



Automated Cost Estimating Integrated Tools

# **Automated Cost Estimator (ACE) Overview Version 7.4**

**April 2014**





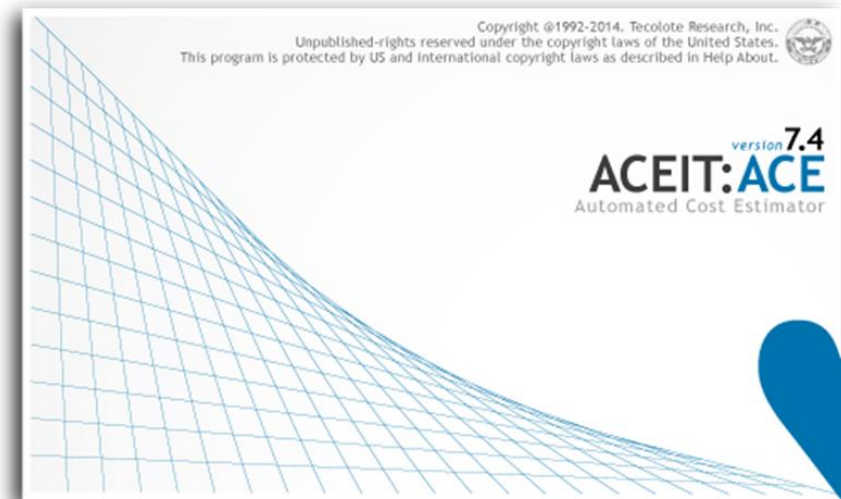
# ACE is an Estimating Platform

## ■ What is ACE?

- Framework to build models
- Calculation engine to compute/process information

## ■ ACE files (sessions) contain user-developed cost estimate

- Methodology
- Documentation
- Inputs
- Integrated uncertainty analysis



**Create risk adjusted, integrated cost/schedule life cycle estimates for any project!**



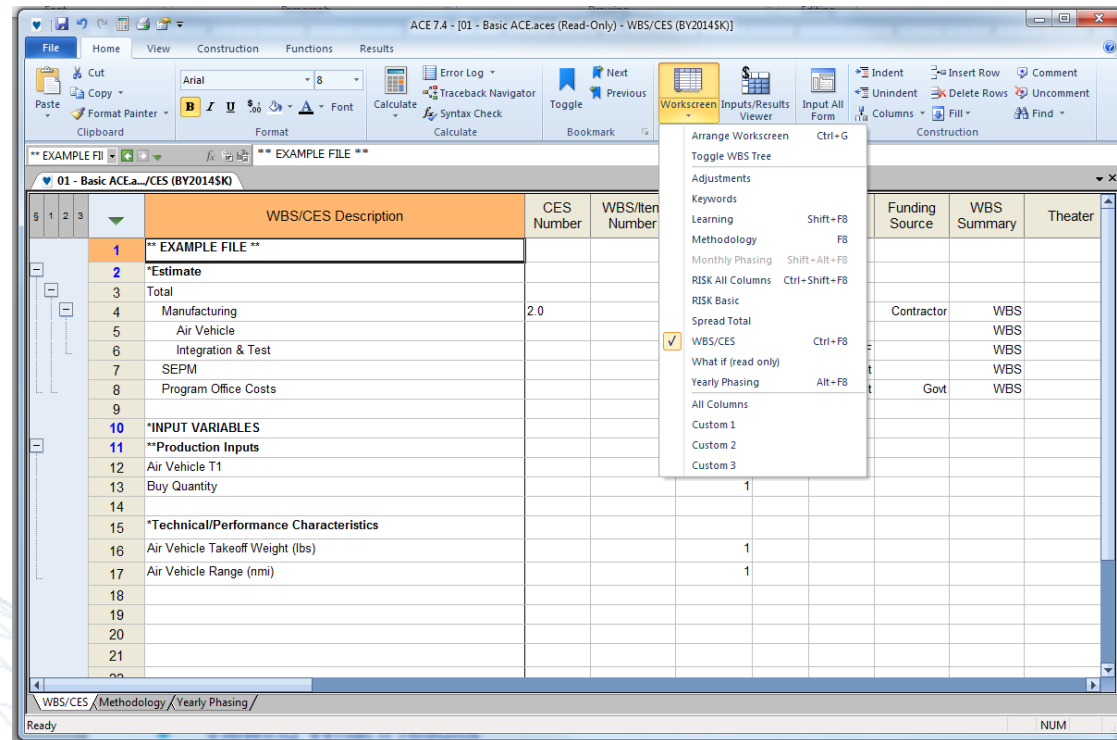
# Workscreens Provide a Filtered View of an ACE Session

■ Each workscreen shows only the relevant fields supporting specific functions involved in building a cost estimate

- Building a WBS/CES
- Implementing methodologies

- Adjusting for FY, dollar units, Fee, Overhead, G&A
- Applying learning curve theory
- Time phasing the estimate (Annual and Monthly)
- Incorporating a risk analysis

- Viewing What if results
- Entering documentation





# Results are Automatically Summed Based on Element Hierarchy

- ACE uses an indenture structure to sum elements, thereby ensuring proper calculation
  - Add/remove elements when the WBS changes without need to redo summing equations
- Tools available to simplify navigation and data entry

The screenshot displays the ACE 7.4 software interface. The main window shows a WBS table with columns for WBS/CES Description, Approp, Unique ID, Tech Baseline, and Phasing Method. Row 10, 'Engine (with learning)', is selected. An 'Input All Form' dialog box is open, showing a tree view of the WBS hierarchy and a form for entering data for the selected row. The form includes fields for Title, Unique ID, Equation/Throughput, and various summary and date fields.

| WBS/CES Description                    | Approp | Unique ID   | Tech Baseline    | Phasing Method |
|--|--------|-------------|------------------|----------------|
| * Powerplant System Estimate           |        | *Estimate   |                  |                |
| POWER GENERATION PLANT                 |        |             | \$ 404,507.181 * |                |
| RDT&E                                  |        |             | \$ 127,240.933 * |                |
| Prime Mission Product                  |        |             | \$ 90,475.886 *  |                |
| Hardware (HW)                          |        | HWS         | \$ 31,297.913 *  |                |
| Structure                              | RDTEA  | StructDev\$ | \$ 23,467.610 *  | BE             |
| Cables, Conduits, and Connectors (CCC) | RDTEA  | CCCDev\$    | \$ 2,118.063 *   | BE             |
| Engine (with learning)                 | RDTEA  |             | \$ 5,712.241 *   | BE             |
| Software (SW)                          |        | SWS         | \$ 38,710.019 *  |                |
| CSCI1                                  | RDTEA  |             | \$ 10,083.809 *  | BE             |
| CSCI2                                  | RDTEA  |             | \$ 11,504.203 *  | BE             |
| CSCI3                                  | RDTEA  |             | \$ 17,122.007 *  | BE             |
| Integration and Assembly (I&A)         | RDTEA  |             | \$ 20,467.953 *  | BE             |
| I&A Check-Out                          | RDTEA  |             | \$ 7,309.983 *   | I&AWrapRat     |
| HW/SW Integration                      | RDTEA  |             | \$ 10,233.977 *  | I&AWrapRat     |
| Tooling and Test Equipment             | RDTEA  |             | \$ 2,923.993 *   | I&AWrapRat     |
| SEPM (RDT&E)                           | RDTEA  |             | \$ 32,812.240 *  | BE             |
| Training                               | RDTEA  |             | \$ 671.849 *     | BE             |
| Data                                   | RDTEA  |             | \$ 615.188 *     | BE             |
| System Test and Evaluation (ST&E)      | RDTEA  |             | \$ 2,665.771 *   | BE             |
| Procurement                            |        |             | \$ 277,266.248 * |                |



# Equations / Data Entered into Specific Fields

- Specific columns are used to enter equations and annual data
- Data is referenced by naming of rows / columns by Unique IDs
- All data used for the estimate is immediately visible

