Estimate Set-up for What-ifs and Faster Updates

ACEIT Users Workshop
National - Public Audience
February 1-2, 2011
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Abstract

- **This presentation will cover tips and tricks to make your estimate better for performing quick what-if exercises, as well as show some estimate organization techniques that will make it faster and easier to update your estimate. The presentation will also show how you can control whether a row will be available for override in POST. Examples of tips will include choosing between C and F phasing, setting up your estimate for schedule changes, and setting up reports for what-if cases.**

ESTIMATE ORGANIZATION

Setting up Schedule for What-Ifs

Useful Functions for What-Ifs Working with Schedules

- **DateAdd (Date, Year [, Month] [,Day], [Truncate])**
  - Returns the date after adding specified number of Years, Months, and Days
  - All parameters can be variables rather than direct inputs
  - Very useful when using a schedule based on durations
- **DateMonthDiff (FromDate, ToDate)**
  - Returns the number of months between two dates
- **Max(x , y [, …])**
  - Returns the maximum value of the inputs
- **FYCLastYr (@Var)**
  - Returns the last year where calculated value for “Var” row exists
  - Use to link last year of schedule between two rows
- **FYCFirstYr (@Var)**
  - Returns the first year where calculated value for Var row exists
  - Use to link first year of schedule between two rows

Setting up Schedule in ACE

- **Set up milestones which will be used for time phasing**

57	*Program Schedule		*Schedule	
58	Milestone B		MS_B	01JAN2011 *
59	Development End		DevEnd	16MAY2013 *
60	Integration End		IntegEnd	16OCT2013 *
61	Develepmental Test End		DTEnd	16JAN2014 *
62	Operational Test End		OTEnd	31AUG2014 *
63	Milestone C		MS_C	29SEP2014 *

- **Assign Unique ID to every Milestone**
- **Suggest putting schedule at the top of the Input Variables**
- **To change format of result:**
  - Right click -> Result Format ->Date -> OK

Setting up Schedule in ACE Utilizing Durations

- **Durations are the key to quick updates and what-ifs for schedules**

65	*Program Schedule Durations		*Durations			
66	Total Schedule Duration		TotDur	45.000 *		
67	Development Duration		DevDur	28.500 *	C	MAX(SwDevDur, HwDevDur)
68	! Software Development Duration (Months)		SwDevDur	26.000 *	C	26
69	! Hardware Development Duration (Months)		HwDevDur	28.500 *	C	28.5
70	Integration Duration (Months)		IntegDur	5.000 *		
71	Integration Duration (Normal)			5.000 *	C	5 * If (IntegSwitch = 1, 1 , 0)
72	Integration Duration (Extended)			0.000 *	C	12 * (IntegSwitch - 1)
73	Developmental Test Duration (Months)		DTDur	3.000 *	C	3
74	Operational Test Duration (Months)		OTDur	7.500 *	C	7.5
75	Milestone C Lag from Operational Test (Months)		MS_CLag	1.000 *	C	1

- **Set up a duration corresponding to each milestone**
- **Note that rows 68 and 69 are non-summing rows here**
  - A non-summing row begins with "!"
    - If this is hard to keep track of, also could take HW and SW duration out of WBS and put them in their own section
  - Development duration is the maximum of SW or HW duration

Setting up Schedule in ACE Utilizing Durations

- **Utilize DateAdd function to calculate dates based on specified durations**

57	*Program Schedule		*Schedule			
58	Milestone B		MS_B	01JAN2011 *	C	01JAN2011
59	Development End		DevEnd	16MAY2013 *	C	DATEADD(MS_B, 0, DevDur)
60	Integration End		IntegEnd	16OCT2013 *	C	DATEADD(DevEnd, 0, IntegDur)
61	Develepmental Test End		DTEnd	16JAN2014 *	C	DATEADD(IntegEnd, 0, DTDur)
62	Operational Test End		OTEnd	31AUG2014 *	C	DATEADD(DTEnd, 0, OTDur)
63	Milestone C		MS_C	29SEP2014 *	C	DATEADD(OTEnd, 0, MS_CLag,

- **Using DateAdd function “links” the program schedule**
- **Makes What-If Drills easy as one change to schedule or duration will ripple to other milestones**

ESTIMATE ORGANIZATION

Bookmarks and Sections

Bookmarks and Sections

- **Bookmarks**
  - Allow user to “jump” to a row in the estimate
  - Row number is Bold and Blue
- **Sections**
  - Allow user to create reports filtered for group of rows
  - Created by beginning a Unique ID with an “ * ”
- **Tips**
  - Create bookmarks and sections for Schedule and input variables for each appropriation
  - Create sections for quantities and discount tables

SETTING UP FOR "WHAT-IFS"

Quantity Discounts and Tables

Useful Functions with Quantity Discounts

- **If (Condition , Yes [, No])**
  - Use when there are 2 options to be chosen between
  - Use in conjunction with Case() for quantity discounts
- **Case (N, Case1, Case2 [, Case3, ...])**
  - N is integer which selects case
    - When N = 1, Case1 is selected, etc.
  - Use with quantity discounts when quantity can easily be converted to integer (e.g. discounts for multiples of 10)

Quantity Discount with If() and Case()

- **IF(COMPO1_QTY = 0 , 0 , Case(IF(COMPO1_QTY>70, 8 , RndUp(COMPO1_QTY/10)) , Compo1_10 , … , Compo1_71))**

