How to use Data-driven Predictive Analytics as the Basis of a DCAA-compliant Estimating System

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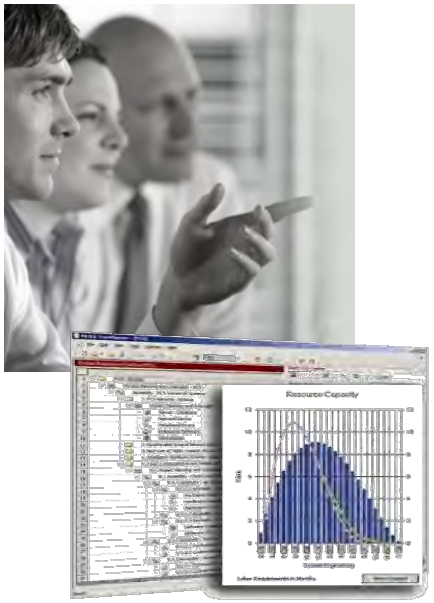
Outline

- Introduction
- What is Predictive Cost Analytics?
- How can Predictive Cost Analytics be used for a DCAA-compliant estimating system?
- What are the key benefits to doing this?

PRICE Systems, L.L.C.

We improve our customers overall ***cost management*** to help them increase revenue and save money. By empowering our clients with ***proven cost models and predictive cost analytics***, they become better estimators - improving bid success ratios, and achieving tremendous savings in analyzing alternatives. They become confident in their costs, schedules, and risk estimates



- Founded as an RCA business in 1975, taken private in 1998
- Headquarters: Mt. Laurel, NJ with additional offices in *DC, OH, VA, UK, France, Germany*
- Partner companies: China, S.Korea, Japan, Australia, Italy, Germany, and elsewhere
- Products: TruePlanning® software, PRICE Models, benchmark databases, integrated processes, and implementation services
- Education: PRICE University, instructor-led training on best estimating practices and product implementation
  350+ customers & 12,000+ project professionals trained worldwide

Who We Service

Federal Agencies, Large Corporations and their Supply Chains

U.S. Space, Defense, Security

- NASA
- Army
- Navy
- Air Force
- DHS
- Census
- FBI

International

- ESA
- UK MOD
- France DND
- Germany BWB
- Spain DND
- Italy MOD, ASI
- S. Korea MOD
- Japan MOD
- China MOD, Space
- Canada DND

Lockheed Martin, Boeing, Raytheon, BAE, General Dynamics, Rolls Royce, Ball, Goodrich, Sikorsky, L3-Com, Booz-Allen, Spirit Aero, Aerospace Corp, EADS, Thales, KAI, LIG, Samsung, Jaguar-Land Rover, COMAC, CYATA, Shanghai Electro

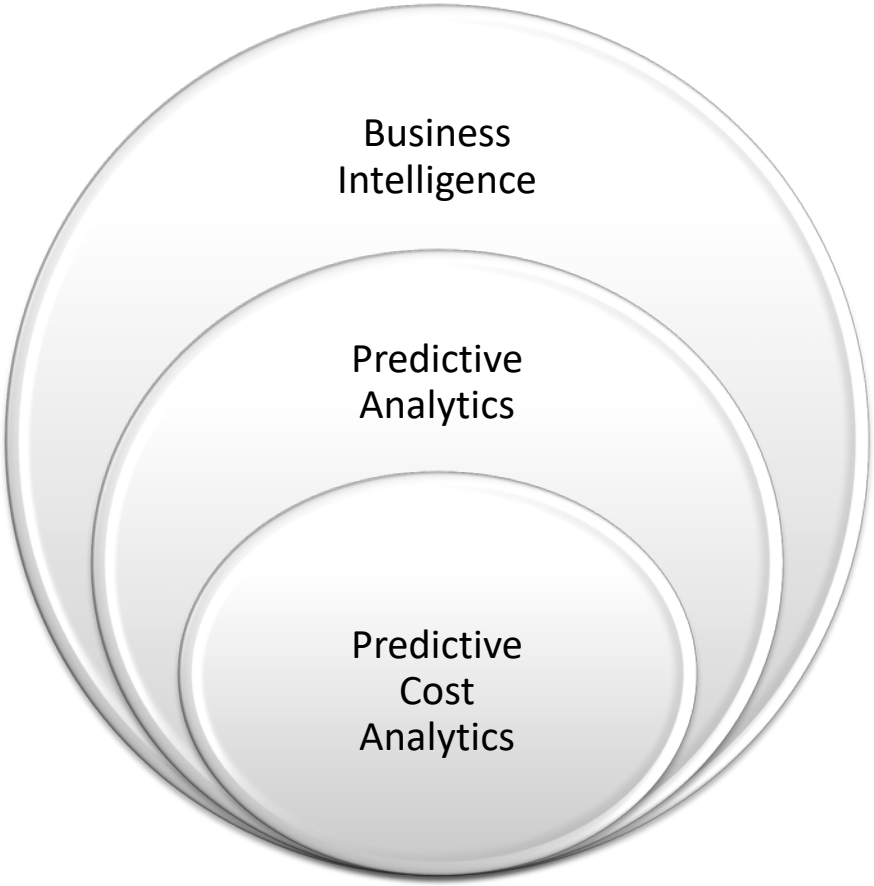
Our objective is to speed and lower the cost of predictive cost analytics for everyone!

Predictive Cost Analytics

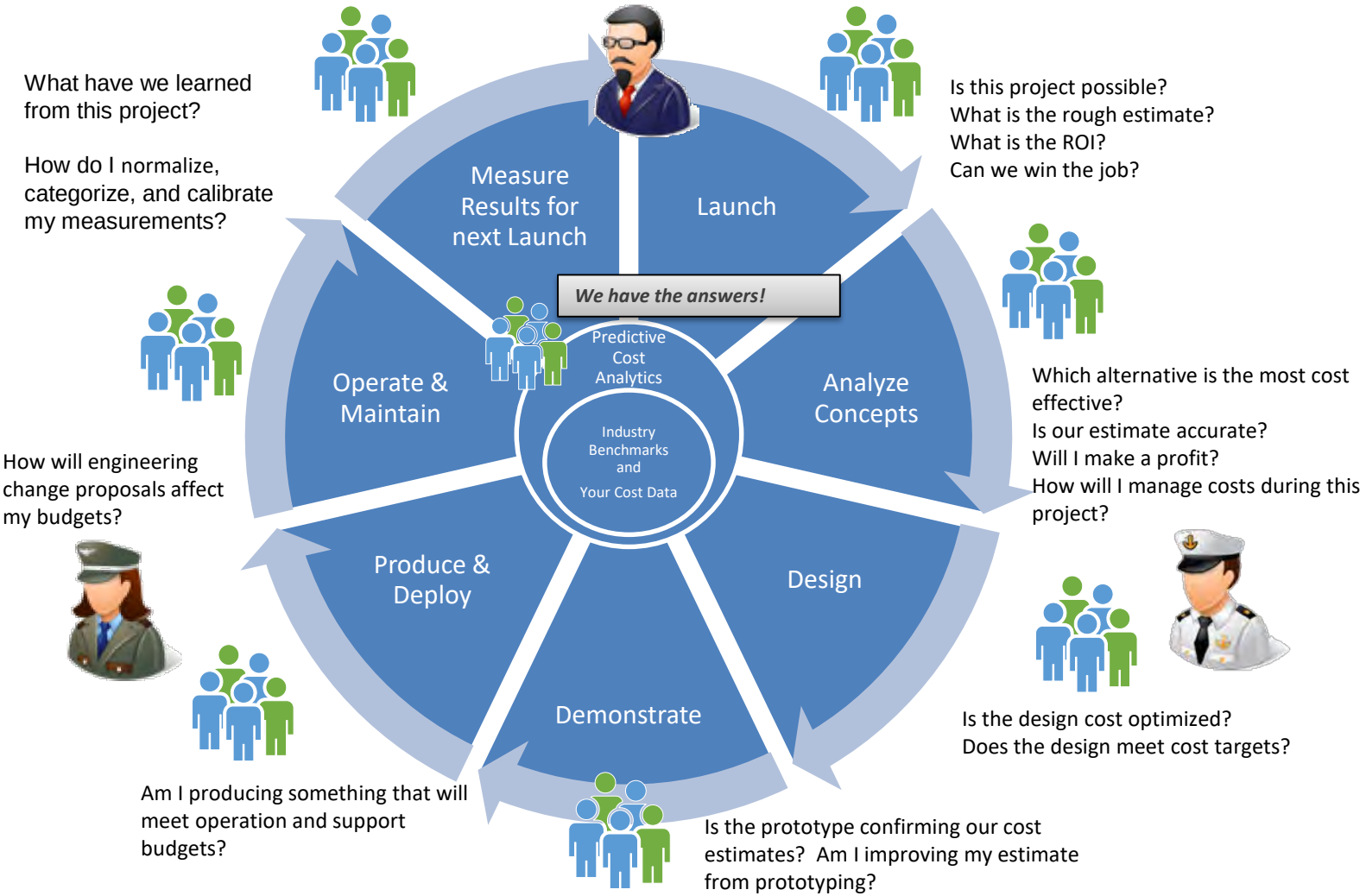
Business intelligence (**BI**) is the set of techniques and tools for the transformation of raw data into meaningful and useful information for business analysis purposes (Wikipedia 2015)

