

Joint Integrated Analysis Tool (JIAT)

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Presenters

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Agenda

- **JIAT Overview (Daniel L. Schwartz)**
- **JIAT Applications (Melissa Cyrulik)**
- **JIAT Benefits and Vision (Daniel L. Schwartz)**
- **Questions**



JIAT Overview

Background

➤ **The Army's Estimating Challenge**

The Army lacks an automated ability to provide integrated analysis that brings together cost estimating, engineering design, and capability/performance data that are appropriate for current or emerging technologies.

➤ **The JIAT System Concept**

ODASA-CE is developing a cost estimating system that will facilitate seamless linkages between cost estimating tools, engineering design models, modeling and simulation, capability/performance data and operations and support databases.



How JIAT Works

JIAT stands for the Joint Integrated Analysis Tool.

JIAT is a system that allows end-users (cost/requirements analysts, engineers, etc.) to run a wide variety of models from their desktop.

Models are made available to end-users through a distributed system of JIAT Model Providers, hosted as web services across the Internet.

Each provider has a collection of available models. The user can search for models across all Providers.

Once the desired model is found, the user can run that model to produce results to include in a cost estimate.

Current JIAT Integrated Tools

- ACE (Tecolote Research, Inc.)
- ForeCostXXI (Technomics, Inc.)
- ODASA-CE Databases
 - Capability-based Costing
 - Automated Cost Data Base (ACDB)
 - Army Military-Civilian Cost System (AMCOS)
 - Operating and Support Management Information System (OSMIS)
 - Force and Organizational Cost Estimating System (FORCES)
- SEER-SEM (Galorath, Inc.)
- TruePlanning Suite (PRICE Systems)
- Cost Estimating Relationships (CER) Libraries

JIAT Evolution

- **JIAT software design and development began in August 2007**

- **JIAT 1.0**
 - Functional Pilot Test Prototype completed October 2008
 - Hosted on test servers at Army Data Center Fairfield (ADCF)

- **JIAT 2.0**
 - Currently under development
 - Initial production version planned released Fall 2009
 - Hosted on production servers at ACDF

Where possible, this presentation shows current system dialogs.
For pieces of the tool that are still in the design process, mockups are shown.



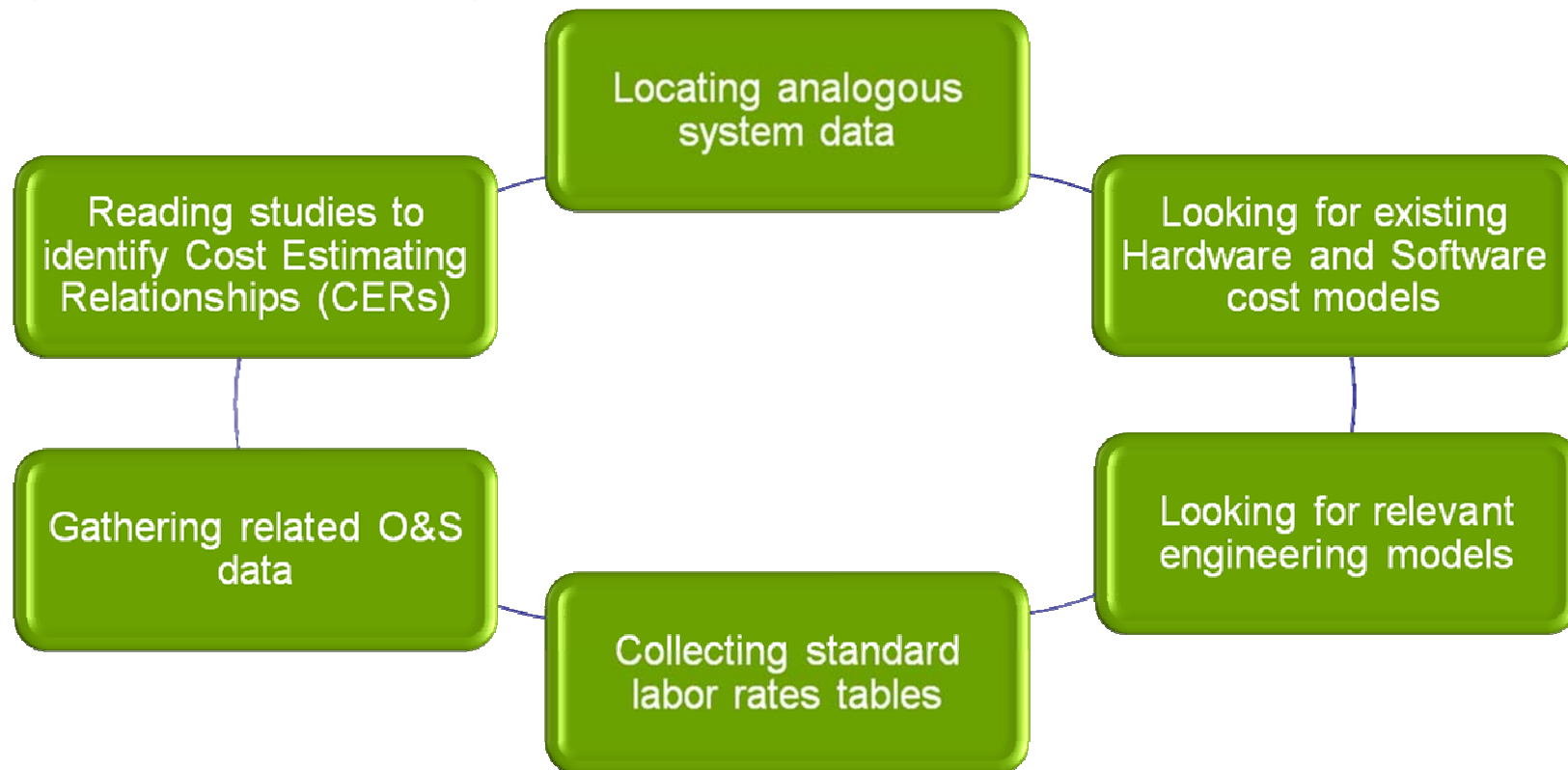
JIAT Applications

JIAT Main Applications

- **JIAT offers a variety of features to assist analysts with cost analysis efforts**
 - **Initial Data Gathering**
 - The first step in any new analysis task is to find relevant source data that can be used as the basis for cost estimating methodologies.
 - Data gathering can include finding analogous systems, locating existing cost models, and pulling rates from standard tables.
 - **Building Integrated Estimating Models**
 - Analysts develop estimating methods and pull model information together to create integrated cost estimating models.
 - This may include integrating existing cost models to develop a new overarching model.
 - **Sequencing Models Together**
 - Model sequencing allows you to pass the results of one model as inputs into another model. A model sequencing chain can be created to link several models together.