142 | IF(COMPO1_QTY=0,0,Case(IF(COMPO1_QTY>70,8,RndUp(COMPO1_QTY/10)),Compo1_10,Compo1_20,Compo1_30,Compo1_40,Compo1_50,Compo1_60,Compo1_70,Compo1_71))

WhatIfsAndFast...ogy (BY2010$M)

	WBS/CES Description	Approp	Unique ID	Point Estimate	Phasing Method	Equation / Throughput	Fiscal Year	Units	Start Date	Finish Date
142	Hardware Component 1 Production Unit Cost	3080	COMPO1_UC$	*	F	IF(COMPO1_QTY=0,0,Case(IF(C				

- **Data Table:**

143	Hardware Component 1 Production Unit Cost Table With C										
144	1-10	500	525	550	600	600	600	610	610	630	630
145	11-20	450	475	500	550	550	550	560	560	590	590
146	21-30	400	425	450	500	500	500	510	510	540	540
147	31-40	350	375	400	450	450	450	460	460	490	490
148	41-50	300	325	350	400	400	400	410	410	440	440
149	51-60	275	300	325	375	375	375	385	385	415	415
150	61-70	250	280	305	350	350	350	360	360	390	390
151	71+	225	270	285	325	325	325	335	335	365	365

- **Tip:**
  - Make sure that data table has values in all possible production years (think about what-ifs)

Useful Functions with Quantity Discounts

- **Vlookup (lookup_value, @DataTable, col_index, num_rows)**
  - Lookup Value finds closest value greater than it in table
  - @DataTable is row beginning the table (Matrix)
  - Col_Index is column to look for values (1 is first year, etc)
  - Num_rows is number of rows in the data table
  - If Lookup_value greater than last row, last row returned
  - Tips:
    - Normalize cost data to base year
    - Enter base year information on row with Vlookup (not on data table)

Quantity Discount with Vlookup()

- **Vlookup(Compo2_Qty, @Compo2UCTable, 1, 8)**

153 | VLookup(COMPO2_QTY, @Compo2UCTable, 1, 8)

WhatIfsAndFast...ogy (BY2010$M)

	WBS/CES Description	Approp	Unique ID	Point Estimate	Phasing Method	Equation / Throughput	Fiscal Year	Units
153	Hardware Component 2 Production Unit Cost	3080	COMPO2_UC$	*	F	VLookup(COMPO2_QTY,	2008	$K
154	Hardware Component 2 Production Unit Cost Table With (		Compo2UCTable	0.000 *				

- **Data Table:**

153	Hardware Component 2 Production Unit Cost		
154	Hardware Component 2 Production Unit Cost Table With Quantity Discount		
155	1-10	10	$200
156	11-20	20	$180
157	21-30	30	$170
158	31-40	40	$160
159	41-50	50	$150
160	51-60	60	$140
161	61-70	70	$130
162	71+	71	$120

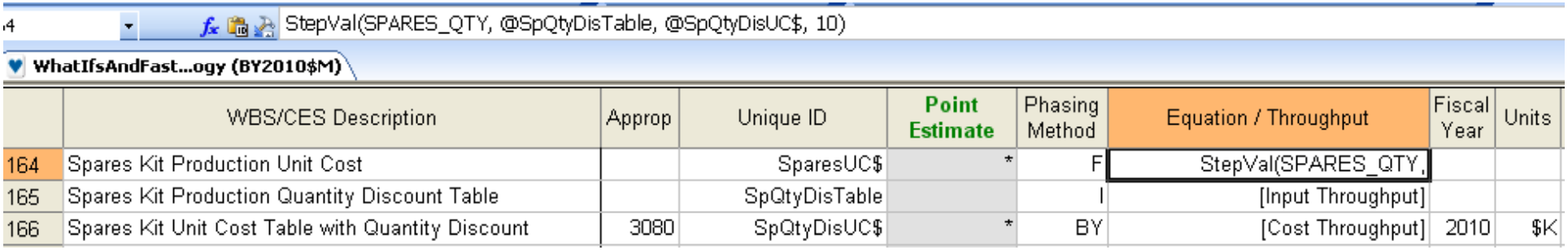
- **Notice that Cost information is on function (not table)**

Useful Functions with Quantity Discounts

- **StepVal (X_Val, @X, @F_Of_X, Num_Steps)**
  - X_Val is input (value to evaluate)
  - @X is row defining highest values in each range
  - @F_of_X is row with values (e.g. unit costs) for X
  - Num_Steps is number of ranges defined by X
  - Tips:
    - Useful with irregular quantity ranges
    - If X_value is higher than greatest range, will return 0
      - Suggest making highest value much greater than possible inputs

Quantity Discount with StepVal()

- **StepVal(SPARES_QTY, @SpQtyDisTable, @SpQtyDisUC$, 10)**



	WBS/CES Description	Approp	Unique ID	Point Estimate	Phasing Method	Equation / Throughput	Fiscal Year	Units
164	Spares Kit Production Unit Cost		SparesUC$	*	F	StepVal(SPARES_QTY,		
165	Spares Kit Production Quantity Discount Table		SpQtyDisTable		I	[Input Throughput]		
166	Spares Kit Unit Cost Table with Quantity Discount	3080	SpQtyDisUC$	*	BY	[Cost Throughput]	2010	$K

