

Conference Paper

Enhancing Excel-Based Cost Models with PivotTable Reporting

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- ▶ Implementing PivotTables in Excel-Based Cost Models
- ▶ Risk/Uncertainty Analysis Implications
- ▶ Benefits & Disadvantages
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PivotTables have been used in Navy Program Life Cycle Cost Estimate (PLCCE) models at SPAWAR for nearly a decade

- ▶ First implemented on a Space and Naval Warfare Systems Command (SPAWAR) cost model in 2002 within a PLCCE model for a large Navy Command & Control (C2) program
- ▶ Cost estimators supporting this Navy C2 program continued to refine and utilize the PivotTable capability to support milestone decision cost reviews with the Naval Center for Cost Analysis (NCCA) and a myriad of Program Office cost reporting requirements and budgetary drills
- ▶ After the utility of PivotTables was proven on this Navy C2 program, other SPAWAR programs slowly began using PivotTables – another large Navy IT program implemented PivotTables in their PLCCE model in 2008 and many others followed
- ▶ PivotTables have since been adopted within SPAWAR as a best practice in Excel-based PLCCE models, and are currently utilized by numerous SPAWAR programs within their PLCCE models



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PivotTables provide a dynamic reporting capability to enhance the outputs of an effectively structured PLCCE model

Integrated PLCCE Model Document

Core PLCCE Modeling Concept

Document Items

- Cover Page
- Table of Contents
- Major GR&A

Inputs

- Variables
- Static
- Risk / Uncertainty Parameters

Estimating Mechanism

- WBS/CES Structure, each element containing:
 - > Documentation
 - > Summaries
 - > Data Sources
 - > Calculations

Outputs

- Cost Summaries, by WBS (BY & TY)
- Risk Summaries
- Affordability
- APB Summary
- Other Analyses

PivotTables enhance PLCCE model outputs

What is a PivotTable?

- ▶ Basically, a simple database capability in Excel that enables the user to analyze, summarize, filter, and report on large sets of data in Excel (i.e. Excel-based lists and databases)
 - Enables a user to transform endless rows and columns of data into a meaningful report quickly and dynamically
 - Several options on how to summarize the data (sum, average, count, max, min, etc.)
 - Easy to change the content and layout of the data using the “Create PivotTable” dialog box
 - Dynamic GUI allows user to drag and drop variables of information into an organized, pre-formatted report

| | A | L | P | Q | R | T | U | W | X | Y | AA | AB |
|----|-----|------------------------|----------------|-------------|-----|---------|-------------------|-------------|---------------|--------------|-----------|---------------------|
| | Ref | WBS Level 2 | Funding Source | Program Nam | APP | SW Bloc | Direct or Indirec | Description | Descripti on2 | Fiscal Years | Then-Year | Constant FY2005 \$K |
| 3 | 1 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY1999 | 0.0 | 0.0 |
| 4 | 2 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2000 | 0.0 | 0.0 |
| 5 | 3 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2001 | 0.0 | 0.0 |
| 6 | 4 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2002 | 0.0 | 0.0 |
| 7 | 5 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2003 | 0.0 | 0.0 |
| 8 | 6 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2004 | 0.0 | 0.0 |
| 9 | 7 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2005 | 85.9 | 85.9 |
| 10 | 8 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2006 | 235.3 | 228.7 |
| 11 | 9 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2007 | 348.5 | 329.3 |
| 12 | 10 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2008 | 453.5 | 416.3 |
| 13 | 11 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2009 | 330.2 | 294.6 |
| 14 | 12 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2010 | 21.4 | 18.5 |



| | A | B | C | D | E |
|----|---|-------------------|--|---------------------|----------------|
| 1 | | | | | |
| 2 | | Funding Source | (All) | | |
| 3 | | Program Name | (All) | | |
| 4 | | S/W Block | (All) | | |
| 5 | | | | | |
| 6 | | FY2005 \$K | | Fiscal Years | |
| 7 | | APPN1 | WBS Level 2 | FY1999 | FY2000 |
| 8 | | MPN | | 195,333 | 197,825 |
| 9 | | | 1.3 Program Management | 662 | 662 |
| 10 | | | 3.1 Mission Personnel | 184,206 | 186,673 |
| 11 | | | 3.3 Intermediate Maintenance | 23 | 23 |
| 12 | | | 3.6 Sustaining Support | 10,443 | 10,468 |
| 13 | | | | | |
| 14 | | O&M,N | | 42,203 | 37,458 |
| 15 | | | 1.1 Prime Mission Product | 3,040 | 1,520 |
| 16 | | | 1.13 Initial Training | 109 | |
| 17 | | | 1.3 Program Management | 3,944 | 6,556 |
| 18 | | | 1.4 Engineering | 5,776 | 4,395 |
| 19 | | | 1.6 Platform/Site Activation/ Installation | 357 | |

Setting up a PivotTable in an Excel-based PLCCE model begins with capturing the PLCCE in a simple “database” format

- ▶ Create a “Database” tab in PLCCE model that summarizes PLCCE at the lowest level of detail on a single tab in a flat database format
 - Contains defined “fields”, which are essentially columns that categorize costs in a useful and meaningful way
 - Each row captures a line item of costs in the PLCCE broken out by these “fields” and is typically linked to the applicable WBS element in the body of the model

