Where cost analysis, capability
and innovation meet...

joint integrated analysis tool

JIAT

Innovation in Cost Estimating:
the Joint Integrated Analysis
Tool (JIAT)

ACEIT User Workshop
January 26, 2010

Agenda

➢ **JIAT Overview (Daniel Schwartz, ODASA-CE)**

➢ **JIAT Applications (Melissa Cyrulik, Tecolote Research)**

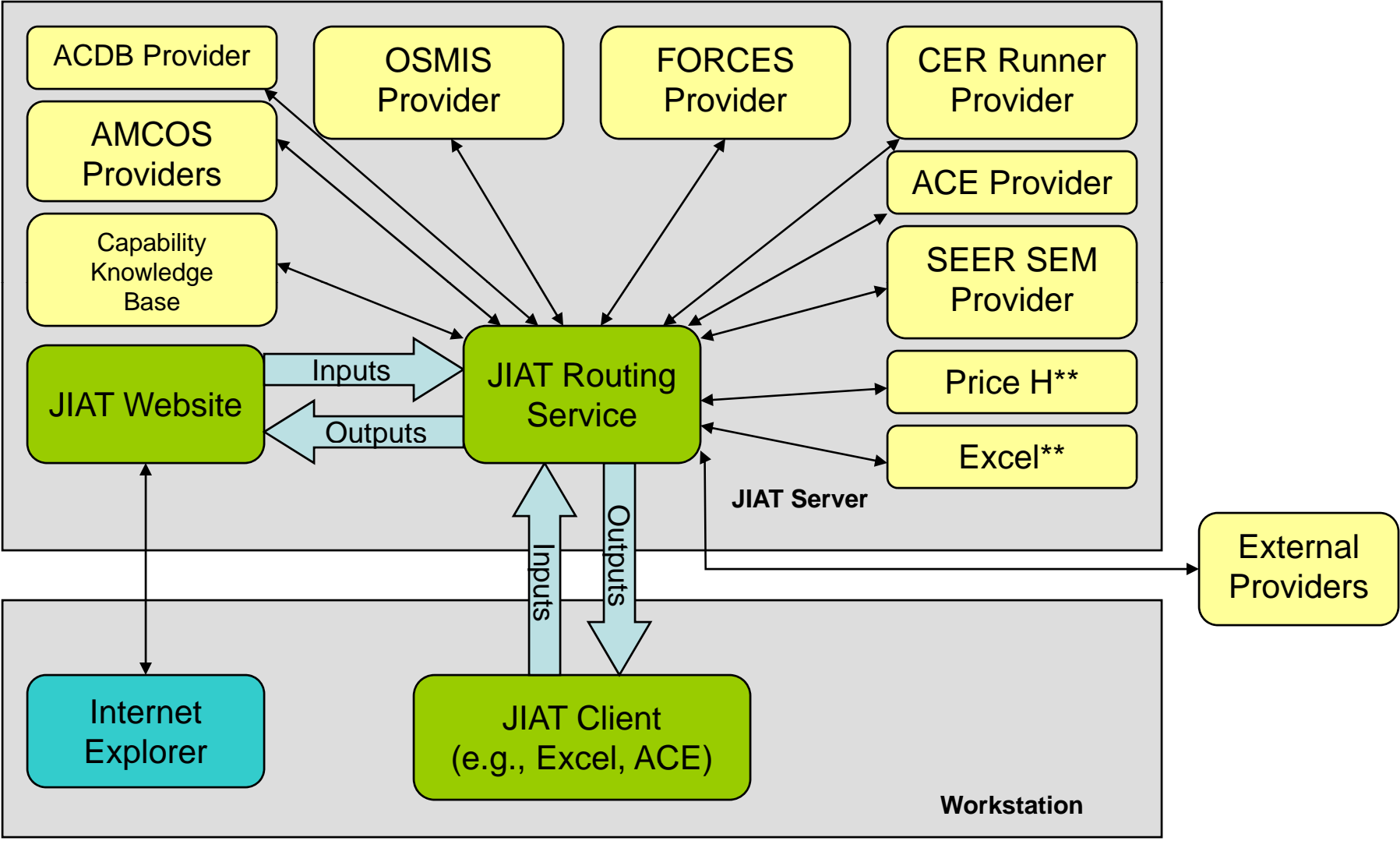➢ **JIAT Benefits and Vision (Daniel Schwartz)**

➢ **Questions**

JIAT Overview

The Army's Cost Estimating Challenge

➢ The Joint Integrated Analysis Tool (JIAT) is administered by the Office of the Deputy Assistant Secretary of the Army – Cost & Economics (ODASA-CE) and Tecolote Research, Inc.