Predictive analytics encompasses a variety of statistical techniques from modeling, machine learning, and data mining that analyze current and historical facts to make predictions about future, or otherwise unknown, events (Wikipedia 2015)

Predictive Cost Analytics a field of predictive analytics specifically targeting cost and schedule estimating for products, projects, on-going operations, other cost-incurring activities



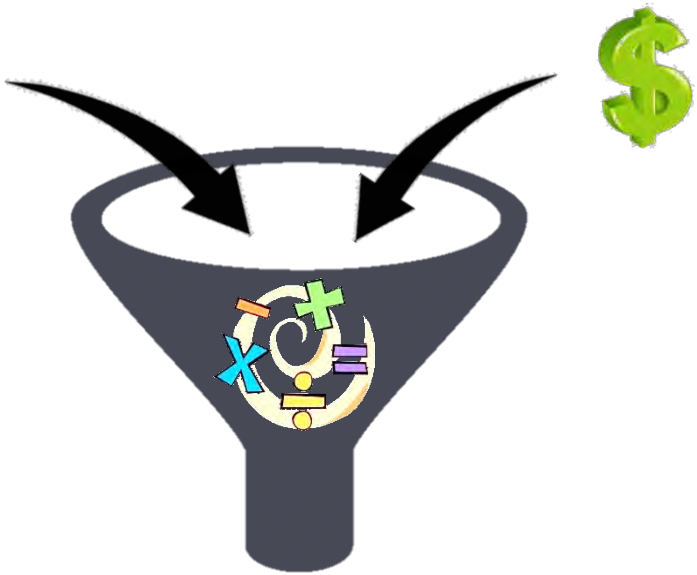
Limited Supply, Large Demand



Cost Models Ease Data Normalization!

Leveraging Supervised Data-Mining with known Cost Drivers

- How big *was* it?
- How much of the engineering and manufacturing *was* new work?
- What *was* the complexity item and the job?
- How familiar *were* the people doing the work?
- *Was* the technology mature?
- When *did* it take place?

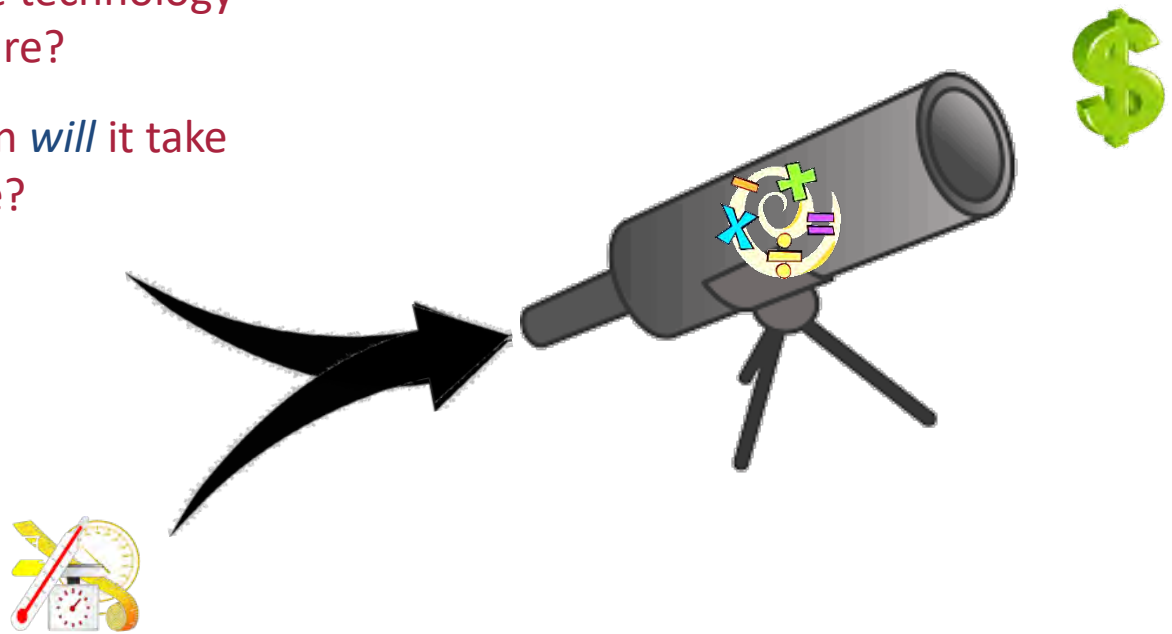


Productivity & Producibility Measures

 | ***Decades of Cost Management Excellence***

Calibrated Cost Models Produce Data-driven Estimates!

- How big *is* it?
- How much of the engineering and manufacturing *is* new work?
- What *is* the complexity item and the job?
- How familiar *are* the people doing the work?
- *Is* the technology mature?
- When *will* it take place?



Productivity & Producibility Measures

 | ***Decades of Cost Management Excellence***

Refreshingly Different

Typically, predictive analytics requires painstaking processes for normalizing data and creating "one-off", multivariate models to predict outcomes. Tailoring generic predictive analytics tools to estimate costs and schedules is complicated and time consuming

It is faster and easier to perform "supervised" data-mining and "calibrate" existing, proven models that are tested and supported by experts…

Predictive Cost Analytics

- Specifically designed to predict costs and schedules
- Integrated tools combine to speed the process and lower the cost to predict costs and schedules
- Proven, reusable cost models that capture the common cost drivers of like-items to be estimated
- PRICE subject matter experts know the process, and are available to help you along the way

Case Study: Olympus Defense

Olympus Defense Corporation

Olympus is a leader in the support of military systems, test equipment and commercial hardware. With a long history of repairing, retrofitting and modifying airborne, space borne, land vehicle and land-based systems, we are experienced in sustainment of navigation, general avionics, mission fire control, interface control, armament stores management and control, airborne transponder, display, interrogator/transponder, communication control and tactical data management systems.

Case Study: Olympus Objectives

Olympus Defense Corporation

Olympus wants to improve their estimating with a new, improved system, that will

1. *Be DCAA-compliant*
2. *Speed estimating to save B&P budgets and increase bid volume*
3. *Build confidence in estimates among company management and customer by using data analytics on historic programs*

Estimating System Importance

PURPOSE (from FAR Part 15.407-5 -- Estimating Systems)

An acceptable estimating system benefits both the Government and the contractor by increasing the accuracy and reliability of individual proposals. It also reduces the scope of reviews to be performed on individual proposals, expedites the negotiation process, and increases the reliability of proposals. Significant deficiencies not corrected by the contractor shall be a consideration in subsequent proposal analyses and negotiations.
(CO will get info from PPIRS).

DCCA Compliance

Cost Estimating System Requirements

(a) Definitions.

"Acceptable estimating system" means an estimating system that complies with the system criteria in paragraph (d) of this clause, and provides for a system that—

(1) Is maintained, reliable, and consistently applied;

(2) Produces verifiable, supportable, documented, and timely cost estimates that are an acceptable basis for negotiation of fair and reasonable prices;

(3) Is consistent with and integrated with the Contractor's related management systems; and

(4) Is subject to applicable financial control systems.

"Estimating system" means the Contractor's policies, procedures, and practices for budgeting and planning controls, and generating estimates of costs and other data included in proposals submitted to customers in the expectation of receiving contract awards. Estimating system includes the Contractor's—

(1) Organizational structure;

(2) Established lines of authority, duties, and responsibilities;

(3) Internal controls and managerial reviews;

(4) Flow of work, coordination, and communication; and

(5) Budgeting, planning, estimating methods, techniques, ***accumulation of historical costs***, and other analyses used to generate cost estimates.

DCCA Audit

Cost Estimating System Audit Guidance

SELECTED CLAUSES

- Does a current 11070 Accounting System audit exist? If so, briefly summarize the results of that audit and assess its impact on the contractor's estimates, based on ***historical costs***. If not, discuss with the supervisor the need to perform a separate assignment.