|    | WBS/CES Description               | Approp | Unique ID   | Tech Baseline    | Phasing Method | Equation / Throughput                            | Fiscal Year | Units | Start Date     | Finish Date    |
|----|-----------------------------------|--------|-------------|------------------|----------------|--|-------------|-------|----------------|----------------|
| 4  | POWER GENERATION PLANT            |        |             | \$ 404,507.181 * |                |  |             |       |                |                |
| 5  | RDT&E                             |        |             | \$ 127,240.933 * |                |  |             |       |                |                |
| 6  | Prime Mission Product             |        |             | \$ 90,475.886 *  |                |  |             |       |                |                |
| 7  | Hardware (HW)                     |        | HW\$        | \$ 31,297.913 *  |                |  |             |       |                |                |
| 8  | Structure                         | RDTEA  | StructDev\$ | \$ 23,467.610 *  | BE             | 15510.4 * StrucWgt                               | 2005        |       | \$ HwStartDate | HwEndDate      |
| 9  | Cables, Conduits, and Connect     | RDTEA  | CCCDev\$    | \$ 2,118.063 *   | BE             | CCCcost  | 2005        |       | \$ DATEADD(H   | HwEndDate      |
| 10 | Engine (with learning)            | RDTEA  |             | \$ 5,712.241     | BE             | Engine_T1  |             |       | HwStartDate    | HwEndDate      |
| 11 | Software (SW)                     |        | SW\$        | \$ 38,710.019 *  |                |  |             |       |                |                |
| 12 | CSCI1                             | RDTEA  |             | \$ 10,083.809 *  | BE             | SWWrapRate\$ * HrsPerPersMth * CsciPM1           |             |       | CSCI1_Start    | CSCI2_StartD   |
| 13 | CSCI2                             | RDTEA  |             | \$ 11,504.203 *  | BE             | SWWrapRate\$ * HrsPerPersMth * CsciPM2           |             |       | CSCI2_Start    | CSCI3_StartD   |
| 14 | CSCI3                             | RDTEA  |             | \$ 17,122.007 *  | BE             | SWWrapRate\$ * HrsPerPersMth * CsciPM3           |             |       | CSCI3_Start    | I&A\$_StartDat |
| 15 | Integration and Assembly (I&A)    | RDTEA  |             | \$ 20,467.983 *  | BE             |  |             |       | I&A\$_StartD   | I&A\$_EndDate  |
| 16 | I&A Check-Out                     | RDTEA  |             | \$ 7,309.983 *   |                | I&AWrapRate\$ * HrsPerPersMth * HwSW_Integ_Dur * |             |       |                |                |
| 17 | HW/SW Integration                 | RDTEA  |             | \$ 2,923.993 *   |                | I&AWrapRate\$ * HrsPerPersMth * HwSW_Integ_Dur * |             |       |                |                |
| 18 | Tooling and Test Equipment        | RDTEA  |             | \$ 2,923.993 *   |                | I&AWrapRate\$ * HrsPerPersMth * HwSW_Integ_Dur * |             |       |                |                |
| 19 | SEPM (RDT&E)                      | RDTEA  |             | \$ 32,812.240 *  | BE             | SEPMWrapRate\$ * HrsPerPersMth * EMD_Dur *       |             |       | HwStartDate    | EMD_EndDate    |
| 20 | Training                          | RDTEA  |             | \$ 671.849 *     | BE             | TrgFactor * HW\$                                 |             |       | I&A\$_EndDa    | EMD_EndDate    |
| 21 | Data                              | RDTEA  |             | \$ 615.188 *     | BE             | DataFactor * (HW\$ + SW\$)                       |             |       | HwStartDate    | EMD_EndDate    |
| 22 | System Test and Evaluation (ST&E) | RDTEA  |             | \$ 2,665.771 *   | BE             | ST&EWrapRate\$ * HrsPerPersMth * ST&E_Dur *      |             |       | I&A\$_EndDa    | EMD_EndDate    |
| 23 |                                   |        |             |                  |                |  |             |       |                |                |
| 24 | Procurement                       |        |             | \$ 277,266.248 * |                |  |             |       |                |                |
| 25 | Manufacturing                     |        | PMP\$       | \$ 198,928.919 * |                |  |             |       |                |                |
| 26 | Hardware (HW)                     |        | HW_Mfg\$    | \$ 172,981.669 * |                |  |             |       |                |                |



# Standard Methods / Techniques to Ensure Reliable Calculations

- Integrated inflation indices to correctly normalize results and develop annual outlay

- Logs to show potential estimate errors

| WBS/CES Description                  | Approp | Unique ID        | Point Estimate                         | Phasing Method |
|--------------------------------------|--------|------------------|--|----------------|
| <b>*Estimate</b>                     |        | <b>*Estimate</b> |  |                |
| Total                                |        |                  | \$ 890,755.722 *                       |                |
| RDT&E                                |        | RDTE\$           | \$ 64,063.575 *                        |                |
| Concept Refinement                   |        |                  | \$ 1,034.093 *                         |                |
| Contractor A                         | RDTEF  |                  | \$ 519.046 *                           | TY             |
| Contractor B                         | RDTEA  |                  | \$ 515.048 *                           | TY             |
| Technology Development               |        |                  | \$ 4,604.018 *                         |                |
| Contractor A                         | RDTEF  |                  | \$ 2,302.009 *                         | TC             |
| Contractor B                         | RDTEA  |                  | \$ 2,302.009 *                         | TS             |
| System Development and Demonstration | RDTEF  | - AIR FORCE      | - Rsch, Dev, Test & Eval               |                |
| Development Engineering              | RDTEA  | - ARMY           | - Rsch, Dev, Test & Eval, Army         |                |
| Air Vehicle                          | APF    | - AIR FORCE      | - Aircraft Procurement                 |                |
| Basic Structure                      | APA    | - ARMY           | - Aircraft Procurement, Army           |                |
| Navigation/Guidance                  | OMF    | - AIR FORCE      | - O&M - Non-Pay, Non-POL               |                |
| Propulsion                           | MPF    | - AIR FORCE      | - Military Personnel - Total           |                |
| Ground Station                       | MPA    | - ARMY           | - Military Personnel (Composite), Army |                |
| Procure OTS Parts                    | OMA    | - ARMY           | - Operation & Maintenance, Army        |                |
| Design New Parts                     | MIPF   | - AIR FORCE      | - Missile Procurement                  |                |
| Software                             | OPF    | - AIR FORCE      | - Other Procurement                    |                |
| Int & Assy                           | MCONF  | - AIR FORCE      | - Military Construction                |                |
| Prototype Manufacturing              | OMF_P  | - AIR FORCE      | - O&M - GS & WB Pay Only               |                |
| Air Vehicle                          | OMF_F  | - AIR FORCE      | - O&M - Fuel                           |                |
| Mobile Ground Station                | MPF_P  | - AIR FORCE      | - Military Personnel - Pay Base        |                |
|                                      | MPF_R  | - AIR FORCE      | - Military Personnel - Other Expenses  |                |
|                                      | MCF_R  | - AIR FORCE      | - Military Personnel - Retirement      |                |
|                                      |        |                  | - MILCON - AF Reserve                  |                |
|                                      |        |                  | \$ 3,206.330 *                         |                |
|                                      |        |                  | \$ 2,855.320 *                         | BE             |
|                                      |        |                  | \$ 351.010 *                           | BE             |
|                                      |        |                  | \$ 20,812 *                            |                |

Error Log - 06 - Implementing O&S Estimating Methods.aces (BY2014\$K)

2 Unused Var | 1 Information | 3 Warning | 2 Fatal

| Error Code | Row # | Severity    | Description  | Col      |
|------------|-------|-------------|--|----------|
| PHZ534     | 46    | Fatal       | Missing or incorrect method on shared item.            | Milestor |
| PHZ534     | 64    | Fatal       | Missing or incorrect method on shared item.            | Milestor |
| PHZ644     | 47    | Warning     | Item summed with C-phased items.                       | Milestor |
| PHZ644     | 48    | Warning     | Item summed with C-phased items.                       | Milestor |
| MTH562     | 73    | Warning     | Unused variable 'Army_Trans\$'.                        | Milestor |
| MTH562     | 76    | Warning     | Unused variable 'ISStruc\$'.                           | Milestor |
| PHZ891     | 170   | Warning     | BY method used without fiscal year or units specified. | Equatic  |
| MTH650     | 46    | Information | Uses learning without R phasing                        | Equatic  |

Buttons: Set as Default, Goto Error, Copy, Close, Help

- Tools to trace model logic

Traceback Navigator (06 - Implementing O&S Estimating Methods.aces)

Row: 25: Software | Case: Point Estimate

| Description                          | ID                | Equation               | Total         | Unwra... | Approp... | Phasing | U  |
|--------------------------------------|-------------------|------------------------|---------------|----------|-----------|---------|----|
| 25: Software                         | RDTE\$WS          | SWLab\$ * SWLabHrs     | \$ 4,885.163  | (none)   | RDTEF     | MS      |    |
| Start Date                           | aStartDate        | SWDevStartDate         | 29SEP2012     | (na)     |           |         |    |
| Finish Date                          | aFinishDate       | SWDevEndDate           | 29DEC2014     | (na)     |           |         |    |
| Predecessors                         |                   |                        |               |          |           |         |    |
| 117: Software Development Start Date | SWDevStartDate    | DATEADD(DevStartDat... | 29SEP2012     | (none)   |           | C       | S  |
| 119: Software Design Review          | SWDesignDate      | DATEADD(SWDevStart...  | 29AUG2013     | (none)   |           | C       | N  |
| 121: Software Code Review            | SWCodeReviewDate  | DATEADD(SWDesignD...   | 29SEP2014     | (none)   |           | C       | N  |
| 123: Software Code Inspection        | SWCodeInspectDate | DATEADD(SWCodeRe...    | 29NOV2014     | (none)   |           | C       | N  |
| 124: Software Development End Date   | SWDevEndDate      | DATEADD(SWCodeIns...   | 29DEC2014     | (none)   |           | C       | F  |
| 146: S/W Labor Hours                 | SWLabHrs          | 32500                  | 32500         | (none)   |           | C       | E  |
| 152: Software Labor Rate             | SWLab\$           | 150                    | \$ 0.150      | (none)   | RDTEF     | CTY     | E  |
| Successors                           |                   |                        |               |          |           |         |    |
| 17: Development Engineering          |                   | Sum of children        | \$ 21,353.907 |          |           |         | (I |
| 106: S/W Maintenance                 |                   | IF(TTP = TLASTTP(@R... | \$ 3,979.932  |          | OMF       | F       | E  |



# Built-in ACE Functions

- **ACE offers several types of built-in functions to automate relationships between elements in an ACE session:**
  - Mathematical
  - Date
  - Economic Analysis
  - Time Period (operate on specific yearly or monthly inputs or results)
  - ACE Specific
  - Inflation
  - Logic and Mathematical
  - Matrix
  - Operational Life
  - RISK



# Functions for specific cost estimating calculations

- Several functions automatically calculate common cost estimating operations
- For example, many cost elements are calculated based on the number of Operational Fielded Units in any given year. The OpFieldedUnits() function calculates operational fielded units in each year based on a buy schedule, fielding lag and life expectancy.