➢ JIAT is a web-based application that provides seamless linkages between cost estimating tools, engineering design models, modeling and simulation tools, as well as capability, performance and operations and support databases.

JIAT Architecture "Big Picture": Running a JIAT Model

JIAT Server

- ACDB Provider
- AMCOS Providers
- Capability Knowledge Base
- OSMIS Provider
- FORCES Provider
- CER Runner Provider
- ACE Provider
- SEER SEM Provider
- Price H**
- Excel**

JIAT Website — Inputs → JIAT Routing Service ← Outputs

External Providers

Workstation

- Internet Explorer
- JIAT Client (e.g., Excel, ACE)

Inputs / Outputs

**Price H and Excel Provider are under development at the time of publication

JIAT Applications

JIAT is an Estimating Workspace

➢ **JIAT delivers a wide variety of applications for cost analysts, requirements professionals, and engineers from a single location.**

Gather Data	• Identify Analogous Systems • Locate Analogous Cost, Schedule, and Technical Data to Build Estimating Relationships

Run Models	• Retrieve and Run Models with Your Inputs:
	  • Hardware and Software Models
	  • Engineering Models
	  • Modeling and Simulation Models

Build Integrated Estimates	• Build Estimating Models from Data, CERs, and Models Stored on JIAT • Build Models in Excel or ACE

Build Model Sequences	• Build a Larger Estimating Model from a Series of Existing Smaller Models
	  • The Results of One Model Provide the Inputs to Another Model
	  • The Sequence is Run as a Single Model

Gathering Data with JIAT

➢ **Access all data sources from a single location – https://jiat.awps.army.mil**
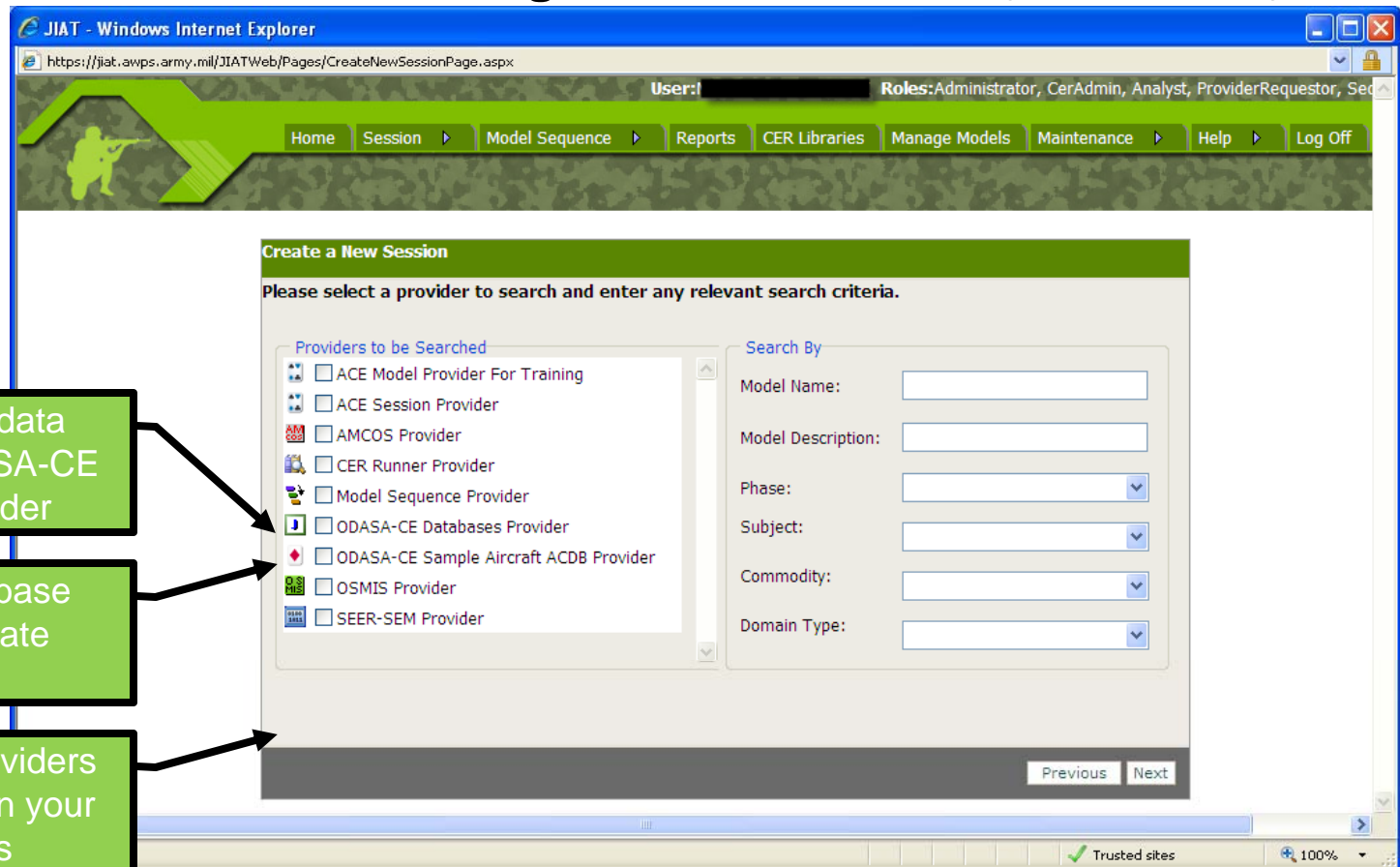
CKB and Forces data located in the ODASA-CE Databases Provider

