relate that custom size unit to one of the standard size unit options available in the Software Component and the Software COTS. The Metrics tab will display metrics in the context of the Custom Size Units.

## Simplified Function Points

A "Simplified Function Points" option has been added to the Size Units drop-down on the Software Component and the Software COTS. "Simplified Function Points" offer a streamlined method of estimating Function Points based on a count of Unspecified Generic Elementary Processes and Unspecified Generic Data Groups.



## **Agile Software Component**

The new Agile Software Component cost object models the true cost of developing software code using an agile development process. It does this by identifying the core activities that are necessary to develop any combination of new, reused, adapted, or deleted code and the cost of the resources that those activities consume. What is unique about the Agile Software cost object is that it determines cost, effort and schedule of agile software development projects by understanding the agile characteristics of the project such as team size, release cycle, iteration length, agile practices employed, etc. along with characteristics of the software being developed and the development team(s) performing the software development. The Agile Software cost object can be used to describe agile software development to any degree of detail – one can model their entire system with a single component or one can model their system to the lowest level of detail available.

## **Agile Assembly**

The new Agile Assembly cost object identifies the start of a Sub-System, Assembly, Sub-Assembly, etc. within the System structure of the Product Breakdown Structure (PBS) associated with an agile software development project. It delineates an assembled unit of integrated sub-elements, which may be incorporated with other assembled units or individual elements, to result in a finished product. What is unique about the Agile Assembly cost object is that it determines cost, effort and schedule of agile software development projects by understanding the agile characteristics of the projects such as team size, release cycle, iteration length, agile practices employed, etc. along with characteristics of the software being developed and the team (s) performing the software development.

# Software Maintenance Model

## New Software Maintenance Estimating Guidance

A new Software Maintenance model is available for estimating the true cost of maintaining software code. This new model includes the following cost objects:

- **Software Maintenance Component** - The Software Maintenance Component cost object is TruePlanning for Software Maintenance's most comprehensive cost object because it models the true cost of maintaining software code by identifying the core activities that are necessary to maintain a software application based on a comprehensive description of the baseline software that is delivered, the anticipated adaptations and improvements and deployment scenario. The model estimates the cost and effort of the maintenance activities based on the cost and effort of the resources that are consumed by these activities. The Software Maintenance Component cost object can be used to describe software maintenance to any degree of detail – one can model their entire system with a single component or can model their system to the lowest level of detail available. The Software Maintenance Component works in concert with the Software Maintenance COTS and Assembly Maintenance cost objects to model cost and effort associated with the entire life of software intensive systems.
- **Software Maintenance COTS** - The Software Maintenance COTS cost object models the true cost of maintaining commercially available off-the-shelf software (COTS) by identifying the activities that are necessary to configure and integrate off-the-shelf software updates, upgrades, along with repairs upkeep glue code during the deployment phase of a software application. This cost object applies to any ready-to-use software components, including those that are acquired through non-commercial channels (for example, government or military software). The Software Maintenance COTS works in concert with the Software Maintenance Component and Assembly Maintenance cost objects to model cost and effort associated with the entire life of software intensive systems.
- **Assembly Maintenance** - The Assembly Maintenance cost object identifies the start of a Maintenance focused Sub-System, Assembly, Sub-Assembly, etc. within the system structure of the PBS. It delineates an assembled unit of integrated sub-elements, which may be incorporated with other assembled units or individual elements, to provide continuous maintenance cost and effort estimates for the deployment of the System. This cost object models all the technical activities that occur during the maintenance lifecycle of a software intensive system that delivers specific platforms or capabilities. The activities deal with technical decisions and oversights that encompass multiple system components. The Assembly Maintenance cost object works in concert with the Software Maintenance Component and Software Maintenance COTS cost objects to model cost and effort associated with the entire life of software intensive systems. The Assembly Maintenance 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 assembly level are a function of the assembly level inputs, as well as information that is rolled up from the children.