Example:

| WBS/CES           | UNIQUE ID  | POINT ESTIMATE | EQ/ THROUGHPUT                         | PM | FY 2015 | FY 2016 | FY 2017 | FY 2018 |
|-------------------|------------|----------------|--|----|---------|---------|---------|---------|
| Fielded Units     |            | 96             | OpFieldedUnits(@BQ,OpLife, LagInYears) | F  |         |         |         |         |
| *Inputs           |            |                |  |    |         |         |         |         |
| Procurement Units | BQ         | 24             | [Input Throughputs]                    | IS | 6       | 8       | 10      |         |
| Operational Life  | OpLife     | 4              |  | C  |         |         |         |         |
| Lag in Years      | LagInYears | 1              |  | C  |         |         |         |         |

Results:

| WBS/CES       | POINT ESTIMATE | FY 2015 | FY 2016 | FY 2017 | FY 2018   | FY 2019   | FY 2020 | FY 2021 |
|---------------|----------------|---------|---------|---------|-----------|-----------|---------|---------|
| Fielded Units | 96             |         | 6       | 6+8=14  | 6+8+10=24 | 6+8+10=24 | 8+10=18 | 10      |





# Open Platform Allows Integration with 3<sup>rd</sup> Party Applications

- **Multiple methods for integration with other applications**
  - Direct export to .rtf and .txt file formats
  - ACE results integrate with Excel through POST
  - ACE clipboard allows dynamic data export/import from/to an ACE session
  - ACE API enables
    - Ability to embed ACE sessions into other tools
    - Ability to create plug-ins that allow direct interaction inside ACE

- **Current ACE plug-ins**

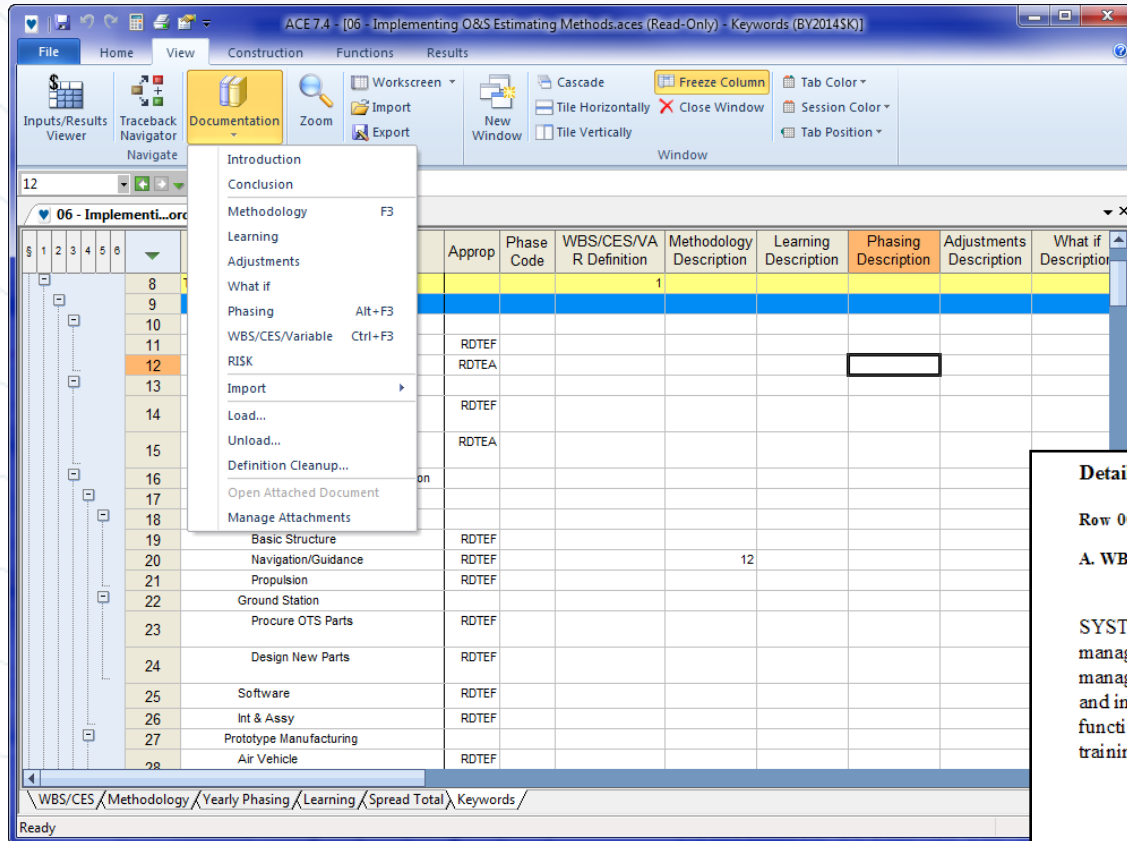
*Getting data into ACE*

- ACE-to-ACE
- Microsoft Excel
- Microsoft Project
- Price
- SEER

|     | WBS/CES Description   | Equation / Throughput | Fiscal Year | Units | Start Date | Finish Date | SEER_ELEMENT (*) | SEER Element   | SEER_PROJECT   |
|-----|---|-----------------------|-------------|-------|------------|-------------|------------------|----------------|--|
| 177 |   |                       |             |       |            |             |                  |                |  |
| 178 | ***Totals C:\Documents and Settings\delliott\UAV Software [TOTAL] |                       | 2000        | \$    |            |             |                  | UAV Software   | C:\Documents and Settings\delliott\My Documents\ACEIT Data\Sessions\Exar |
| 179 | ! Ground Segment [TOTAL]  |                       |             |       |            |             |                  | Ground Segment | C:\Documents and Settings\delliott\My Documents\ACEIT Data\Sessions\Exar |
| 180 | ! Flight Software [TOTAL]   |                       |             |       |            |             |                  |                |  |
| 181 |   |                       |             |       |            |             |                  |                |  |
| 182 |   |                       |             |       |            |             |                  |                |  |
| 183 | *** Development Cost(BY) by Year UAV Software [DEV COST]          |                       |             |       |            |             |                  |                |  |
| 184 | ! Ground Segment [DEV COST]                                       |                       |             |       |            |             |                  |                |  |
| 185 | ! Flight Software [DEV COST]                                      |                       |             |       |            |             |                  |                |  |
| 186 |   |                       |             |       |            |             |                  |                |  |
| 187 |   |                       |             |       |            |             |                  |                |  |
| 188 | *** Development Effort by Year UAV Software [DEVEFFORT]           |                       |             |       |            |             |                  |                |  |
| 189 | ! Ground Segment [DEVEFFORT]                                      |                       |             |       |            |             |                  |                |  |
| 190 | ! Flight Software [DEVEFFORT]                                     |                       |             |       |            |             |                  |                |  |
| 191 |   |                       |             |       |            |             |                  |                |  |
| 192 |   |                       |             |       |            |             |                  |                |  |



# Full Estimate Documentation Capability



■ Documentation can be imported via:

- RTF and MS Word files
- Copy and Paste Commands

■ Documentation Available via:

- Input All Form
- Narrative Report
- MS-Word Document

■ Analysts can document in real time:

- WBS
- Methodology
- Phasing
- Risk
- Adjustments

**Detailed Basis of Estimate**

Row 00016 SEPM \$ 27,065,488 FY 2006 \$K

**A. WBS Definition (ID: 5)**

SYSTEM ENGINEERING/PROGRAM MANAGEMENT - The system engineering/program management element refers to integration of the system from a technical and business management control standpoint. This element encompasses the planning, directing, controlling, and integrating the definition, development and production of the system/program including the functions of logistics and logistics support, maintenance support, facilities, personnel and training, and testing and activation of a system.

**B. Fiscal Year Phasing Results (FY2006 \$K)**

| FY2005    | FY2006    | FY2007    | FY2008    | FY2009    | Total      |
|-----------|-----------|-----------|-----------|-----------|------------|
| \$3,866.5 | \$3,866.5 | \$7,733.0 | \$7,733.0 | \$3,866.5 | \$27,065.5 |

**C. Estimating Methodology (Equation/Throughput Calculated Yearly and Summed)**

0.37 \* PMP\$

**C.1. Methodology Rationale (ID: 9)**

DEVELOPMENT COST FACTOR - System/Project Management (S/PM)

DESCRIPTION - Estimates Development System/Project Management cost as a percent of Development Prime Mission Product (PMP) cost. This factor was updated August 1998.

SOURCE DATA - An analysis was made of 200 CPRs and C/SSRs stored in ACEIT's



# Quick Access to Estimate Results

The top window shows the 'BY Results' view for 'Demo ACE Sessi...logy (BY2011SK)'. The table below is a summary of the data shown:

| WBS/CES Description          | Total          | FY 2010 | FY 2011       | FY 2012       | FY 2013       | FY 2014       | FY 2015       | FY 2016      | FY 2017      | FY 2018       | FY 2019       |
|------------------------------|----------------|---------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|---------------|---------------|
| * Powerplant System Estimate | \$ 382,731.491 |         | \$ 18,000.913 | \$ 31,148.031 | \$ 21,919.519 | \$ 21,146.637 | \$ 19,564.136 | \$ 5,776.539 | \$ 2,811.574 | \$ 38,393.525 | \$ 38,000.000 |
| POWER GENERATION PLANT       | \$ 382,731.491 |         | \$ 18,000.913 | \$ 31,148.031 | \$ 21,919.519 | \$ 21,146.637 | \$ 19,564.136 | \$ 5,776.539 | \$ 2,811.574 |               |               |
| RDT&E                        | \$ 120,367.348 |         |               |               |               |               |               |              |              |               |               |
| Prime Mission Product        | \$ 85,586.925  |         | \$ 16,113.324 | \$ 22,935.297 | \$ 12,841.564 | \$ 14,342.629 | \$ 15,740.622 | \$ 3,613.488 |              |               |               |
| Hardware (HW)                | \$ 29,603.194  |         | \$ 16,113.324 | \$ 13,489.870 |               |               |               |              |              |               |               |

The bottom window shows the 'BY Phased By Appn' view for 'Demo ACE Sessi...ewer (BY2011SK)'. The table below is a summary of the data shown:

| Cost Element                 | Approp | Total          | FY 2010 | FY 2011       | FY 2012       | FY 2013       | FY 2014       | FY 2015       |
|------------------------------|--------|----------------|---------|---------------|---------------|---------------|---------------|---------------|
| * Powerplant System Estimate |        |                |         |               |               |               |               |               |
| RDTEA                        |        | \$ 120,367.348 |         | \$ 18,000.913 | \$ 31,148.031 | \$ 21,919.519 | \$ 21,146.637 | \$ 19,564.136 |
| OPA                          |        | \$ 262,364.143 |         |               |               |               |               |               |
| Total:                       |        | \$ 382,731.491 |         | \$ 18,000.913 | \$ 31,148.031 | \$ 21,919.519 | \$ 21,146.637 | \$ 19,564.136 |

- Time-Phased Base Year and Then Year results can be quickly generated
- Estimated costs can be “racked and stacked” by various breakouts (Appropriation, Funding Agency, Contract Line Item, Job Order Number, Budget Line Item, etc.)