- ▶ Most difficult and time-consuming step

| | A | L | P | Q | R | T | U | W | X | Y | AA | AB |
|----|-----|------------------------|----------------|-------------|-----|----------|--------------------|-------------|---------------|--------------|-----------|---------------------|
| 2 | Ref | WBS Level 2 | Funding Source | Program Nam | APP | S/W Bloc | Direct or Indirect | Description | Descripti on2 | Fiscal Years | Then-Year | Constant FY2005 \$K |
| 3 | 1 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY1999 | 0.0 | 0.0 |
| 4 | 2 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2000 | 0.0 | 0.0 |
| 5 | 3 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2001 | 0.0 | 0.0 |
| 6 | 4 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2002 | 0.0 | 0.0 |
| 7 | 5 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2003 | 0.0 | 0.0 |
| 8 | 6 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2004 | 0.0 | 0.0 |
| 9 | 7 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2005 | 85.9 | 85.9 |
| 10 | 8 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2006 | 235.3 | 228.7 |
| 11 | 9 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2007 | 348.5 | 329.3 |
| 12 | 10 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2008 | 453.5 | 416.3 |
| 13 | 11 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2009 | 330.2 | 294.6 |
| 14 | 12 | 1.3 Program Management | External | Common | MPN | 4.X | Indirect | Prog Mgmt | Indirect | FY2010 | 21.4 | 18.5 |

Once the “Database” tab is set up, creating the PivotTable report is a snap with the “Create PivotTable” dialog box

- ▶ Click on the “PivotTable” button on the “Insert” ribbon to access the “Create PivotTable” dialog box

The screenshot shows an Excel spreadsheet with columns labeled M through AB. The data includes 'WBS Level 3', 'Funding Source', 'Program Nam', 'APP', 'S/W Bloc', 'Direct or Indirect', 'Description', 'Description2', 'Fiscal Years', 'Then-Year', and 'Constant FY2005 \$K'. A 'PivotTable' button is circled in red on the 'Insert' ribbon. A red arrow points from this button to the 'Create PivotTable' dialog box, which is also circled in red. The dialog box contains the following text:

Create PivotTable

Choose the data that you want to analyze

- Select a table or range
- Table/Range: Database3!\$A\$2:\$AE\$15500
- Use an external data source
- Choose Connection...
- Connection name:

Choose where you want the PivotTable report to be placed

- New Worksheet
- Existing Worksheet
- Location:

Buttons: OK, Cancel

- ▶ Will demo how to do this at the end of the presentation
 - Step-by-step guidance on setting up a PivotTable using this feature is in the back-up slides

Editing PivotTables is simple with “Drag and Drop” GUI or with “Field List” pane

| FY2005 \$K | | Fiscal Years | |
|------------|--|--------------|---------|
| APPN1 | WBS Level 2 | FY1999 | FY2000 |
| MPN | | 195,333 | 197,825 |
| | 1.3 Program Management | 662 | 662 |
| | 3.1 Mission Personnel | 184,206 | 186,673 |
| | 3.3 Intermediate Maintenance | 23 | 23 |
| | 3.6 Sustaining Support | 10,443 | 10,468 |
| O&M,N | | 42,203 | 37,458 |
| | 1.1 Prime Mission Product | 3,040 | 1,520 |
| | 1.13 Initial Training | 109 | |
| | 1.3 Program Management | 3,944 | 6,556 |
| | 1.4 Engineering | 5,776 | 4,395 |
| | 1.6 Platform/Site Activation/ Installation | 357 | |
| | 1.7 Data | 453 | 531 |
| | 2.1 Program Related | 569 | 783 |
| | 3.2 Unit Level Consumption | 3,095 | 3,177 |
| | 3.3 Intermediate Maintenance | 8 | 9 |
| | 3.4 Depot Maintenance | | |
| | 3.6 Sustaining Support | 14,388 | 12,949 |
| | 3.7 Consolidated ISEA (CISEA) | 2,224 | 1,386 |

PivotTable Field List

Choose fields to add to report:

- Ref #
- CES Total
- CES Level 1
- CES Level 2
- CES Level 3
- CES Level 4
- CES Level 5
- CES Level 6
- CES Child
- WBS Total
- WBS Level 1

Drag fields between areas below:

Report Filter: [Empty]