- Verify that the estimators appropriately considered ***historical experience (e.g., evidence of search for relevant history).*** Evaluate the rationale for any significant departures from relevant history. Verify that the estimators appropriately integrated information from other management systems (e.g., accounting system, labor system, IT). (DFARS 252.215-7002(d)(4)(ix & xi))

- ***If relevant historical hours were used, the estimating team used appropriate analytical methods for arriving at the estimated hours (e.g., improvement curve).*** Verify that historical non-recurring activities were properly identified and removed. (DFARS 252.215-7002(d)(4)(x))

- e. ***If relevant history was not available, the estimating method was reasonably sound and, when appropriate, adequately supported by an internal comparison of past projections using the chosen method and actual results***. (DFARS 252.215-7002(d)(4)(xiii))

- ***Verify that the estimators appropriately considered historical experience (e.g., historical vendor pricing, historical scrap, learning curves). Verify that estimators appropriately integrated information from other management systems***

Impact of Deficient Estimating Systems

PRICE MAKING A DIFFERENCE FOR 40 YEARS

DFARS definition

"Shortcomings in the system that materially affect the ability of officials of the DoD to rely upon information produced by the system that is needed for management purposes."

Impact

- *Increase the scope and frequency of Government reviews of individual contractor proposals*
- *Prolong the proposal negotiation process*
- *Decrease the reliability of contractor's proposals*
- *It will be part of your contractor review in FAPIIS*
- POTENTIAL WITHHOLDING BY CO PER DFARS *Contracting Officer (CO) will withhold 5% of amounts due from progress payments and performance-based payments, and direct the contractor, in writing, to withhold 5% from its billings on interim cost vouchers on Cost Reimbursement, Labor Hour, and Time and Materials contracts until the CO has determined that the contractor has corrected all significant deficiencies as directed by the CO's final determination*

