



ENHANCING ACEIT CAPABILITIES WITH THE JOINT INTEGRATED ANALYSIS TOOL (JIAT)



**5TH ANNUAL ACEIT USER WORKSHOP
FEBRUARY 1-2, 2011**



Introduction to ACEIT and JIAT

- ACEIT provides a full suite of tools to assist cost analysts with the mechanics of analyzing data, building documented cost models and exploring what-ifs.
- When using ACEIT the major challenges for the cost analyst are:
 - ✓ Identifying relevant source data (analogous systems)
 - ✓ Collecting cost, technical, and schedule data
 - ✓ Developing or finding relevant CERs and factors
 - ✓ Finding and using appropriate cost/engineering models
 - ✓ Identifying inputs to uncertainty analysis

JIAT provides assistance with these challenges



JIAT and ACEIT Together

Use JIAT and ACEIT Together as a Powerful Tool-box



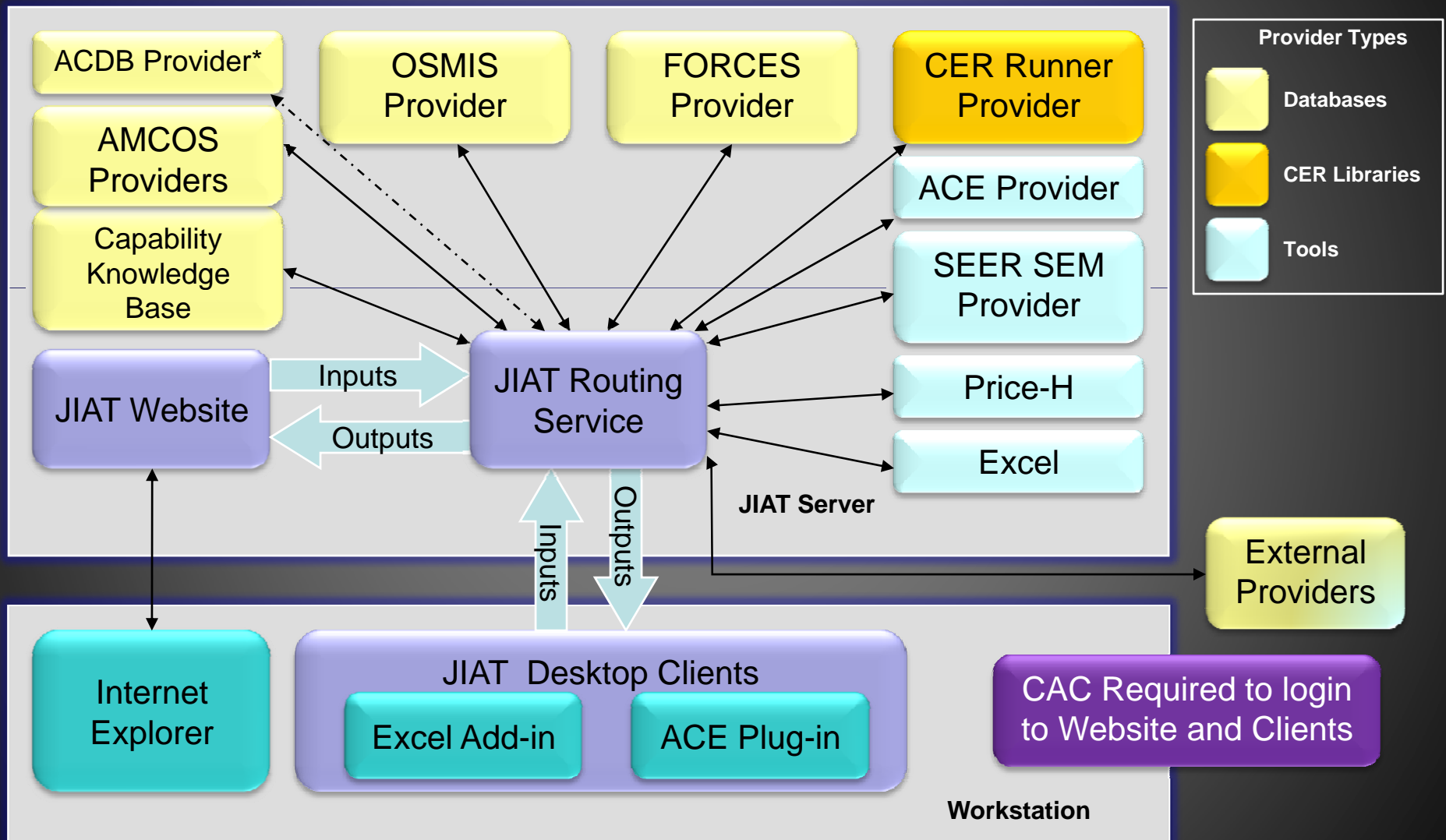
- Controls access to:
 - Databases
 - CER Libraries
 - Models
 - Estimating data
 - Model Sequences

**JIAT is for DoD Analysts
Only**



- Analyze data sets with CO\$TAT
- Develop estimates, models, AOAs, and CBAs with ACE
- Run what-if drills in ACE or POST
- Report on estimate results with ACE or POST

JIAT 2.1 Components



* Currently only one sample ACDB database is hosted – Army databases are scheduled to be supported in JIAT 2.2 in Sep 2011



Working with the JIAT Desktop

- Use the JIAT Excel Add-in to access JIAT and CO\$TAT at the same time

The screenshot shows the Microsoft Excel interface with the following details:

- Title Bar:** Book1 [Compatibility Mode] - Microsoft Excel
- Ribbon:** Home, Insert, Page Layout, Formulas, Data, Review, View, Developer, Add-Ins, **JIAT**, **COSTAT** (both circled in red).
- Model Runner:** Create New, Relink, Documentation, Create New, Run Query, About, Close, Help.
- Formula Bar:** A7, fx, Capabilities
- Worksheet:**
 - Row 1: **JIAT Data Query** (blue header)
 - Row 2: Model: Program by Capability
 - Row 3: Description: Given a set of Input conditions, return all matching records from the CKB Programs table
 - Row 4: Provider: CKB Provider (as of 6/11/2009)
 - Row 5: Query Inputs | Query Results
 - Row 6: Name | Value
 - Row 7: Capabilities | Select Run Query to produce output results.
- Sheet Tabs:** Data Query Sheet, Sheet1, Sheet2, Sheet3
- Status Bar:** Ready, 100%



Working with the JIAT Desktop

- Use the JIAT ACE Plug-in to bring JIAT content directly into ACE

The screenshot shows the ACE 7.2 software interface. The main window displays a spreadsheet with columns for WBS/CES Description and Appropriation. The 'Tools' menu is open, and the 'JIAT Ace Plugin' option is highlighted with a red circle. A separate dialog box titled 'JIAT ACE Plug-in' is open, showing options for 'Import JIAT Session Data', 'Update JIAT Session Data', 'JIAT CER Library', and 'Tag ACE Rows'.