Column Labels: Fiscal Years

Row Labels: APPN1, WBS Level 2

Values: Sum of FY2005 \$K

Defer Layout Update Update

▶ Will demo how to use this at the end of the presentation

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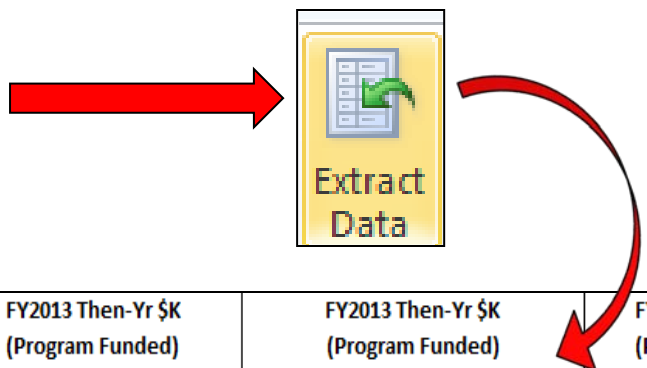
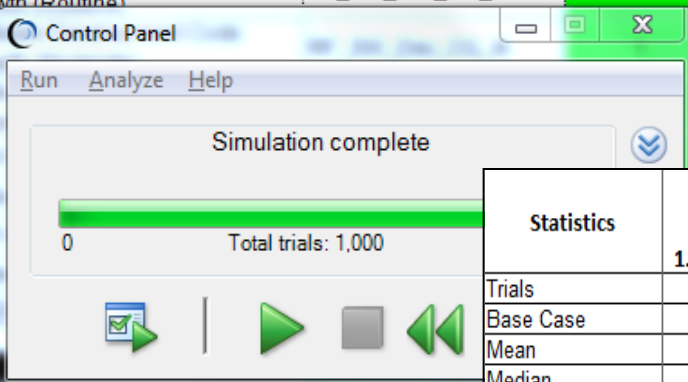
Cost risk/uncertainty analysis in Navy Excel-based cost models is currently executed using Oracle Crystal Ball

- ▶ Step 1: Create risk/uncertainty assumptions and forecasts and run simulation model

- ▶ Step 2: Extract risk/uncertainty forecast data

| Risk Variable WBS | Funding Source | Risk Factor | Name Definition | Risk Variable |
|-------------------|----------------|--|-----------------|---------------|
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Routine) | RF_SW_Dev_CG_R | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.2 | Program Funded | Software Development Code Growth (Simple) | RF_SW_Dev_CG_S | 1 |
| WBS 1.1.3 | Program Funded | System Level IA&T | | |
| WBS 1.1.4 | Program Funded | Purchased Services | | |

| FORECAST DATA | |
|--|---------|
| FY2013 Then-Yr \$K (PMW Funded) - Software Development | \$3,337 |
| FY2013 Then-Yr \$K (PMW Funded) - System Level IA&T | \$367 |
| FY2013 Then-Yr \$K (PMW Funded) - Purchased Services | \$521 |



| Statistics | FY2013 Then-Yr \$K (Program Funded) 1.1.2 Software Development | FY2013 Then-Yr \$K (Program Funded) 1.1.3 Integration, Assembly, & Test | FY2013 Then-Yr \$K (Program Funded) 1.1.4 Purchased Services |
|-----------------------|---|--|---|
| Trials | 1000 | 1000 | 1000 |
| Base Case | 3337 | 367 | 521 |
| Mean | 3651 | 495 | 521 |
| Median | 3503 | 465 | 521 |
| Standard Deviation | 1122 | 175 | 8 |
| Coeff. of Variability | 0.3074 | 0.3537 | 0.0151 |

| Percentiles | FY2013 Then-Yr \$K (Program Funded) 1.1.2 Software Development | FY2013 Then-Yr \$K (Program Funded) 1.1.3 Integration, Assembly, & Test | FY2013 Then-Yr \$K (Program Funded) 1.1.4 Purchased Services |
|-------------|---|--|---|
| 0% | 1045 | 123 | 498 |
| 10% | 2374 | 301 | 511 |
| 20% | 2709 | 350 | 514 |
| 30% | 2977 | 388 | 517 |
| 40% | 3236 | 428 | 519 |
| 50% | 3503 | 465 | 521 |

* Note: Extracted forecast cost data will be used to populate the risk/uncertainty adjusted database table

Risk/uncertainty adjusted cost data from Crystal Ball is leveraged to create a risk/uncertainty adjusted “Database” for a PivotTable

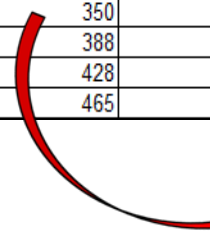
| Statistics | FY2013 Then-Yr \$K (Program Funded) | FY2013 Then-Yr \$K (Program Funded) | FY2013 Then-Yr \$K (Program Funded) |
|-----------------------|--|--|--|
| | 1.1.2 Software Development | 1.1.3 Integration, Assembly, & Test | 1.1.4 Purchased Services |
| Trials | 1000 | 1000 | 1000 |
| Base Case | 3337 | 367 | 521 |
| Mean | 3651 | 495 | 521 |
| Median | 3503 | 465 | 521 |
| Standard Deviation | 1122 | 175 | 8 |
| Coeff. of Variability | 0.3074 | 0.3537 | 0.0151 |

| Percentiles | FY2013 Then-Yr \$K (Program Funded) | FY2013 Then-Yr \$K (Program Funded) | FY2013 Then-Yr \$K (Program Funded) |
|-------------|--|--|--|
| | 1.1.2 Software Development | 1.1.3 Integration, Assembly, & Test | 1.1.4 Purchased Services |
| 0% | 1045 | 123 | |
| 10% | 2374 | 301 | |
| 20% | 2709 | 350 | |
| 30% | 2977 | 388 | |
| 40% | 3236 | 428 | |
| 50% | 3503 | 465 | |

- ▶ Step 3: Create an additional risk/uncertainty adjusted database table which replicates the point estimate database table