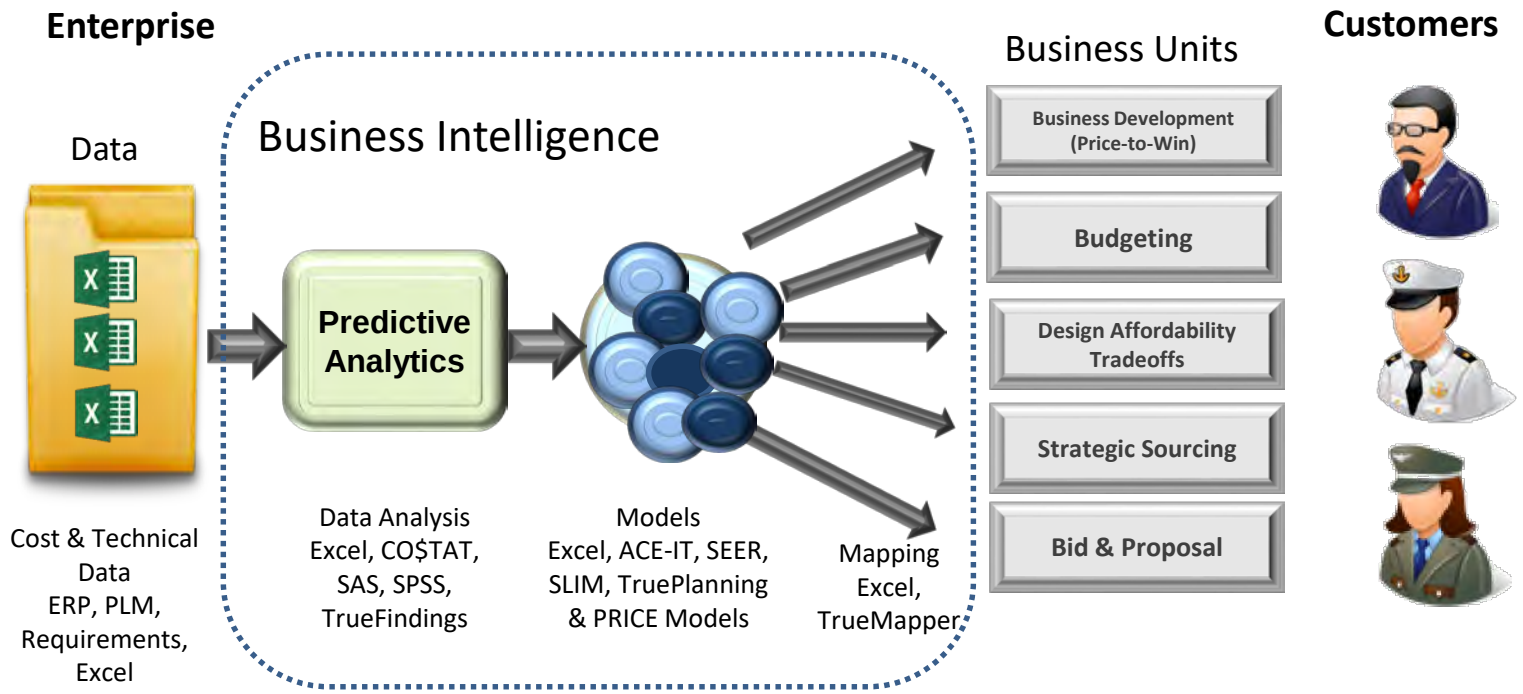
Product: Zeus 240XR

Integrated INS GPS ADAHRS Flight Controls

Olympus Defense Corporation

 | ***Decades of Cost Management Excellence***

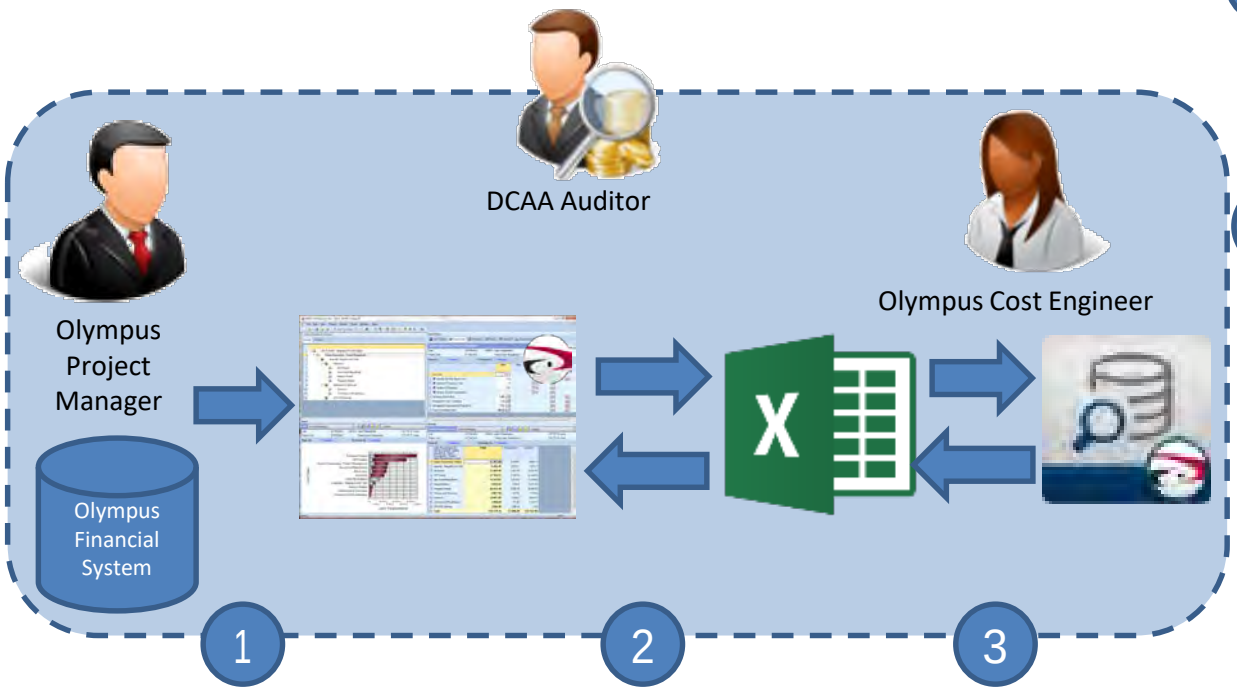
Predictive Cost Analytics



Supervised Data-Mining Speeds the Process

Predictive Cost Analytics

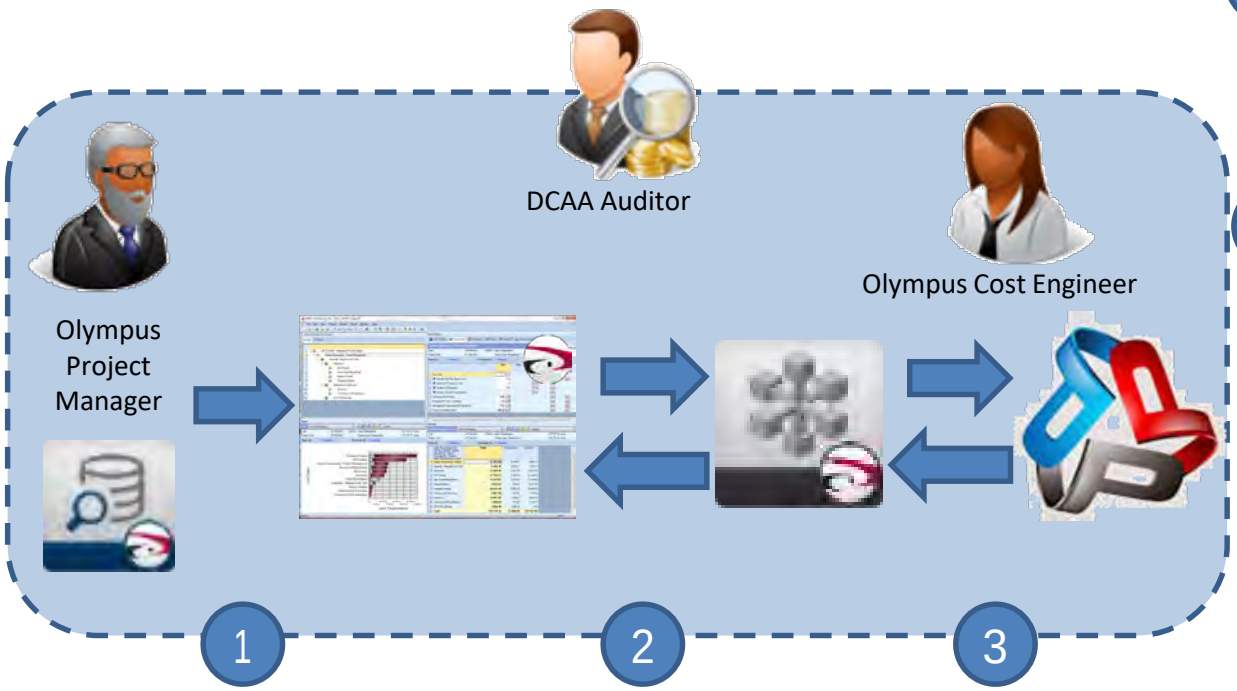
DCAA-Compliant Estimating System – Capturing Historic Data



1. Project Manager models the completed project Cost Model. Actual hours / costs filled in from financial system (<=2 weeks from end)
2. Cost Model measures complexity & productivity of the project, and enters into Excel database.
3. Statistical Analytics Tool analyzes Excel database, determines best fit equations or averages to achieve <=10% variance in aggregate across all projects.

Predictive Cost Analytics

DCAA-Compliant Estimating System – Estimating New Project

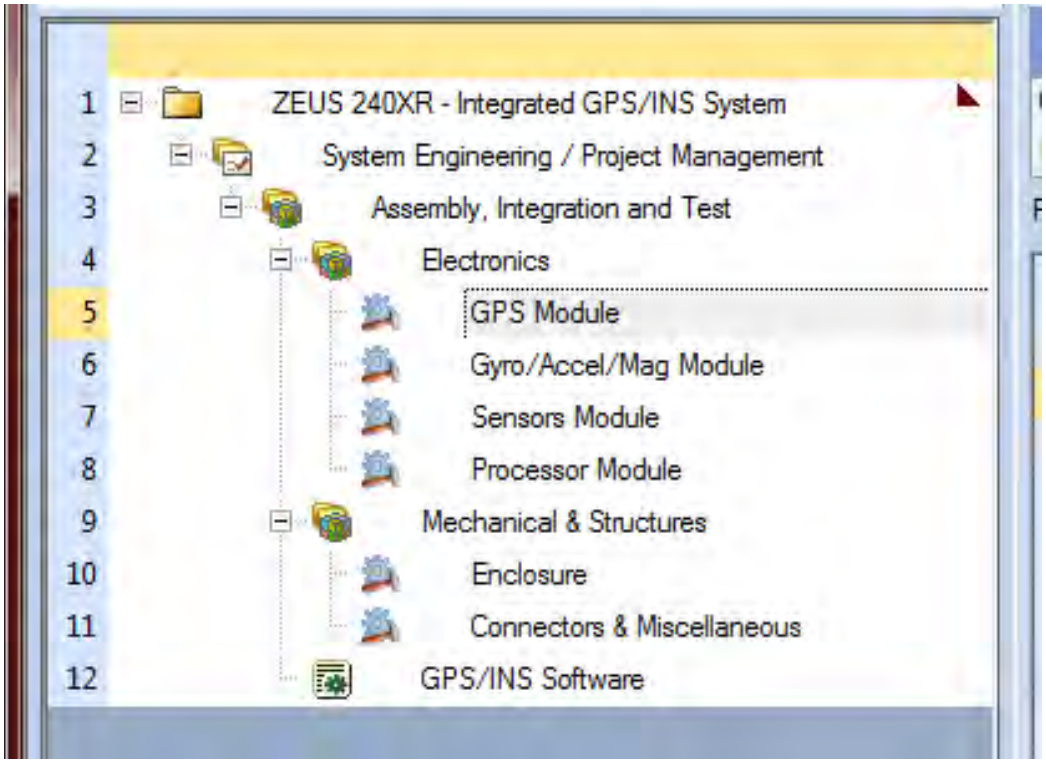


1. Project Manager models the new project in Cost Model, with statistical findings for complexity and productivity from most recent completed projects
2. Cost Model estimates hours and costs, which are mapped to the Proposal cost element structure
3. Mapped hours and costs are transferred to Pricing Tool. DCAA approved forward pricing rates are used to price final proposal

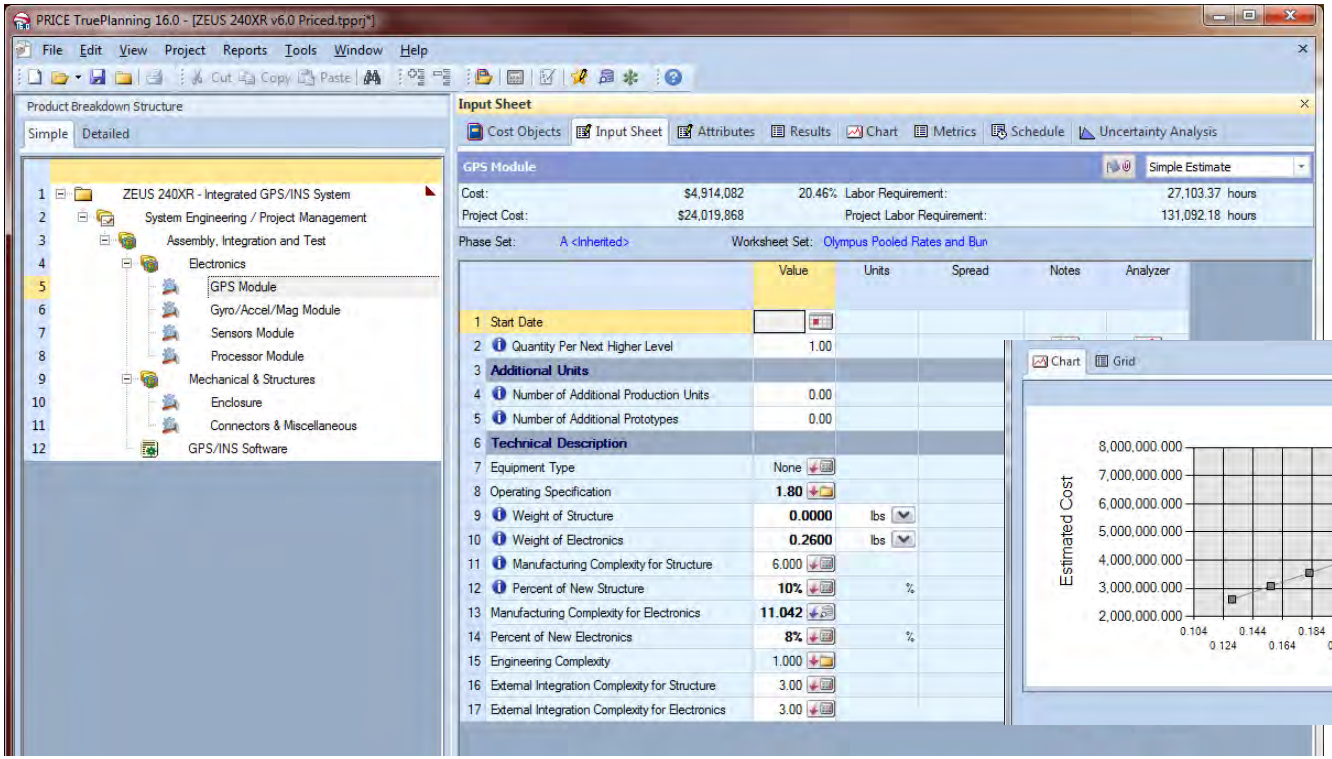
DCAA Compliance Key Tenants

1. Standard PBS/WBS/OBS
2. Simple Measurements and Analytics
3. Engineering OWNS the Measurement and Estimate, Cost Engineer monitors the Estimating System
4. Traceability and Consistency
5. Show a clear and logical tie to DCAA-approved forward pricing rates
6. Communication and Transparency with DCAA