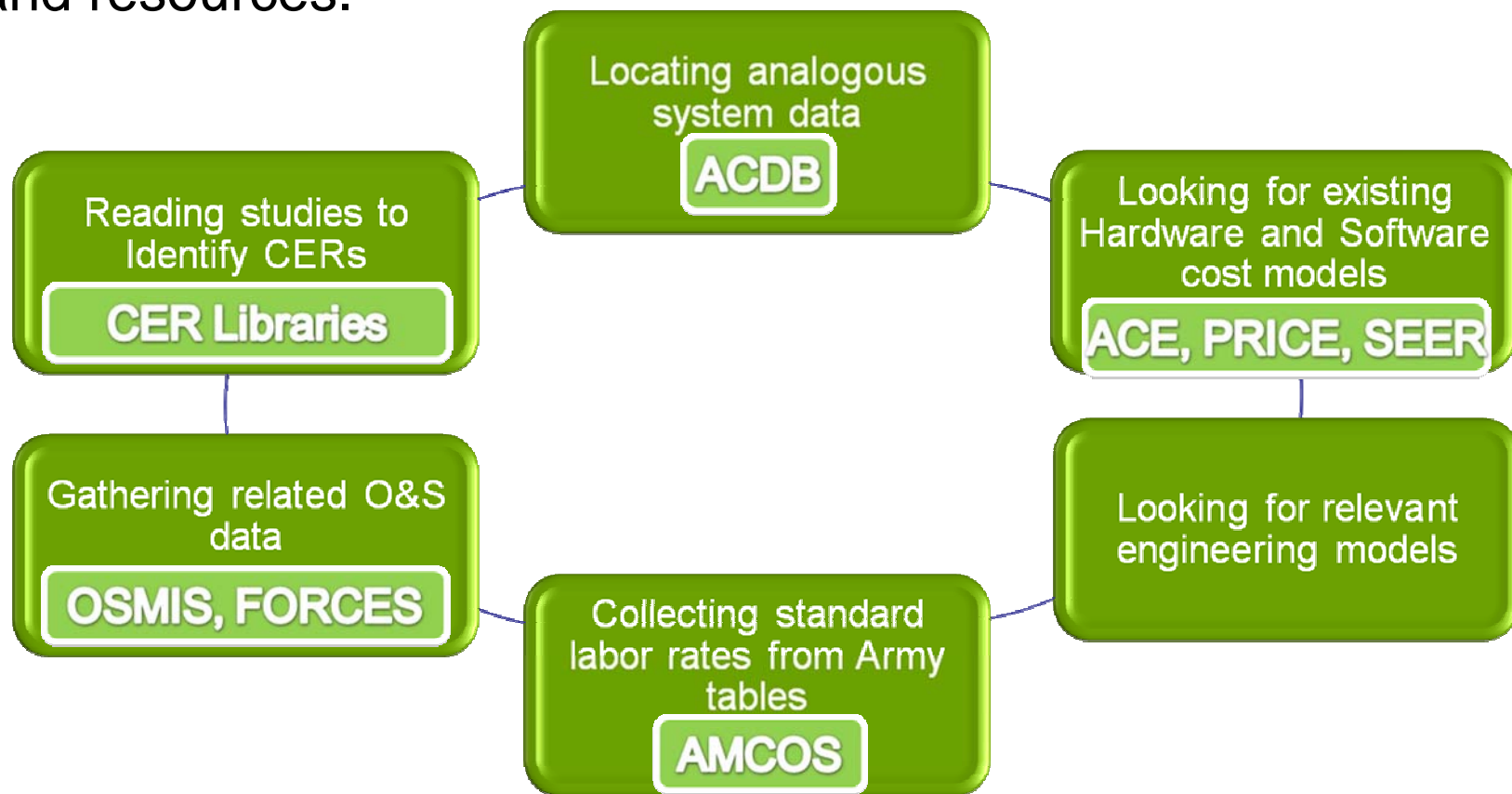
Initial Data Gathering

- New studies or analyses often require the analyst to look at what they need to estimate and embark on a safari to search for and gather relevant source data.
- Typical safaris may include:



JIAT Providers in Context

- Analysts go to several sources to gather information.
- Going to each individual provider to pull information takes time and resources.



Access Providers from a Single Location

- Search providers for relevant information

The screenshot displays a web interface titled "Create a New Session". Below the title, it instructs the user to "Please select a provider to search and enter any relevant search criteria." The interface is divided into two main sections: "Providers to be Searched" and "Search By".

Providers to be Searched: A list of providers with checkboxes next to them:

- ACE Session Provider
- AMCOS Provider
- CER Runner Provider
- ForeCost Provider
- ODASA-CE Databases Provider
- PRICE True Planning Provider
- SEER-SEM Provider

Search By: A series of input fields and dropdown menus:

- Model Name:
- Model Description:
- Phase:
- Subject:
- Commodity:
- Domain Type:

At the bottom right, there are "Previous" and "Next" buttons.

Annotations:

- A green box with the text "Search by various criteria" has an arrow pointing to the "Search By" section.
- A green box with the text "List of available providers varies depending on your login privileges" has an arrow pointing to the "Providers to be Searched" list.

Run a Provider Model via a Web Browser

The screenshot shows a web browser window titled "JIAT - Windows Internet Explorer" with the URL "https://jiat.tecolote.com/JIATWeb/Pages/OpenStandardSessionPage.aspx". The page displays a "Non-Time Phased Model Runner - Demo" interface. A green callout box labeled "SEER SEM Model" points to the "Provider" field in the model information section. Another green callout box labeled "Generate Multiple excursions with a Model" points to the "Calculate" button. A third green callout box labeled "Enter model inputs" points to the input fields in the table below. A white callout box labeled "Notional data" points to the "CSCI 1-AVERAGE MONTHLY LABOR RATE" row in the table.