Each ACDB Database listed as a separate Provider

List of available providers varies depending on your login privileges

JIAT Process: Data sources come to the Analyst

Common Data Query Interface

- Source data can be gathered and incorporated into analysis and estimates

AMCOS Data

ACDB Databases

Enter Data Query Inputs and view Query Results

Notional data

Searching For and Running CERs

Create a New Session

Please select a provider to search and enter any relevant search criteria.

Enter Search By Criteria

Use the CER Runner Provider to locate and calculate CERs with your inputs

Providers to be Searched
- ☐ ACE Model Provider For Training
- ☐ ACE Session Provider
- ☐ AMCOS Provider
- ☑ CER Runner Provider
- ☐ Model Sequence Provider
- ☐ ODASA-CE Databases Provider
- ☐ ODASA-CE Sample Aircraft ACDB Provider
- ☐ OSMIS Provider
- ☐ SEER-SEM Provider

Search By

Field	Value
Model Name:	
Model Description:	
Phase:	Development
Subject:	Sys Engr/Proj Mngmnt
Commodity:	
Domain Type:	

Previous | Ne...

Create a New Session

Please select a model and click Next.

Model Name	Provider
(USASMDC Ground Based Interceptor Cost Model Librar) Missile Independent Cost Model, SEPM	CER Runner Provider
(Sample CER Library) SYSTEMS ENGINEERING/MGMT	CER Runner Provider
(Sample CER Library) SEPM	[Rotocraft Model] .8720* (DE$ + PM$) ner Provider
(Sample CER Library) SEPM	CER Runner Provider
(Sample CER Library) SYSTEMS ENGINEERING/MGMT	CER Runner Provider

1 2

View list of potential CERs

Previous | Next

Non-Time Phased Model Runner - CER

Model: SYSTEMS ENGINEERING/MGMT
Description: [Rotocraft Model] .8720* (DE$ + PM$)
Provider: CER Runner Provider
Base Year 2008 $

Session   Edit   Calculate   Case   Documentation

	Variable Name	Appropriation	Model Units	Convert From	Case 1	Case 2
1	OUTPUT VARIABLES					
2	SYSTEMS ENGINEERING/MGMT Output	RDTEF			$401.12	$348.80
3	INPUT VARIABLES					
4	DE$				120	100
5	PM$				340	300

Notional data

Calculate the CER with various inputs

Running Models

Working with Existing Hardware and Software Models

- Identify potential pre-existing models
- Understand the cost drivers associated with different types of models
- Provide rough order of magnitude estimates on basic components
- Identify new Providers
- Provide Cross Checks