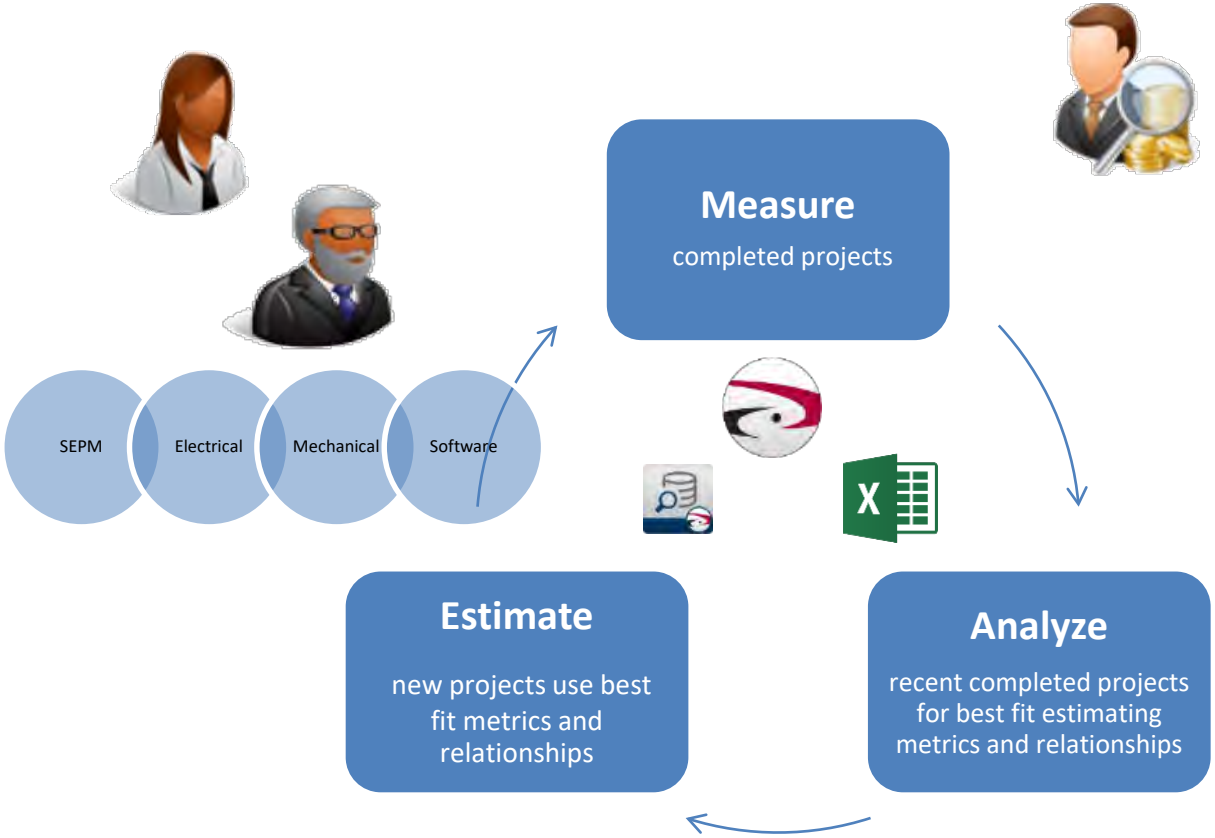
1. Standard Product Breakdown Structure



2. Simple Analytics



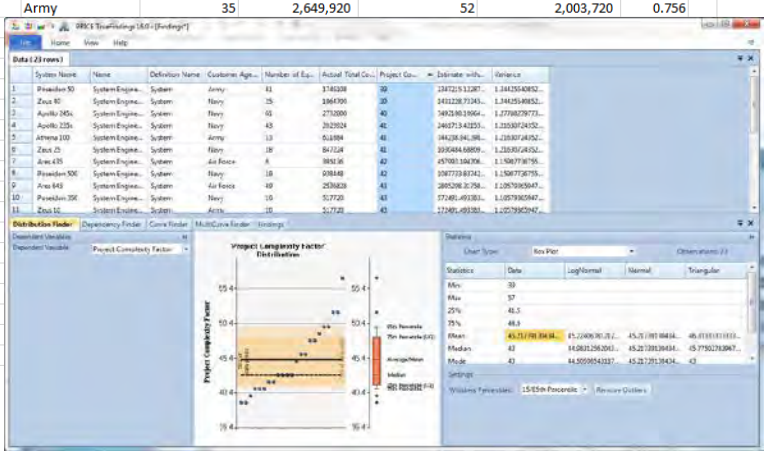
3. Engineering OWNS the measurements & estimate



Engineering Groups maintain their own measurements, analytics, and estimates. Work with Labor hours and high-level cost pools. Cost Engineer maintains consistency of "supervised analytics". Auditor can review process and documents at any time.

3. Engineering OWNS the measurements & estimate *Systems Engineering / Project Management*

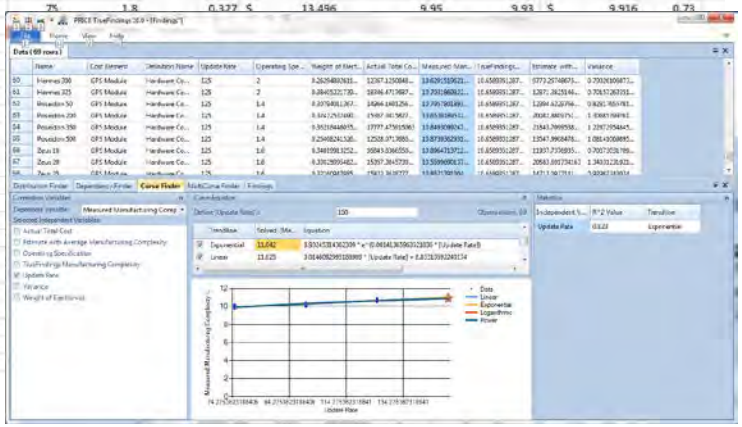
System Name	Name	Definition Name	Customer Agency	Number of Equivalent Requirements (Number)	Actual Total Cost(Hours)	Project Complexity Factor(Number)	Estimate with Average Project Complexity(Hours)	Variance
Apollo 135x	System Engineering / Project Management	System	Army	46	3,220,000	50	2,633,461	0.818
Apollo 235x	System Engineering / Project Management	System	Navy	43	2,023,924	41	2,461,713	1.216
Apollo 245x	System Engineering / Project Management	System	Navy	61	2,732,800	40	3,492,198	1.278
Apollo 100	System Engineering / Project Management	System	Navy	22	1,540,000	50	1,259,481	0.818
Ares 435	System Engineering / Project Management	System	Air Force	8	395,136	42	457,993	1.159
Ares 555	System Engineering / Project Management	System	Air Force	61	3,614,128	46	3,492,198	0.966
Ares 645	System Engineering / Project Management	System	Air Force	49	2,536,828	43	2,805,208	1.106
Artemis 100	System Engineering / Project Management	System	Army	22	1,419,264	48	1,259,481	0.887
Artemis 150	System Engineering / Project Management	System	Army	35	2,649,920	52	2,003,720	0.756
Artemis 250	System Engineering / Project Management	System						
Artemis 350	System Engineering / Project Management	System						
Athena 100	System Engineering / Project Management	System						
Hermes 150	System Engineering / Project Management	System						
Hermes 300	System Engineering / Project Management	System						
Hermes 325	System Engineering / Project Management	System						
Poseidon 50	System Engineering / Project Management	System						
Poseidon 200	System Engineering / Project Management	System						
Poseidon 350	System Engineering / Project Management	System						
Poseidon 500	System Engineering / Project Management	System						
Zeus 10	System Engineering / Project Management	System						
Zeus 20	System Engineering / Project Management	System						
Zeus 25	System Engineering / Project Management	System						
Zeus 40	System Engineering / Project Management	System						



SEPM estimate based on the ***average Project Complexity*** of the last 23 projects. The expected variance is about 3%