- **Data Table**

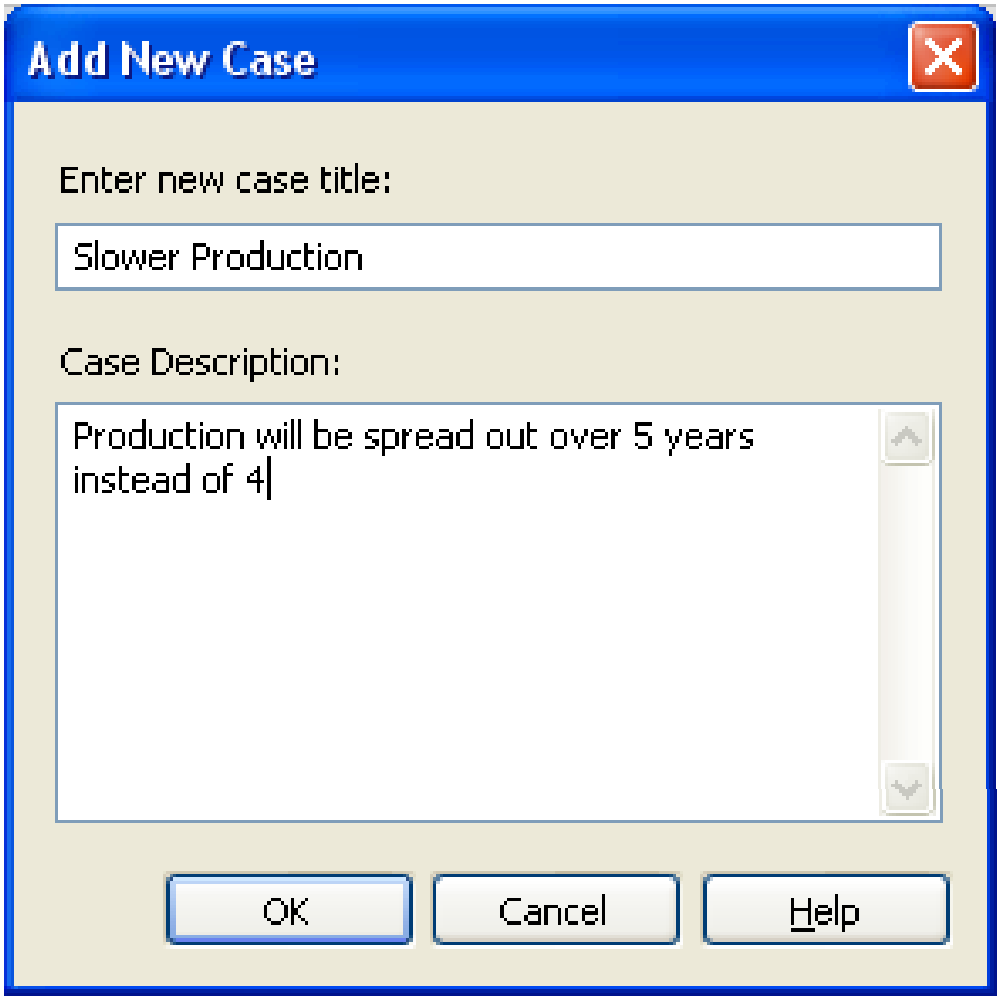
164	Spares Kit Production Unit Cost						
165	Spares Kit Production Quantity Discount Table	3	6	10	25	50	5000
166	Spares Kit Unit Cost Table with Quantity Discount	300	290	280	270	260	250

- **Notice that final value in table is far beyond expected production quantity to avoid a unit cost of zero**

CREATING "WHAT-IF" CASES AND OVERRIDES

Creating a New Case

- **Open Inputs-Results Viewer (IRV)**
- **Cases -> Add Case**



Overriding Cell Values

- **In IRV, white cells can be overridden**
  - Input desired what-if

128							
129	*FIELDING QUANTITIES						
130	Production Quantities		**25**	33.000 *	**25**	**8**	
131	Spares Kit Quantities		5.000 *	7.000 *	5.000 *	2.000 *	
132	Fielding Quantities		15.000 *	40.000 *	73.000 *	98.000 *	106.0(
133							

- **Overrides show as Bold and Blue, and do not have " * " after number**
- **See "Slower Production" Case in ACE example file IRV**

SETTING UP FOR "WHAT-IFS"

"Switches"

"Switches"

- **"Switches" are ACE rows, usually phased using C method, that allow the user to quickly choose between two (or more) scenarios**
- **Use Cases: Extended schedule, Alternate methodology, Changing procurement profiles, any "known" estimate what-if**
  - See rows 77 and174 in ACE file
- **Tip: Put potential values in "WBS/CES Description" and in "Equation/throughput" (as comment)**
  - Insert a comment in "Equation/Throughput" by surrounding with [Square Brackets]

Using Switches Example Equations

- **Changing switch value should affect other rows, examples from ACE file given:**
  - IntegSwitch: 1= Normal Sched., 2 = Extended Sched.
    - Example 1: Normal Duration(Row 71):
      - 5 * If (IntegSwitch = 1, 1 , 0)
    - Example 2: Extended Duration (Row 72):
      - 12 * (IntegSwitch - 1)
  - FieldUpSwitch: 1 = Off, 2= On
    - Example 3: Operational Life (Row 126)
      - If(FieldUpSwitch = 1, 10 , 15)
    - Example 4: Field SW Upgrades (Row 53)
      - SwUpgradeFact *FYTot(@SwDev$)*Case(FieldUpSwitch, 0 , 1)