- ▶ Step 4: Using Excel “lookup” functions, import the cost risk/uncertainty values of the extracted forecast data to the risk/uncertainty database table

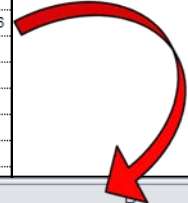
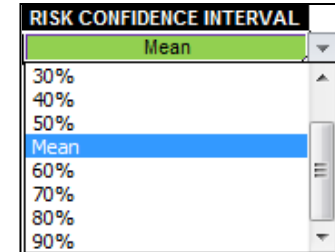
| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|----|-------------------------------------|-----------|----------------|------|----------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | WBS | Release | Funding Source | APPN | Description | FY2011 (TY \$K) | FY2012 (TY \$K) | FY2013 (TY \$K) | FY2014 (TY \$K) | FY2015 (TY \$K) | FY2016 (TY \$K) | FY2017 (TY \$K) | FY2018 (TY \$K) |
| 1 | | | | | | | | | | | | | |
| 2 | 1.1.2 Software Development | Release 1 | Program | RDTE | Software Development | \$0 | \$3,110 | \$1,964 | \$0 | \$0 | \$0 | \$0 | \$0 |
| 3 | 1.1.2 Software Development | Release 2 | Program | RDTE | Software Development | \$0 | \$0 | \$715 | \$2,266 | \$0 | \$0 | \$0 | \$0 |
| 4 | 1.1.2 Software Development | Release 3 | Program | RDTE | Software Development | \$0 | \$0 | \$0 | \$16 | \$2,269 | \$803 | \$0 | \$0 |
| 5 | 1.1.2 Software Development | Release 4 | Program | RDTE | Software Development | \$0 | \$0 | \$0 | \$0 | \$0 | \$979 | \$4,494 | \$455 |
| 6 | 1.1.2 Software Development | Release 5 | Program | RDTE | Software Development | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$1,646 |
| 7 | 1.1.2 Software Development | Release 1 | Program | RDTE | KTR Below-the-Line | \$0 | \$1,048 | \$625 | \$0 | \$0 | \$0 | \$0 | \$0 |
| 8 | 1.1.2 Software Development | Release 2 | Program | RDTE | KTR Below-the-Line | \$0 | \$0 | \$312 | \$668 | \$0 | \$0 | \$0 | \$0 |
| 9 | 1.1.2 Software Development | Release 3 | Program | RDTE | KTR Below-the-Line | \$0 | \$0 | \$0 | \$34 | \$708 | \$276 | \$0 | \$0 |
| 10 | 1.1.2 Software Development | Release 4 | Program | RDTE | KTR Below-the-Line | \$0 | \$0 | \$0 | \$0 | \$0 | \$487 | \$1,246 | \$219 |
| 11 | 1.1.2 Software Development | Release 5 | Program | RDTE | KTR Below-the-Line | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$696 |
| 12 | 1.1.2 Software Development | Release 1 | Program | RDTE | Testing | \$0 | \$22 | \$25 | \$0 | \$0 | \$0 | \$0 | \$0 |
| 13 | 1.1.2 Software Development | Release 2 | Program | RDTE | Testing | \$0 | \$0 | \$9 | \$24 | \$0 | \$0 | \$0 | \$0 |
| 14 | 1.1.2 Software Development | Release 3 | Program | RDTE | Testing | \$0 | \$0 | \$0 | \$0 | \$25 | \$17 | \$0 | \$0 |
| 15 | 1.1.2 Software Development | Release 4 | Program | RDTE | Testing | \$0 | \$0 | \$0 | \$0 | \$0 | \$21 | \$26 | \$8 |
| 16 | 1.1.2 Software Development | Release 5 | Program | RDTE | Testing | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$30 |
| 17 | 1.1.3 Integration, Assembly, & Test | Release 1 | Program | RDTE | IA&T | \$0 | \$574 | \$363 | \$0 | \$0 | \$0 | \$0 | \$0 |
| 18 | 1.1.3 Integration, Assembly, & Test | Release 2 | Program | RDTE | IA&T | \$0 | \$0 | \$132 | \$418 | \$0 | \$0 | \$0 | \$0 |
| 19 | 1.1.3 Integration, Assembly, & Test | Release 3 | Program | RDTE | IA&T | \$0 | \$0 | \$0 | \$3 | \$418 | \$149 | \$0 | \$0 |
| 20 | 1.1.3 Integration, Assembly, & Test | Release 4 | Program | RDTE | IA&T | \$0 | \$0 | \$0 | \$0 | \$0 | \$182 | \$827 | \$85 |
| 21 | 1.1.3 Integration, Assembly, & Test | Release 5 | Program | RDTE | IA&T | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$306 |
| 22 | 1.1.4 Purchased Services | All | Program | RDTE | Primary Host | \$0 | \$0 | \$365 | \$371 | \$377 | \$384 | \$390 | \$397 |
| 23 | 1.1.4 Purchased Services | All | Program | RDTE | Implementation | \$0 | \$0 | \$156 | \$0 | \$0 | \$0 | \$0 | \$0 |