# Baselines can be Established as Basis for Scenario Evaluation

- Main methodologies are basis for all calculations
- Add an unlimited number of alternative scenarios (what if cases)
- Scenarios are enabled by overriding methodology equations and/or input variables (total or yearly)
- Supporting documentation, reports, time-phased (BY or TY) and risk results can be created for any scenario
- Cost Benefit Analysis calculations can be added to the session and evaluated for each alternative

The screenshot shows the ACE 7.4 software interface. The main window displays a comparison table between a 'Tech Baseline' and a 'Protect Scenario' across various WBS/CES descriptions. The table includes columns for 'TOTAL', 'FY' (Fiscal Year), 'WBS/CES Description', 'Tech Baseline', and 'Protect Scenario'. The 'Protect Scenario' column is highlighted in orange. The status bar at the bottom indicates 'Ready'.

| TOTAL   |    | WBS/CES Description                   | Tech Baseline | Protect Scenario |
|---------|----|---------------------------------------|---------------|------------------|
| FY 2010 |    |                                       |               |                  |
| FY 2011 |    |                                       |               |                  |
| FY 2012 | 69 | CCC Weight (Lbs)                      | 495.0 *       | 600              |
| FY 2013 | 70 |                                       |               |                  |
| FY 2014 | 71 | Structural Weight (Lbs)               | 1,275.0 *     | 1400             |
| FY 2015 | 72 |                                       |               |                  |
| FY 2016 | 73 | Engine T1                             | \$ 602.875 *  | \$ 602.875 *     |
| FY 2017 | 74 |                                       |               |                  |
| FY 2018 | 75 | kHp per Ton                           | 2.000 *       | 2.000 *          |
| FY 2019 | 76 | Oil = 1, Coal = 0                     | 1.0 *         | 1.0 *            |
| FY 2020 | 77 | Learning Slope                        | 95.000 *      | 97               |
| FY 2021 | 78 |                                       |               |                  |
| FY 2022 | 79 | Development to Production Step Factor | 0.776 *       | .85              |
| FY 2023 | 80 |                                       |               |                  |
| FY 2024 | 81 | * Quantities                          |               |                  |
| FY 2025 | 82 | Quantity (Development)                | 10.0 *        | 10.0 *           |
| FY 2026 | 83 | Quantity (Procurement)                | 70.0 *        | 70.0 *           |
|         | 84 |                                       |               |                  |
|         | 85 | * Software Section                    |               |                  |
|         | 86 | Total SLOC                            | 206,000.0 *   | 240,000.0 *      |
|         | 87 | CSCI 1 SLOC                           | 55,000.0 *    | 65000            |
|         | 88 | CSCI 2 SLOC                           | 62,000.0 *    | 75000            |
|         | 89 | CSCI 3 SLOC                           | 89,000.0 *    | 100000           |
|         | 90 |                                       |               |                  |



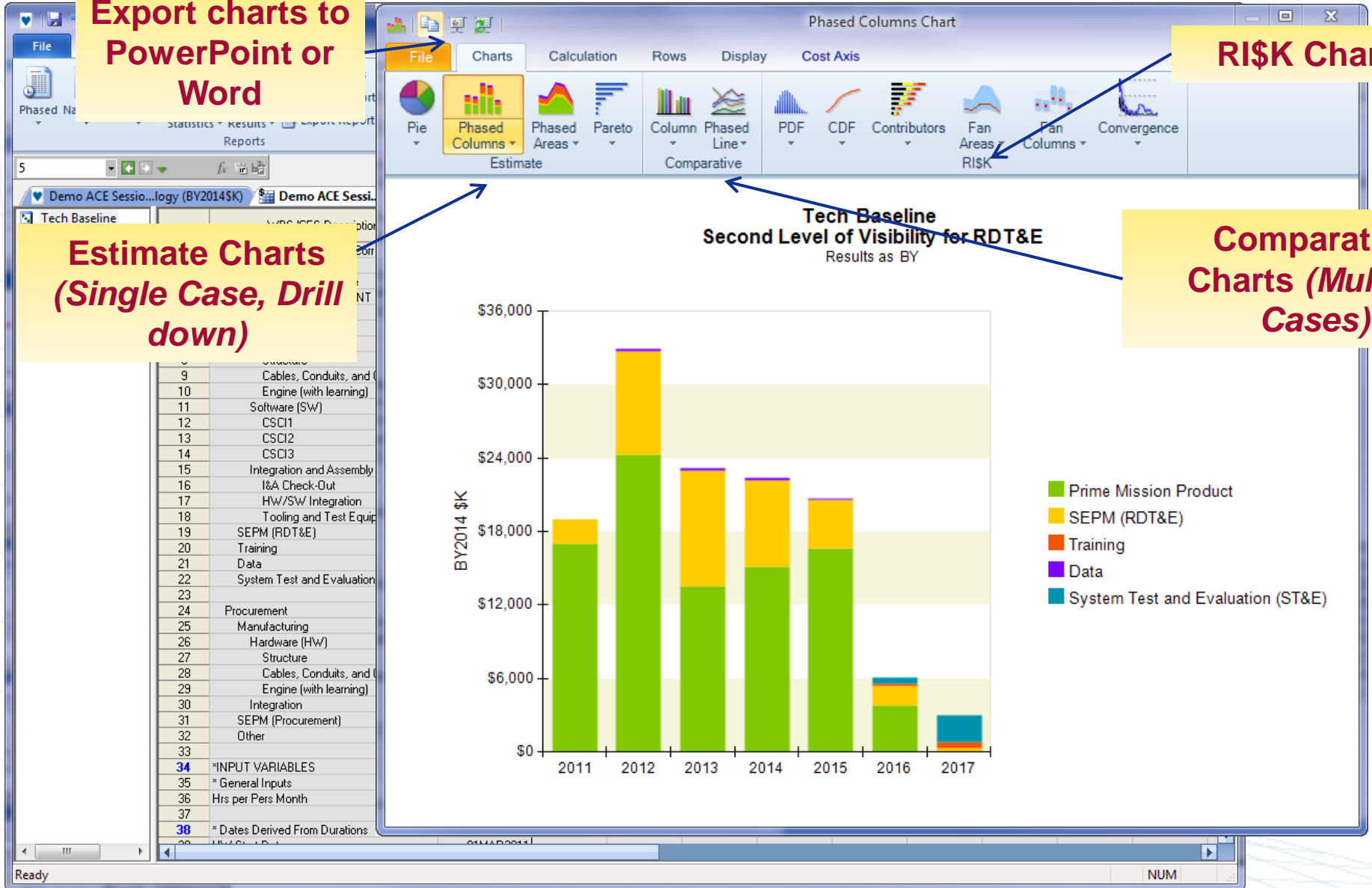
# Graphically View Results in ACE

Export charts to PowerPoint or Word

RISK Charts

Estimate Charts (Single Case, Drill down)

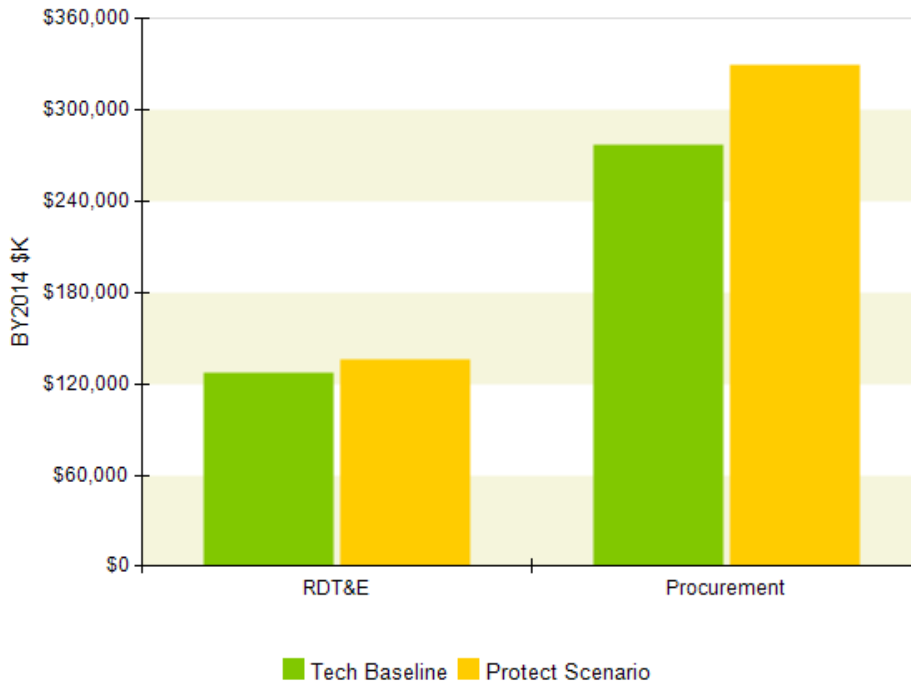
Comparative Charts (Multiple Cases)