Utilizing Switches with New Cases

- **"SW Field Upgrade, Longer Integration" Case**

76			
77	"What-If" Integration Takes Longer? [1 = Normal Schedule , 2 = Ex		2
78			

170	*O&M Inputs		
171	*Software Maintenance Inputs		
172	Basic Software Maintenance Factor		0.100 *
173	Software In Field Upgrade Factor		0.050 *
174	Include SW in Field Upgrade? [1 for No, 2 for Yes] (switch)		2
175			

SW Field Upgrade, Longer Integration Results

Cost Element	Approp	Total	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
*My Example Program Estimate								
Total Estimate		$428.29		$19.59	$43.06	$39.08	$35.48	$32.17
Development Total Estimate		$151.00		$19.59	$43.06	$39.08	$35.48	$13.79
TOTAL PROCUREMENT		$110.79						$18.38
TOTAL OPERATIONS AND MAINTENANCE		$166.50						
*FIELDING QUANTITIES								
Production Quantities		$106.00						15
Spares Kit Quantities		$22.00						3
Fielding Quantities								

- **Development stretches into FY15**
  - Analyst should now look at Production schedule and any BY/TY/SY/I/IS rows to ensure assumptions remain true
- **O&M increases due to additional SW costs**

SETTING UP FOR "WHAT-IFS"

IS, I, TY, BY, SY Phasing

Disadvantages of IS, I, TY, BY, SY

- **Start/Finish Date columns ignored**
  - Prevents linking schedule data from other rows
- **Difficult to dynamically move schedule**
- **Require manual updates if changes needed**
- **No “bread crumbs” if row is not documented**

Using IS, I, TY, BY, SY with "What-Ifs"

- **Set up TY/BY/SY rows as input variables**
  - Include information for if additional years were added
    - Both prior years and follow-on years

	WBS/CES Description	Unique ID	Point Estimate	Phasing Method	Equation / Throughput	Fiscal Year	Units
112	Government Contracting Officer Support	GovKOSpt$	$ 2.770 *	BY	[Cost Throughput]	2011	$K

  - Within WBS, F phase row and use Start/Finish Date
    - Links schedule to rest of estimate

	WBS/CES Description	Point Estimate	Phasing Method	Equation / Throughput	Fiscal Year	Units	Start Date	Finish Date
32	Contracting Officer Support	$ 1.286 *	F	GovKOSpt$			MS_B	MS_C

    - Note: Point estimate totals on input variable row will be artificially high with added values, consider not showing total for row

- **Caution: Even if values are added to prior and following years, analyst should check assumptions to make sure they are still valid**

SETTING UP FOR "WHAT-IFS"

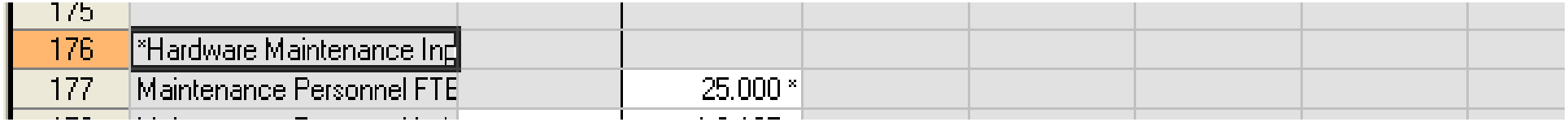
C or F Phasing?

C or F phasing?

- **Use C phasing when a variable or equation does not change over time and has no value in time**
  - Inflation costs calculated by ACE
- **Use F phasing when a variable or equation should be evaluated annually**
  - Using F phasing on a row that normally would be C phasing will allow for annual overrides to values

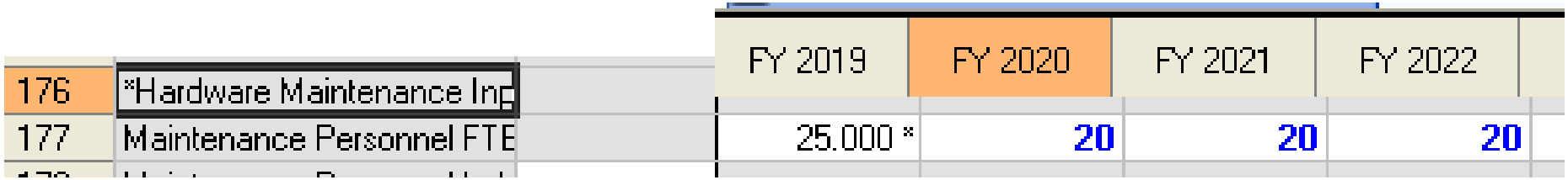
Using F Phasing to allow annual overrides

- **In example ACE File, “Maintenance Personnel” (row 177) was originally C phased, since there were a constant 25 personnel**
  - Gray cells cannot be overridden, annual overrides not possible



175		
176	*Hardware Maintenance Inc	
177	Maintenance Personnel FTE	25.000 *

  - For “Reduction in Force” What-If, need to reduce this to 20 from FY2020 and beyond
  - Row phasing changed to F to allow annual override