Working with existing engineering models

Looking for Tools

- Understand the technical characteristics associated with various hardware and software objects
- Understand trade space for various hardware and software
- Calculate cost driver inputs based on technical characteristics

Working with existing modeling and simulation models

Looking for Tools

- Model operational and system designs and assess their feasibility
- Model operational and system designs and asses their effectiveness

Run a Provider Model via a Web Browser

- **Provider software is hosted on the JIAT server allowing you to run a model via a Web Browser**

- **Create and calculate various cases with different model inputs**

- **Save session for later use**

Notional data

Common Model Runner Structure

SEER SEM Model

Non-Time Phased Model Runner - SEER SEM

Model: Training SEER SEM example
Description: This is a SEER Example for JIAT Training
Provider: SEER-SEM Provider
Base Year 2009 $

Session   Edit   Calculate   Case   Documentation

	Variable Name	Appropriation	Model Units	Convert From	Case 1	Better Team
1	**OUTPUT VARIABLES**					
2	UAV Software-Development Base Year Cost	RDTEF			$19,246,589.10	$17,124,636.54
3	UAV Software-Development Schedule Months		mo		46.25	41.35
4	UAV Software-Effective Size		SLOC		95000.00	93000.00
5	UAV Software-Productivity Lines/Person Month		SLOC/person mo		116.00	147.00
6	Ground Segment-Development Base Year Cost	RDTEF			$12,209,869.37	$10,923,643.18
7	Ground Segment-Development Schedule Months		mo		46.26	41.38
8	Ground Segment-Effective Size		SLOC		75000.00	75000.00
9	Ground Segment-Productivity Lines/Person Month		SLOC/person mo		138.00	193.00
10	**INPUT VARIABLES**					
11	Ground Segment-New Lines of Code		SLOC		75000.00 *	75000.00 *
12	Ground Segment-Pre-existing lines of code NDR		SLOC		0.00 *	0.00 *
13	Ground Segment-Programmer Capabilities					
14	Ground Segment-Development System Experience					
15	Ground Segment-AVERAGE MONTHLY LABOR RATE	RDTEF				
16	Flight Software-New Lines of Code		S			
17	Flight Software-Pre-existing lines of code NDR		S			

Done

- Analysts can explore models without detailed knowledge of the provider's software

- Supports Non-Time-Phased and Time-Phased models

- Analyst posting a model to JIAT controls which Input and Output rows are visible

ACE Model with Time Phased Inputs and Results

Time Phased Model Runner - ACE Demo

Model: Training ACE Example
Description: This is an ACE Example for JIAT Training
Provider: ACE Model Provider For Training
Base Year 2006 $K

Session   Edit   View   Calculate   Documentation

	Variable Name	Appropriation	Model Units	Input Units	Total	2006	2007	2008	2009	2010
1	**OUTPUT VARIABLES**									
2	Total				$1,080,542.81	$144,121.55	$144,118.71	$288,109.60	$288,107.31	$216,085.65
3	Manufacturing				$788,337.44	$105,111.66	$105,111.66	$210,223.32	$210,223.32	$157,667.49
4	Air Vehicle	3010			$685,510.82	$91,401.44	$91,401.44	$182,802.89	$182,802.89	$137,102.16
5	Integration	3010			$102,826.62	$13,710.22	$13,710.22	$27,420.43	$27,420.43	$20,565.32
6	SEPM	3010			$291,684.85	$38,891.31	$38,891.31	$77,782.63	$77,782.63	$58,336.97
7	Other	3080			$520.52	$118.57	$115.74	$103.65	$101.37	$81.19
8	**INPUT VARIABLES**									
9	Air Vehicle Unit Cost	3010			$9,140.14 *					
10	Air Vehicle Buy Quantity		unt		75.00 *	10	10	20	20	15
11	Air Vehicle Takeoff Weight (lbs)		lb		12000.00 *					
12	Air Vehicle Range (nmi)		nmi		250.00 *					

Notional data

Examining Trade Space

- Examine a systems trade space to understand how sensitive your model is to varying degrees of cost driver changes

- Run any JIAT hosted model in multiple run model

- Set up and calculate a batch run to see model results for various input combinations

Multiple Run Model Runner - ACE Demo

Model:	Training ACE Example
Description:	This is an ACE Example
Provider:	ACE Model Provider For