WBS/CES Description	Approp
15 *Estimate	
16 Total	
17 Manufacturing	
18 Air Vehicle	3010
19 Integration	3010
20 SEPM	3010
21 Other	3080
22	
23 *INPUT VARIABLES	
24 Air Vehicle Unit Cost	3010
25 Air Vehicle Buy Quantity	
26	
*Technical/Performance Characteristics	
28 Air Vehicle Takeoff Weight (lbs)	TW 12000.00 *
29 Air Vehicle Range (nmi)	RANGE 250.00 *
30	
31	
32	



Using JIAT and ACEIT Together

➤ Main features in this presentation

- ✓ Using JIAT to identify relevant analogies
- ✓ Retrieving program data to use in a model or CER development
- ✓ Developing CERs or factors with CO\$TAT
- ✓ Searching for CERs from JIAT libraries and importing them directly into the ACE session
- ✓ Analyzing data obtained through JIAT to develop uncertainty distributions

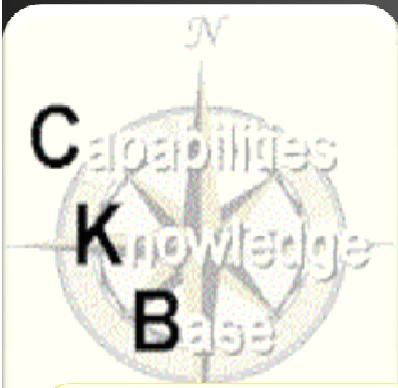
➤ Other features discussed

- ✓ Using ACEIT Inflation Utility to normalize data sets
- ✓ Creating private CER and factor libraries for your organization
- ✓ Setting up ACE sessions to host on JIAT
- ✓ Running ACE models in the JIAT Excel Client
- ✓ Importing model results from JIAT-hosted models into your ACE session
- ✓ Creating Model Sequences



Current JIAT Database Providers

➤ JIAT provides access to Army databases



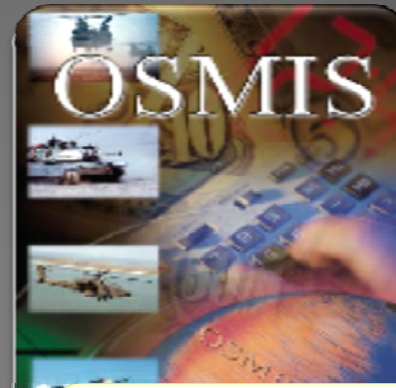
Identify Analogous Systems

- Capabilities
- Programmatic data
- Technical data
- Schedule data
- SAR data



Collect Standard Rates

- Enlisted
- Officer
- Civilian
- National Guard
- Reserve
- 17 tables provided



Gather O&S Data

- Vehicle operational data
- Support systems data
- Aircraft flight data
- Software maintenance data



Obtain Force and Organizational Data

- Flying costs
- Cost per mile
- Facilities costs
- Equip data and costs
- Replenishment costs
- Mileage
- 50 tables provided

Search and Retrieve Data



Quickly find Analogous Systems Using JIAT

Use the CKB Provider to identify analogous systems and gather cost, technical, and schedule data for pre-Milestone A analysis

- An analogous system provides a starting point for all other data gathering activities
- Perform program searches by capability
- Retrieve analogous program's cost, technical, and schedule data
- CKB reports SAR data

Model Name	Provider Name
Program by General Characteristic	CKB Provider (as of 6/11/2009)
Program by Capability	CKB Provider (as of 6/11/2009)
Schedules by PNO	CKB Provider (as of 6/11/2009)
Technical by PNO	CKB Provider (as of 6/11/2009)
Capabilities by PNO	CKB Provider (as of 6/11/2009)
Cost by PNO	CKB Provider (as of 6/11/2009)
O&S Cost by PNO	CKB Provider (as of 6/11/2009)



Quickly find Analogous Systems Using JIAT

- Use the CKB Provider to search for analogies by capabilities

The screenshot shows the Microsoft Excel interface with the JIAT Data Query tool. The 'Run Query' dialog box is open, and the 'Select Value(s)' sub-dialog is active. The 'Variable Value' list includes the following items:

- (Level-1) C3I
- (Level-1) C3I > (Level-2) Area
- (Level-1) C3I > (Level-2) Loca
- (Level-1) C3I > (Level-2) Net-C
- (Level-1) C3I > (Level-2) Thea
- (Level-1) C3I > (Level-2) Wide
- (Level-1) Control
- (Level-1) Control > (Level-2) Manned
- (Level-1) Control > (Level-2) Unmanned
- (Level-1) Deploy
- (Level-1) Deploy > (Level-2) Air
- (Level-1) Deploy > (Level-2) Ground

The callout box highlights the following search criteria:

- Control: Manned
- Maneuvering Environment: Air
- Support: Ground



Quickly find Analogous Systems Using JIAT

➤ Results from the CKB Provider – “Program by Capability” search

The screenshot shows an Excel spreadsheet titled 'Book1 [Compatibility Mode] - Microsoft Excel'. The 'Data Query' tab is active, displaying the results of a search for 'Program by Capability'. The spreadsheet is organized into sections: 'Query Inputs' and 'Query Results'. The 'Query Results' section contains a table with columns for Name, Value, PNO, Program Name, Long Name, Service, Program Type, Program Sub-Type, Acquisition Type, Acquisition Category, and DAMIR Status. A callout box points to the search results, stating: 'Search results include: • Army, Navy, and Air Force • Rotary and fixed wing aircraft'.

Query Inputs			Query Results							
Name	Value	PNO	Program Name	Long Name	Service	Program Type	Program Sub-Type	Acquisition Type	Acquisition Category	DAMIR Status
Capability	(Level-1)	Units								
		156	BLACK HAWK (UH-60A/L)	Black Hawk Utility Helicopter (UH-60L)	Army	Aircraft	Rotary-Wing	MDAP	-	InActive
		182	LUH	Light Utility Helicopter (LUH); UH-72A Lakota	Army	Aircraft	Rotary-Wing	MDAP	IC	Active
		191	MH-60R	MH-60R Multi-Mission Helicopter	Navy	Aircraft	Rotary-Wing	MDAP	IC	Active
		200	C-17A	C-17A Globemaster III	Air Force	Aircraft	Fixed-Wing	MDAP	IC	Active
		202	APACHE BLOCK III (AB3)	APACHE BLOCK III (AB3)	Army	Aircraft	Rotary-Wing	MDAP	ID	Active
		212	V-22	V-22 Joint Services Advanced Vertical Lift Aircraft (Osprey)	Navy	Aircraft	Hybrid-Wing	MDAP	ID	Active
		220	C-130J	C-130J Hercules	Air Force	Aircraft	Fixed-Wing	MDAP	IC	Active
		276	E-2C REPRODUCTION	E-2C Reproduction	Navy	Aircraft	Fixed-Wing	MDAP	IC	InActive
		278	CH-47F	CH-47F Improved Cargo Helicopter (ICH)	Army	Aircraft	Rotary-Wing	MDAP	IC	Active
		282	MH-60S	MH-60S Fleet Combat Support Helicopter	Navy	Aircraft	Rotary-Wing	MDAP	IC	Active
		327	C-5 RERP	C-5 Reliability Enhancement and Reengining Program (RERP)	Air Force	Aircraft	Fixed-Wing	MDAP	ID	Active
		390	CH-53K	CH-53K Heavy Lift Replacement (HLR)	Navy	Aircraft	Rotary-Wing	MDAP	ID	Active
		831	LONGBOW APACHE	AH-64D LONGBOW APACHE	Army	Aircraft	Rotary-Wing	MDAP	IC	Active



Use JIAT to Retrieve Program Data

- The CKB Provider allows you to retrieve cost, schedule, and technical data for systems by PNO
- Cost data is available for RDT&E, PROC, MILCON and O&M
- Technical data is available from sources like Military Fact files, and Global Security
- Schedule data shows Milestone dates and durations (not pictured)

The screenshot displays two overlapping Excel windows showing JIAT Data Query results. The top window shows cost data for Program Name 156 BLACK, and the bottom window shows technical data for the same program name.