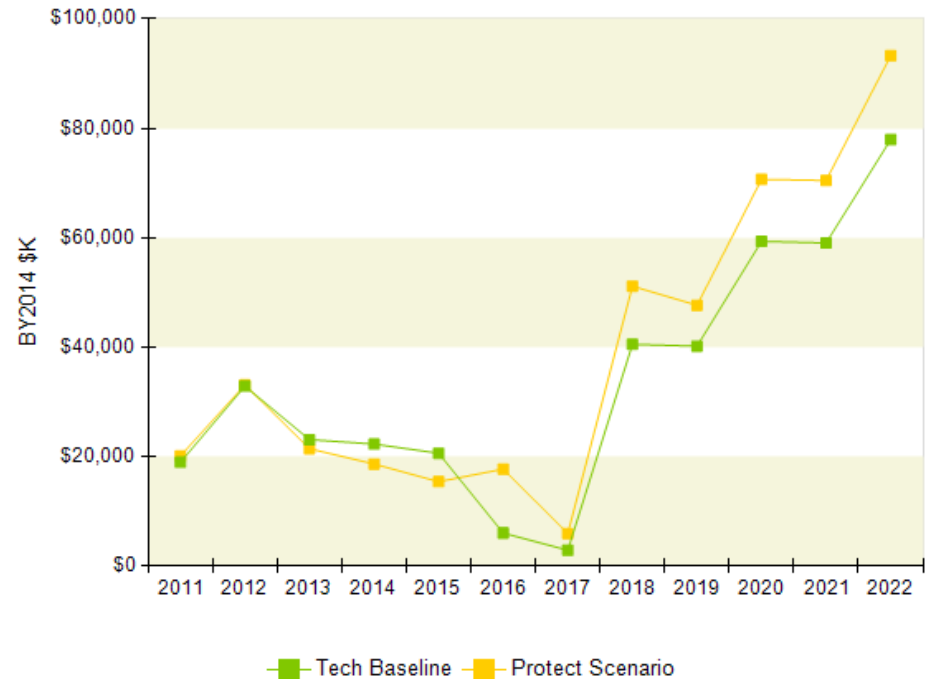


# Graphical Outputs to Compare What-if Cases

**Multiple cases**  
**Second Level of Visibility for POWER GENERATION PLANT**  
 Results as BY



**Multiple cases**  
**POWER GENERATION PLANT**  
 Results as BY





# **Uncertainty Analysis in ACE**





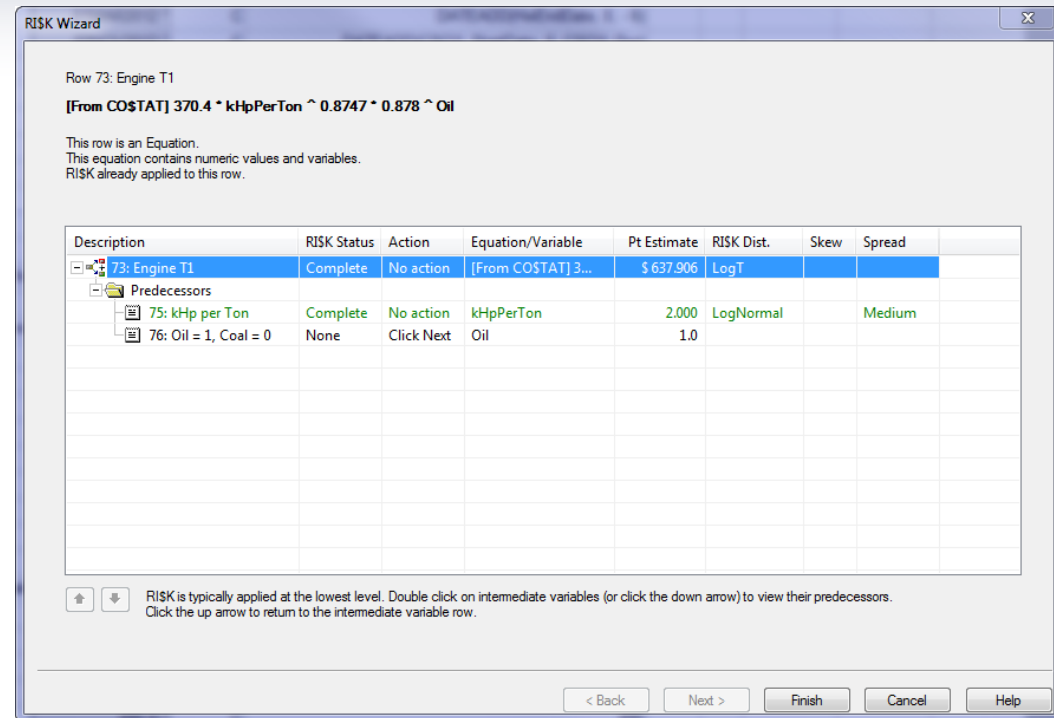
# What Does an Estimator Need to Perform Uncertainty Analysis?

- **Ability to apply uncertainty throughout the estimate**
  - Estimating Methodology (CERs)
  - Configuration (inputs)
  - Technical / Schedule
  - Discrete events
  - Correlate uncertainties
  - Sensitive to risk mitigation plans
- **Method to generate a defensible estimate of the overall uncertainty**
- **Ability to adjust the point estimate to a desired confidence level and to control how the risk dollars will be phased**
- **Charts/tables to present estimate uncertainty**



RI\$K Wizard. Designed for new analysts, provides easy-to-follow screens that apply RI\$K distributions to the estimate

- The wizard gives guidance on whether uncertainty should be specified:
  - on the current row
  - and/or on the variables
  - or not recommended for that type of methodology



- Easy-to-understand options help the analyst characterize the uncertainty
- The wizard also displays any rows or variables feeding into the current row and shows if they already have uncertainty specified. The analyst is given the opportunity to specify uncertainty on these rows also.

**NOTE:** Advanced analysts will most likely continue to use the Advanced mode of the Input All form or the RI\$K workscreens to enter uncertainty.



# Input All Form: Basic and Advanced Mode

Selected Row: 31  
Move Item: [Buttons]  
Goto: [Button]  
Include Children: [Checked]  
Title: SEPM (Procurement) Phasing Method: [Dropdown]  
Unique ID: [Field] Replace Unique ID [Button] Phasing Wizard [Button]  
Equation/Throughput:  $0.37 * PMP\$$  [Eq Builder...][CER Lib...]  
Summary | FY Inputs | Monthly | Learning | Spread Total | RISK | Defs  
0% 57% 100% 229%  
Point Est. .25 .75  
Right-Skewed Triangular distribution with High Spread  
 NO uncertainty -- Point Estimate represents the exact eventual outcome  
 Point Estimate offers a close approximation of the eventual outcome  
 Point Estimate offers a rough approximation of the eventual outcome  
 Point Estimate is likely more than the eventual outcome  
 Point Estimate is likely less than the eventual outcome  
 Point Estimate is likely a lot more than the eventual outcome  
 Point Estimate is likely a lot less than the eventual outcome  
 I have defined my own distribution specification  
Undo Redo Advanced Close Help

**Basic mode:**

- Provides descriptive choices for specifying uncertainty
- Diagram changes based on selection

**Advanced mode:**

- Guides you through valid parameter choice
- Status tells you when the specification is Complete

Summary | Adjustments | FY Inputs | Monthly | Learning | Spread Total | RISK  
RISK Distribution Specification  
Distribution: Triangular P.E. Position: Mode  
Available Parameters: [List]  
RISK Specification: [Table]  
Status: Complete Estimate: \$ 73,603.700 \*  
Grouping: ID: Factors Grp ID...  
Strength: CorFactors  
Cumulative Distribution Functions: View Custom CDFs  
More RISK Options: More...



# Uncertainty Specification

- Apply uncertainty to cost methods and cost drivers
- All uncertainty specifications available at a glance:
  - **RI\$K Spec:** Review or edit entire specification for that row
  - **Distribution:** Select shape (Normal, Log-normal, Student's t, Log-t, Triangular, Uniform, Beta, BetaPERT, Weibull, or user-defined CDF)
  - **Spread/Skew:** Assign default dispersion, or
  - **Define dispersion:** low/high as a value or % of PE, Stdev, CV, others
  - **Group:** apply correlation
  - **RI\$K On/Off:** Control RI\$K distributions used in the simulation

73 Form=Log-t, PE=Median, High\*=126.16, High%=95.0000, DF=14.0000, GrpID=HW, GrpStr=CorrHw\_Other, Seed=1606972

▼ Demo Ace Sessi...mns (BY2011\$K)

|    | WBS/CES           | ID        | Tech Baseline  | Eq / Thruput | RI\$K Spec                           | Group | Strength     | Dist      | PE Pos |
|----|-------------------|-----------|--|--------------|--------------------------------------|-------|--------------|-----------|--------|
| 73 | Engine T1         | Engine_T1 | \$ 602.875 * [From CO\$TAT] 370.4 * kHpPerTon ^ 0.8747 * 0.878 ^ Oil |              | Form=Log-t, PE=Median, High*=126.16, | HW    | CorrHw_Other | Log-t     | Median |
| 74 |                   |           |  |              |                                      |       |              |           |        |
| 75 | kHp per Ton       | kHpPerTon | 2.000 *  | 2            | Form=lognormal,                      |       |              | lognormal | Median |
| 76 | Oil = 1, Coal = 0 | Oil       | 1.0 *  | 1            |                                      |       |              |           |        |
| 77 | Learning Slope    | EngLrnSlp | 95.000 *   | 95           |                                      |       |              |           |        |

Methodology / What if (read only) / Spread Total / Yearly Phasing / RI\$K Basic / Learning / RI\$K All Columns / Keywords /



# Correlation can be Assessed and Modeled

ACE 7.4 - [Demo ACE Session 2014.aces - RISK Correlation (FY2014 \$K, RISK Correlation, Case: Tech Baseline, with RISK)]

File Home View Construction Functions Results

Phased Narrative Inflation RISK Statistics DEC Results Edit Reports Import Report Template Export Report Template Favorites View Results View Charts... Automatically Calculate Refresh View Export Report More Options