Session   Edit   Run

	Variable		Type	Input	List
1	**OUTPUT VARIABLES**				
2	Total				
3	Manufacturing				
4	Air Vehicle				
5	Integration				
6	SEPM				
7	Other				
8	**INPUT VARIABLES**				
9	Air Vehicle Unit Cost		List	$9,140.14 *	...
10	Air Vehicle Buy Quantity		Fixed	7.00 *	
11	Air Vehicle Takeoff Weight (lbs)		List	12000.00 *	...
12	Air Vehicle Range (nmi)		Fixed	250.00 *	

Inputs

1	8000
2	9250
3	10000
4	11100
5	12000
6	13450
7	14850
8	15000
9	16850
10	17000

Ok   Cancel

Enter a list of inputs for your input variables

Results Tabular Report

Session: ACE Example

Export to Excel

	Inputs				Outputs					
Run #	Air Vehicle Unit Cost	Air Vehicle Buy Quantity	Air Vehicle Takeoff Weight (lbs)	Air Vehicle Range (nmi)	Total	Manufacturing	Air Vehicle	Integration	SEPM	Other
1	9135.24667955	7	8000	300	101268.584666115	73538.7357703949	63946.7267568651	9592.00901352976	27209.3322350461	520.516660673599
2	9306.57276853	7	9250	300	103158.054438478	74917.9107867184	65146.0093797552	9771.90140696327	27719.6269910858	520.516660673599
3	9401.09841435	7	10000	300	104200.530523335	75678.8422355194	65807.6889004517	9871.15333506775	28001.1716271422	520.516660673599
4	9530.46706075	7	11100	300	105627.272640227	76720.25983909			28236.4961404633	520.516660673599
5	9629.27473934	7	12000	300	106716.973123556	77515.661651739	67404.9		28650.7948111434	520.516660673599
6	9777.26444175	7	13450	300	108349.077556623	78706.9787561677	68440.8510923199	10265.1279603848	2912.5821397821	520.516660673599
7	9909.09550997	7	14850	300	109802.976492426	79768.2188552941	69363.6685698209	10404.5502854731	29514.2409764588	520.516660673599
8	9922.65417887	7	15000	300	109952.508272438	79877.3661399741	69458.5792521514	10418.7868878227	29554.6254717904	520.516660673599
9	10081.9848429	7	16850	300	111709.686500903	81159.9779855689	70573.8939004947	10586.0840850742	30029.1918546605	520.516660673599
10	10094.3122989	7	17000	300	111845.639849519	81259.2140064568	70660.1860925712	10599.0279138857	30065.909182389	520.516660673599

Notional data

Batch Run Results - Result of each WBS Output for each input variable combination

Building Integrated Estimating Models

- Tools like Excel and ACE can be used to build models that incorporate data using the JIAT System

- From Excel: Query Databases and run any JIAT hosted model

ACDB Query Results

ACDB Results in CO$TAT

ACDB in Excel

Notional data

JIAT Models in Excel

- Run any JIAT hosted model from Excel

- Model runs off the JIAT server and data results are stored in your Excel workbook

SEER-SEM Model in Excel

Create New Cases

Link Results from Data Queries and Models together in Excel

Excel Provider

➢ **Publish Excel workbooks containing data and formulas as JIAT models**

➢ **Add Excel JIAT Template to Excel Workbook and run the model with JIAT common runner**
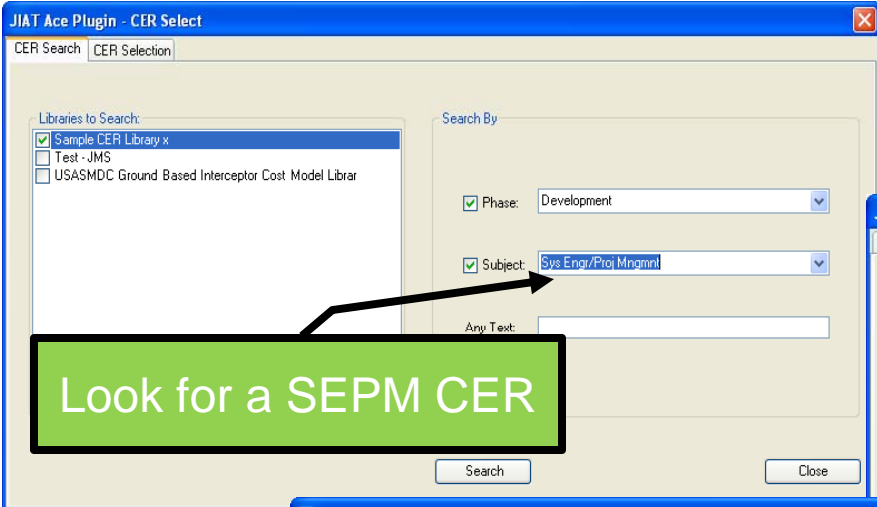
Create JIAT Template worksheet