# Common Elements Improvements

## New Common Element Models

The Common Elements model has been enhanced with model improvements based on field testing feedback as well as the addition of four new cost objects: Peculiar Support Equipment, Common Support Equipment, Contractor Logistics Support, and Initial Spares and Repair Parts.

- Peculiar Support Equipment is used to capture Peculiar Support Equipment costs. Many PSE costs are captured in the standard models, such as Hardware Component, Hardware COTS, Assembly, and Integration Assembly Test and Checkout. This cost object will sum up all PSE costs found in your project and display them on the Metrics tab. This cost object also gives you a place to capture additional PSE costs that are not accounted for elsewhere in your estimate. Peculiar Support Equipment is defined as the design, development, and production of those deliverable items and associated software required to support and maintain the system or portions of the system while the system is not directly engaged in the performance of its mission and which are not common support equipment.
- Common Support Equipment is used to capture Common Support Equipment (CSE) costs. Many CSE costs are captured in the standard models, such as Hardware Component, Hardware COTS, Assembly, and Integration Assembly Test and Checkout. CSE costs are typically included on overhead rates charged to labor resources that work in facilities where the CSE is housed. If you suspect any CSE costs are not included in the overhead rates you are using in your estimate, you can capture them separately here. Also, this cost object supplies you with a database of common CSE types and their average costs to aid you in building a more detailed accounting of CSE costs.
- Contractor Logistics Support creates a high-level ROM estimate of Contractor Logistics Support (CLS) costs. This cost object works by estimating Operation and Support (O&S) costs using analogies to existing programs, modified to fit your expected fleet size and operational tempo.
- Initial Spares and Repair Parts is defined as the deliverable spare components, assemblies, and sub-assemblies used for initial replacement purposes in the material system equipment end item. This cost object provides two methods for estimating: "Informed by PMP" and "Cost/Labor Factors".

For more information, refer to the "Common Elements Overview" Help topic.

## Common Element Converter

A Common Element Converter has been added to the Project Folder which will convert a Product Breakdown Structure that uses System and Assembly cost objects to a Product Breakdown Structure that uses Common Elements.

For more information, refer to the "Converting to Common Elements" Help topic.

# IT Services Improvements

## Added New Data Types

Two new data types, Digital Storage and Currency Per Digital Storage, have been added to the IT Services cost objects.

## Infrastructure Services New Projects and Operations - Estimating Cloud Costs

- When "Infrastructure as a Service" is chosen for the Purchasing Model input, a new input called "Type of Cloud Service" will be added. This input allows you to specify the type of device being deployed or in operation for Infrastructure as a Service. Choices for this input include: Server, Storage, and Virtual Machines.
- When you set the "Type of Cloud Service" input to "Storage," a new "Time Period of Service" input will be added along with a new "Monthly Object Storage Price" calculator and a "Monthly File Storage Price" calculator.
- When you set the "Type of Cloud Service" input to "Virtual Machine," a new "Monthly Price Per Virtual Machine" calculator will be added as well as a "Monthly Additional Disk Price" calculator.

## Training Services New Projects and Operations Updates

- The Development and Design effort for Training Services New Projects and Operations has been reduced for Instructor Led training.
- A new input for "Delivery Infrastructure in Place" has been added to the Training Services New Projects and Operations cost objects to indicate the extent to which there is existing delivery infrastructure for e-Learning training development projects.
- Development Team Expertise now applies to the development and design of instructor led training.

# Rotorcraft Improvements

## Enhanced Modeling Structure

The new Rotorcraft model has undergone major changes to the modeling structure. The new model consists of two cost objects:

- VTOL Aircraft - a new cost object representing aircraft and fleet level development, production, and operation and support costs. Examples of aircraft types that you can model include Helicopters, Compound Helicopters, Tiltrotor, and Tilt-Wings.
- VTOL Component - a new cost object representing any subsystem or component within the aircraft. Examples of subsystem types that you can model include Wings, Rotor Systems, Fuselage, Landing Gear, Nacelle, Propulsion, Drive Systems, Flight Control, and Systems.