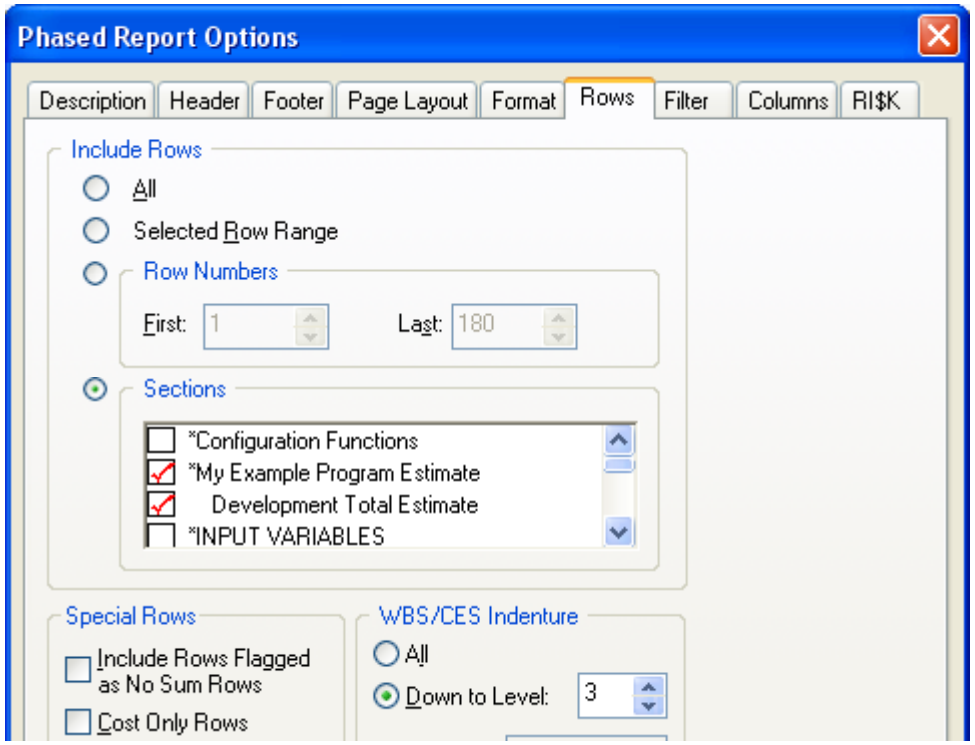
		FY 2019	FY 2020	FY 2021	FY 2022
176	*Hardware Maintenance Inc				
177	Maintenance Personnel FTE	25.000 *	20	20	20

SETTING UP ACE REPORTS

Utilizing Sections

Creating a Phased Report Utilizing Sections

- **Reports->Generate,Edit,View,Print**
  - Select Phased from Drop Down
  - Either Edit an existing report or create a new one
  - On Rows tab, select sections to include in report



See “TY Phased Summary” example in ACE Session

TY Phased Summary Example

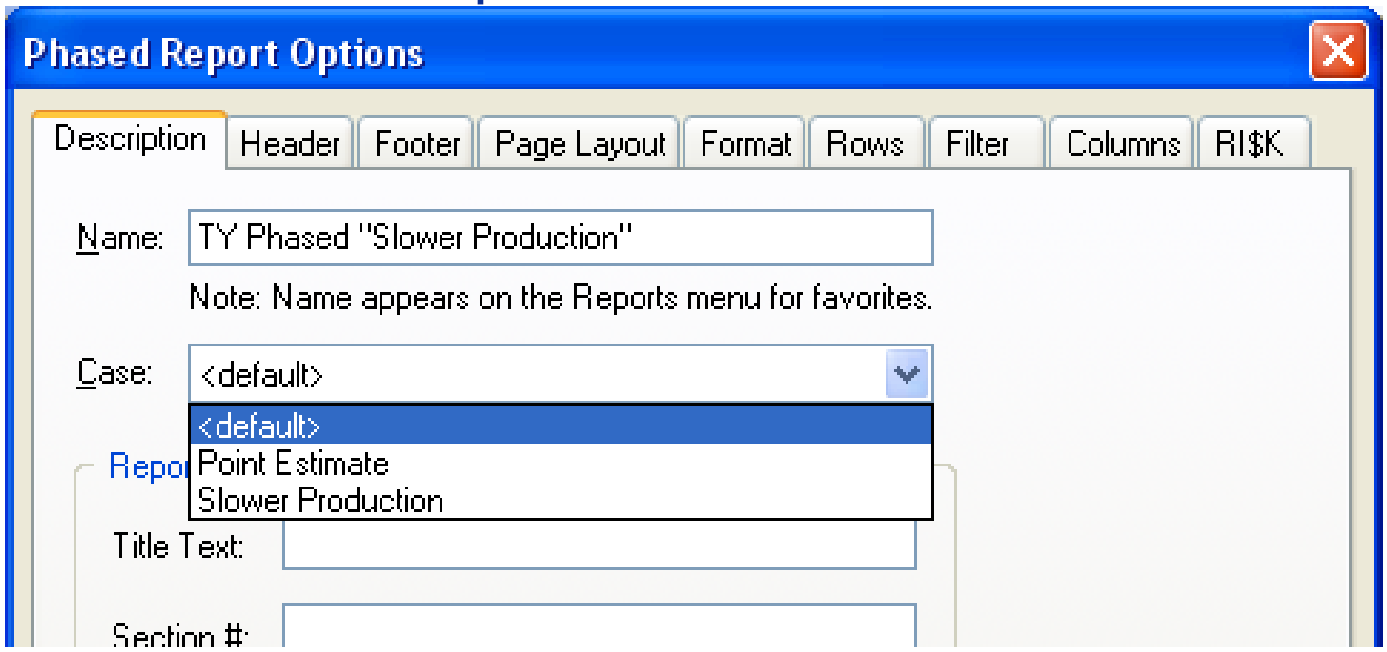
Cost Element	Approp	Total	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
Total Estimate		$351.05		$20.24	$45.96	$44.34	$26.69	$20.33	$47.22	$36.46	$21.97	$16.22
Development Total Estimate		$137.23		$20.24	$45.96	$44.34	$26.69					
Total Contractor Costs		$91.31		$13.19	$35.90	$29.47	$12.75					
Engineering Change Orders	3600	$15.70		$0.37	$2.84	$6.85	$5.64					
Total Program Office Costs		$30.23		$6.68	$7.23	$8.02	$8.30					
TOTAL PROCUREMENT		$112.73						$20.33	$40.04	$29.16	$14.55	$8.66
TOTAL CONTRACTOR		$70.84						$12.23	$31.80	$20.78	$6.03	
Total Program Office Costs		$41.89						$8.10	$8.24	$8.38	$8.52	$8.66
TOTAL OPERATIONS AND MAINTENANCE		$101.08							$7.18	$7.30	$7.43	$7.56
Maintenance Personnel	3400	$74.90							$5.20	$5.29	$5.38	$5.47
Post Production Software Support (PPSS)	3400	$26.18							$1.99	$2.02	$2.05	$2.09
Field Software Upgrades (OPTIONAL)	3400											
*FIELDING QUANTITIES												
Production Quantities		106						15	50	33	8	
Spares Kit Quantities		22						3	10	7	2	
Fielding Quantities									15	65	98	106