Generic Excel workbook

Use Excel links to link data into Input and Output Varaibles
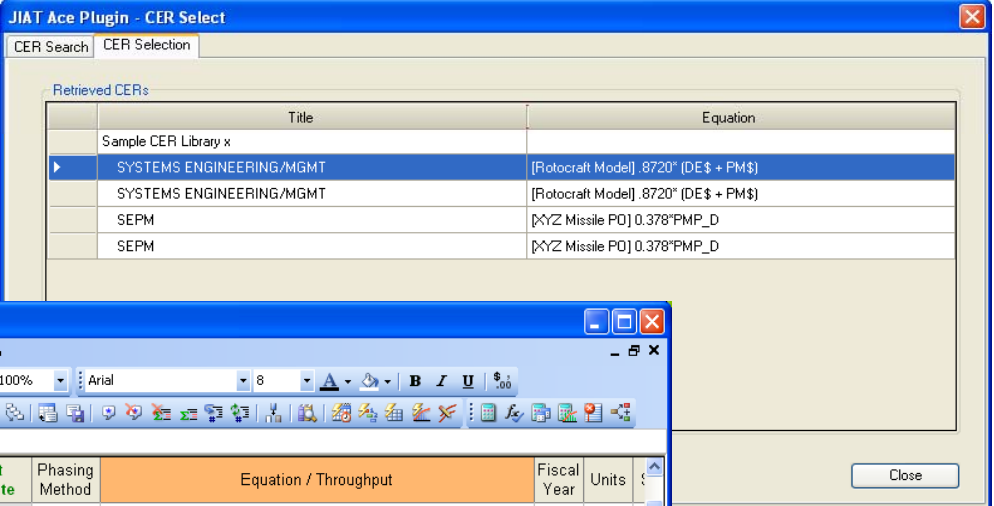
➢ **Once templated and loaded to the JIAT website, Excel based models can then run in JIATs common model runner**

Pull JIAT Hosted CERs into ACE

- From within ACE, search JIAT CER libraries
- Select a CER and incorporate it into your ACE estimate
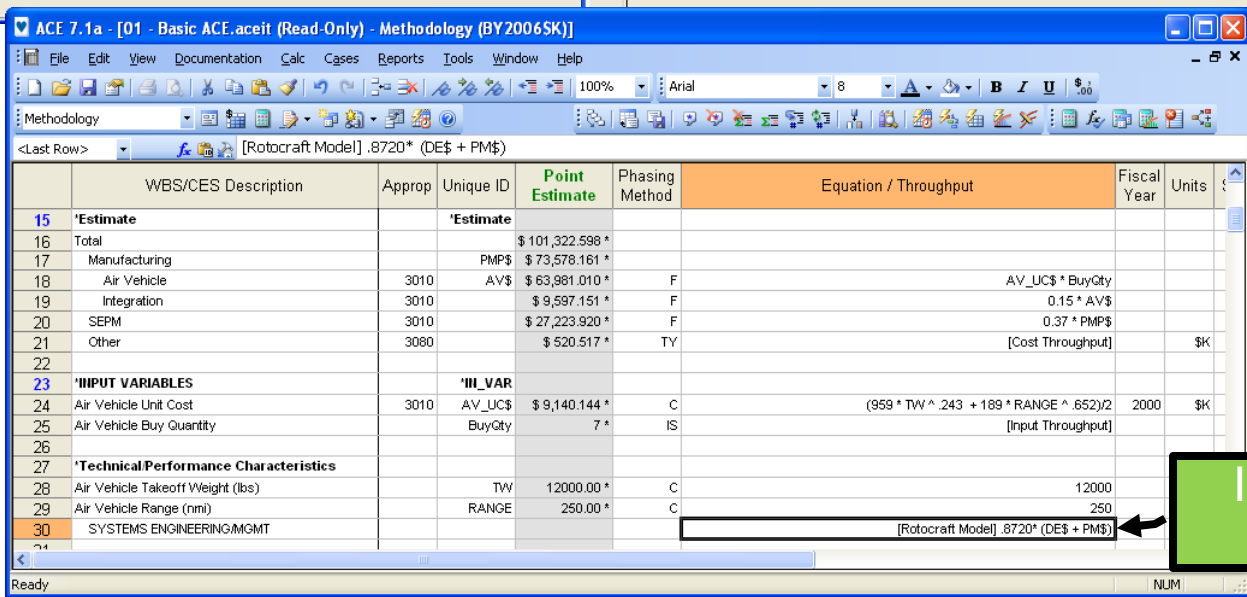
Look for a SEPM CER