PivotTables can then be generated from the risk/uncertainty adjusted “Database” and dynamically adjusted with a drop-down

| | A | B | C | D | E | F | G | H | I | J | K | L | M |
|----|-------------------------------------|-----------|----------------|------|----------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | WBS | Release | Funding Source | APPN | Description | FY2011 (TY \$K) | FY2012 (TY \$K) | FY2013 (TY \$K) | FY2014 (TY \$K) | FY2015 (TY \$K) | FY2016 (TY \$K) | FY2017 (TY \$K) | FY2018 (TY \$K) |
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| 4 | 1.1.2 Software Development | Release 3 | Program | RDTE | Software Development | \$0 | \$0 | \$0 | \$16 | \$2,269 | \$803 | \$0 | \$0 |
| 5 | 1.1.2 Software Development | Release 4 | Program | RDTE | Software Development | \$0 | \$0 | \$0 | \$0 | \$0 | \$979 | \$4,494 | \$455 |
| 6 | 1.1.2 Software Development | Release 5 | Program | RDTE | Software Development | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$1,646 |
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| 8 | 1.1.2 Software Development | Release 2 | Program | RDTE | KTR Below-the-Line | \$0 | \$0 | \$312 | \$668 | \$0 | \$0 | \$0 | \$0 |
| 9 | 1.1.2 Software Development | Release 3 | Program | RDTE | KTR Below-the-Line | \$0 | \$0 | \$0 | \$34 | \$708 | \$276 | \$0 | \$0 |
| 10 | 1.1.2 Software Development | Release 4 | Program | RDTE | KTR Below-the-Line | \$0 | \$0 | \$0 | \$0 | \$0 | \$487 | \$1,246 | \$219 |
| 11 | 1.1.2 Software Development | Release 5 | Program | RDTE | KTR Below-the-Line | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$696 |
| 12 | 1.1.2 Software Development | Release 1 | Program | RDTE | Testing | \$0 | \$22 | \$25 | \$0 | \$0 | | | |
| 13 | 1.1.2 Software Development | Release 2 | Program | RDTE | Testing | \$0 | \$0 | \$9 | \$24 | \$0 | | | |
| 14 | 1.1.2 Software Development | Release 3 | Program | RDTE | Testing | \$0 | \$0 | \$0 | \$0 | \$25 | | | |
| 15 | 1.1.2 Software Development | Release 4 | Program | RDTE | Testing | \$0 | \$0 | \$0 | \$0 | \$0 | | | |
| 16 | 1.1.2 Software Development | Release 5 | Program | RDTE | Testing | \$0 | \$0 | \$0 | \$0 | \$0 | | | |
| 17 | 1.1.3 Integration, Assembly, & Test | Release 1 | Program | RDTE | IA&T | \$0 | \$574 | \$363 | \$0 | \$0 | | | |
| 18 | 1.1.3 Integration, Assembly, & Test | Release 2 | Program | RDTE | IA&T | \$0 | \$0 | \$132 | \$418 | \$0 | | | |
| 19 | 1.1.3 Integration, Assembly, & Test | Release 3 | Program | RDTE | IA&T | \$0 | \$0 | \$0 | \$3 | \$418 | | | |
| 20 | 1.1.3 Integration, Assembly, & Test | Release 4 | Program | RDTE | IA&T | \$0 | \$0 | \$0 | \$0 | \$0 | | | |
| 21 | 1.1.3 Integration, Assembly, & Test | Release 5 | Program | RDTE | IA&T | \$0 | \$0 | \$0 | \$0 | \$0 | | | |
| 22 | 1.1.4 Purchased Services | All | Program | RDTE | Primary Host | \$0 | \$0 | \$365 | \$371 | \$377 | | | |
| 23 | 1.1.4 Purchased Services | All | Program | RDTE | Implementation | \$0 | \$0 | \$156 | \$0 | \$0 | | | |

▶ Step 5: Create drop down filter to dynamically adjust cost risk/uncertainty at a particular confidence interval