Top Query Results (Cost Data):

Name	Value	PNO	Program Name	Sub-Program Name	Data Source	Source Date	Cost Type	Appropriation	Base Yr	BY Total Cost	TY Total Cost	Total Quantity
Program N	156 BLACK									\$M	\$M	
Sub-Program	APACHE	001	Aircraft 1	Aircraft 1	SAR	12/25/1999	PROC	2031	1971	1304.926	5403.876	712
Cost Type	PROC	002	Aircraft 2	Aircraft 2	SAR	12/25/2007	PROC	2031	2006	2040.0418	2343.8133	387
		003	Aircraft 3	Aircraft 3	SAR	12/25/2007	PROC	1506	2006	10694.8905	11824.9654	283
		004	Aircraft 4	Aircraft 4	SAR	12/25/2007	PROC	2031	1999	5455.3333	5999.3509	213

Bottom Query Results (Technical Data):

Name	Value	PNO	Program Name	Sub-Program Name	Attribute	Value	Units	Source Type
Program N	156 BLACK							
Sub-Program	AH-64D	001	Aircraft 1	Aircraft 1	Crew	4	qty	Military Fact File
		001	Aircraft 1	Aircraft 1	Height	17	ft	Global Security
		001	Aircraft 1	Aircraft 1	Length	64.8	ft	Global Security
		001	Aircraft 1	Aircraft 1	Max Cruise Speed	160	mph	Military Fact File
		001	Aircraft 1	Aircraft 1	Max Gross Weight	20250	lbs	Military Fact File
		001	Aircraft 1	Aircraft 1	Max Operating Altitude	18996.1	ft	Global Security
		001	Aircraft 1	Aircraft 1	Max Speed	145	mph	Global Security
		001	Aircraft 1	Aircraft 1	Range			Global Security
		001	Aircraft 1	Aircraft 1	Range			Military Fact File
		001	Aircraft 1	Aircraft 1	Rate Of Climb	698.8	ft/min	Global Security
		001	Aircraft 1	Aircraft 1	Rotor Diameter	53.7	ft	Global Security
		001	Aircraft 1	Aircraft 1	Troop Cap - Combat-Equip	11	qty	Military Fact File
		001	Aircraft 1	Aircraft 1	Troop Cap - Combat-Equip	11	qty	Military Website
		001	Aircraft 1	Aircraft 1	Wingspan	7.8	ft	Global Security
		001	Aircraft 1	Aircraft 1	Crew	4	qty	Global Security
		001	Aircraft 1	Aircraft 1	Crew	4	qty	Military Fact File
		001	Aircraft 1	Aircraft 1	Empty Weight	11516	lbs	Global Security
		001	Aircraft 1	Aircraft 1	Engine	1940	shp	Global Security
		001	Aircraft 1	Aircraft 1	Height	17	ft	Global Security

A callout box labeled "Notional data" points to the "Max Speed" row in the technical data table.



Use ACEIT Inflation Utility to Normalize JIAT- Provided Data Sets

- Cost data often requires normalization before it can be analyzed
- ACEIT Inflation Utility allows you to use the ACE inflation tables in Excel worksheets

The screenshot shows an Excel spreadsheet with a table of aircraft data. The table has columns for Sub-Program Name, Data Source, Source Date, Cost Type, Appropriation, Base Yr, BY Total Cost, TY Total Cost, Total Quantity, BY Procurement Average Unit Cost (PAUC), Quantity Units, BY 2010 Total Cost, and BY 2010 Average Unit Cost. The 'Insert ACEITInf Function' dialog box is open, showing options for Database (System), Inflation Set (US Government Indices for FY 2010), Appropriation (APA), From Year (2006), To Year (2010), Value to Inflate (2040.0418), and Inflation (2197.18525). The dialog box also shows a tree view of appropriations including AIR FORCE and ARMY.

1	Sub-Program Name	Data Source	Source Date	Cost Type	Appropriation	Base Yr	BY Total Cost	TY Total Cost	Total Quantity	BY Procurement Average Unit Cost (PAUC)	Quantity Units	BY 2010 Total Cost	BY 2010 Average Unit Cost
2		0	0	0	0	0	0 \$M	0 \$M	0	0 \$M	0	0 \$M	0 \$M
3	Aircraft 1	SAR	36519	PROC	2031	1971	1304.926	5403.876	712	1.83	Aircraft	7314.327	
4	Aircraft 2	SAR	39441	PROC	2031	2006	2040.042	2343.813	387	5.27	Aircraft		
5	Aircraft 3	SAR	39441	PROC	1506	2006	10694.89	11824.97	283		Aircraft		
6	Aircraft 4	SAR	39441	PROC	3010	1996	54525.1						
7	Aircraft 5	SAR	39441	PROC	2031	2006	6873.32						
8	Aircraft 6	SAR	39441	PROC	1506	2005	43475.1						
9	Aircraft 7	SAR	39441	PROC	3010	1996	10487.1						
10	Aircraft 8	SAR	39076	PROC	1506	1994	3834.48						
11	Aircraft 9	SAR	39441	PROC	2031	2005	12725.9						
12	Aircraft 10	SAR	39624	PROC	1506	1998	6685.89						
13	Aircraft 11	SAR	39624	PROC	3010	2008	6082.05						
14	Aircraft 12	SAR	39441	PROC	1506	2006	12481.9						
15	Aircraft 13	SAR	37980	PROC	2031	1996	7769.47						
16	Aircraft 14	SAR	39441	PROC	2031	1996	1014						

Function dialog allows you to select different inflation tables and appropriations

Fill to normalize the entire dataset

Notional data



Move the Normalized JIAT Data to a CO\$TAT Data Sheet

- CKB Provider's normalized data is passed into a CO\$TAT data sheet where it is analyzed and CERs and factors are developed

The screenshot shows an Excel spreadsheet titled "JIAT AUW.xlsx [Compatibility Mode] - Microsoft Excel". The active sheet is "CO\$TAT". The data table has the following columns: Observations, BY 2010 Total Cost, BY 2010 Average Unit Cost, Year, Type, Quantity, Crew, Weight (lbs), Height (ft), Length (ft), Max Cruise Speed (mph), Max Operating Altitude (ft), Max Speed (mph), Range (mi), Rate of Climb (ft/min), Rotor Diameter (ft), and Troop Cap. The data rows are numbered 3 through 19. A callout box points to the "CO\$TAT" tab, stating "Combine data from multiple JIAT data queries into one CO\$TAT data sheet". Another callout box points to a row of data, stating "Example shows sample data from CKB Cost By PNO and Technical By PNO data queries".