Note: This new PBS style allows for a flexible and partial PBS to be created and new cost object types to be added in future releases.

## Linkable Cost Object

The new Rotorcraft model can link to a Hardware Lifecycle cost object for a detailed lifecycle analysis.

## VTOL Aircraft Updates

- Changed Economic Base Year from 2014 to 2001 for both cost objects since the original model was built around 2001, and the CERs are based on cost analysis and regression from that time.
- Rearranged inputs in a more logical manner.
- Resolved issues with Performance Factor.
- Added descriptions to Inputs and Metrics.
- **Weight algorithm:** Users can automatically assign weights, use the built-in weight algorithm via the Auto-calculate option, or they can customize component or system weights using manual inputs or group weight adjustment factors.
- **Fuel Consumption:**
  - Renamed Basis for Fuel Consumption to Basis for Energy Consumption.
  - Renamed Fuel Consumption unit from gal / flight hour to unit per flight hour.
  - Renamed Fuel Cost Per Gallon to Energy Cost Per Unit.

# Space Missions Improvements

## Space System and Subsystem Metric Updates

The Metrics tab for the Space System and Subsystem has been updated to reflect user preferences. The metrics now depict the following:

- 1) Design Summary
- 2) Fabrication Summary
- 3) Assembly, Integration, and Test Summary
- 4) Launch Operations Summary

Each summary section contains at minimum the overall cost, the overall labor hours, and the overall duration of each activity/phase. The Design and Fabrication summaries also include the units produced for each respective phase.

## Schedule Adjustment

The Assembly, Integration, and Test (AIT) activity has been relabeled as a “Production” phase activity and now uses “Fabrication” as its direct predecessor. This is different from earlier versions where part of the AIT occurred directly after Design.

## Mass Input Consolidation

The custom Space Missions cost objects that are not derived from the Hardware catalog now only use one mass input to calculate the development and production costs for the object itself as well as the integration costs. This is different from earlier versions where different weight inputs were used to calculate each cost type.

# Operational and Site Activation Improvements

## **Split Site Survey and Deployment Cost Object**

The Site Survey and Deployment cost object has been split into two new cost objects: Deployment Physical Installations and Site Survey. The Deployment Physical Installations cost object estimates deployment of a system to its site of usage. The Site Survey cost object models site visits or "Site Surveys (SS)." These visits are used to identify and prepare for the deployment of a system on a site.

For more information, refer to the "Operational and Site Activation Overview" Help topic.

# 2020 Economic Update

TruePlanning has been updated to reflect new labor rates, exchange rates, PPP rates, and escalation data. Further economic support has been provided for the following countries: Bulgaria, Croatia, Estonia, Hungary, Lithuania, Malaysia, Portugal, Qatar, Serbia, Tunisia, and United Arab Emirates.

## Sources:

- Escalation Tables - International Monetary Fund (IMF) & Eurostat.
- Exchange Rates - OECD, IRS\*, X-rates, & OFX\*.
- PPPs - Organisation for Economic Co-operation and Development (OECD) & IMF\*.

The economic data implemented in TruePlanning 16 SR2 were collected in April 2020 and represent the most up-to-date information available from that organization at that time.

## OSD Inflation/Escalation Rates

Inflation/Escalation Rates have been added to TruePlanning that reflect OSD Inflation Guidance collected in April 2020. Sources include:

- Army/Navy Rates - <https://www.ncca.navy.mil/tools/inflation.cfm>
- NASA Rates - <https://www.nasa.gov/offices/ocfo/sid/publications>
- Air Force Rates - SAF/FM and Bureau of Labor Statistics (PPI Rates)

\*Data from these sources were collected in October 2019, as updated data were not available to PRICE during the April 2020 update.