| | A | C | D | E | F | G | H | I | J | | | |
|----|--|----------------|---------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1 | | | | | | | | | | | | |
| 2 | | Funding Source | Program | Funded | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | WBS | | | | FY2011 (TY \$K) | FY2012 (TY \$K) | FY2013 (TY \$K) | FY2014 (TY \$K) | FY2015 (TY \$K) | FY2016 (TY \$K) | FY2017 (TY \$K) | FY2018 (TY \$K) |
| 5 | [-] Release 1 | | | | \$0 | \$4,755 | \$2,977 | \$0 | \$0 | \$0 | \$0 | \$0 |
| 6 | 1.1.2 Software Development | | | | \$0 | \$4,181 | \$2,614 | \$0 | \$0 | \$0 | \$0 | \$0 |
| 7 | 1.1.3 Integration, Assembly, & Test (IA&T) | | | | \$0 | \$574 | \$363 | \$0 | \$0 | \$0 | \$0 | \$0 |
| 8 | [-] Release 2 | | | | \$0 | \$0 | \$1,169 | \$3,376 | \$0 | \$0 | \$0 | \$0 |
| 9 | 1.1.2 Software Development | | | | \$0 | \$0 | \$1,037 | \$2,958 | \$0 | \$0 | \$0 | \$0 |
| 10 | 1.1.3 Integration, Assembly, & Test (IA&T) | | | | \$0 | \$0 | \$132 | \$418 | \$0 | \$0 | \$0 | \$0 |
| 11 | [-] Release 3 | | | | \$0 | \$0 | \$0 | \$53 | \$3,419 | \$1,245 | \$0 | \$0 |
| 12 | 1.1.2 Software Development | | | | \$0 | \$0 | \$0 | \$50 | \$3,001 | \$1,096 | \$0 | \$0 |
| 13 | 1.1.3 Integration, Assembly, & Test (IA&T) | | | | \$0 | \$0 | \$0 | \$3 | \$418 | \$149 | \$0 | \$0 |
| 14 | [-] Release 4 | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$1,669 | \$6,593 | \$766 |
| 15 | 1.1.2 Software Development | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$1,487 | \$5,766 | \$682 |
| 16 | 1.1.3 Integration, Assembly, & Test (IA&T) | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$182 | \$827 | \$85 |
| 17 | [-] Release 5 | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$2,679 |
| 18 | 1.1.2 Software Development | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$2,373 |
| 19 | 1.1.3 Integration, Assembly, & Test (IA&T) | | | | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$306 |
| 20 | [-] All | | | | \$0 | \$0 | \$521 | \$371 | \$377 | \$384 | \$390 | \$397 |
| 21 | 1.1.4 Purchased Services | | | | \$0 | \$0 | \$521 | \$371 | \$377 | \$384 | \$390 | \$397 |
| 22 | Grand Total | | | | \$0 | \$4,755 | \$4,667 | \$3,800 | \$3,797 | \$3,298 | \$6,983 | \$3,842 |

▶ Step 6: Create PivotTable for cost risk/uncertainty adjusted estimates to answer a myriad of client data calls in a matter of minutes

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Integrating PivotTable reporting into a PLCCE model can yield many benefits to a cost analyst

- ▶ Provides a more flexible and dynamic cost reporting mechanism that enables the cost estimator to respond to a myriad of cost-related data calls that would otherwise take days in a matter of minutes
- ▶ Allows for detailed cost break-outs that can provide the basis for annual program spend plans or any other Planning, Programming, Budgeting, & Execution (PPBE) products
- ▶ Performs a simplified cross-walking of Work Breakdown Structure (WBS) / Cost Estimating Structure (CES) that would otherwise necessitate significant modeling effort
- ▶ Enables cross-checking of existing cost summaries and any other cost figures down to the lowest level of the model
- ▶ Displays dynamic views of various cost break-outs in various categories, including Base Year or Then Year dollars

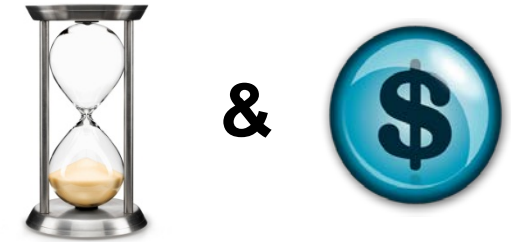
The image shows two overlapping spreadsheet windows. The top window is titled 'Personal Budget Spreadsheet' and contains a table with columns for 'Total' and 'Ave'. A box labeled 'PLCCE Model' is overlaid on this window. The bottom window shows a PivotTable with columns for fiscal years from FY2011 to FY2018 and rows for various WBS categories like 'Release 1', 'Release 2', etc. A box labeled 'PivotTables' is overlaid on this window. A red arrow points from the 'PLCCE Model' box to the 'PivotTables' box. A red plus sign is located to the right of the arrow.



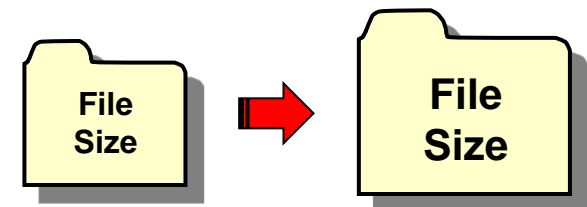
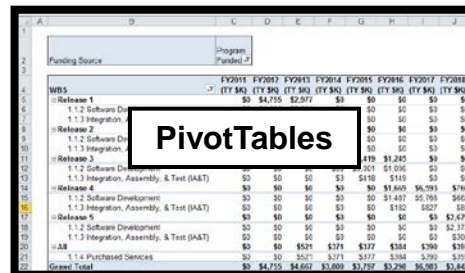
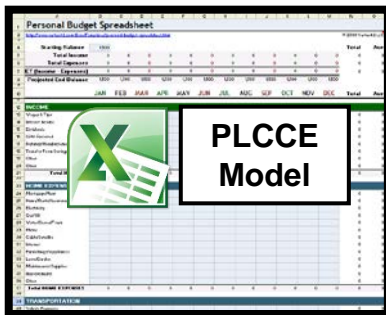
for Data Calls & Ad-Hoc Analyses

Implementing PivotTables in a PLCCE model can present some challenges

- ▶ Implementing the database structure in a PLCCE model and cross-checking it for accuracy can be a time-consuming and tedious process, especially in large, complex models



- ▶ The PivotTable tool and database structure add additional file-size to Excel-based models
 - Can be up to 3 MB for large, complex models



The benefits of implementing PivotTables in cost models make overcoming these challenges WELL worth it

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Using PivotTables in PLCCE models is not just a nice concept – it's a real capability that is currently providing benefits to programs