Observations	BY 2010 Total Cost	BY 2010 Average Unit Cost	Year	Type	Quantity	Crew	Weight (lbs)	Height (ft)	Length (ft)	Max Cruise Speed (mph)	Max Operating Altitude (ft)	Max Speed (mph)	Range (mi)	Rate of Climb (ft/min)	Rotor Diameter (ft)	Troop Cap
Variable ID	Tot\$	AUC\$	Year	Type	Qty	Crew	Wgt	Hgt	Lgnth	CruiseSp d	Alt	Speed	Range	Climb	RotorDia	TroopCap
Aircraft 1	7314.327	10.25745	1971	Rotary-Wi	712	4	11516	17	64.8	160	18996.1	145	367.1	698.8	53.7	11
Aircraft 2	2197.185	5.675946	2006	Rotary-Wi	387	2	3953	11.3	42.7		11300	167	425.8		36.1	8
Aircraft 3	11518.71	40.70095	2006	Rotary-Wi	283	4	23000	16.7	65	165.7	14847	153.1	437.3		53.8	
Aircraft 4	68941.65	323.1051	1996	Fixed-Wir	213	3	11800	55.1	173.9	500	45000	500	2761.9			102
Aircraft 5	7402.77	10.39333	2006	Rotary-Wi	712	2	11800	15	50	167	14650	165	300	2415	8	
Aircraft 6	48276.06	94.27444	2005	Hybrid-Wi	512	3	33460	22	57	295	25000	351	352	3200	38	24
Aircraft 7	13259.95	88.11614	1996	Fixed-Wir	150	2	86190	38.8	112.8	400	28000	410	3264	2100		92
Aircraft 8	5039.254	101.9814	1994	Fixed-Wir	49	5	40840	18.3	57.5	300	30000	389	1726	1522	60	33
Aircraft 9	14131.11	24.62906	2005	Rotary-Wi	574	3	23400	19	99	137	20000	184	1300	1522	60	33
Aircraft 10	8246.452	27.09803	1998	Rotary-Wi	304	2	23000	17	65	180	17560	200	427		54	12
Aircraft 11	6228.846	113.1976	2008	Fixed-Wir	55	7	762000	65	240			572	2473			
Aircraft 12	13443.4	78.7524	2006	Rotary-Wi	171		74000			19						
Aircraft 13	9823.736	12.01181	1996	Rotary-Wi	818											
Aircraft 14	12832.41	17.03149	1996		754											



Regress the JIAT Provided Data to Create a CER

Pairwise Variable Analysis For Dataset New Dataset

Sunday, 28 November 2010, 2:00 pm

I. Correlation Matrix

	Tot\$	AUC\$	Year	Type	Qty	Crew	Wgt	Hgt	Lgnth	CruiseSpd	Alt
Tot\$	1.0000	0.6732	0.2004		-0.1758	0.4715	0.6803	0.9002	0.8822	-0.1144	
AUC\$	0.6732	1.0000	0.3382		-0.7302	0.4200	0.9678	0.5844	0.4808	0.6435	
Year	0.2004	0.3382	1.0000		-0.4611	-0.5021	0.2564	-0.2515	-0.0391	0.1406	
Type				1.0000							
Qty	-0.1758	-0.7302	-0.4611		1.0000	0.0897	-0.6278	0.1559	0.0936	-0.6539	0.5891
Crew	0.4715	0.4200	-0.5021		0.0897	1.0000	0.2949	0.4950	0.3835	-0.3382	0.4123
Wgt	0.6803	0.9678	0.2564		-0.6278	0.2949	1.0000	0.8396	0.7367	0.8520	-0.4659
Hgt	0.9002	0.5844	-0.2515		0.1559		0.8396	1.0000			
Lgnth	0.8822	0.4808	-0.0391		0.0936		0.7367		1.0000		
CruiseSpd	-0.1144	0.6435	0.1406		-0.6539		0.8520			1.0000	
Alt	0.1812	-0.4750	-0.5060		0.5891						1.0000
Speed	0.1800	0.1939	0.4118		-0.3640						
Range	0.5955	0.0991	0.2321		0.0711						
Climb	-0.0122	-0.0152	0.8668		0.0235						
RotorDia	0.4898	0.5468	-0.3122		-0.3952						
TroopCap	0.9102	0.5990	0.2373		0.2875						
Wingspan											
Engine											

Run a pair-wise analysis to see which variables have strong relationships and are potential cost drivers

Perform Linear, Log-Linear or Non-Linear regression to develop CERs or factors

View regression results and decide if the CER or factor is suitable for use within estimates

Linear Analysis for Dataset New Dataset, Case 6

Wednesday, 01 December 2010, 8:47 am

I. Model Form and Equation Table

Model Form:	Unweighted Linear model
Number of Observations Used:	7
Equation in Unit Space:	$AUC\$ = (-5.26) + 0.002491 * Wgt + (-0.005473) * Engine$

II. Fit Measures (in Fit Space)

Coefficient Statistics Summary

Variable	Coefficient	Std Dev of Coef	Beta Value	T-Statistic (Coef/SD)	P-Value	Prob Not Zero
Intercept	-5.2604	5.1321		-1.0250	0.3633	0.6367
Wgt	0.0025	0.0008	2.2669	3.2878	0.0303	0.9697
Engine	-0.0055	0.0029	-1.3105	-1.9007	0.1300	0.8700

Goodness-of-Fit Statistics

Std Error (SE)	R-Squared	R-Squared (Adj)	Pearson's Corr Coef
5.6727	96.68%	95.01%	0.9832



Using JIAT's CER Library in ACE

- JIAT currently hosts over 150 documented CERs and factors available for Army users
- CER and factor sources
 - ✓ Missile Blue Book
 - ✓ Ground Vehicles Blue Book
 - ✓ Manned and Unmanned Aircraft (library created by ODASA-CE analyst from several documented studies)
- Permissions are set by user group and individual user to allow access to various libraries
- Private libraries can be created for other organizations or groups
 - ✓ Example: CECOM has its own factors library available only to CECOM analysts
- Search across all libraries by phase, keyword, and text from a single login and simple-to-navigate user interface



Search JIAT Libraries from ACE

- JIAT expands your CER Library!
- Search through JIAT hosted libraries and pull CERs and factors directly into ACE

The screenshot displays the ACE 7.2 software interface. The main window shows a project titled "01 - Basic ACE.a...logy (BY2010\$K)". A menu is open, highlighting the "JIAT Ace Plugin" option. Below the menu, a "JIAT ACE Plug-in" dialog box is visible, containing buttons for "Import JIAT Session Data", "Update JIAT Session Data", "JIAT CER Library", and "Tag ACE Rows".