3. Engineering OWNS the measurements & estimate *Electrical Engineering*

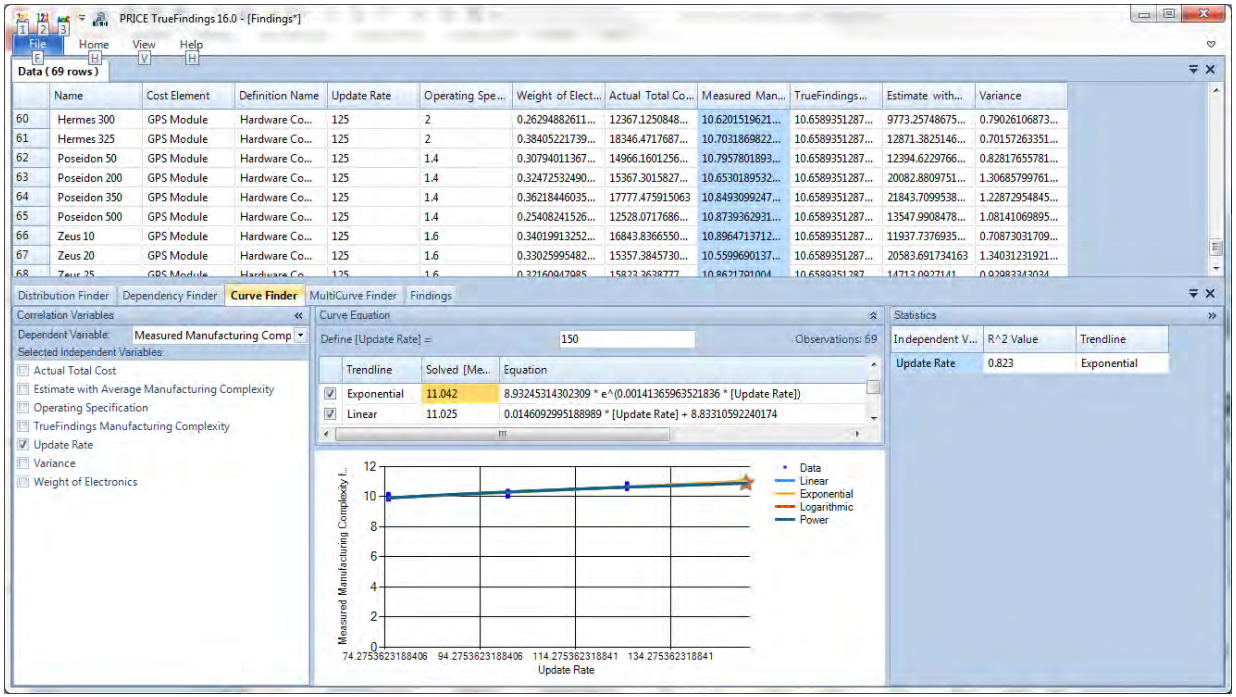
Name	Cost Element	Definition Name	Update Rate(Number)	Operating Specification(Number;;Input)	Weight of Electronics(Weight;lbs;Input)	Actual Total Cost(Currency;$, USA, 2015)	Measured Manufacturing Complexity for Electronics(Number;;Input)	TrueFindings Manufacturing Complexity(Number)	Estimate with Average Manufacturing Complexity(Currency;$, USA, 2015)	Variance(Number)
Apollo 135x	GPS Module	Hardware Component	75	1.8	0.302	$ 12,168	9.82	9.93	$ 10,339	0.85
Apollo 235x	GPS Module	Hardware Component	75	1.8	0.267	$ 11,480	10.16	9.93	$ 14,474	1.26
Apollo 245x	GPS Module	Hardware Component	75	1.8	0.213	$ 9,141	10.15	9.93	$ 8,137	0.89
Apollo 100	GPS Module	Hardware Component	75	1.8	0.395	$ 16,303	9.95	9.93	$ 10,650	0.65
Ares 435	GPS Module	Hardware Component	75	1.4	0.239	$ 9,626	9.83	9.93	$ 10,426	1.08
Ares 555	GPS Module	Hardware Component	75	1.4	0.341	$ 14,484	10.09	9.93	$ 12,629	0.87
Ares 645	GPS Module	Hardware Component	75	1.4	0.390	$ 15,978	9.92	9.93	$ 12,014	0.75
Artemis 100	GPS Module	Hardware Component	75	1.8	0.299	$ 11,997	9.81	9.93	$ 15,841	1.32
Artemis 150	GPS Module	Hardware Component	75	1.8	0.375	$ 15,239	9.88	9.93	$ 14,287	0.94
Artemis 250	GPS Module	Hardware Component	75	1.8	0.385	$ 15,480	9.82	9.93	$ 17,898	1.16
Artemis 350	GPS Module	Hardware Component	75	1.8	0.327	$ 13,496	9.95	9.93	$ 9,916	0.73
Athena 100	GPS Module	Hardware Component								
Hermes 150	GPS Module	Hardware Component								
Hermes 300	GPS Module	Hardware Component								
Hermes 325	GPS Module	Hardware Component								
Poseidon 50	GPS Module	Hardware Component								
Poseidon 200	GPS Module	Hardware Component								
Poseidon 350	GPS Module	Hardware Component								
Poseidon 500	GPS Module	Hardware Component								
Zeus 10	GPS Module	Hardware Component								
Zeus 20	GPS Module	Hardware Component								
Zeus 25	GPS Module	Hardware Component								
Zeus 40	GPS Module	Hardware Component								
Apollo 135x	GPS Module	Hardware Component								
Apollo 235x	GPS Module	Hardware Component								
Apollo 245x	GPS Module	Hardware Component								
Apollo 100	GPS Module	Hardware Component								
Ares 435	GPS Module	Hardware Component								
Ares 555	GPS Module	Hardware Component								
Ares 645	GPS Module	Hardware Component								
Artemis 100	GPS Module	Hardware Component								



Electrical Engineering estimate based on a ***linear regression*** analysis of Manufacturing Complexity as a function of "Module Type" and "Update Rate" derived from our last 276 projects. The expected variance is about 4%

The Power of Analytics

Extrapolation using Regression



Olympus has never built an INS with an Update Rate of 150 – What will it cost? What is a rational approach to the estimate? – linear regression based on historic projects!

 |

3. Engineering OWNS the measurements & estimate *Mechanical Engineering*

	A	B	C	D	E	F	G	H	I	J	K
1	Name	Cost Element	Definition Name	Operating Specification(Number;;Input)	Weight of Structure(Weight;lbs;Input)	Actual Total Cost(Currency;$, USA, 2015)	Measured Manufacturing Complexity for Structure(Number;;Input)	TrueFindings Manufacturing Complexity(Number)	Estimate with Average Manufacturing Complexity(Currency;$, USA, 2015)	Variance(Number)	
2	Apollo 135x	Enclosure	Hardware Component	1.8	3.350	$ 11,241	7.97	7.92	$ 10,593	0.94	
3	Apollo 235x	Enclosure	Hardware Component	1.8	3.678	$ 12,599	7.98	7.92	$ 9,619	0.76	
4	Apollo 245x	Enclosure	Hardware Component	1.8	3.457	$ 11,635	7.80	7.92	$ 12,975	1.12	
5	Apollo 100	Enclosure	Hardware Component	1.8	2.537	$ 8,584	7.87	7.92	$ 6,626	0.77	
6	Ares 435	Enclosure	Hardware Component	1.4	3.077	$ 10,693	7.93	7.92	$ 10,354	0.97	
7	Ares 555	Enclosure	Hardware Component	1.4	4.315	$ 14,543	8.01	7.92	$ 13,961	0.96	
8	Ares 645	Enclosure	Hardware Component	1.4	4.116	$ 14,074	7.88	7.92	$ 17,506	1.24	
9	Artemis 100	Enclosure	Hardware Component	1.8	3.687	$ 12,410	7.85	7.92	$ 10,384	0.84	
10	Artemis 150	Enclosure	Hardware Component	1.8	3.300	$ 11,589	7.95	7.92	$ 9,887	0.85	
11	Artemis 250	Enclosure	Hardware Component	1.8	3.062	$ 10,216	7.84	7.92	$ 8,974	0.88	
12	Artemis 350	Enclosure	Hardware Component	1.8	3.284	$ 11,088	8.02	7.92	$ 13,081	1.18	
13	Athena 100	Enclosure	Hardware Component	1.8	3.545	$ 12,470	7.92	7.92	$ 9,799	0.79	
14	Hermes 150	Enclosure	Hardware Component	2.0	3.311	$ 11,477	7.80	7.92	$ 13,721	1.20	
15	Hermes 300	Enclosure	Hardware Component								
16	Hermes 325	Enclosure	Hardware Component								
17	Poseidon 50	Enclosure	Hardware Component								
18	Poseidon 200	Enclosure	Hardware Component								
19	Poseidon 350	Enclosure	Hardware Component								
20	Poseidon 500	Enclosure	Hardware Component								
21	Zeus 10	Enclosure	Hardware Component								
22	Zeus 20	Enclosure	Hardware Component								
23	Zeus 25	Enclosure	Hardware Component								
24	Zeus 40	Enclosure	Hardware Component								
25	Apollo 135x	Connectors & Miscellaneous	Hardware Component								
26	Apollo 235x	Connectors & Miscellaneous	Hardware Component								
27	Apollo 245x	Connectors & Miscellaneous	Hardware Component								
28	Apollo 100	Connectors & Miscellaneous	Hardware Component								
29	Ares 435	Connectors & Miscellaneous	Hardware Component								
30	Ares 555	Connectors & Miscellaneous	Hardware Component								
31	Ares 645	Connectors & Miscellaneous	Hardware Component								
32	Artemis 100	Connectors & Miscellaneous	Hardware Component								