- ▶ Supporting “what-if” cost scenarios for POM/budgetary issues created by various SPAWAR programs
- ▶ Cross-checking PLCCE model summaries for a large Navy C2 program after recent conversion from OSD CAPE CES to SPAWAR Global WBS
- ▶ Enabled quick cross-walk of costs in the SPAWAR Global WBS to the MIL-STD 881 WBS for AIS systems during the creation of a Service Cost Position (SCP) with NCCA for a large Navy C2 program
- ▶ Providing cost controls to PMO functional leads to guide spend plan development for each program within a large division of the Command and Control program office at SPAWAR
- ▶ Delivered comprehensive system installation cost summaries to the resource sponsor for a large Navy IT program, broken out by ship class to include initial procurement, installation, design service allocation, and hardware refresh



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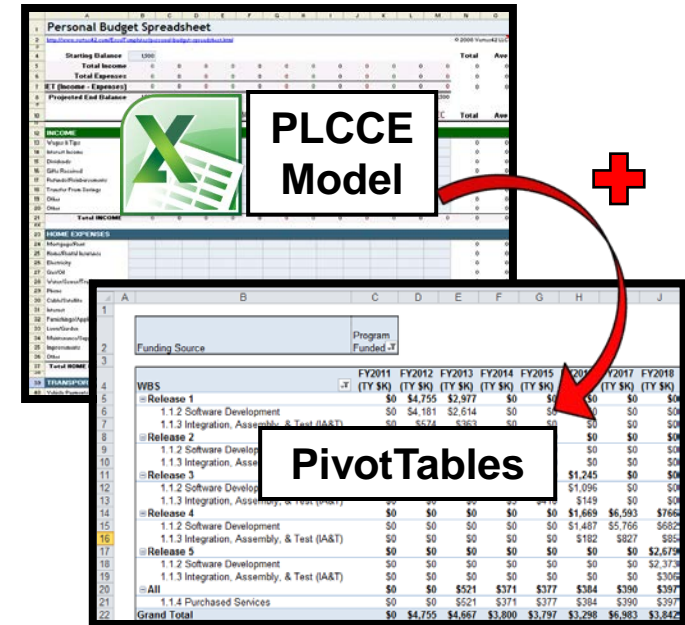
- ▶ Background
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PivotTable reporting provides cost estimators with an excellent capability to transform their Excel-based cost models into dynamic, flexible tools

- ▶ Once the database structure is constructed, implementing and manipulating PivotTables in the model is an intuitive, user-friendly process that will yield instant and significant rewards
- ▶ PivotTable reporting can be integrated with risk/uncertainty analysis in the model, which enhances the outputs of the PivotTables and enables advanced scenario analysis
- ▶ There are numerous benefits to implementing PivotTables in a cost model that far outweigh the associated challenges
- ▶ PivotTables are a proven capability that have been enhancing a select few SPAWAR PLCCE models for almost a decade and have become a best practice for new models created at SPAWAR



“Super CCE/A”



Questions?

For further information . . .

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Back-up Slides

Creating a PivotTable

- ▶ Step 1: Identify the Data Source
- ▶ Step 2: On the “Insert” Ribbon: Click on “PivotTable” button
- ▶ Step 3: Use “Create PivotTable” dialog box to specify the parameters of your PivotTable
 - Specify what data want to summarize in your PivotTable under “Select Table or Range”
 - Specify where you want your PivotTable to be created under “Choose where you want the PivotTable report to be placed”
 - Click “OK”
- ▶ Step 4: Add data fields to your PivotTable layout using the “Field List”
- ▶ Step 5: Customize the layout of your PivotTable using the “Drag-and-Drop” GUI

PivotTable Basics

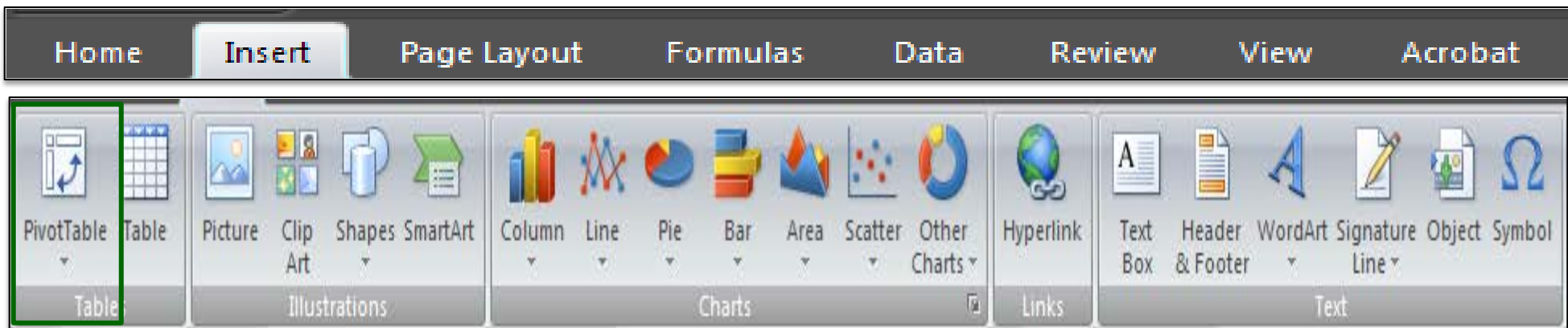
A PivotTable is a feature in MS Excel that enables you to summarize and analyze data in lists and tables. PivotTables are called such because you can quickly rearrange the position of PivotTable fields to give you a different view of the table