Overlaid on the interface are several callout boxes:

- Search by criteria and view search results:** Points to the "JIAT ACE Plug-in - CER Search" dialog box, which shows a table of "Retrieved CERs".
- Access JIAT:** Points to the "JIAT ACE Plug-in" dialog box.
- Definitions for each CER or factor:** Points to the "Definition" button in the "JIAT ACE Plug-in - CER Selection" dialog box.
- Paste directing into your session:** Points to the "Paste" button in the "JIAT ACE Plug-in - CER Selection" dialog box.

The "Retrieved CERs" table contains the following data:

Title	Equation
RDT&E Factor Prototype Manufacturing and SE/PM	ProtoM\$*1.0777
RDT&E Factor Development Engineering and SE/PM	DE\$*.6285
RDT&E Factor DE/PM and SE/PM	DEPM\$*.4301
SYSTEMS ENGINEERING/MGMT	[Protocraft Model].0464 * REC_PROD\$
SYSTEMS ENGINEERING/MGMT	[Protocraft Model].8720* [DE\$ + PM\$]
SEPM	[XYZ Missile PO] 0.378*PMP_D



Import JIAT CERs into ACE

- Examine CERs that meet the search criteria and review their parameters and documentation
- Paste selected CER or factor into the session (see previous slide)
- Link imported equation IDs into the structure of the session
- Documentation is automatically imported into the session and stored on the estimate row

The screenshot shows the ACE 7.2 software interface. The main window displays a spreadsheet with columns for WBS/CES Description, Approp, Unique ID, Point Estimate, Phasing Method, Equation / Throughput, Fiscal Year, Units, Start Date, and Finish Date. A pop-up window provides detailed information for a specific CER:

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 Automated Cost Data Base (ACDB). All were from XYZ Development contract efforts occurring between 1980-2000. The monthly cost data from these reports were normalized to BY00, \$K, using monthly OSD inflation indices. The 200 observations in the original database were segregated into two reasonably homogeneous datasets for further analysis. A normal development set was created which contained 50 candidate observations that were selected based on the assumption that they all represent what we have termed normal development. On average efforts were 94.4% spent (i.e., Cum ACWP/LRE).

REFERENCES System Example, Teclote Research 200. ESCP XXXX, Sep 2000.

USES - Use this factor to estimate System/Project Management (S/PM) Development costs for normal development programs. A development program may be considered normal when it is believed that the system hardware or equipment will be developed rather than acquired off-the-shelf. The output of a normal development program is a complete set of instructions and drawings for producing, fielding, operating, and supporting the end item in quantity. Much of the normal development effort is devoted to fabrication of a product on prototype that meets all of the prime item development specifications and that can be reproduced from releaseable drawings prepared as part of the development effort.

- Use this factor as a gross check on your primary estimating methodology. Use it as your primary method only when you have a quick reaction/tradeoff/planning type estimate, and no specific method exists, e.g., cost/CER/factor from analogous programs.

LIMITATIONS - The data set for this CER includes normal development programs only. Therefore NDI/SWI (Non-developmental Item/SW Intensive) programs where the system is intended to be assembled from

Notional data

Create your Own JIAT CER Libraries

- Use the JIAT website to post CERs and create libraries

Create a hierarchy to organize your CERs and factors

Upload definitions for each entry



Study Datasets for Uncertainty Specifications

- Study dataset to understand its range and distribution shape
- Range and shape information can be used to define uncertainty distributions for ACE RI\$K calculations
- Use CO\$TAT Univariate Analysis
- Use data from any JIAT database Provider
 - ✓ The following example uses OSMIS data



Study JIAT Datasets with CO\$TAT

- Use OSMIS Provider to get “Consumables per System” cost for last ten years of operation of Aircraft 1 across its 10 major operating command areas
 - ✓ 77 data points extracted (sample data below depicts data for aircraft in one command)

JIAT AUW.xlsx - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Developer Add-Ins JIAT

Security Warning Automatic update of links has been disabled Options...

C9 AR : USAR

Query Inputs		Query Results										
Name	Value	Variable Name	Units	1993	1994	1995	1996	1997	1998	2007	2008	2009
Commodity A : AVIATION		Consumables	\$	1536012.39	1069901.39	548770.55	426687.86	13429.28	2011.41	97215.80	1385119.51	402003.8138
Mission Description : Aircraft 1		Repairables	\$	6607252.82	7552372.97	4799528.08	3120309.92	65673.51	20166.65	347953.80	8555602.42	1092754.398
Major Command : AR : USAR		Operating Tempo	HOURS	6378	9395	5406	784	10	0	155	2867	717
Start Year	1993	Density	SYSTEMS	45	57	50	14	14				11
End Year	2009	Consumables per System	\$ per SYSTEM	34133.61	18770.20	10975.42	30477.70	959.23	167.62	19443.16	81477.61	36545.80
CONOPS In Without Cost		Repairables per System	\$ per SYSTEM	146827.84	132497.77	95990.56	222879.28	4690.96	1680.56	69590.76	503270.73	99341.31
		Consumables per Unit Activity	\$ per HOUR	240.83	113.88	101.51	544.24	1342.93	0.00	627.20	483.13	560.68
		Repairables per Unit Activity	\$ per HOUR	1035.95	803.88	887.81	3979.99	6567.35	0.00	2244.87	2984.17	1524.07

OSMIS A OSMIS 1 OSMIS 2 OSMIS 3 OSMIS 4 OSMIS 5 OSMIS 6 OSMIS 7 OSMIS 8

Ready 100%



CO\$TAT Univariate Analysis

JIAT AUW.xlsx - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Developer Add-Ins COSTAT

Criteria Prediction Intervals Report Styles Dataset Pairwise Analysis Cases Linear Log Linear Non Linear Analysis Learning Beta Univariate Examples Help Rules of Thumb About Close Application

Input data into CO\$TAT Data sheet

Run a Univariate Analysis

CO\$TAT reports show RI\$K Multipliers

Observations	Consumables per Year
Obs 1	17841
Obs 2	73385
Obs 3	32576
Obs 4	117137
Obs 5	139222
Obs 6	181532
Obs 7	205505
Obs 8	118300
Obs 9	112804
Obs 10	229934
Obs 11	193244
Obs 12	883742
Obs 13	230126
Obs 14	60627

Univariate Analysis for Dataset Consumables per Year, Case 1

Monday, 13 December 2010, 8:38 am

I. Univariate Data Analysis

Data Description

Variable	Consumables per Year
# of Observations	77
# of Missing Values	0
Maximum	883742.4506
Minimum	17840.7971
Range	865901.6535

CO\$TAT reports show range data

Descriptive Measures

Average	112130.6649
Std. Dev. (Sample)	101540.8718
RMS (Population)	100879.3607
1st Quartile	71246.6598
Median	93840.8469
3rd Quartile	120325.8507
Skewness	5.8446

Confidence Interval (Predicting Population Mean from Sample Mean)

Sample Mean	112130.6649
Lower Bound	99079.9250
Upper Bound	135181.4042
Std Error	11571.6563
Confidence Level	95.00%

Prediction Interval (Predicting Individual Observation from Sample Mean)

Lower Bound	-91447.9526
Upper Bound	315709.2824
Confidence Level	95.00%
RI\$K (%) Multiplier of the Average	
Lower Bound	-81.5548
Upper Bound	281.5548