Variable Name	Year	Units	Small Software	Large Software
OUTPUT VARIABLES				
1 General Purpose JIAT Software Project-Development Base Year Cost	2008	\$	\$188.00	\$0.00
2 General Purpose JIAT Software Project-Maintenance Base Year Cost	2008	\$	\$0.00	\$0.00
3 General Purpose JIAT Software Project-Development Schedule Mon...		month	4.15	0.00
4 CSCI 1-Development Base Year Cost	2008	\$	\$188.00	\$0.00
5 CSCI 1-Development Schedule Months		month	4.15	0.00
6 CSCI 1-Effective Size		Sourc	500.00	0.00
7 CSCI 1-Productivity Lines/Person Month		SLOCp	373.00	0.00
8 CSCI 2-Development Base Year Cost	2008	\$	\$0.00	\$0.00
9 CSCI 2-Development Schedule Months		month	0.00	0.00
10 CSCI 2-Effective Size		Sourc	0.00	0.00
11 CSCI 2-Productivity Lines/Person Month		SLOCp	0.00	0.00
INPUT VARIABLES				
12 CSCI 1-New Lines of Code		Sourc	500	5000
13 CSCI 1-Pre-existing lines of code NDR		Sourc	0	2000
14 CSCI 1-Development System Experience			Nom	Nom
15 CSCI 1-Cost Input Base Year			2008.00 *	2008.00 *
16 CSCI 1-AVERAGE MONTHLY LABOR RATE	2008	\$	100	100
17 CSCI 2-New Lines of Code		Sourc	0.00 *	0.00 *
18 CSCI 2-Pre-existing lines of code NDR		Sourc	0.00 *	0.00 *
19 CSCI 2-Development System Experience			Nom	Nom
20 CSCI 2-Cost Input Base Year			2008.00 *	2008.00 *
21 CSCI 2-AVERAGE MONTHLY LABOR RATE	2008	\$	\$0.00 *	\$0.00 *

- 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

Common Model Runner Structure

- Analysts can explore models without full knowledge of the provider's software
- Supports Non-Time-Phased and Time-Phased models

Non-Time Phased Model Runner - Demo

Model: General Purpose JIAT Software Project
 Description: An Example Two CSCI Model
 Provider: SEER-SEM Provider

SEER SEM Model

Variable Name	Year	Units	Small Software	Large Software
OUTPUT VARIABLES				
General Purpose JIAT Software Project-Development Base Year Cost	2008	\$	\$188.00	\$0.00
General Purpose JIAT Software Project-Maintenance Base Year Cost	2008	\$	\$0.00	\$0.00
General Purpose JIAT Software Project-Development Schedule Mon...		month	4.15	0.00
CSCI 1-Development Base Year Cost	2008	\$	\$188.00	\$0.00
CSCI 1-Development Schedule Months		month	4.15	0.00
CSCI 1-Effective Size		Source	500.00	0.00
CSCI 1-Productivity Lines/Person Month		SLOCp	373.00	0.00
CSCI 2-Development Base Year Cost	2008	\$	\$0.00	\$0.00
CSCI 2-Development Schedule Months		month	0.00	0.00
CSCI 2-Effective Size		Source	0.00	0.00
CSCI 2-Productivity Lines/Person Month		SLOCp	0.00	0.00
INPUT VARIABLES				
CSCI 1-New Lines of Code				
CSCI 1-Pre-existing lines of code NDR				
CSCI 1-Development System Experience				
CSCI 1-Cost Input Base Year				
CSCI 1-AVERAGE MONTHLY LABOR RATE				
CSCI 2-New Lines of Code				
CSCI 2-Pre-existing lines of code NDR				
CSCI 2-Development System Experience				
CSCI 2-Cost Input Base Year				
CSCI 2-AVERAGE MONTHLY LABOR RATE				

Time Phased Model Runner - ACE Demo

Model: Basic ACE
 Description: This is a JIAT model based on the Basic ACE Examp
 Provider: ACE Session Provider

ACE Model with Time Phased Inputs and Results

Variable Name	Units	Total	2006	2007	2008	2009	2010
OUTPUT VARIABLES							
Total		\$101,322.60	\$14,518.87	\$14,516.03	\$28,904.25	\$28,901.96	\$14,481.48
Manufacturing		\$73,578.16	\$10,511.17	\$10,511.17	\$21,022.33	\$21,022.33	\$10,511.17
Air Vehicle		\$63,981.01	\$9,140.14	\$9,140.14	\$18,280.29	\$18,280.29	\$9,140.14
Integration		\$9,597.15	\$1,371.02	\$1,371.02	\$2,742.04	\$2,742.04	\$1,371.02
SEPM		\$27,223.92	\$3,889.13	\$3,889.13	\$7,778.26	\$7,778.26	\$3,889.13
Other		\$520.52	\$118.57	\$115.74	\$106.65	\$103.37	\$51.16
INPUT VARIABLES							
Air Vehicle Unit Cost	\$K	\$9,140.14 *					
Air Vehicle Buy Quantity		7.00 *	1.00 *	2.00 *	2.00 *	2.00 *	1.00 *
Air Vehicle Takeoff Weight (lbs)		12000.00 *					
Air Vehicle Range (nmi)		250.00 *					

Notional data

- When a model is posted to JIAT an analyst controls which Input and Output rows are visible



Common Structure for Source Data

JIAT Query Model Sheet

Model: Active Enlisted
Description: Amcos Life for Active Enlisted Pay Plan
Provider: AMCOS Provider