## Updated Labor Rates

In TruePlanning 16 SR2, the PRICE Cost Research team updated all of 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 Reporting Issues with Folders**

An issue has been resolved where some reports using "Subgroup" were not showing children data on a Folder when the "Parents Include Roll-Up Data" check-box was enabled.

## **Invalid WBS Structures**

If a user tries to open a project that contains a WBS with an invalid structure (specifically, when a parent WBS node is missing), TruePlanning will throw an exception.

## **Find and Replace Issues with Text Inputs**

Issues have been resolved related to finding and replacing data with text based inputs.

## **Issues Exporting and Importing Currency Factors**

Issues related to exporting and importing currency factors with international region settings have been resolved.

# 16 SR2 Update

## Update 5

### TruePlanner® Improvements

#### **Updated Escalation Import**

The escalation import has been updated to allow users to indicate the specific years they want to use for the escalation, rather than having to use all the years defined in the Escalations dialog.

#### **Resolved Conversion Issue with Linked Cost Objects**

An issue has been resolved with conversions between linked cost objects that had the same currency symbol but different countries.

#### **Updated Translation Files to Support MCPLXE Calculators**

The translation files have been updated to support translation of the Manufacturing Complexity for Electronics calculators.

#### **Resolved Import Issues with Incomplete Findings Data**

An issue has been resolved that was preventing a project from importing whenever it had incomplete findings data.

#### **Resolved Issues with Common Element Conversion and Invalid Sensitivity Information**

An issue has been resolved with the Common Element conversion when a project contained invalid Sensitivity information.

#### **Updated Software Security Certificate**

An update has been made to the software security certificate.

### Cost Model Improvements

#### **Integration Assembly Test and Checkout – Added new global input “Switch for IATC Production to represent Installation Only”**

A new global input “Switch for IATC Production to represent Installation Only” has been added to the Integration Assembly Test and Checkout cost object. This switch will modify the Integration Assembly Test and Checkout (IATC) so that its Production Manufacturing activity represents installation only by way of

removing any "Fabricator" or "Material" costs. The "Switch for IATC Production to represent Installation Only" can be used to model a scenario where you install new equipment on an existing system in such a way that no material is fabricated or consumed during the installation process which is not already accounted for by a Hardware Component or a Hardware COTS (i.e., no negligible weight assembly materials, no floor shrinkage during installation, etc.).

- "Off" will use PRICE default CERs, including Fabricator and Material costs.
- "On" will represent Installation Only, removing Fabricator and Material costs.

## **Application Type Calculator Update**

The "Stores Management" selection in the Application Type drop-down has been renamed to "Weapons Store Management."

## **Software Maintenance Component and Software Maintenance COTS - Updates to Corrective Maintenance and Perfective Maintenance Costs**

Importing a file that contains links between a Software Component and a Software Maintenance Component or a Software COTS and a Software Maintenance COTS may have changes to the Corrective Maintenance and Perfective Maintenance costs. In previous versions, the link established between the Programming Language was in some cases set to the wrong Programming Language in the Maintenance version of the cost object (although the display on the Input Sheet did not reflect this difference). This has been resolved in the current update.

## **Update 4**

### **TruePlanner<sup>®</sup> Improvements**

#### **Saved Project Results Improvements**

Improvements have been made to the way saved results are read from files to ensure that they are accurate.

#### **Sensitivity Analyzer Improvements**

Improvements have been made to the Sensitivity Analyzer to support Common Elements.

#### **Performance Enhancements**

Performance enhancements have been made for including and excluding cost objects in the Product Breakdown Structure.

### **Cost Model Improvements**

#### **Resolved Calculation Issue for Assembly and Integration Assembly Test and Checkout Cost Objects**

A calculation issue has been resolved on the "Assembly" and "Integration Assembly Test and Checkout" cost objects when modeling a Cumulative Learning Curve Type.

### **New Total Ownership Cost Metrics**

New metrics have been added to the Total Ownership Cost cost object for the CAPE O&S Cost Element Structure.