Demo ACE Session...asic (BY2014SK) Demo ACE Sessio...ine, with RISK Demo ACE Sessio...ewer (BY2014SK)

| Row | WBS/CES                                  | Row 5: RDT&E | Row 6: Prime Mission Product | Row 7: Hardware (HW) | Row 8: Structure | Row 9: Cables, Conduits, and Connectors | Row 10: Engine (with learning) | Row 11: Software (SW) | Row 12: CSC1 | Row 13: CSC2 |
|-----|--|--------------|------------------------------|----------------------|------------------|---|--------------------------------|-----------------------|--------------|--------------|
| 1   | 5 RDT&E                                  | 1.000        | 0.849                        | 0.567                | 0.520            | 0.008                                   | 0.226                          | 0.495                 | 0.141        | 0.281        |
| 2   | 6 Prime Mission Product                  |              | 1.000                        | 0.750                | 0.691            | 0.010                                   | 0.292                          | 0.519                 | 0.157        | 0.287        |
| 3   | 7 Hardware (HW)                          |              |                              | 1.000                | 0.925            | 0.053                                   | 0.374                          | 0.004                 | 0.010        | 0.007        |
| 4   | 8 Structure                              |              |                              |                      | 1.000            | -0.006                                  | -0.001                         | 0.001                 | 0.004        | 0.006        |
| 5   | 9 Cables, Conduits, and Connectors (CCC) |              |                              |                      |                  | 1.000                                   | 0.011                          | -0.034                | -0.016       | -0.014       |
| 6   | 10 Engine (with learning)                |              |                              |                      |                  |   | 1.000                          | 0.014                 | 0.017        | 0.008        |
| 7   | 11 Software (SW)                         |              |                              |                      |                  |   |                                | 1.000                 | 0.312        | 0.545        |
| 8   | 12 CSC1                                  |              |                              |                      |                  |   |                                |                       | 1.000        | 0.014        |
| 9   | 13 CSC2                                  |              |                              |                      |                  |   |                                |                       |              | 1.000        |
| 10  | 14 CSC3                                  |              |                              |                      |                  |   |                                |                       |              |              |
| 11  | 15 Integration and Assembly (I&A)        |              |                              |                      |                  |   |                                |                       |              |              |
| 12  | 16 I&A Check-Out                         |              |                              |                      |                  |   |                                |                       |              |              |
| 13  | 17 HW/SW Integration                     |              |                              |                      |                  |   |                                |                       |              |              |

Grouping and Correlation Wizard

Group Name:

Assign the same correlation to all elements:

Enter individual group strengths.  
 If you specify a dominant element with a "D", the remaining entries are the correlation with that element.

Enter a correlation matrix.  
 ACE will identify the dominant element and column of correlations that most closely replicates the entered matrix. NOTE: Your entered values are NOT SAVED. To save, copy/paste to a convenient location.

Automatically display strength column.

| Row | WBS/CES Description       | Total               | Strength        | 8     | 32    | 55    | 61    | 66    | 73    |
|-----|---------------------------|---------------------|-----------------|-------|-------|-------|-------|-------|-------|
| 8   | Structure                 | 23,467.610 (54%)*   | CorrHw_Other[0] | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 32  | Other                     | \$ 4,733.629 (50%)* | CorrHw_Other[0] | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 55  | HW Duration               | 18.0 (23%)*         | CorrHw_Other[0] | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| 61  | ST&E Duration             | 12.0 (20%)*         | CorrHw_Other[0] | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 |
| 66  | CCC                       | 784,855.900 (38%)*  | CorrHw_Other[0] | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 |
| 73  | Engine T1                 | \$ 637.906 (50%)*   | CorrHw_Other[0] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| 79  | Development to Production | 0.776 (25%)*        | CorrHw_Other[0] | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |



# Risk Statistics Easily Available

ACE 7.4 - [Demo ACE Session 2014.aces - Inputs/Results Viewer (BY2014\$K)]

File Home View Construction Functions Results Display Cases

BY RISK Statistics Phased by Case Configuration Rows RISK Parameters Year/Month Range Auto Size Columns Point Estimate 50% DEC Results Row Views Calculate Zoom Bookmark Toggle Override Session Options RISK Allocation Options

5

Demo ACE Session...asic (BY2014\$K) Demo ACE Sessi...wer (BY2014\$K)

|    | WBS/CES Description                    | Point Estimate       | Mean           | Std Dev       | CV       | 5%             | 10%            | 15%            | 20%            |                |
|----|--|----------------------|----------------|---------------|----------|----------------|----------------|----------------|----------------|----------------|
| 1  | Choose 1=No Corr, 2=Given Corr         | 1.000                | 1.000          |               |          | 1.000          | 1.000          | 1.000          | 1.000          |                |
| 2  |  |                      |                |               |          |                |                |                |                |                |
| 3  | * Powerplant System Estimate           |                      |                |               |          |                |                |                |                |                |
| 4  | POWER GENERATION PLANT                 | \$ 404,507.181 (22%) | \$ 457,660.599 | \$ 66,633.764 | 0.145596 | \$ 360,106.297 | \$ 378,371.338 | \$ 390,490.736 | \$ 401,081.912 | \$ 411,173.048 |
| 5  | RDT&E                                  | \$ 127,240.933 (14%) | \$ 135,944.886 | \$ 7,732.506  | 0.056880 | \$ 123,361.291 | \$ 125,907.917 | \$ 127,673.628 | \$ 129,271.337 | \$ 130,869.054 |
| 6  | Prime Mission Product                  | \$ 90,475.886 (10%)  | \$ 97,598.201  | \$ 5,609.163  | 0.057472 | \$ 88,560.973  | \$ 90,379.698  | \$ 91,735.366  | \$ 92,779.350  | \$ 93,799.350  |
| 7  | Hardware (HW)                          | \$ 31,297.913 (52%)  | \$ 31,271.080  | \$ 4,162.445  | 0.133108 | \$ 24,693.215  | \$ 26,055.238  | \$ 26,969.793  | \$ 27,780.403  | \$ 28,527.913  |
| 8  | Structure                              | \$ 23,467.610 (54%)  | \$ 23,161.181  | \$ 3,855.742  | 0.166474 | \$ 16,981.373  | \$ 18,283.491  | \$ 19,186.824  | \$ 19,877.853  | \$ 20,527.913  |
| 9  | Cables, Conduits, and Connectors (C&C) | \$ 2,118.063 (38%)   | \$ 2,202.922   | \$ 227.052    | 0.103068 | \$ 1,847.614   | \$ 1,912.792   | \$ 1,960.691   | \$ 1,998.733   | \$ 2,036.775   |
| 10 | Engine (with learning)                 | \$ 5,712.241 (50%)   | \$ 5,906.977   | \$ 1,557.988  | 0.263754 | \$ 3,749.720   | \$ 4,094.258   | \$ 4,386.608   | \$ 4,586.610   | \$ 4,786.612   |
| 11 | Software (SW)                          | \$ 38,710.019 (6%)   | \$ 42,980.605  | \$ 2,908.385  | 0.067667 | \$ 38,497.767  | \$ 39,335.096  | \$ 39,940.255  | \$ 40,404.889  | \$ 40,869.522  |
| 12 | CSCI1                                  | \$ 10,083.809 (19%)  | \$ 10,876.044  | \$ 851.885    | 0.078327 | \$ 9,644.114   | \$ 9,831.716   | \$ 9,977.957   | \$ 10,109.530  | \$ 10,241.103  |
| 13 | CSCI2                                  | \$ 11,504.203 (15%)  | \$ 13,158.014  | \$ 1,600.498  | 0.121637 | \$ 10,951.078  | \$ 11,259.675  | \$ 11,483.809  | \$ 11,670.456  | \$ 11,857.103  |
| 14 | CSCI3                                  | \$ 17,122.007 (24%)  | \$ 18,946.547  | \$ 2,273.771  | 0.120010 | \$ 15,620.160  | \$ 16,141.817  | \$ 16,556.867  | \$ 16,904.381  | \$ 17,251.895  |
| 15 | Integration and Assembly (I&A)         | \$ 20,467.953 (9%)   | \$ 23,346.516  | \$ 2,325.311  | 0.099600 | \$ 20,020.950  | \$ 20,520.970  | \$ 20,912.984  | \$ 21,242.586  | \$ 21,572.188  |
| 16 | I&A Check-Out                          | \$ 7,309.983 (24%)   | \$ 8,051.346   | \$ 988.986    | 0.122835 | \$ 6,552.530   | \$ 6,830.634   | \$ 7,048.476   | \$ 7,200.876   | \$ 7,353.276   |
| 17 | HW/SW Integration                      | \$ 10,233.977 (9%)   | \$ 11,806.290  | \$ 1,258.049  | 0.106558 | \$ 9,974.114   | \$ 10,268.124  | \$ 10,507.540  | \$ 10,688.434  | \$ 10,869.328  |
| 18 | Tooling and Test Equipment             | \$ 2,923.993 (3%)    | \$ 3,488.880   | \$ 371.682    | 0.106533 | \$ 2,962.899   | \$ 3,040.499   | \$ 3,106.205   | \$ 3,157.516   | \$ 3,208.827   |
| 19 | SEPM (RDT&E)                           | \$ 32,812.240 (38%)  | \$ 33,998.192  | \$ 4,126.587  | 0.121377 | \$ 26,926.406  | \$ 28,362.613  | \$ 29,419.433  | \$ 30,383.258  | \$ 31,347.083  |
| 20 | Training                               | \$ 671.849 (34%)     | \$ 938.805     | \$ 492.008    | 0.524079 | \$ 370.441     | \$ 444.302     | \$ 502.551     | \$ 547.937     | \$ 593.323     |
| 21 | Data                                   | \$ 615.188 (32%)     | \$ 742.457     | \$ 228.833    | 0.308211 | \$ 430.828     | \$ 483.092     | \$ 520.750     | \$ 551.860     | \$ 582.970     |
| 22 | System Test and Evaluation (ST&E)      | \$ 2,665.771 (52%)   | \$ 2,667.231   | \$ 308.138    | 0.115527 | \$ 2,194.538   | \$ 2,275.657   | \$ 2,337.083   | \$ 2,391.127   | \$ 2,445.171   |
| 23 |  |                      |                |               |          |                |                |                |                |                |
| 24 | Procurement                            | \$ 277,266.248 (25%) | \$ 321,715.713 | \$ 63,296.250 | 0.196746 | \$ 230,188.195 | \$ 246,833.435 | \$ 257,684.940 | \$ 267,702.307 | \$ 277,266.248 |
| 25 | Manufacturing                          | \$ 198,928.919 (37%) | \$ 214,860.163 | \$ 38,374.212 | 0.178601 | \$ 157,969.718 | \$ 168,230.501 | \$ 176,055.491 | \$ 182,118.841 | \$ 187,782.191 |
| 26 | Hardware (HW)                          | \$ 172,981.669 (33%) | \$ 189,857.927 | \$ 33,610.884 | 0.177032 | \$ 140,132.281 | \$ 148,954.026 | \$ 155,743.427 | \$ 161,287.606 | \$ 166,531.785 |
| 27 | Structure                              | \$ 127,476.056 (36%) | \$ 141,266.786 | \$ 31,030.046 | 0.219656 | \$ 95,427.078  | \$ 103,696.132 | \$ 110,024.497 | \$ 114,661.989 | \$ 119,300.481 |
| 28 | Cables, Conduits, and Connectors (C&C) | \$ 11,505.317 (22%)  | \$ 13,431.744  | \$ 2,333.399  | 0.173723 | \$ 10,073.205  | \$ 10,638.028  | \$ 11,010.187  | \$ 11,378.586  | \$ 11,746.985  |
| 29 | Engine (with learning)                 | \$ 34,000.296 (50%)  | \$ 35,159.398  | \$ 9,273.430  | 0.263754 | \$ 22,319.017  | \$ 24,369.770  | \$ 26,109.888  | \$ 27,300.335  | \$ 28,527.913  |
| 30 | Integration                            | \$ 25,947.250 (58%)  | \$ 25,002.236  | \$ 6,374.926  | 0.254974 | \$ 15,196.344  | \$ 16,933.501  | \$ 18,349.975  | \$ 19,396.351  | \$ 20,527.913  |
| 31 | SEPM (Procurement)                     | \$ 23,603.700 (22%)  | \$ 102,110.567 | \$ 34,296.077 | 0.335872 | \$ 55,532.964  | \$ 62,294.919  | \$ 67,507.392  | \$ 72,025.655  | \$ 76,543.918  |