Inputs		Outputs								
Name	Value	APPN	Category	Element	Fiscal Year	Units	E1	E2	E3	E4
Summary	Composite Standard Rates	MPA	Military Compensation	Avg Cost of Base Pay (Military)	2008	Dollars				
Group	13 : FIELD ARTILLERY	MPA	Military Compensation	Avg Cost of Basic Allowance for Housing (in cash)	2008	Dollars				
SubGroup	13B : CANNON CREWMEMBER	MPA	Military Compensation	Avg Cost of Basic Allowance for Subsistence	2008	Dollars				
APPN	ALL	MPA	Other Benefits	Avg Cost of Other Benefits	2008	Dollars				
Category	ALL	MPA	Permanent Change of Station Costs	Avg Permanent Change of Station-annualized 0	2008	Dollars				
Element	ALL	MPA	Recruiting Costs	Avg Recruiting Cost for MOS 0	2008	Dollars				
		MPA	Recruiting Costs	Avg Recruiting Cost for MOS (Amortized)	2008	Dollars				
		MPA	Retired Pay Accrual	Avg Cost of Retired Pay Accrual	2008	Dollars				
		MPA	Selective Reenlistment Bonus	Avg Cost of Reenlistment Bonus (A and B Amortized)	2008	Dollars				
		MPA	Separation Costs	Avg Cost of All Separation Incentives	2008	Dollars				
		MPA	Special Pays	Avg Cost of Special Pays	2008	Dollars				
		MPA	Training	Avg Cost of Training (Total Amortized)	2008	Dollars				
		OMA	Medical Support Costs	Avg Cost of Medical Support Cost	2008	Dollars				
		OMA	Morale, Welfare and Recreation Costs	Avg Cost of Morale, Welfare and Recreation	2008	Dollars				

AMCOS Data

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

JIAT ACDB Model Sheet

Model: ACDB
Description: ACDB
Provider: ACDB Provider

Inputs		Outputs									
Name	Value	Name	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	
Commodity		System Type	Large Vehicle	Large Vehicle	Large Vehicle	Luxury Vehicle	Luxury Vehicle	Sport Vehicle	Utility Vehicle	Compact Vehicle	
System Type		System	Roadmaster	Roadmaster	Roadmaster	Seville	Seville	Corvette	Explorer	Mazda 626	
System		Model	ROADMASTER BAS	ROADMASTER BAS	ROADMASTER BAS	SEVILLE SLS	SEVILLE SLS	CORVETTE BASIC	EXPLORER XL	626 DX	
Model		Contract Number	BKRD-M-FY94-01	BKRD-M-FY95-02	BKRD-M-FY96-03	CADSV-FY94-01	CADSV-FY94-01	CHVCOR-FY94-01	FRDEX-FY94-01	MZ626-FY94-01	
Contract Number		Task	Buick Roadmaster Lo	Buick Roadmaster Lo	Buick Roadmaster Lo	Cadillac Seville Lot 1P	Cadillac Seville Lot 1P	Chevrolet Corvette Lc	Ford Explorer Lot 1P	Mazda 626 Lot 1Prod	
Task		Contractor	Buick Motor Co.,USA	Buick Motor Co.,USA	Buick Motor Co.,USA	Cadillac Motor Co.,U	Cadillac Motor Co.,U	Chevrolet Motor Co.,	Ford Motor Co.,USA	Mazda Motor Co.,JA	
Contractor		Life Cycle Phase	P & D	P & D	P & D	P & D	P & D	P & D	P & D	P & D	
Life Cycle Phase		Source Document	CDSR	CDSR	CDSR	CDSR	CUSTOM	CPR	CDSR	CDSR	
Source Document		Report By	Prime Contractor	Prime Contractor	Prime Contractor	Prime Contractor	Prime Contractor	Prime Contractor	Prime Contractor	Prime Contractor	
Task		LRE Date	6/15/1994	6/15/1995	6/15/1996	6/15/1994	3/1/2000	6/15/1994	6/15/1994	6/15/1994	
Resource		Units	Thousands of Dollars	Thousands of Dollars	Thousands of Dollars	Thousands of Dollars	Thousands of Dollars	Thousands of Dollars	Thousands of Dollars	Thousands of Dollars	
		Base Year	2004	2004	2004	2004	2004	2004	2004	2004	
		Total % Spent (ACV/P/LRE)					100	100			
		System Buy Quantity	100	300	500	100	100	100	100	100	
		System First Unit	1	101	401	1	1	1	1	1	
		System Last Unit	100	400	900	100	100	100	100	100	
		Resource	Production Total	Production Total	Production Total	Production Total	Production Total	Production Total	Production Total	Production Total	
		DEVELOPMENT	2777.344	6478.52	10687.84	4765.566	225.009	4247.098	2128.688	1675.314	
		DEVELOPMENT ENGINEERING	2760.214	6369.62	10580.64	4731.306	225.009	4155.738	1991.648	1629.634	
		PRODUCIBILITY, ENGINEERING, & PLANNING	2378.786	5608.92	9401.44	4078.082	225.009	3592.454	1716.426	1405.802	
		DEVELOPMENT TOOLING	113.058	315.23	462.4	195.282		172.442	82.224	69.662	
		PROTOTYPE MANUFACTURING	12.562	32.61	53.6	216.98		19.414	9.136	7.994	
		SYSTEM ENGINEERING/PROGRAM MANAGEMENT	62.81	217.4	107.2	108.49		94.788	45.58	37.696	
		PROJECT MANAGEMENT ADMINISTRATION	12.562	21.74	107.2	216.98		19.414	9.136	7.994	
		OTHER	12.562	21.74	107.2	216.98		19.414	9.136	7.994	
		SYSTEM TEST AND EVALUATION	12.562	21.74	107.2	216.98		19.414	9.136	7.994	
		TRAINING	253.524	760.9	1608	433.96		381.428	182.72	149.602	

ACDB Databases

Notional data

Building Integrated Estimating Models

- Tools like Excel and ACE can be used to build models that incorporate data using the JIAT System
- Multiple “queries” from a single database can be included as JIAT Cases
- Different worksheets can link to different JIAT Models and then can be summarized

The screenshot displays an Excel spreadsheet titled "JIAT Model Sheet" with a "Calculate.." button and a "Case:" dropdown menu. A dialog box titled "Select Cases to Calculate" is open, showing a list of cases from Case 1 to Case 12. The spreadsheet contains a table with the following data:

Variable Name	Variable ID	Type	Required	Fiscal Year	Units	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
Consumables per System	CONS/Density	OUTPUT		2006	\$	\$154,692.00	\$91,478.00	\$98,685.00	\$76,368.00	\$39,475.00	\$31,614.00	\$100,712.00
Repairables per System	REPS/Density	OUTPUT		2006	\$	\$100,198.00	\$69,873.00	\$53,329.00	\$20,181.00	\$11,242.00	\$5,896.00	\$25,608.00
Consumables per Unit Activity	CONS/Activity	OUTPUT		2006	\$	\$26.65	\$31.91	\$18.23	\$25.18	\$9.97	\$8.66	\$88.38
Repairables per Unit Activity	REPS/Activity	OUTPUT		2006	\$	\$7,005.20	\$7,208.91	\$2,544.84	\$685.95	\$79.47	\$22.89	\$13,705.29
MDS	MDS	INPUT	Y			M551A1 - SH	M551A1 - SM	M551A1 - SM	M551A1 - SM	M551A1 - SM	M551A1 - SM	M551A1 - SM
FY	FY	INPUT	Y			1993	1994	1995	1996	1997	1998	1999

A green box labeled "OSMIS Data" is positioned over the data table, with an arrow pointing to the "Case 1" column. A "Notional data" label is visible at the bottom right of the table.

JIAT Data in Excel

- JIAT provided data in Excel can be analyzed with CO\$TAT to create CERs and learning curves

I. Model Form and Equation Table

Model Form:	Unweighted Log-Linear model
Number of Observations Used:	28
Equation in Unit Space:	Repairables = 803 * Activity ^ 0.2368

Equation vs. Variable (Unit Space)

The scatter plot shows Predicted (Repairables) on the y-axis (0 to 120,000) and Activity on the x-axis (0 to 800,000). Blue diamonds represent Actual data points, and red squares represent Predicted data points. A red trend line is visible for the predicted values.

Notional data

Sample Integrated Estimating Model

- Data gathering and model building assisted by JIAT System

Air Vehicle Estimate

Development

Hardware

Software

Procurement

Non-Recurring

Recurring

Operations and Maintenance

Manpower

Consumables & Repairables

Cost Estimating Model

Estimate Hardware with ACE Model

Pull Data from ACDB to Generate CERs or Factors with CO\$TAT

Estimate Software with SEER SEM Model

Estimate Recurring Production with ACE Model

Pull Data from ACDB to Build Learning Curves with CO\$TAT

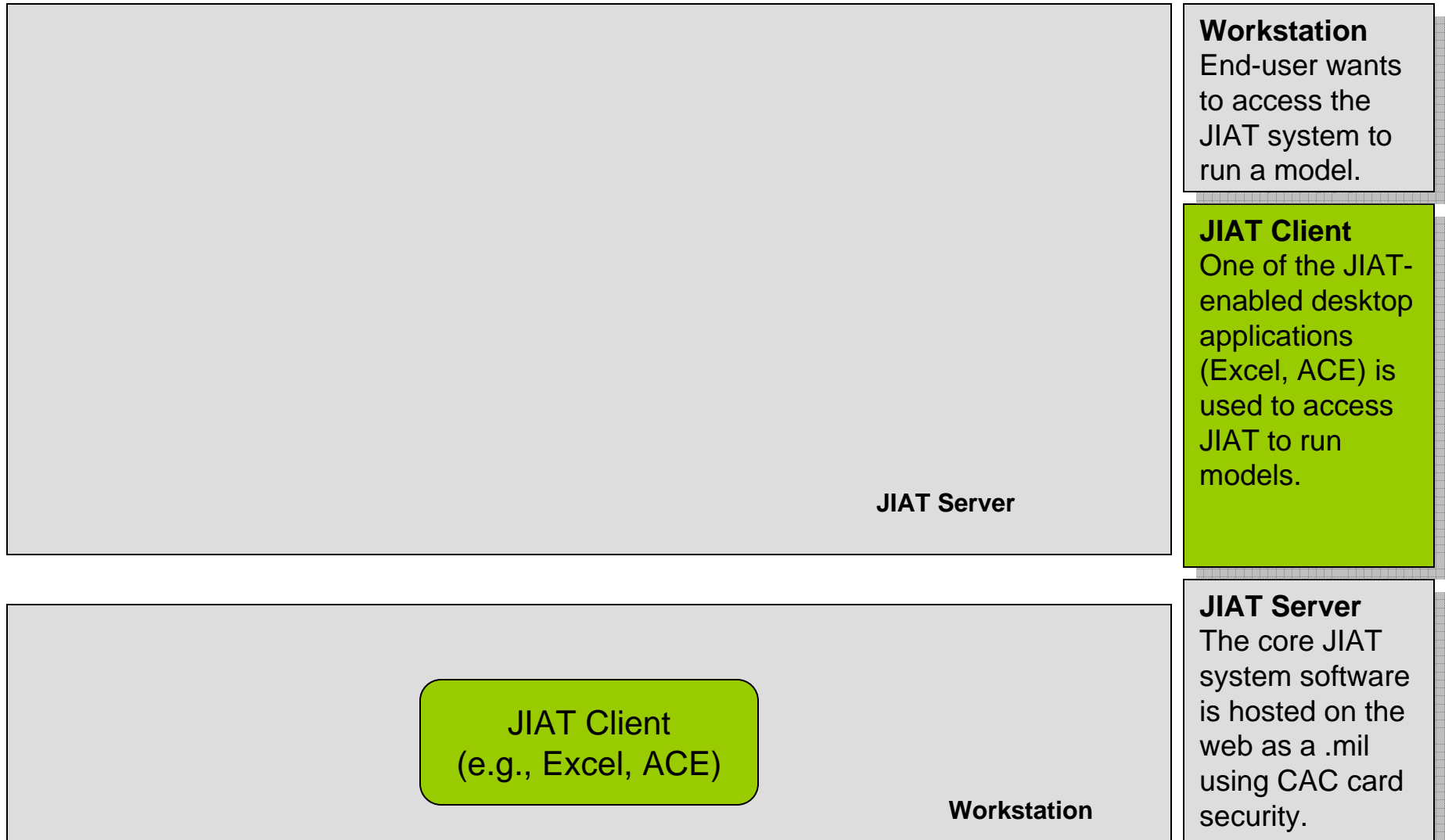
Pull Data from ACDB to Generate CERs or Factors with CO\$TAT