## **TrueMapper<sup>®</sup> Improvements**

### **Resolved issues Converting English Number Strings**

An issue has been resolved where TrueMapper was not converting English number strings correctly when working in non-English environments.

## **TruePlanningXL Improvements**

### **Performance Enhancements**

Performance enhancements have been made to calibrations in TruePlanningXL.

## **Update 3**

## **TruePlanner<sup>®</sup> Improvements**

### **Resolved Issues with Uncertainty Analysis to Maintain Spread Values**

In previous versions, if you applied Uncertainty to an input that had spread values filled out and then calculated the Uncertainty Analysis, the spread values would all be reset to the same number. This issue has been resolved in the current update.

### **Resolved Issues Running Sensitivity Analysis on Auto-Calculated Inputs**

An issue has been resolved where the Sensitivity Analysis would not run on an input from a linked cost object (such as Hardware Lifecycle) whose value was auto-calculated.

### **Resolved Calculator Issues with Economic Base Year**

Previously, if you set the Economic Base Year on a calculator input and then tried to set the same Economic Base Year again, the calculator input grid showed up differently than it normally does for dates. In this version, when you set the Economic Base Year to a new date or the same date, the grid will display the same way it always has for dates.

### **Resolved Issues with Common Element Conversion**

Issues have been resolved in the Common Element conversion to support the following functionality:

- Attributes
- Activity Properties
- Input Validation
- Sensitivity Analyzer settings
- Inputs with inheritance turned off

## TrueMapper® Improvements

### Resolved Issues with QDV Integration

Issues with the QDV import/export functionality in TrueMapper have been resolved to work with the new Edit Mapping Window.

### Resolved Issues with Edit Mapping Window

An issue has been resolved that was causing the Edit Mapping Window to appear empty whenever you tried to edit mappings from the Manage Mappings window of TruePlanning.

## Cost Model Improvements

### Performance Improvements

Performance improvements have been made across the cost models to address slowdowns caused from the Python 3.7 upgrade.

### Agile Software - DO-178 Modeling Guidance

The updated DO-178 modeling guidance has been applied to the "Operating Specification" calculator of the Agile Software model.

### Assembly, Integration Assembly Test and Checkout, Hardware Component, and Hardware COTS - Added Ability to Model Partial Production Quantities

Enhancements have been made in the Assembly, Integration Assembly Test and Checkout, Hardware Component, and Hardware COTS models to allow for the modeling of partial production quantities.

### System - Resolved Issue with Total O&S Cost per Operating Hour Metric

An issue has been resolved that was causing an incorrect value for the "Total O&S Cost per Operating Hour" metric when the "Number of Operational Hours" input was spread over time.

## **Total Ownership Cost - Added Project Folder Inputs for Non-Constant Failure Rates**

Inputs have been added to the Project Folder to support "Non-Constant Failure Rates" on the Hardware Lifecycle in order to pass the maintenance demand correctly through the Total Ownership Cost objects down to lower levels of the PBS. The new Project Folder inputs are "Failure Rate Mode," "Number of Systems Deployed," and "System Service Life."

Additionally, the "Number of Operational Hours" input has been changed to a Project Folder input so that it matches the behavior on the System, Assembly, and Folder.

## **Hardware Lifecycle - Life Cycle Cost Management (LCCM) Enhancements**

New inputs, metrics, and activities have been added for the Life Cycle Cost Management (LCCM) program that supports users in modeling Obsolescence Mitigation, Predetermined Maintenance, and Condition-based Maintenance. The LCCM functionality is licensed separately from the other models.

## **Update 2**

### **TruePlanner<sup>®</sup> Improvements**

#### **Python 3.7 Upgrade**

All applications in the TruePlanning Suite have been upgraded to use Python 3.7. Support for Python 2.7 is no longer available.

#### **Disabled "Include" Menu on Activities and Resources**

The "Include" menu has been disabled for activities and resources in the Detailed Product Breakdown Structure view. This menu is now only available on a cost object.