SETTING UP ACE REPORTS

Reports and Cases

Creating a Time Phased Report for a specific case

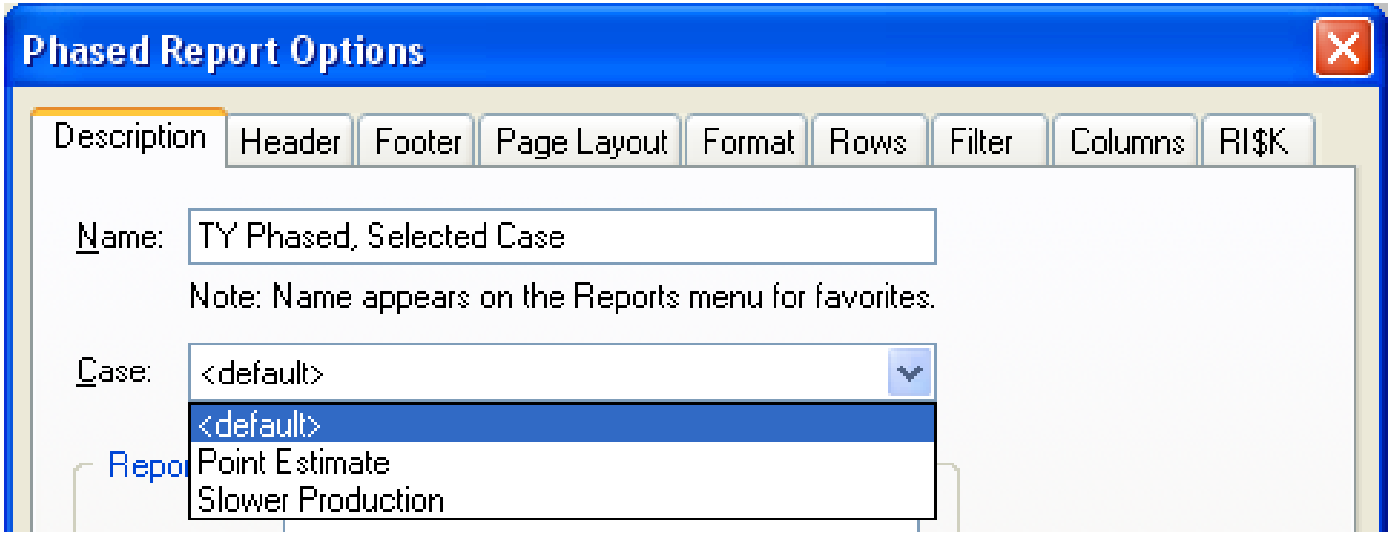
- **Reports->Generate,Edit,View,Print**
  - Select Phased from Drop Down
  - Either Edit an existing report or create a new one
  - On Description tab, select Case to include in report