CO\$TAT reports show RI\$K Multipliers

II. Histogram

Univariate Histogram

Use the histogram to eyeball a distribution

III. Histogram Data

Range	Center	Count
17841 - 141541	79691	67
141542 - 265241	203392	9
265242 - 388942	327092	0
388943 - 512642	450792	0
512643 - 636342	574492	0
636343 - 760042	698193	0
760043 - 883742	821893	1

Incorporate Distribution Information into your Uncertainty Analysis

➤ Enter estimate and RI\$K distribution

The screenshot displays the ACE 7.2 software interface. The main window shows a table of WBS/CES items. Row 307, 'Consumables per System', is selected. The 'Input All Form' dialog box is open, showing the 'RI\$K Distribution Specification' tab. The distribution is set to 'LogNormal' with a 'P.E. Position' of 'Median'. The 'Available Parameters' list includes 'Low', 'Low Percentile', 'Spread', 'Adj. Std. Error', 'CV', and 'Std. Deviation'. The 'RI\$K Specification' table shows 'High' at 281.55 and 'High Percentile' at 97.5000. A callout box with a blue border and white background contains the text: '•CO\$TAT Results used to specify RI\$K' and '•Export and Paste CO\$TAT results into ACE'. A blue arrow points from this callout to the 'High Percentile' parameter in the dialog.

WBS/CES Description	Unique ID	Point Estimate
297	Organizational Maintenance Repair Rate	OMRR 0.020 (50%) *
298		
299	Number of flying hours between each Inter	IMFH 35 (20%) *
	Number of Intermediate Maintenances need	IMQty 2011 (83%) *
300		
301	Hours to perform each Intermediate Mainten	IMHrs 5 (20%) *
302		
303	Number of flying hours between each Depo	DMFH 80 *
	Number of Depot Maintenances needed eac	DMQty 880 (74%) *
304		
305	Hours to perform each Depot Maintenance	DMHrs 10 (20%) *
306		
307	Consumables per System	Conspersys\$ \$ 112.131 (50%) *
308		
309	Hardware Mod Percentage	HWMMod% 0.09 (50%) *
310	Software Mod Percentage	SWMod% 0.05 (50%) *
311	Years of HW Maint	HWMModYrs 10 *
312	Years of SW Maint	SWModYrs 5 *

➤ Uncertainty results for consumable row

WBS/CES Description	Point Estimate	Mean	Std Dev	CV	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%
307 Consumables per System	112.131 (50%)	128.939	\$ 73.274	0.5683	\$ 47.058	\$ 56.991	\$ 64.867	\$ 71.892	\$ 78.529	\$ 84.995	\$ 91.467	\$ 98.077	\$ 104.923	\$ 112.121	\$ 119.827	\$ 128.206	\$ 137.413	\$ 147.904	\$ 160.133



Taking it one step further with ACEIT Distribution Finder (DF)

- Where the Univariate analysis provides data range analysis it only helps you develop an approximation on which uncertainty distribution to utilize
- Tools like ACEIT Distribution Finder and CO\$TAT 7.3 provide features that make recommendations on distribution shapes
- ACEIT Distribution Finder Utility Prototype developed in July 2010
 - ✓ Prototype explored methods to fit distributions to data and how to report results
- CO\$TAT 7.3 will include Distribution Finder
 - ✓ Simplified user interface and generic, CO\$TAT-type report
- This brief shows a version of the Distribution Finder Utility Prototype
 - ✓ The prototype is not a supported application
- JIAT users can use any commercial tool that can draw data from Excel or ACEIT to perform this function

Distribution Utility Recommends an Uncertainty Distribution

2. Set fit parameters

3. Set Fit Constraints

4. Run "Fit All"

5. Study results of "Fit"

Copy Whole

Copy Fit Results

Go To Custom

Repair Range Names

Replicate Settings to (Sheet)

Restore Defaults to Sheet(s)

Minimization Settings for Curve Fitting

Minimize on: **sst**

Minimize error of the sample %tile instead of the sample value

Goodness of Fit Statistic Parameters

Lvl of Sig: 0.05

Chi^2 Test Bins: 11

Chi^2 Bin Selector: Mann-Wald/2

Sturges Bins: 8

Mann-Wald Bins: 21

Force integer freq per bin (default unrounded)

Bins in PDF: 10

Element Selection and Filtering

Select Data Set: Consumables per Year

Filter by Category: NONE

Element to Analyze: []

Hide Program Name: FALSE

Number data points excluded: 0

Plot	Sample	Lognormal	Normal	Triangular	Beta
4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Constrain Mean					
Constrain StdDev					
Force Min->Zero					
Surround Sample					
		Limit Normal <0, 1%			

Fit All | Fit LN | Fit Nor | Fit Tri | Fit Beta

BY2010\$	Sample	Lognormal	Normal	Triangular	Beta
Mean	98,715.08	99,330.77	98,873.40	98,721.96	98,086.81
StdDev	44,148.07	42,894.04	42,501.55	43,058.98	43,011.60
CV	0.447	0.432	0.430	0.436	0.439
Min	17,840.80			15,023.65	17,840.80
Mode		76,858.98	98,873.40	63,952.58	80,929.79
Max	210,580.14			217,189.65	210,580.14
Alpha					1.615
Beta					2.264
Data Count	77	% of Curve <= 0:	1.0%	None	None
Standard Error of Estimate	8,663.92	10,900.11	8,812.33	10,533.11	
SEE / Fit Mean	9%	11%	9%	11%	
Chi^2 Fit test 11 Bin, Sig 0.05	Good (86%)	Good (46%)	Good (19%)	Poor (4%)	

Consumables per Year,(All)

Filter= NONE; Fit = SSE on Value

Force Min => 0; Nor TRI Beta | Force Include Sample Min/Max: TRI Beta

6. Utility also reports distribution parameters as a percent of the point estimate (PE) where the PE is either the mean, median or mode

#	Stddev From	Exclude from Fit	Title for Charts --> (based on columnar triads)	Consumables per Year,(All)
1.83			Project Name 1	17840.80
0.57			Project Name 2	73385.48
1.50			Project Name 3	32575.84
0.42			Project Name 4	117136.92

%tile Override	Selected Filter Elements

Sample Range: 192739.3464
Inner Quadrile Range: 47352.44189

Go To Error Analysis

1. Load data into utility

Notional data

CDF Chart Title Source

Manually Enter Title -> My Analysis

Use Data Set Name as Chart Title

Use Sheet Label as Chart Title



Additional Areas where JIAT and ACEIT Come Together

- Set up ACE sessions to load and run in JIAT
 - ✓ Tag session units
 - ✓ Identify ACE rows to show in JIAT

The screenshot shows the ACE 7.2 software interface. The main window displays a table with columns for WBS/CES Description, JIAT_WBS_ITEM, JIAT_UNITS, Approp, Unique ID, Point Estimate, Phasing Method, and Equation / Throughput. A dialog box titled 'Tag ACE Session Rows' is open, showing a list of WBS items to be tagged. The items include 'Total', 'Manufacturing', 'Air Vehicle', 'Integration', 'SEPM', and 'Other'. The dialog box also has buttons for 'Set Units', 'Set WBS', 'Write Data', and 'Close'.