#### **Resolved Findings Issue with Older Files**

Older files opened in the TruePlanning applications will now convert findings data into an updated format, removing the possibility of errors.

#### **Resolved Issues with Common Element Conversion**

Issues have been resolved in the Common Element conversion to support the following functionality:

- Notes
- Attachments
- Worksheet Set links
- Phase Set links

- Cost Type
- Calculator data

## Cost Model Improvements

### Resolved Issues with Hardware Lifecycle Project Import

Any global values and inheritance states that were changed on a cost object (not the Project Folder) will be maintained when a project from a previous version with Hardware Lifecycle applied is imported into a newer version of TruePlanning.

### DO-178 Modeling Guidance Revisited

From 2012-2014, the PRICE Cost Research team performed a study on the cost impacts of DO-178 certification. This study has been revisited, and the guidance has been re-calibrated to work with the most recent versions of TruePlanning. The new guidance is available in the “Operating Specification” calculator of the Software model. The new guidance also gives separate recommendations for “Level A” and “Level B” certification, which were previously combined into a single category. A new whitepaper discussing this supporting research is available upon request.

## Update 1

### TruePlanner<sup>®</sup> Improvements

#### Resolved issues with Category/Link columns on higher resolution displays

An issue has been resolved where the Category/Link column icons in the PBS were showing up too small or not at all.

#### Resolved issues with mapping import when handling WBS nodes that contained extra spaces

Issues have been resolved when trying to view mappings in a saved project if there were extra white spaces at the end of the WBS node names.

#### Improvements to Calculation Log Error Messages

In situations where you did not have a catalog licensed and you tried to run a project containing a cost object from that catalog, you would receive a generic error message in the calculation log. Improvements have been made so that the calculation log is now more specific in reporting the catalog/cost object containing the licensing issue.

#### Resolved issues with HL linking conversions when using Metric Units

Previously, when you changed the File > Options to Metric Units and added a linked Hardware Lifecycle to the PBS, some of the conversions were incorrect on the Hardware Lifecycle Input Sheet. This issue has been

resolved in the current update.

## **Added Units to inputs in MCPLXS Detail calculator**

A new "Units" row has been added to the Manufacturing Complexity for Structure - Detail calculator that allows you to define the units associated with the calculator inputs.

## **Opening projects from previous versions with saved results**

An issue has been resolved where TruePlanning was not prompting users to calculate when opening a project from a previous version with saved results.

## **TrueBOE™ Improvements**

### **Automatic application shutdown with invalid license**

An issue has been resolved where TrueBOE would close down immediately if you opened it without a license. In this version, TrueBOE will remain open and a license error will display until you acknowledge it by pressing the "OK" button.

### **Resolved issues with multiple activities mapped to top-level WBS item**

An issue has been resolved in TrueBOE when opening a project that had multiple activities mapped to a top-level WBS item.

## **TrueMapper® Improvements**

### **Mapping Assignment Enhancements**

Several enhancements have been made to the mapping assignment functionality which will make it quicker and easier to add and edit mappings. With this update, you can now add or edit mapping assignments in the new Edit Mapping Window or within an Excel file. You can also continue making mapping assignments using the original drag-and-drop feature.

- **Edit Mapping Window** - A new Edit Mapping Window is available that allows you to quickly add and edit mapping assignments directly within TrueMapper. This window is useful for adding and editing multiple assignments because it allows you to copy and paste information between cells as well as select and drag cells to auto fill data.
- **Edit Mappings in Excel** - It is now possible to export a WBS with mappings directly to an Excel file. You can use the Excel file to make changes to the assignments and then import them back into TrueMapper. This Excel file shares the exact format used in the Edit Mapping Window but allows you to take advantage of full Excel functionality.

For more information, refer to the "About Mapping Assignments" Help topic.



## **Resolved Issues with Percentage Reports**

When viewing a percentage report with mappings, there were situations where the percentages for non-labor resources were incorrect. This issue has been resolved.