See "TY Phased "Slower Production"" in example ACE File

Creating a report for the Selected Case in the IRV

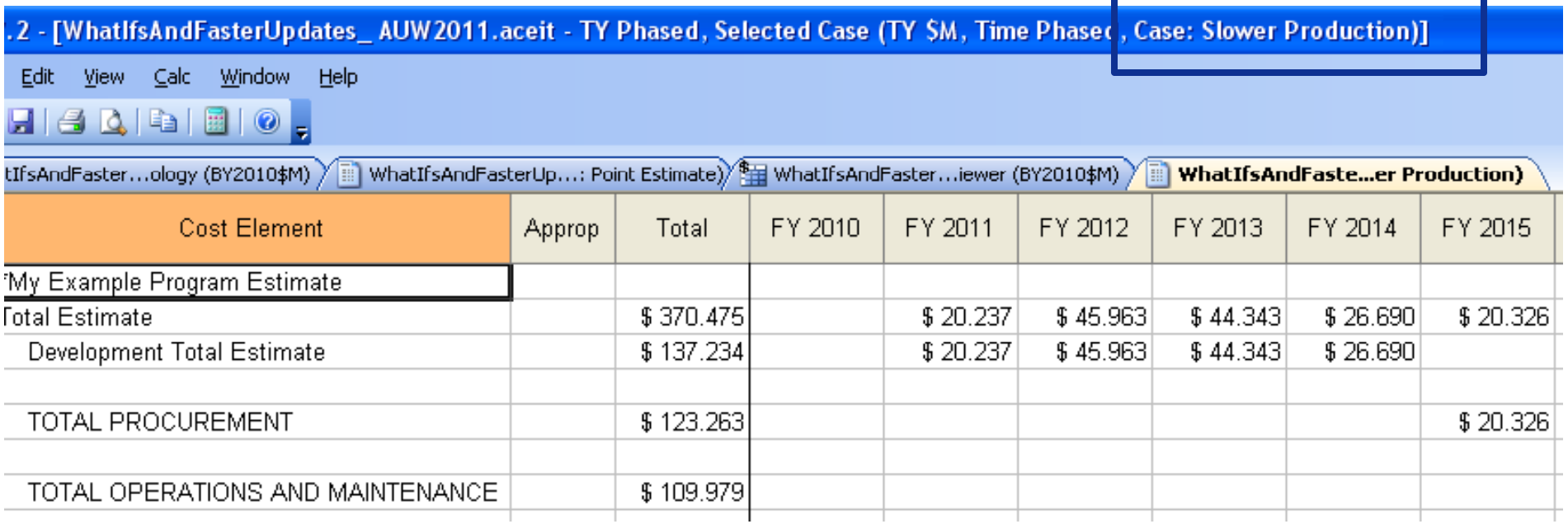
- **Reports->Generate,Edit,View,Print**
  - Select Phased from Drop Down
  - Either Edit an existing report or create a new one
  - On Description tab, select <default> case
- **In Inputs-Results Viewer, select desired case before generating report**



See "TY Phased, Selected Case"in example ACE File

TY Phased, Selected Case

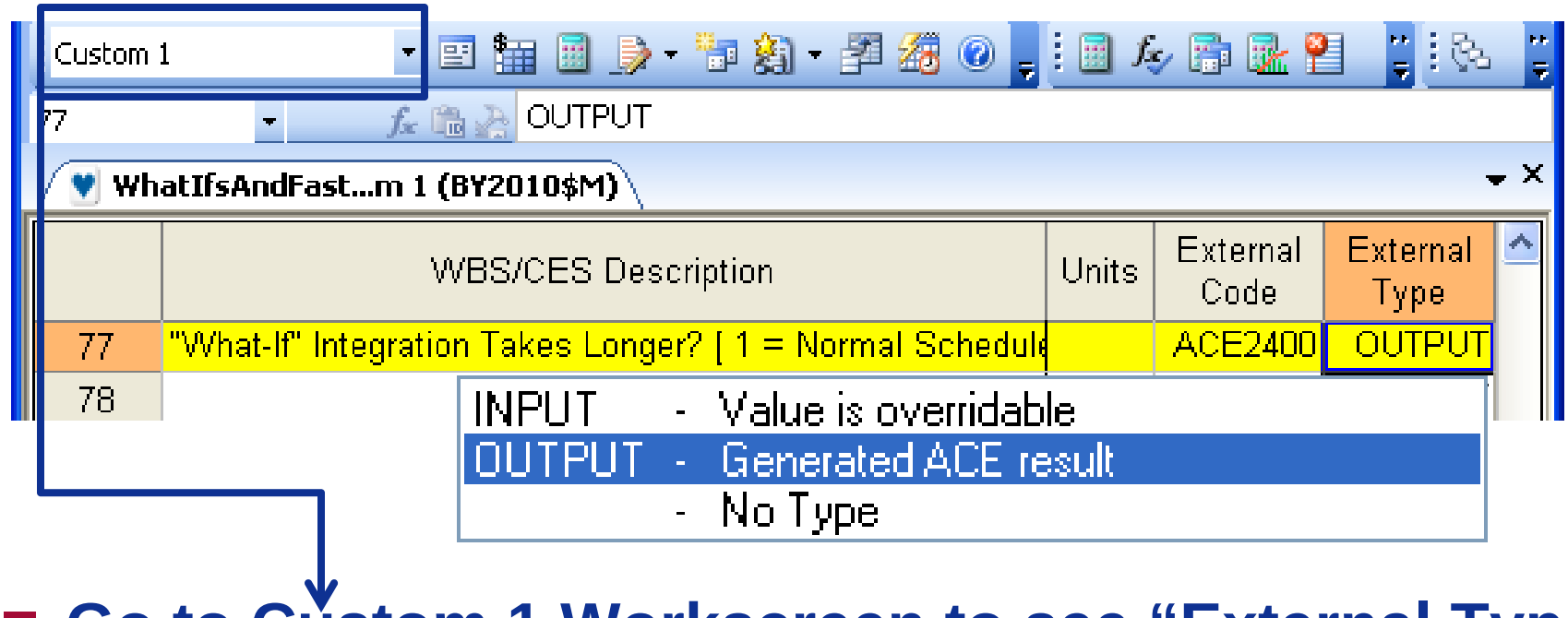
- **Case of report viewed at top of window**