► Example:

- Sort, count, and total the data stored on one table or spreadsheet
- Create a second table displaying the summarized data
- Create an interactive graphical representation of the data in a PivotTable. (PivotChart)

► Menu Path

- Insert Tab on Ribbon → PivotTable



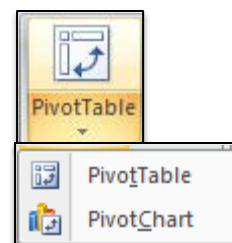
Creating a PivotTable in Excel 2007/2010

Excel 2007 changed up a lot of things that users were comfortable with – including PivotTables which is probably one most frequently used features. The first major change to PivotTables was the method in creating a basic pivot which is now somewhat simpler in Excel 2007/2010. Below are the steps in creating a PivotTable:

Step 1: Identify the Data Source

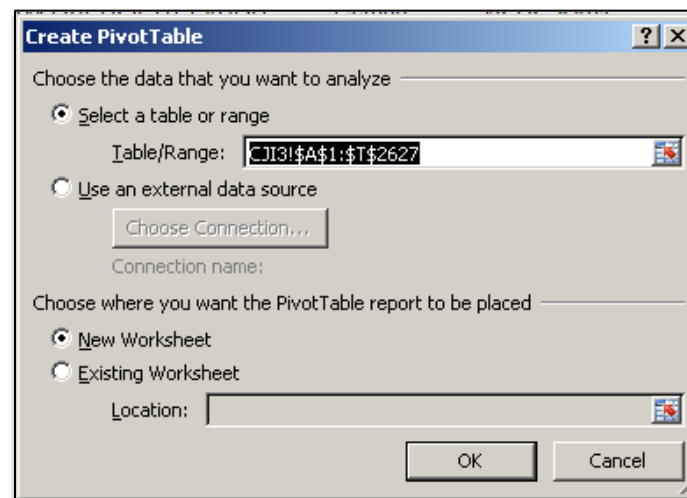
Step 2: On the “Insert” Ribbon: Click on “PivotTable” button

– At the left on the “Tables” tab



Step 3: Use “Create PivotTable” dialog box to specify the parameters of your PivotTable

- Specify what data want to summarize in your PivotTable under “Select Table or Range”
- Specify where you want your PivotTable to be created under “Choose where you want the PivotTable report to be placed”
- Click “OK”



Creating a PivotTable in Excel 2007/2010 (cont'd)

Step 4 : Add data to your PivotTable layout using the “Field List”

The screenshot displays the Microsoft Excel 2007 interface. The main window shows a PivotTable layout on a worksheet with the following drop zones:

- Drop Page Fields Here (rows 1-3)
- Drop Column Fields Here (columns 4-16)
- Drop Row Fields Here (rows 4-16)
- Drop Data Items Here (rows 5-16, columns 5-16)

The PivotTable Tools ribbon is visible, with the Options tab selected. The PivotTable Field List task pane is open on the right, showing a list of fields to add to the report:

- Document Date
- Assignment
- Object
- CO object name
- Cost Element
- Cost element name
- Value COCurr
- Value TranCurr
- Total quantity
- Posting Date

Below the list, the 'Drag fields between areas below:' section shows four drop zones: Report Filter, Column Labels, Row Labels, and Values. The 'Defer Layout Update' checkbox is unchecked.

Annotations on the image include:

- A blue bracket on the left side of the worksheet area labeled "Build Space".
- A blue bracket on the right side of the PivotTable Field List task pane labeled "Field names from the source data.".
- A blue bracket on the right side of the PivotTable Field List task pane labeled "Drop zones that create the Pivot Table structure.".

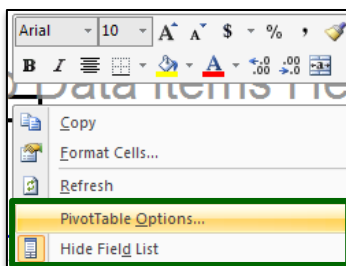
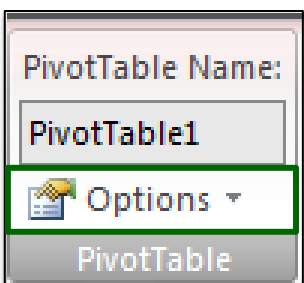
Creating a PivotTable in Excel 2007/2010

Step 5 : Customize the layout of your PivotTable using the “Drag-and-Drop” GUI.

- Drop and Drag fields into the PivotTable can be done in two ways:
 - PivotTable Report
 - Field list Window

! If you cannot drag the pivot fields onto the worksheet layout, you will need to change to setting in the PivotTable options. To do so:

1. Right-click a cell in the PivotTable and click PivotTable Options or select “Options” on the Ribbon.



2. On the Display tab, add a check mark to Classic PivotTable Layout.

3. Click OK, to close the PivotTable Options dialog box.