Ready NUM



# Estimates can be Adjusted to Desired Confidence Levels

In constant or then year dollars

**ACE Session Properties**

General | Calculation | Errors | Inflation

RISK and Config Reporting | Format | Summary | Present Value

Configuration Defaults

Display Config Info

Set Config Info

RISK Report default setting

Display every 5th percentile

From 0%

To 100%

Display five user-defined percentiles

| Level |
|-------|
| 1     |
| 2     |
| 3     |
| 4     |
| 5     |

Sunk Years

Last Year:

2010

RISK Allocation

This process is used for Phased, Budgetary and C reports to cause probability level results to sum, p Allocation options do NOT affect RISK statistical

Allocate at  % probability

Allocation markers defined in:

Allocate by Std Dev:

RISK Phasing Profile:

RISK PE Percent Adjustment:  %

Allocate then inflate (BY RISK statistics used)

Inflate then allocate (TY/SY RISK statistics used)

OK Cancel Set as D

ACE 7.4 - [Demo ACE Session 2014.aces - TY Phased Costs (TY SK, Time Phased, Case: Tech Baseline, 50% CL allocated at Level 2)]

File Home View Construction Functions Results

Phased Narrative Inflation RISK Statistics DEC Reports

Automatically Calculate Refresh View Export Report

Demo ACE Session...asic (BY2014SK) Demo ACE Sessio...ewer (BY2014SK) Demo ACE Session...ted at Level 2)

| Row | Cost Element | Approp                                 | Total                     | FY 2011       | FY 2012       | FY 2013       | FY 2014       | FY 2015       | FY 2016      |
|-----|--------------|--|---------------------------|---------------|---------------|---------------|---------------|---------------|--------------|
| 13  | 3            | * Powerplant System Estimate           |                           |               |               |               |               |               |              |
| 14  | 4            | POWER GENERATION PLANT                 | \$ 505,476.340 (~50%)     | \$ 18,394.548 | \$ 32,537.708 | \$ 24,167.013 | \$ 26,144.292 | \$ 23,778.796 | \$ 9,484.868 |
| 15  | 5            | RDT&E                                  | \$ 137,919.182 (50%)      | \$ 18,394.548 | \$ 32,537.708 | \$ 24,167.013 | \$ 26,144.292 | \$ 23,778.796 | \$ 9,484.868 |
| 16  | 6            | Prime Mission Product                  | \$ 98,755.054 (50%)       | \$ 16,457.551 | \$ 23,974.150 | \$ 14,524.747 | \$ 17,302.911 | \$ 19,468.123 | \$ 7,027.572 |
| 17  | 7            | Hardware (HW)                          | \$ 30,670.324 (52%)       | \$ 16,457.551 | \$ 14,125.257 | \$ 87.516     |               |               |              |
| 18  | 8            | Structure                              | RDTEA \$ 22,796.095 (53%) | \$ 13,139.652 | \$ 9,656.443  |               |               |               |              |
| 19  | 9            | Cables, Conduits, and Connectors (CCC) | RDTEA \$ 2,175.232 (53%)  | \$ 99.937     | \$ 1,987.779  | \$ 87.516     |               |               |              |
| 20  | 10           | Engine (with learning)                 | RDTEA \$ 5,698.997 (53%)  | \$ 3,217.962  | \$ 2,481.035  |               |               |               |              |
| 21  | 11           | Software (SW)                          | \$ 43,515.567 (52%)       |               | \$ 9,848.893  | \$ 14,437.231 | \$ 17,293.050 | \$ 1,936.393  |              |
| 22  | 12           | CSC1                                   | RDTEA \$ 10,746.250 (55%) |               | \$ 9,848.893  | \$ 897.357    |               |               |              |
| 23  | 13           | CSC2                                   | RDTEA \$ 13,229.021 (54%) |               |               | \$ 11,559.758 | \$ 1,669.263  |               |              |
| 24  | 14           | CSC3                                   | RDTEA \$ 19,540.295 (54%) |               |               | \$ 1,980.115  | \$ 15,623.787 | \$ 1,936.393  |              |
| 25  | 15           | Integration and Assembly (I&A)         | RDTEA \$ 24,569.163 (52%) |               |               | \$ 9.861      | \$ 17,531.730 | \$ 7,027.572  |              |
| 26  | 16           | I&A Check-Out                          | RDTEA \$ 8,477.618 (51%)  |               |               | \$ 3.522      | \$ 6,261.332  | \$ 2,212.764  |              |
| 27  | 17           | HW/SW Integration                      | RDTEA \$ 12,424.307 (51%) |               |               | \$ 4.930      | \$ 8,765.865  | \$ 3,653.512  |              |
| 28  | 18           | Tooling and Test Equipment             | RDTEA \$ 3,667.238 (51%)  |               |               | \$ 1.409      | \$ 2,504.533  | \$ 1,161.296  |              |
| 29  | 19           | SEPM (RDT&E)                           | RDTEA \$ 34,644.393 (50%) | \$ 1,901.349  | \$ 8,405.957  | \$ 9,464.813  | \$ 8,659.275  | \$ 4,180.219  | \$ 1,710.890 |
| 30  | 20           | Training                               | RDTEA \$ 908.560 (50%)    |               |               |               |               | \$ 143.792    |              |
| 31  | 21           | Data                                   | RDTEA \$ 721.374 (50%)    | \$ 35.648     | \$ 157.601    | \$ 177.453    | \$ 182.106    | \$ 130.454    | \$ 32.077    |
| 32  | 22           | System Test and Evaluation (ST&E)      | RDTEA \$ 2,889.799 (50%)  |               |               |               |               |               | \$ 570.538   |
| 33  | 23           |  |                           |               |               |               |               |               |              |
| 34  | 24           | Procurement                            | \$ 367,557.159 (50%)      |               |               |               |               |               |              |
| 35  | 25           | Manufacturing                          | \$ 248,276.713 (51%)      |               |               |               |               |               |              |
| 36  | 26           | Hardware (HW)                          | \$ 219,206.731 (51%)      |               |               |               |               |               |              |

Ready NUM



# TY RI\$K Results

ACE 7.4 - [Demo ACE Session 2014.aces - TY Phased Costs (TY \$K, Time Phased, Case: Tech Baseline, 50% CL a

File Home View Construction Functions Results

Phased Narrative Inflation RISK Statistics DEC Results Reports

Import Report Template Edit Reports Export Report Template Favorites View Results View Charts... View

Automatically Calculate Refresh View Export Report More Options

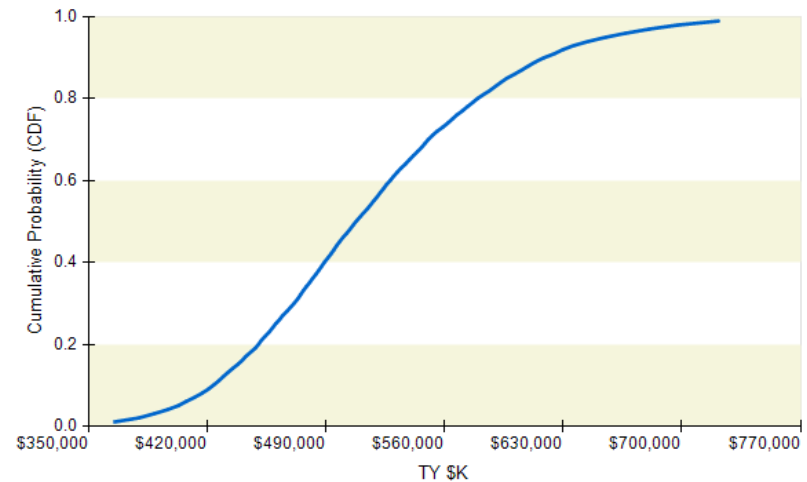
Demo ACE Session...asic (BY2014SK) Demo ACE Sessio...ewer (BY2014SK) Demo ACE Session...ted at Level 2)