Mechanical Engineering estimate is based on the ***average Manufacturing Complexity for each Item Type*** of the last 46 projects. The expected variance is about 5%

3. Engineering OWNS the measurements & estimate *Software Engineering*

Name	Project ID	Total Hrs(Hours	%Int	Sys IntegE	TS Profac(Number)	Weighted TS Profac(Number)	Measured Software I&T(Hour	Dev SubTotal(Hours)	Measured Total(Hour	%Int of Total	Software I&T(Hours	Dev(Hours)	Total(Hours)
Apollo 245x	11722	18715.8	5.48%	0.77	0.690	0.009	1026.30	17689.50	18715.80	0.05	647.00	11536.05	12183.05
Ares 555	11757	2690.7	9.34%	0.817	0.701	0.001	251.20	2439.50	2690.70	0.09	161.11	1573.72	1734.83
Apollo 245x	11236	3684.6	23.04%	1.769	0.708	0.001	849.00	2835.60	3684.60	0.23	550.49	1895.51	2446.00
Apollo 245x	9895	1304.9	26.67%	1.23	0.74	0.001	348.01	956.90	1304.91	0.27	235.65	655.57	891.22
Ares 645	11792	24915.1	1.03%	0.579	0.738	0.013	256.72	24658.40	24915.12	0.01	174.03	16603.34	16777.37
Zeus 40	9946	5840.6	18.52%	2.373	0.747	0.003	1081.40	4759.20	5840.60	0.19	742.93	3265.83	4008.76
Zeus 25	11185	3097.3	27.42%	3.229	0.766	0.001	849.30	2248.00	3097.30	0.27	598.58	1641.85	2240.43
Zeus 10	11127	10123.3	23.95%	3.687	0.768	0.004	2424.70	7698.60	10123.30	0.24	1713.48	5455.58	7169.06
Artemis 150	10742	30838.0	4.49%	0.826	0.777	0.016	1385.20	29452.80	30838.00	0.04	991.23	20860.58	21851.82
Ares 555	11274	4828.2	3.98%	0.926	0.787	0.003	192.29	4635.90	4828.19	0.04	139.44	3410.67	3550.11
Hermes 300	11045	2933.2	11.95%	1.007	0.787	0.001	350.61	2582.60	2933.20	0.12	254.40	1889.37	2143.77
Poseidon 200	11661	876.7	11.40%	1.153	0.787	0.000	99.90	776.79	876.69	0.11	72.50	564.00	636.51
Artemis 100	11333	529.6	9.63%	0.740	0.802	0.000	51.02	478.61	529.63	0.10	37.75	351.84	389.59
Artemis 150	10980	5469.8	10.50%	2.902	0.812								
Hermes 325	10768	841.2	11.95%	0.836	0.821								
Artemis 250	9905	4292.7	7.33%	0.617	0.824								
Ares 555	9959	1766.9	16.85%	1.331	0.835								
Hermes 325	11051	21927.9	4.44%	0.953	0.840								
Zeus 25	10899	7943.6	5.41%	1.028	0.843								
Hermes 150	11390	6882.2	2.20%	0.780	0.849								
Apollo 245x	10936	2607.2	19.73%	1.967	0.851								
Hermes 325	9861	974.9	10.99%	1.030	0.858								
Artemis 150	9966	20627.4	3.87%	0.730	0.860								
Zeus 10	8645	3432.2	22.96%	2.134	0.879								
Artemis 100	9965	20350.6	2.93%	0.667	0.880								
Athena 100	10997	2780.2	4.70%	0.649	0.890								
Athena 100	11349	1959.2	17.64%	1.455	0.892								
Hermes 300	9918	620.5	21.92%	1.123	0.898								
Hermes 300	11435	7508.0	4.53%	0.617	0.901								
Hermes 150	10766	24916.8	6.86%	1.866	0.914								
Apollo 100	10939	3280.9	8.64%	2.847	0.914								

Software Engineering estimate is based on the ***average Organizational Productivity*** of the last 184 projects. The expected variance is about 2.5%

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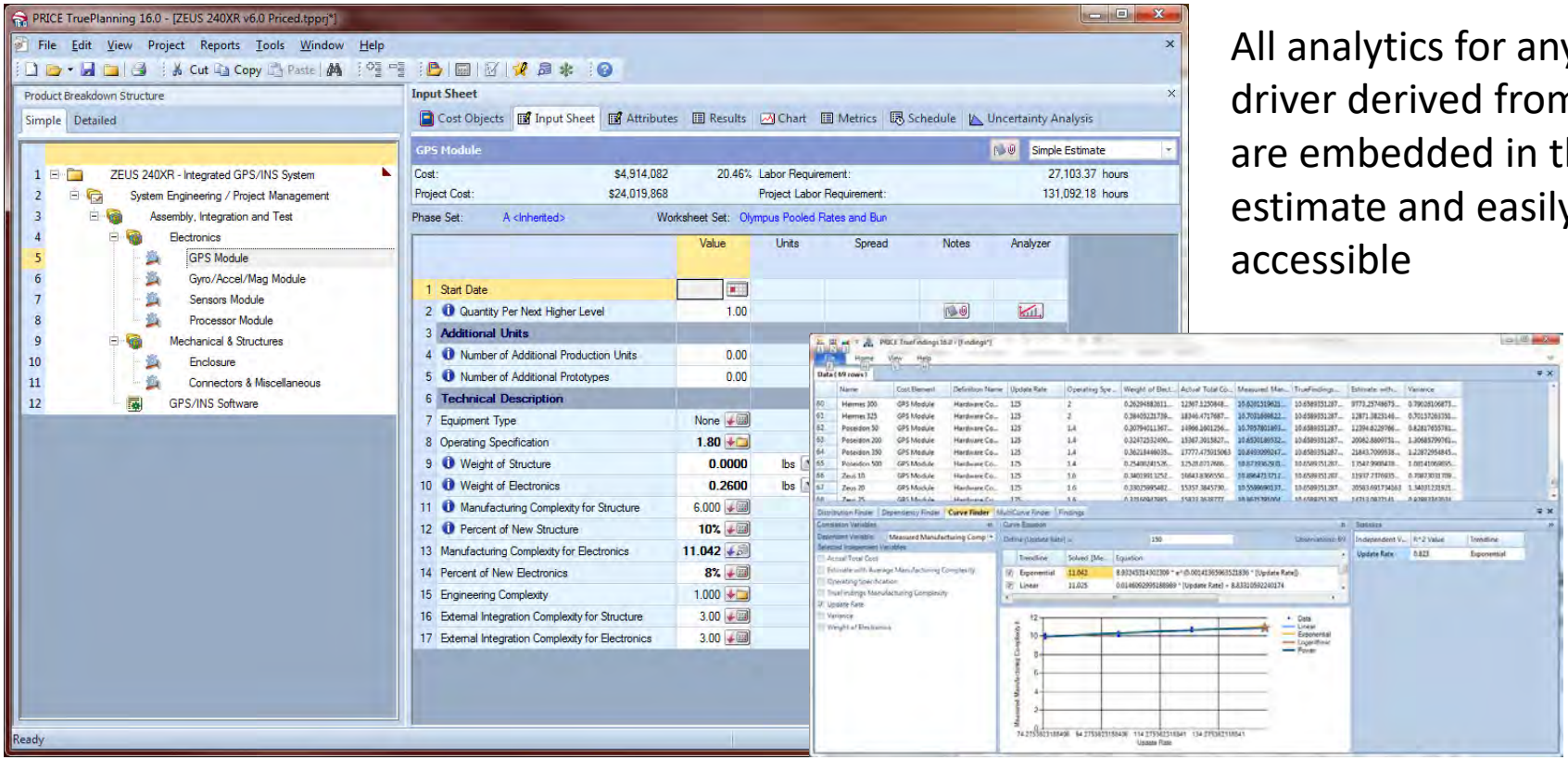
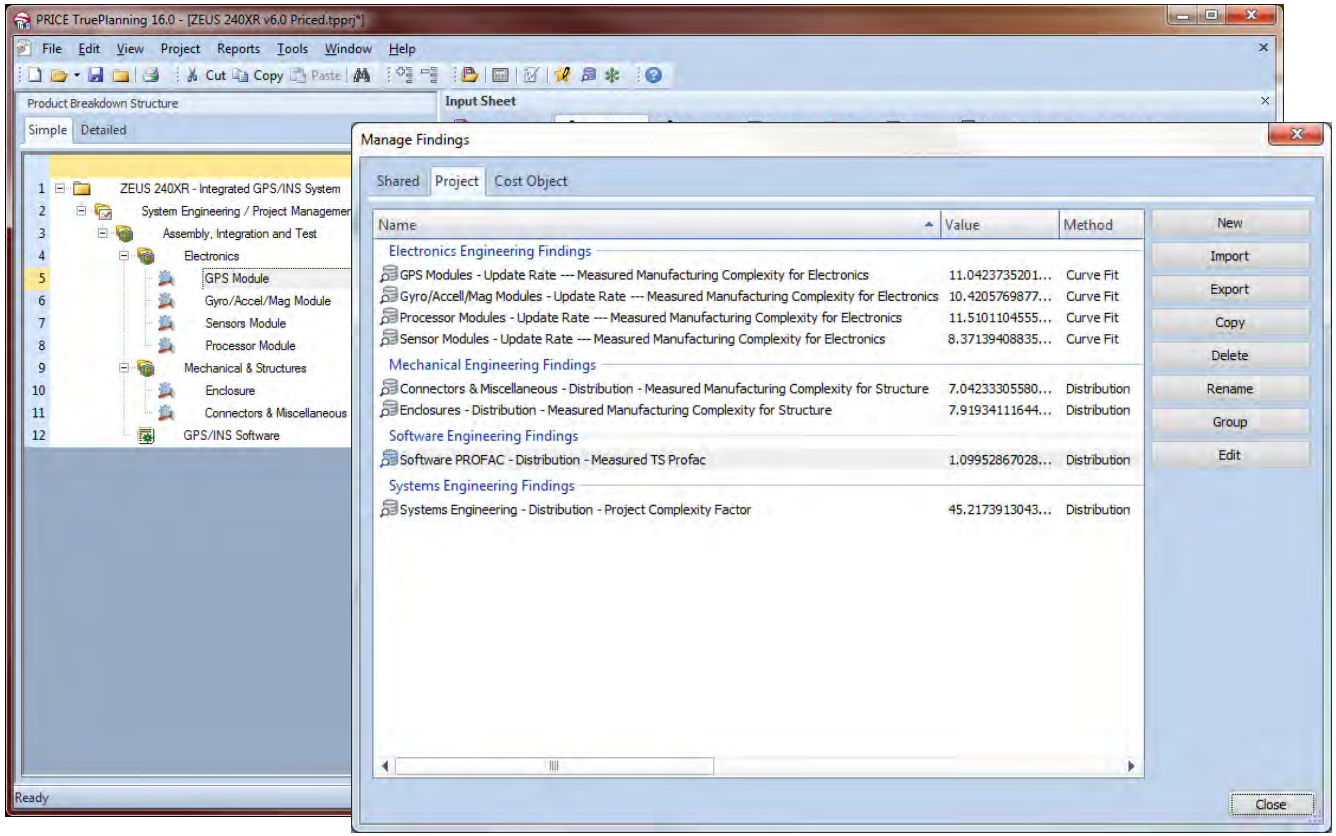
4. Traceability and Consistency