Pull Labor Rates from AMCOS

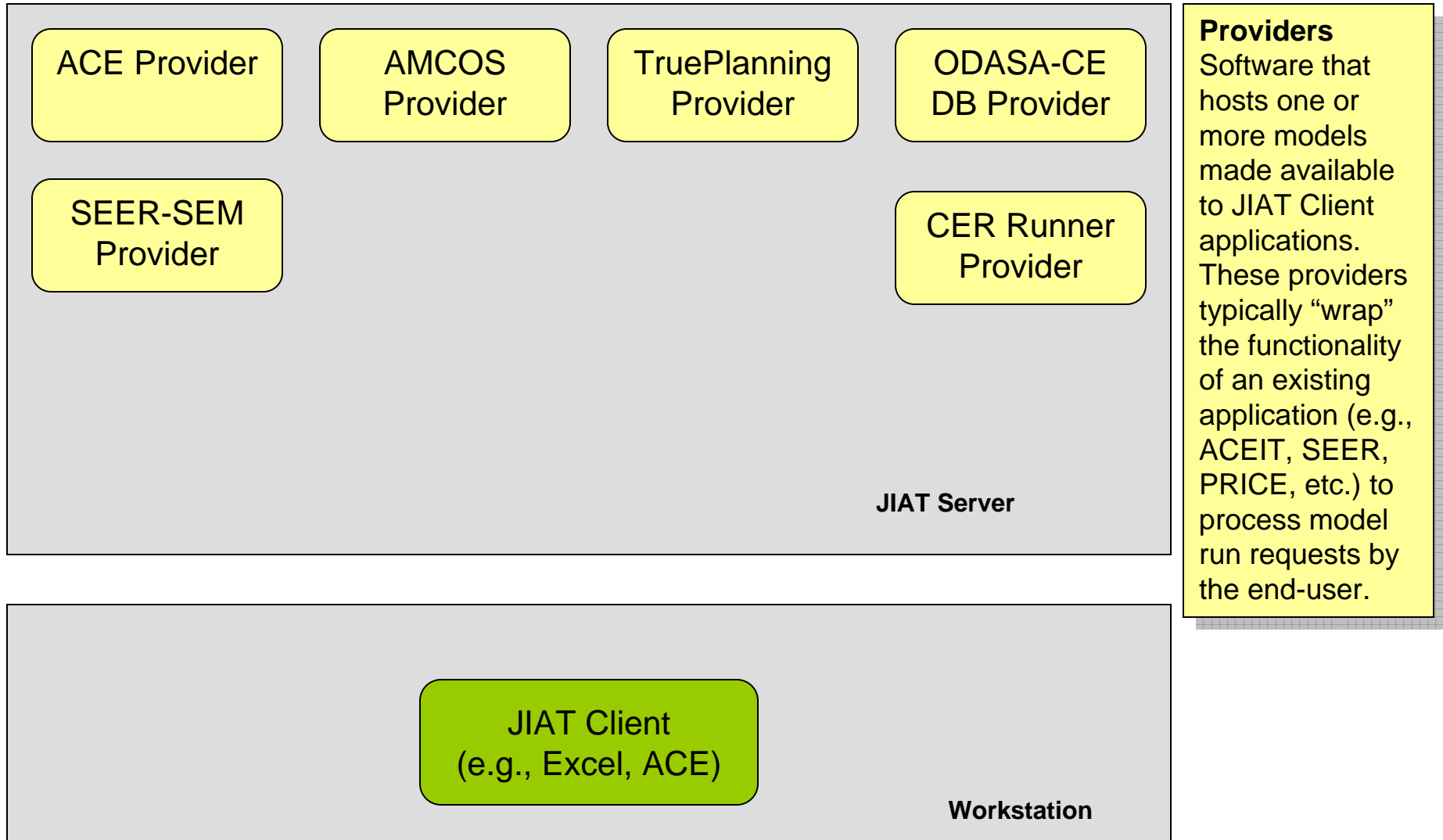
Study Consumable and Repairable by Optempo Data with OSMIS



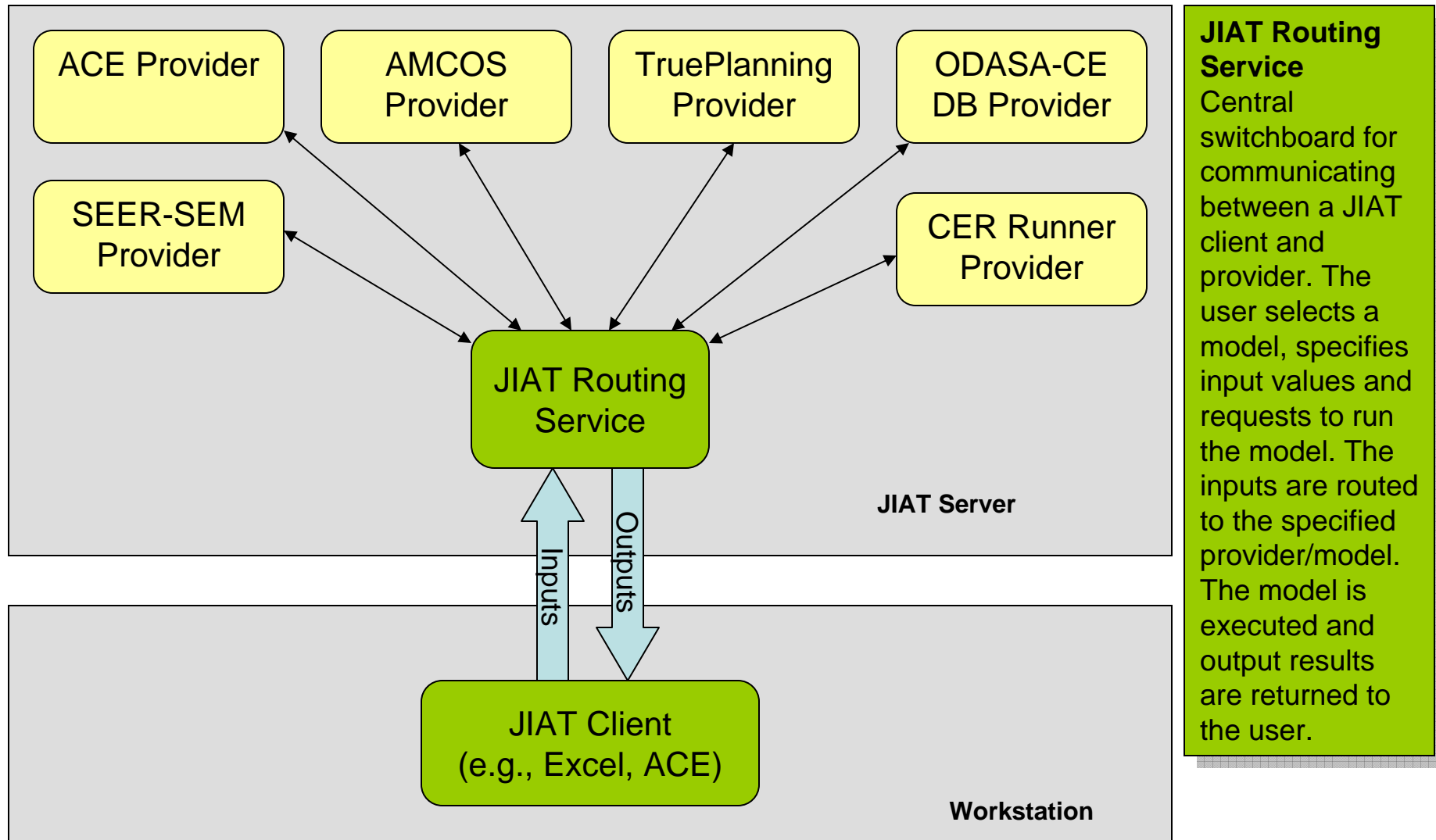
JIAT Architecture “Big Picture”: Running a JIAT Model