The screenshot shows the Microsoft Excel spreadsheet 'JIAT AUW.xlsx'. The spreadsheet displays a table with columns for Variable Name, Appropriation, Model Unit, Convert From, Baseline, Enhanced System, and Basic System. The table contains data for various output variables and input variables. A 'Security Warning' message is visible at the top of the spreadsheet.

Variable Name	Appropriation	Model Unit	Convert From	Baseline	Enhanced System	Basic System
OUTPUT VARIABLES						
Total				\$109,238.66	\$112,726.88	\$106,525.69
Manufacturing				\$79,324.39	\$81,870.54	\$77,344.12
Air Vehicle	3010			\$68,977.73	\$71,191.77	\$67,255.76
Integration	3010			\$10,346.66	\$10,678.77	\$10,088.36
SEPM	3010			\$29,350.02	\$30,292.10	\$28,617.33
Other	3080			\$564.25	\$564.25	\$564.25
Air Vehicle Unit Cost	3010			\$9,853.96	\$10,170.25	\$9,607.97
INPUT VARIABLES						
Air Vehicle Buy Quantity		unt		7.00 *	7.00 *	7.00 *
Air Vehicle Takeoff Weight (lbs)		lb		12000.00 *	15000	10000
Air Vehicle Range (nmi)		nmi		250.00 *	250.00 *	250.00 *

- Run ACE Models in JIAT Excel Client
 - ✓ Access ACE models stored on server
 - ✓ Run what-if cases
 - ✓ Run total and time-phased
 - ✓ Also runs in web browser

Notional data



Additional Areas where JIAT and ACEIT Come Together

ACE 7.2 - [01 - Basic ACE.aceit (Read Only) - Methodology (BY2010SK)]

Methodology

31 *** JIAT Session: GPS Hardware ***

WBS/CES Description	Approp	Unique ID	Point Estimate	Phasing Method	JIAT_COST_TOTAL (\$ Total (Cost))	JIAT_NONCOST_TOTAL (\$) Total	Equation / Throughput	Fiscal Year	Units
15 Estimate			Estimate						
16 Total			\$ 109,238,661 *						
17 Manufacturing			PMP\$ \$ 79,324,391 *						
18 Air Vehicle		3010	AV\$ \$ 68,977,731 *	F			AV_UC\$ * BuyQty		
19 Integration		3010	\$ 10,346,660 *	F			0.15 * AV\$		
20 SEPM		3010	\$ 29,350,025 *	F			0.37 * PMP\$		
21 Other		3080	\$ 564,245 *	TV			[Cost Throughput]		\$K
22									
23 INPUT VARIABLES			INL_VAR						
24 Air Vehicle Unit Cost		3010	AV_UC\$ \$ 9,853,962 *	C			(959 * TW * .243 + 189 * RANGE * .652)/2	2000	\$K
25 Air Vehicle Buy Quantity			BuyQty 7 *	IS			[Input Throughput]		
26									
27 Technical Performance Characteristics									
28 Air Vehicle Takeoff Weight (lbs)			TW 12000.00 *	C				12000	
29 Air Vehicle Range (nmi)			RANGE 250.00 *	C				250	
30									
31 JIAT Session: GPS Hardware ***									
32 Next Generation GPS Receiver: Total Development Cost	RDTEA			C	3975.26403957843			1993	\$
33 Next Generation GPS Receiver: Total Production Cost	OPA			C	31206.7177594489			1993	\$
34 Next Generation GPS Receiver: Total Cost	OPA			C	35181.9817980273			1993	\$
35 Next Generation GPS Receiver:Pattern: Antenna:Coverage				C		0.25			
36 Next Generation GPS Receiver:Pattern: Antenna:Activation				C		1			
37 Next Generation GPS Receiver:Pattern: Antenna:Activation				C		1			

➤ Import model results from JIAT-hosted models into your ACE session

- ✓ Run a model in the JIAT web browser and save it to your account
- ✓ Models include Excel, PRICE-H, SEER SEM and ACE
- ✓ From within ACE access your JIAT models and import them into your ACE session

https://jiat.awps.army.mil/?ID=c7a7760a-7148-4456-8877-513859d6d268 - JIAT - Windows Internet Explorer

Home Session Model Sequence Reports CER Libraries Manage CERs Manage Models Maintenance Help Log Off

Model Sequence Designer - Software Estimate

Sequence Documentation

Model Sequence		Variable Mapping					
Model	Provider	Inputs	Visible	Mapped Variable	Mapped Model	Outputs	Visible
SEER SEM Plug in Example	SEER-SEM Provider	Air Vehicle Unit Cost	<input type="checkbox"/>			Total	<input checked="" type="checkbox"/>
		Air Vehicle Buy Quantity	<input type="checkbox"/>			Manufacturing	<input checked="" type="checkbox"/>
		Air Vehicle Takeoff Weight (lbs)	<input type="checkbox"/>			Air Vehicle	<input type="checkbox"/>
		Air Vehicle Range (nmi)	<input type="checkbox"/>			Integration	<input type="checkbox"/>
		Software Development Schedule Months	<input type="checkbox"/>	UAV Software:Development Schedule Months	SEER SEM Plug in Example	SEPM	<input checked="" type="checkbox"/>
		Software Labor Rate	<input checked="" type="checkbox"/>			Other	<input checked="" type="checkbox"/>
						Software	<input checked="" type="checkbox"/>

Add... Delete Up Down

Trusted sites 100%

- Create model sequences with ACE sessions in the series
- ✓ Model sequences chain models together to pass inputs/results across multiple models
 - ✓ Example shows a SEEM SEM model passing software effort months to an ACE cost estimate
 - ✓ Resulting sequence is run like one model



Coming in JIAT 2.2

- Enhancements and studies for the next version of JIAT (due September 2011)
 - ✓ ACDB model providers for all the ACDB Army databases
 - ✓ AIM Provider to provide Army DAMIR and AV/SOA data
 - ✓ DCARC CSDR-SR Provider
 - ✓ Web Link libraries
 - ✓ Military Composite Rates Provider
 - ✓ Data query export to CO\$TAT
 - ✓ Study FEDLOG to gather requirements for a potential FEDLOG Provider



Overview of JIAT Benefits

- Web services technology provides a platform to bring multiple tools together in one workplace
- Established a Service-Oriented Architecture (SOA) framework to encourage the integration of other Services' cost estimating tools and databases
- JIAT can easily segment user groups by Service and command
- Analyses for all phases of the program – including pre-Milestone A
- Comprehensive analysis can reduce program risk by addressing hardware, software, and programmatic requirements early in the program's life cycle



Conclusion

- **JIAT allows you to obtain controlled access to a wide variety of data from a single interface and login**
- **Access to data is controlled by user group and individual permission levels**
- **You can use JIAT data**
 - ✓ To support building your ACE models
 - ✓ In your CO\$TAT analysis to build CERs and factors
 - ✓ To identify uncertainty distributions to enter into ACE RI\$K
- **You can use JIAT CER Libraries**
 - ✓ To expand your available CERs and factors
 - ✓ To organize your CERs and factors so they can be used across your organization and easily inserted into your ACE sessions
- **Additionally, JIAT provides access to other model sources that can be imported into your estimates**