Include in your Estimate

Pull JIAT Session Cases into ACE
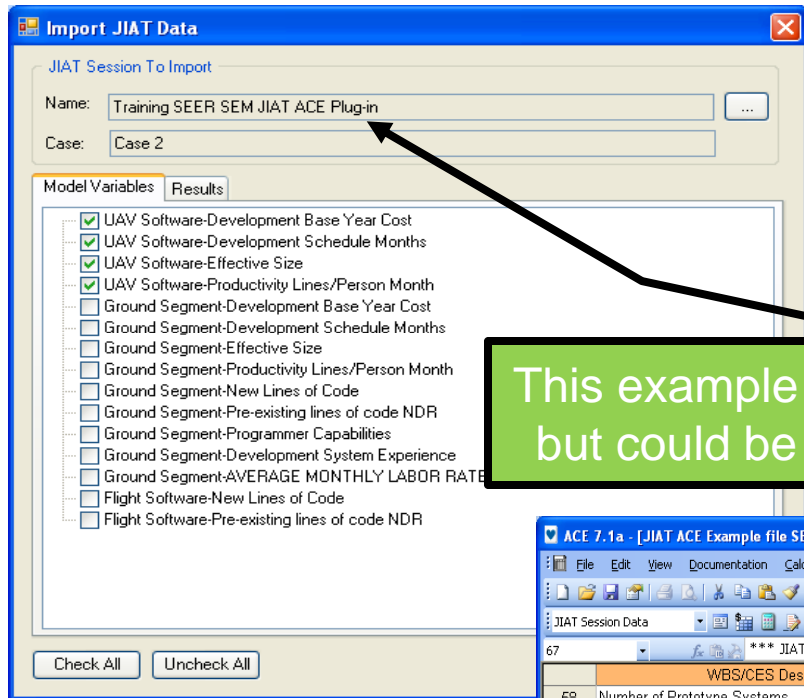
- The results from your JIAT sessions on the web for any model can be pulled into your ACE session