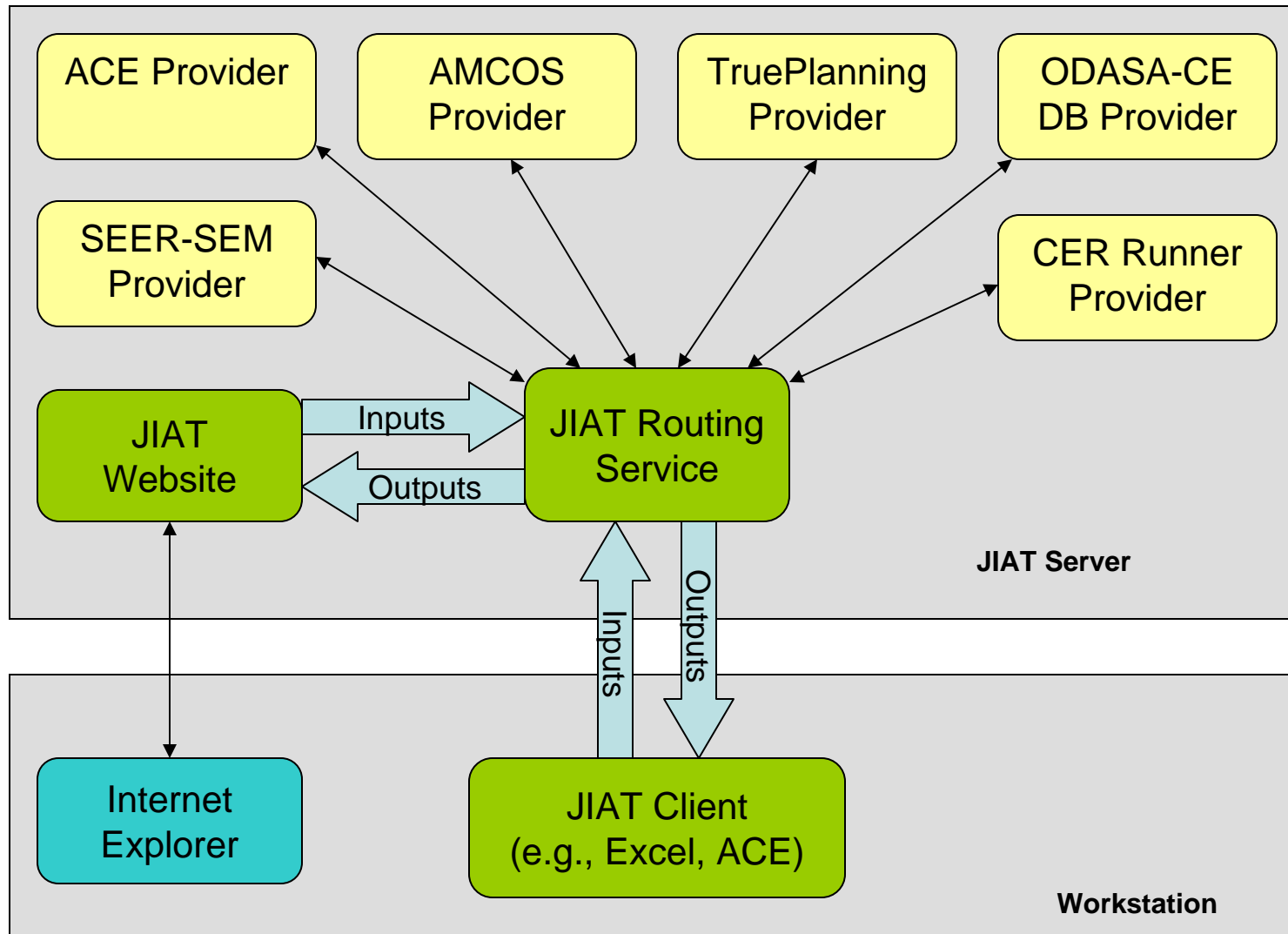
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JIAT Architecture “Big Picture”: Running a JIAT Model