| Row | Cost Element                           | Approp | Total                 | FY 2011       | FY 2012       |
|-----|--|--------|-----------------------|---------------|---------------|
| 13  | * Powerplant System Estimate           |        |                       |               |               |
| 14  | POWER GENERATION PLANT                 |        | \$ 505,476.340 (~50%) | \$ 18,394.548 | \$ 32,537.708 |
| 15  | RDT&E                                  |        | \$ 137,919.188 (50%)  | \$ 18,394.548 | \$ 32,537.708 |
| 16  | Prime Mission Product                  |        | \$ 98,755.054 (50%)   | \$ 16,457.551 | \$ 23,974.150 |
| 17  | Hardware (HW)                          |        | \$ 30,670.324 (52%)   | \$ 16,457.551 | \$ 14,125.257 |
| 18  | Structure                              | RDTEA  | \$ 22,796.095 (53%)   | \$ 13,139.652 | \$ 9,656.443  |
| 19  | Cables, Conduits, and Connectors (CCC) | RDTEA  | \$ 2,175.232 (53%)    | \$ 99.937     | \$ 1,987.779  |
| 20  | Engine (with learning)                 | RDTEA  | \$ 5,698.997 (53%)    | \$ 3,217.962  | \$ 2,481.035  |
| 21  | Software (SW)                          |        | \$ 43,515.567 (52%)   |               | \$ 9,848.893  |
| 22  | CSCI1                                  | RDTEA  | \$ 10,746.250 (55%)   |               |               |
| 23  | CSCI2                                  | RDTEA  | \$ 13,229.021 (54%)   |               |               |
| 24  | CSCI3                                  | RDTEA  | \$ 19,540.295 (54%)   |               |               |
| 25  | Integration and Assembly (I&A)         | RDTEA  | \$ 24,569.163 (52%)   |               |               |
| 26  | I&A Check-Out                          | RDTEA  | \$ 8,477.618 (51%)    |               |               |
| 27  | HW/SW Integration                      | RDTEA  | \$ 12,424.307 (51%)   |               |               |
| 28  | Tooling and Test Equipment             | RDTEA  | \$ 3,667.238 (51%)    |               |               |
| 29  | SEPM (RDT&E)                           | RDTEA  | \$ 34,644.393 (50%)   | \$ 1,901.349  |               |
| 30  | Training                               | RDTEA  | \$ 908.560 (50%)      |               |               |
| 31  | Data                                   | RDTEA  | \$ 721.374 (50%)      | \$ 35.648     |               |
| 32  | System Test and Evaluation (ST&E)      | RDTEA  | \$ 2,889.799 (50%)    |               |               |
| 33  |  |        |                       |               |               |
| 34  | Procurement                            |        | \$ 367,557.158 (50%)  |               |               |
| 35  | Manufacturing                          |        | \$ 248,276.713 (51%)  |               |               |
| 36  | Hardware (HW)                          |        | \$ 219,206.731 (51%)  |               |               |

Ready

- TY time phased RI\$K results allocated at specified confidence level from a specified level in the WBS
- In this case, 50% from 2<sup>nd</sup> level, meaning RDT&E and Procurement are the 50% statistical results, remaining levels adjusted to sum

**Tech Baseline  
POWER GENERATION PLANT**  
Results as TY Actual Statistics  
Calculated with 7000 iterations, CV = 0.150

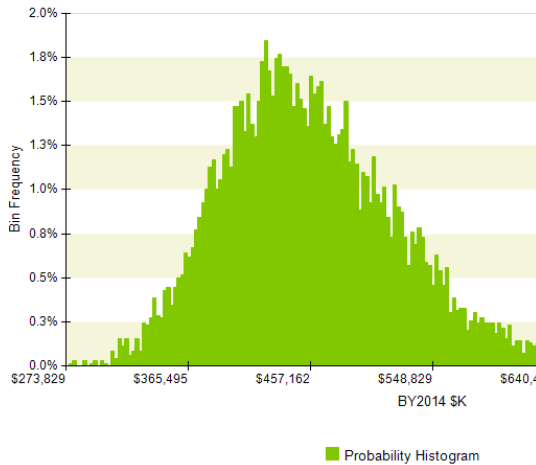


- TY RI\$K cumulative distribution curve

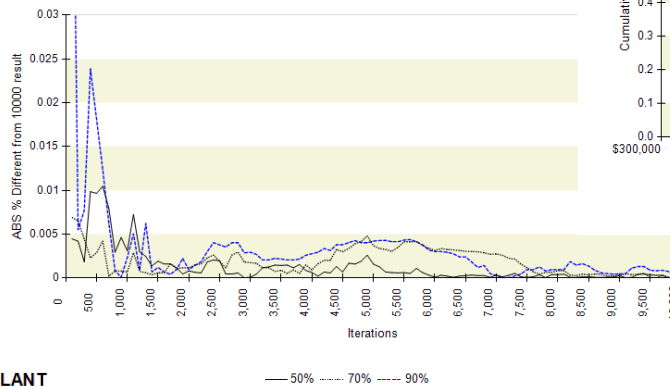


# Graphical Outputs to Present Uncertainty Results

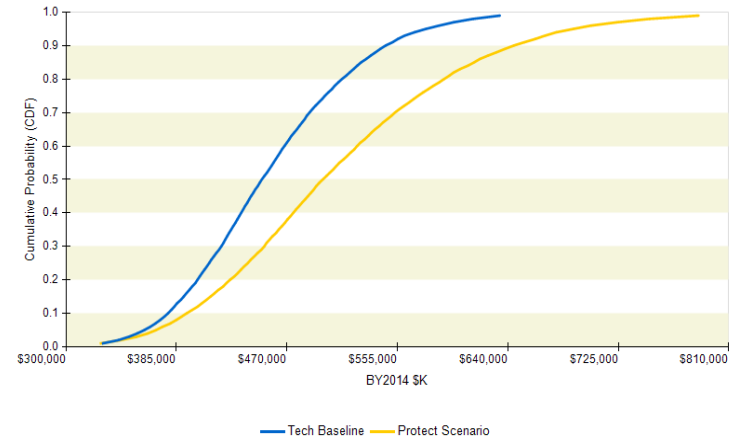
**Tech Baseline  
POWER GENERATION PLANT**  
Results as BY Statistics  
Calculated with 7000 iterations, CV = 0.146



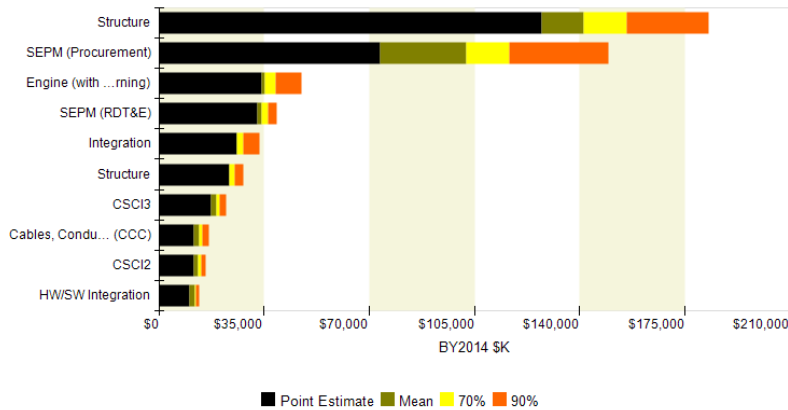
**Tech Baseline  
Convergence for POWER GENERATION PLANT**  
Calculated with 10000 iterations, CV = 0.145



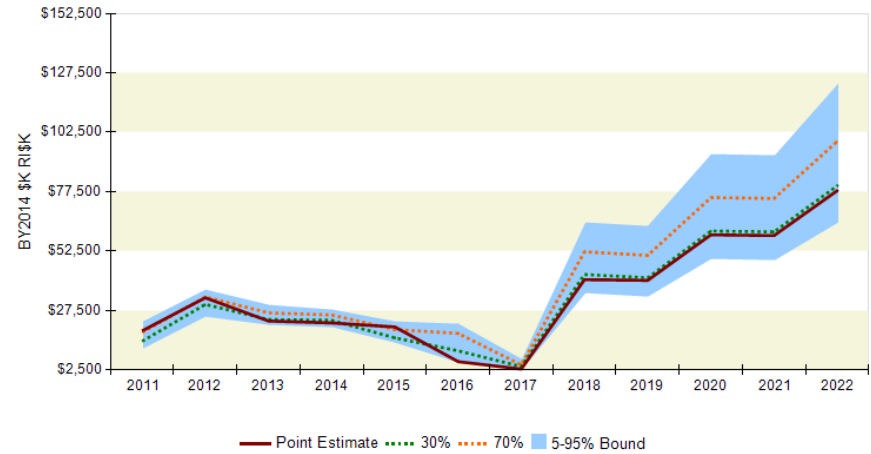
**Multiple cases  
POWER GENERATION PLANT**  
Results as BY Statistics  
Calculated with 7000 iterations, CV (Tech Baseline) = 0.146



**Tech Baseline  
Cost Contributors for POWER GENERATION PLANT**  
Results as BY Statistics  
Calculated with 7000 iterations, CV = 0.146  
Sorted on 90% Total Value



**Tech Baseline  
POWER GENERATION PLANT**  
Annual BY2014\$K Costs By Year  
Results as BY Statistics  
Calculated with 7000 iterations, CV = 0.146







# Benefits of Using ACEIT are Substantial

- **Implements standardized process and increases estimate quality**
  - Supports development of consistent, systematic, and defensible Life Cycle Cost Estimates
  - Delivers integrated, automated documentation, with complete audit trail
  - Improves estimate review and verification process through consistent model structure
  - Contains industry approved algorithms and databases to model inflation, learning, and phasing
  - Integrates statistical and risk analysis to quantify uncertainty in estimates
  - Enhances quality by eliminating many errors often made in spreadsheets (which frequently go undetected)
- **Provides flexibility to model any system type**
  - Unlimited flexibility to model any type of system linking all life cycle phases and facilitate any type of Analysis of Alternatives
  - Huge variety of automated and customizable reports
- **Integrates with other applications through an open platform**
  - Ability to link to virtually any other tool
  - Robust Application Programming Interface (API ) to facilitate electronic interaction
- **Reduces management challenges**
  - Structured modeling platform shortens time for ACE users to learn a new model
  - Eases organization-wide distribution of key standards (WBS, inflation, etc.)
  - Empowers the analysts to answer Key Program/Project Management questions