JIAT provides the data to drive your ACE models



Back Up



Identifying DF Results to Enter into ACE

➤ DF recommends distributions and provides relevant statistics

Example

- DF recommends Log Normal distribution
- Normal and Triangular also good
- All three distributions are statistically significant

BY2010S	Sample	Lognormal	Normal	Triangular	Beta
Mean	98,715.08	99,330.77	98,873.40	98,721.96	98,086.81
StdDev	44,148.07	42,894.04	42,501.55	43,058.98	43,011.60
CV	0.447	0.432	0.430	0.436	0.439
Min	17,840.80			15,023.65	17,840.80
Mode		76,858.98	98,873.40	63,952.58	80,929.79
Max	210,580.14			217,189.65	210,580.14
Alpha					1.615
Beta					2.264
Data Count	77	% of Curve <= 0:	1.0%	None	None
Standard Error of Estimate		8,663.92	10,900.11	8,812.33	10,533.11
SEE / Fit Mean		9%	11%	9%	11%
Chi ² Fit test 11 Bins, Sig 0.05		Good (86%)	Good (46%)	Good (19%)	Poor (4%)

These tables contain fit parameters and statistics that have been normalized by either the Mean, Median or Mode. Use these as percent multipliers of your point estimate.

Recommended Fit Lognormal (Mean = 99330.77, Std Dev = 42894.04)						Condensed Recommendation Lognormal (99330.77, 42894.04)											
Consumables per Year, (All) Unitized by Mean						Consumables per Year, (All) Unitized by Median						Consumables per Year, (All) Unitized by Mode					
	Sample	LN	Normal	Tri	Beta		Sample	LN	Normal	Tri	Beta		Sample	LN	Normal	Tri	
Mean	1.0000	1.0000	1.0000	1.0000	1.0000	Mean	1.0729	1.0893	1.0000	1.0646	1.0317	Mean		1.2924	1.0000	1.5437	
Std Dev	0.4472	0.4318	0.4299	0.4362	0.4385	Std Dev	0.4798	0.4704	0.4299	0.4643	0.4524	Std Dev		0.5581	0.4299	0.6733	
CV	0.4472	0.4318	0.4299	0.4362	0.4385	CV	0.4472	0.4318	0.4299	0.4362	0.4385	CV		0.4318	0.4299	0.4362	
Min	0.1807			0.1522	0.1819	Min	0.1939			0.1620	0.1877	Min				0.2349	
Mode		0.7738	1.0000	0.6478	0.8251	Mode		0.8428	1.0000	0.6896	0.8513	Mode		1.0000	1.0000	1.0000	
Max	2.1332			2.2000	2.1469	Max	2.2887			2.3421	2.2150	Max				3.3961	
Sample Mean/Dist Mean		0.9938	0.9984	0.9999	1.0064	Sample Median/Dist Median		1.0090	0.9306	0.9922	0.9678	Sample Mode/Dist Mode					
Dist Median/Dist Mean	0.9321	0.9181	1.0000	0.9393	0.9692	Dist Median/Dist Median	1.0000	1.0000	1.0000	1.0000	1.0000	Dist Median/Dist Mode		1.1865	1.0000	1.4500	
SDev Log Space		0.4135				SDev Log Space		0.4135				SDev Log Space		0.4135			
SEE/Dist Mean		0.0872	0.1102	0.0893	0.1074	SEE/Dist Median		0.0950	0.1102	0.0950	0.1108	SEE/Dist Mode		0.1127	0.1102	0.1378	
						Actual Median	92008.15	9119									

Recommended Fit		Recommended	
Long Form	Lognormal (Mean = 1.0000, Std Dev = 0.4318)	Short Form	Lognormal (1.0000, 0.4318)
Fitted Mean	1.0000	Fitted Mean	1.0893
Fitted Std Dev	0.4318	Fitted Std Dev	0.4704
Fitted CV	0.4318	Fitted CV	0.4318
Low		Low	
Mode	0.7738	Mode	0.8428
High		High	
Sample Mean/Dist Mean	0.9938	Sample Mean/Dist Mean	1.0090
Dist Median/Dist Mean	0.9181	Dist Median/Dist Mean	1.0000
SDev Log Space	0.4135	SDev Log Space	0.4135
SEE/Dist Mean	0.0872	SEE/Dist Mean	0.0950

- RISK best practice is to define parameters as a percent of the PE
- DF provides unitized results based on PE interpretation
- For Log-Normal, generally select "Unitized by Median"
- DF always reports the mean and stdev for lognormal



Incorporate Distribution Information into your Uncertainty Analysis

➤ Enter estimate and RI\$K distribution from DF results

The screenshot shows the ACE 7.2 software interface. On the left is a table of WBS/CES items. Row 307, 'Consumables per System', is highlighted. A blue box labeled 'Notional data' is drawn around the 'Point Estimate' column for this row. On the right is the 'Input All Form' dialog for this item. The 'Distribution' is set to 'LogNormal'. The 'P.E. Position' is set to 'Undefined'. The 'RI\$K Specification' table shows 'Std. Deviation' as 47 and 'Mean' as 108.9. The 'Estimate' is \$112,131 (50%).

WBS/CES Description	Unique ID	Point Estimate	Equation / Throughput
297 Organizational Maintenance Repair Rate	OMRR	0.020 (50%) *	.02
298			
299 Number of flying hours between each Inter	IMFH	35 (20%) *	35
300 Number of Intermediate Maintenances need	IMGty	2011 (83%) *	RndDn((TotMsnSched + Mod(FYCCum(@TotMsnSched, FYR-1),IMFH))/IMFH)
301 Hours to perform each Intermediate Maint	IMHrs	5 (20%) *	5
302			
303 Number of flying hours between each Dep		80 *	80
304 Number of Depot Maintenances needed ea	DMGty	686 (74.3%) *	RndDn((TotMsnSched + Mod(FYCCum(@TotMsnSched, FYR-1),DMFH))/DMFH)
305 Hours to perform each Depot Maintenance	DMHrs	10 (20%) *	10
306			
307 Consumables per System	Conspersys\$	\$ 112.131 (50%) *	[Univariate Risk Bounds]
308			
309 Hardware Mod Percentage	HVMod%	0.09 (50%) *	.09
310 Software Mod Percentage	SVMod%	0.15 (50%) *	.15
311 Years of HVV Maint	HVModYrs	10 *	10
312 Years of SVV Maint	SVModYrs	5 *	5

- DF Results used to specify RI\$K
- Enter P.E. Position as Undefined
- Enter Std Dev and Mean as % of PE

➤ Uncertainty results for consumable row

WBS/CES Description	Point Estimate	Mean	Std Dev	CV	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%
307 Consumables per System	112.131 (50%)	122.124	\$ 52.780	0.4322	\$ 56.829	\$ 66.017	\$ 73.055	\$ 79.177	\$ 84.841	\$ 90.261	\$ 95.595	\$ 100.960	\$ 106.434	\$ 112.107	\$ 118.092	\$ 124.507	\$ 131.451	\$ 139.240	\$ 148.171