## **TruePlanningXL Improvements**

### **Performance Enhancements**

The performance of calibration in TruePlanningXL has been improved.

### **Resolved Issues with TruePlanningXL Ribbon Buttons**

An issue has been resolved where if you opened Excel with the option to show the Excel start screen disabled, the buttons on the TruePlanningXL ribbon would also be disabled. In this situation, you had to create a new workbook after opening Excel in order to be able to use TPXL.

## **Cost Model Improvements**

### **Software Component/COTS - Added new "Defense/Space Agile" option to Development Process input**

A new "Defense/Space Agile" option has been added to the "Development Process" input on the Software Component and the Software COTS. The "Defense/Space Agile" option takes into account the fact that while all agile projects follow agile philosophy, organizations working in the aerospace and defense industries often find they have to do a modified version of agile that allows them to apply agile best practices while respecting schedule and acquisition process constraints.

### **Agile Software Component - Added "Burn Down Rate" metric for Custom Size Units**

A new "Burn Down Rate" metric has been added to the Agile Software Component that represents the expected burn down rate or the amount of capability delivered per iteration in the context of custom size units.

### **Agile Software Component - Updated "Tailoring Multiplier" Output Name**

The "Tailoring Multiplier" output name in the Functional Size calculator has been updated to "Tailoring Complexity."

### **Assembly/Integration Assembly Test and Checkout – Issue Resolved regarding Hardware/Software Integration Cost**

An issue has been resolved where, in certain situations, changes to Production and/or O&S cost could affect the estimated Hardware/Software Integration (HSI) cost.

HSI cost is estimated as a function of development labor hours rolled up from descendent Hardware and Software cost objects. If you have nested Assemblies, the lower level assembly will perform HSI on its children. When you get to the higher level assembly, some of these labor hours will be from components that have already been through HSI and should be weighted less when estimating this higher level of HSI. The issue deals with this “weighting” algorithm.

Effort that drives HSI should be weighted according to the percentage of \*development\* labor that has already been through HSI. However, it was actually being weighted by the percentage of \*total\* labor. When you changed cost drivers that should only affect Production and/or O&S costs, this affected the weighting algorithm, which changed HSI cost.

This issue only occurs when you have an Assembly (or Integration Assembly Test and Checkout) that contains BOTH:

- An immediate child assembly (or Integration Assembly Test and Checkout) that contains Hardware and/or Software
- An immediate child Hardware or Software item

### **Issue Resolved with Hardware Lifecycle estimates for non-integer Years of Deployment**

An issue has been resolved where the number of estimated failures were not correctly calculated for partial-years at the end of a period of deployment (e.g., the 0.5 years portion of a 10.5 year-long deployment estimate).

### **Issue Resolved with Unit Production Cost metrics in a Common Element/Microcircuits PBS**

An issue was resolved that caused incorrect Unit Production Cost/Amortized Unit Production Cost (UPC/AUPC) metric values on Folders in the PBS.

This issue caused double-counting of UPC/AUPC contributions from some components when the folder also contained Integration Assembly Test and Checkout or Program Management (Common Elements model), Module (Microcircuits model), or Assembly Maintenance (Software Maintenance model).

### **Rotorcraft 3.0 Enhancements**

- VTOL Aircraft - Updated all Time Between Overhaul (TBO) inputs to accept a zero value
- VTOL Aircraft - Updated all Time Between Overhaul (TBO) input descriptions
- VTOL Aircraft - Issue Resolved: Corrected weight algorithm for intermediate gear box weight

### **Infrastructure Services New Projects and Operations Enhancements**

- The default storage prices, virtual machine prices and CERs in the following calculators have been updated based on new research: Monthly Object Storage Price, Monthly File Storage Price, Monthly Price Per Virtual Machine, and Monthly Additional Disk Price.

- The inputs "Local Disk Included" and "Local Disk Amount" were removed from the Virtual Machine calculator.