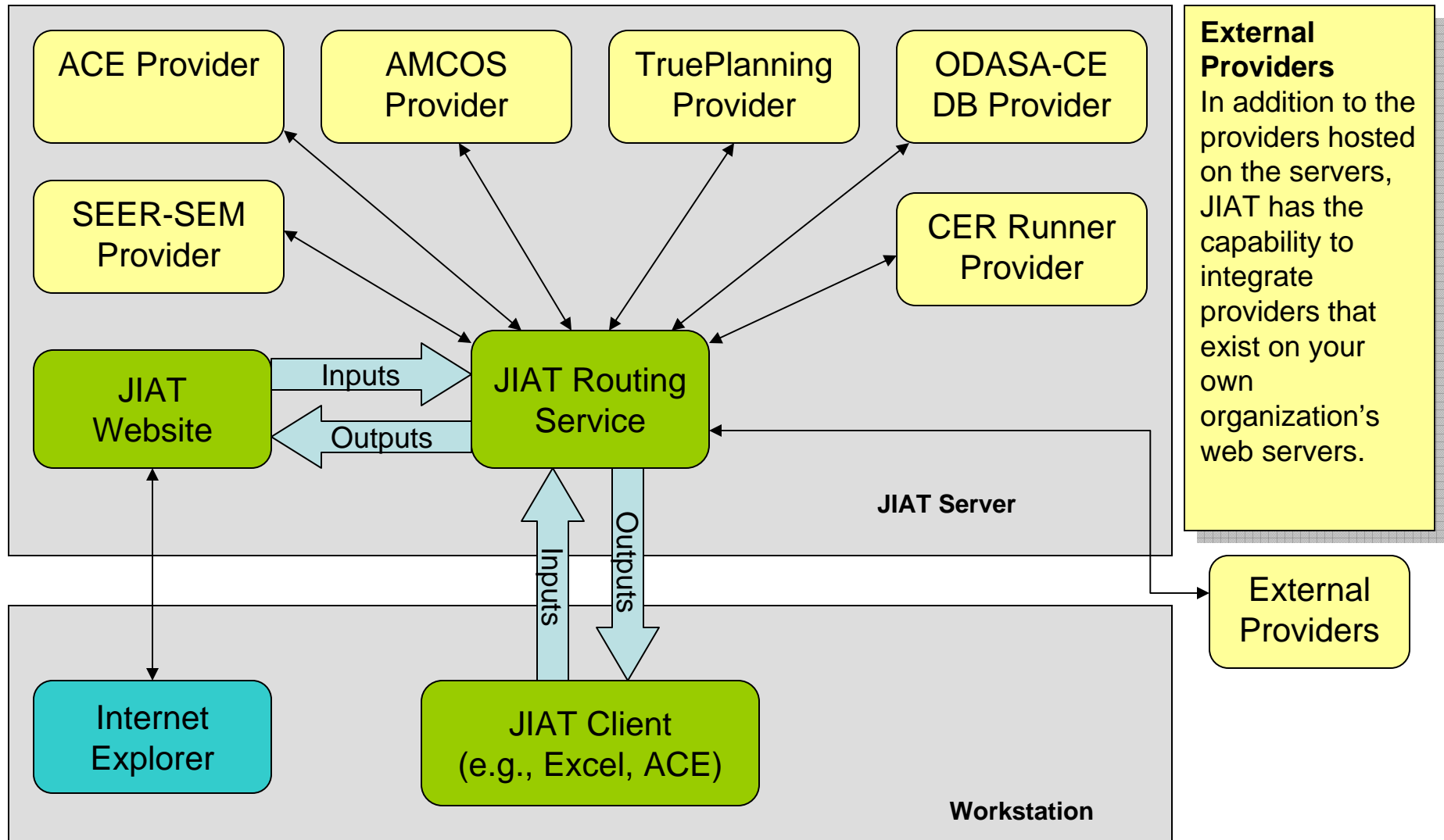


JIAT Architecture “Big Picture”: Running a JIAT Model



JIAT Website
 Model running can also be performed using the JIAT website requiring only a web browser on the end-user workstation. The JIAT website is also a JIAT client and uses the same technique as the desktop clients to run models.

JIAT Architecture “Big Picture”: Running a JIAT Model



JIAT Model Sequencing

- Allows the construction of a linear sequence of 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

The screenshot shows the 'Model Sequence Designer - My Sequence' window. It features two main panels: 'Model Run Sequence' and 'Variable Mapping for: Model 6'. The 'Model Run Sequence' panel contains a table with four models: Model 9 (SEER SEM), Model 22 (ACE), Model 6 (ACE), and Model 4 (ACE). The 'Variable Mapping' panel shows a table of inputs and outputs for Model 6, with checkboxes for visibility and variable names.

Model	Provider
Model 9	SEER SEM
Model 22	ACE
Model 6	ACE
Model 4	ACE

Inputs	Visible	Variable	Model
Input-G	<input checked="" type="checkbox"/>	Output-A	Model 9
Input-H	<input type="checkbox"/>	Output-B	Model 9
Input-I	<input checked="" type="checkbox"/>	Input-J	Model 22
Input-E	<input type="checkbox"/>		

Outputs	Visible
Output-P	<input checked="" type="checkbox"/>
Output-Q	<input type="checkbox"/>
Output-R	<input checked="" type="checkbox"/>
Output-S	<input type="checkbox"/>
Output-T	<input checked="" type="checkbox"/>

Four Models in the Sequence

Identifies how inputs feed for each model

Identifies Sequence outputs



JIAT Benefits and Vision

JIAT Benefits and Vision

- **Benefits:**
 - Web services technology provides a platform to bring multiple tools together in one workplace
 - Establishes a standard Service-Oriented Architecture (SOA) framework to encourage the integration of other Services' cost estimating tools and databases
 - Analyses for all phases of the program – development through sustainment
 - Comprehensive analysis will reduce program risk by addressing hardware, software and programmatic requirements early in the program's lifecycle
- **Vision:**
 - Functionality for the cost, acquisition, requirements and modeling and simulation communities



Promoting JIAT's Future Growth

- We are putting the building blocks together to allow JIAT to work with system open architectures through APIs and web services

- As JIAT moves forward we are looking to:
 - Involve services and agencies across the federal government
 - Include more engineering service providers
 - Expand to modeling and simulation service providers

- We are looking for assistance with identifying potential providers

- We would be happy to talk with you or your group about JIAT in more detail



Questions?