- This is an area for future expansion as more engineering and modeling and simulation models are added to JIAT
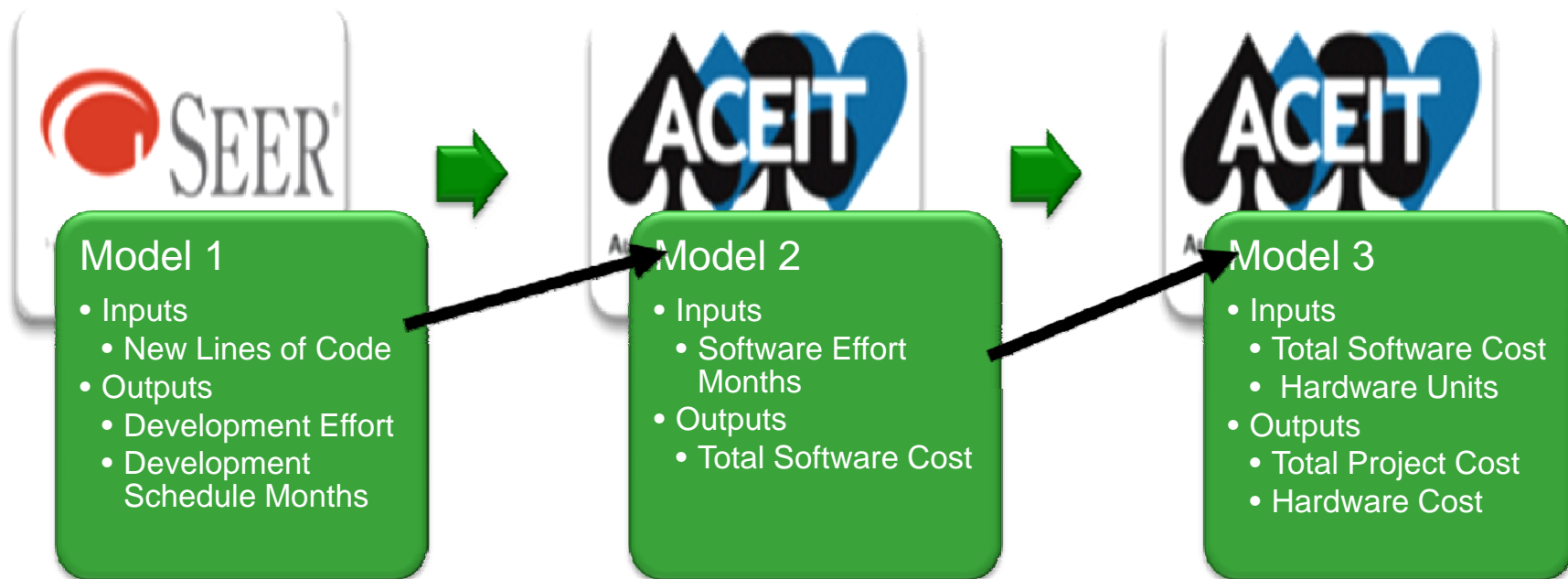
This example is a SEER-SEM model but could be an engineering model

Results incorporated in ACE DECS

- Advantage with JIAT is that you don't need to have SEER-SEM on your computer

JIAT Model Sequencing

➢ **Build a larger estimating model from a series of existing smaller models**

➢ **Input feeds for each model in the sequence may be mapped to other model inputs or outputs that have been generated earlier in the sequence**

Model 1
- Inputs
  - New Lines of Code
- Outputs
  - Development Effort
  - Development Schedule Months

Model 2
- Inputs
  - Software Effort Months
- Outputs
  - Total Software Cost

Model 3
- Inputs
  - Total Software Cost
  - Hardware Units
- Outputs
  - Total Project Cost
  - Hardware Cost

JIAT Model Sequencing

➢ **Setting up the Model Sequence**

Model Sequence Designer - Training Model Sequence

Sequence   Documentation

Model Sequence

Model	Provider
test: Seer-ModelOne	SEER-SEM Provider
test: ACE Model Two	ACE Session Provider
test: ACE Model Three	ACE Session Provider

Variable Mapping

Inputs	Visible	Mapped Variable	Mapped Model
Software Cost	☐	Total Software Cost	test: ACE Model Two

Outputs	Visible
Total Project Cost	☑
Hardware Cost	☑

Indentifies sequence outputs

Indentifies how inputs feed for each model

Three models in the sequence

Add...   Delete   Up   Down

Home | Session ▶ | Model Sequence ▶ | Reports | CER Libraries | Manage Models | Maintenance ▶

User:

Non-Time Phased Model Runner - l;'adsl;dl';;l

Model: Training Model Sequence
Description: This is an example for Training.
Provider: Model Sequence Provider
Base Year 2009 $

Session   Edit   Calculate   Case   Documentation

✓ ↶ ✄ 🗎 📋 ◀◀ ▶▶

	Variable Name	Appropriation	Model Units	Input Units	Case 1
1	**OUTPUT VARIABLES**				
2	Total Project Cost				15000.00
3	Hardware Cost				15000.00
4	**INPUT VARIABLES**				
5	Single CSCI-New Lines of Code		SLOC		0.00 *

➢ **Run the sequence like any JIAT model**

➢ **Create New Cases and Calculate results**

JIAT Benefits and Vision

Promoting JIAT's Future Growth

➢ As JIAT moves forward we are planning to:

  ➢ Involve other Services and agencies across the federal government

  ➢ Include engineering design models

  ➢ Expand to integrate modeling and simulation tools

  ➢ We are looking for assistance with identifying potential providers

Questions?