Cost Element	Approp	Total	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
My Example Program Estimate								
Total Estimate		$ 370.475		$ 20.237	$ 45.963	$ 44.343	$ 26.690	$ 20.326
Development Total Estimate		$ 137.234		$ 20.237	$ 45.963	$ 44.343	$ 26.690	
TOTAL PROCUREMENT		$ 123.263						$ 20.326
TOTAL OPERATIONS AND MAINTENANCE		$ 109.979						

SETTING UP SESSION FOR POST OVERRIDES

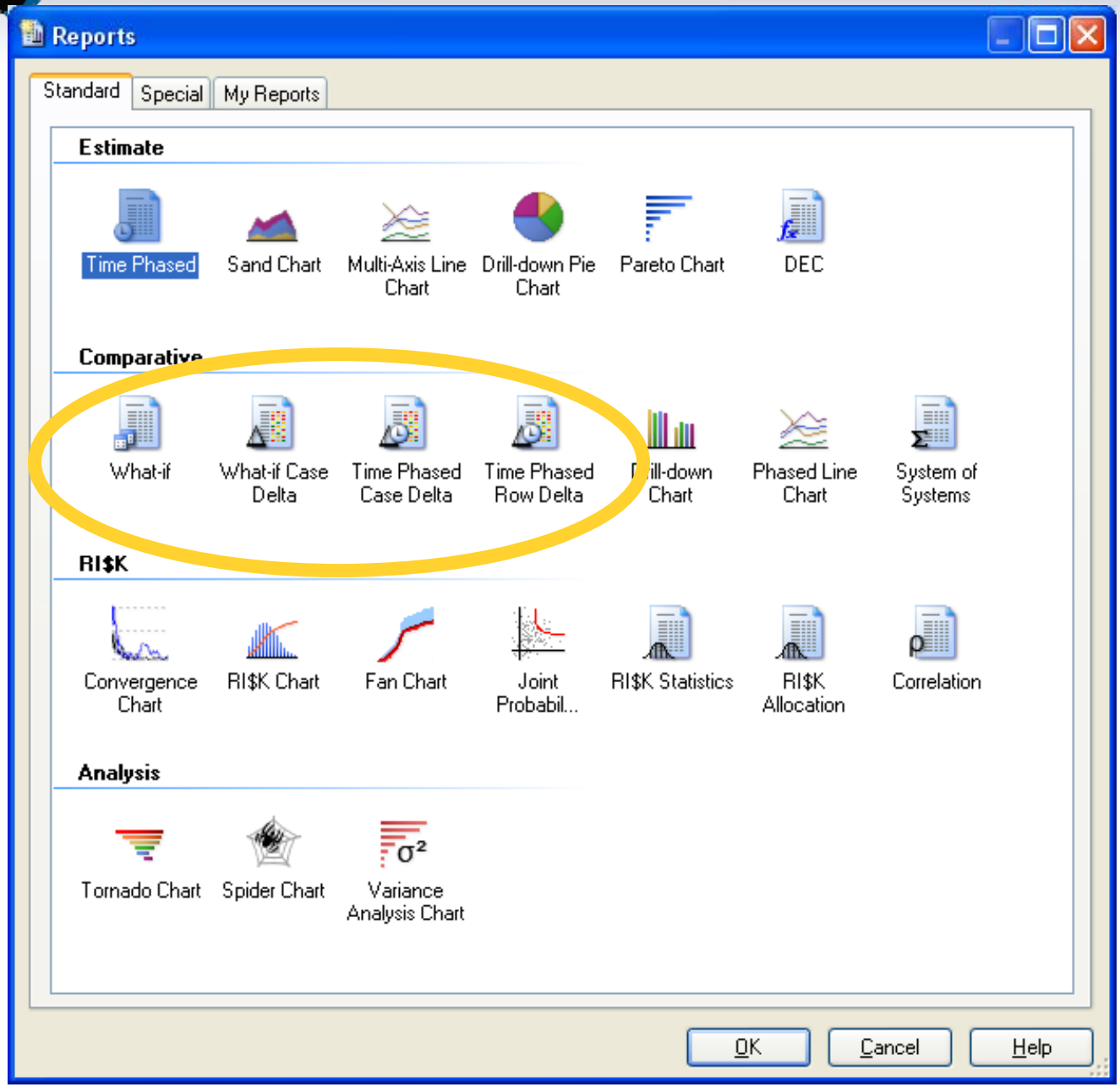
Setting up Rows for POST Overrides



- **Go to Custom 1 Workscreen to see “External Type”**
- **INPUT: Allows value to be overridden in POST**
- **OUTPUT: Default, value only overridden in ACE**
- **Blank : No Type, row does not display in POST**

COMPARISON REPORTS AVAILABLE IN POST

POST Available Reports



Summary

- **Organization**
  - Dates at top, use sections and bookmarks to keep file organized
- **Set up quantity discount tables for faster updates/what-ifs**
- **Use “Switches” for known “What-Ifs”**
- **Consider including additional years with IS, I, BY, TY, SY rows**
  - Create input variables, Call with F phased Row
- **To make annual changes to C Phased row, change to F Phasing**
- **Use sections for Reporting relevant information**
- **Reports able to be created for specific case or selected case**
- **Rows can be modified to allow POST overrides, or be hidden from POST**
- **Comparison Reports available in POST**


Thank you!