All analytics for any cost driver derived from data are embedded in the estimate and easily accessible

4. Traceability and Consistency



All Analytical Findings used for the estimate are summarized and easily accessible

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5. Show a clear and logical tie to DCAA-approved forward pricing rates

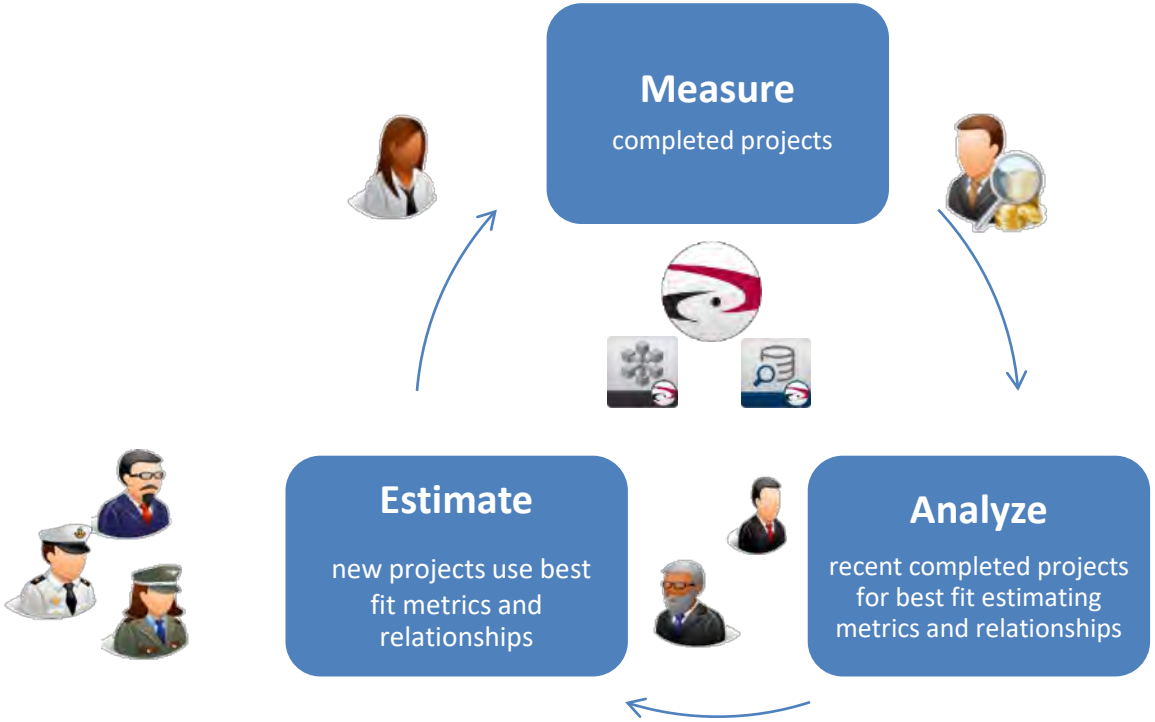
1. Olympus uses a three-tiered breakdown of rates for their DCAA-approved organizational breakdown structure
2. Actual Olympus forward-pricing rates and burdening used in Pricing tool
3. Cost Model uses “pooled” labor rates and burdening approximation for tradeoffs and target pricing
4. Cost Model pooled labor hours are mapped into Pricing Tool resources with a standard work ratio supported by history (20/40/40)
5. Pricing Tool is used for final pricing and Cost Volume production

6. Communication and Transparency with DCAA

- Early Notice
- Invite them to be part of the process
- Keep it simple
- Document the process, and stick to it
- Make Databases, Cost Model and Pricing Tool files available for inspection and review

Predictive Cost Analytics

DCAA-Compliant Estimating System



Predictive Cost Analytics deploys ***supervised analytics*** to simplify and speed the process

Olympus DCAA Compliance

P-01	Estimating Using Cost Estimating Relationships (CER) or Parametric Estimating
Version 9.6, dated April 2016	**W/P Reference**
1. Based on your understanding of the policies and procedures obtained during the demonstrations, determine whether the policies comply with the DFARS criteria and whether the actual practices (using the proposals selected in B-01) comply with the policies as you perform the following steps:	✓
a. Review and evaluate the written description that assigns responsibility for preparing, reviewing, and approving the CER. Identify the personnel responsible for preparing the proposed CER for the selected price proposals. Verify that personnel have sufficient training, experience, and guidance to ensure the CER is proposed in accordance with the established procedures. (DFARS 252.215-7002(d)(4)(i, ii & iii))	✓
b. Review the written basis of estimate. Determine if the description sufficiently identifies and documents the sources of data and the estimating methods and rationale used in developing the CER. (DFARS 252.215-7002(d)(4)(iv))	✓

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Olympus DCAA Compliance

c. Verify that the CER is based on relevant historical experience. Evaluate the rationale for any significant departures from relevant history. Verify that the estimators appropriately integrated information from other management systems (e.g., accounting system, IT). (DFARS 252.215-7002(d)(4)(ix & xi))	
d. Verify evidence that adequate supervision occurred throughout the development and application of the CER (e.g., signature on worksheet(s)). Determine if errors were timely detected and corrected. If no errors were identified, determine whether errors would likely have been detected considering the extent of supervision and management review. (DFARS 252.215-7002(d)(4)(v & vii))	

Olympus DCAA Compliance

2. Determine if the practices for establishing and updating the CER are sound and are compliant with the provisions of the solicitation and are adequate to serve as a basis to reach a fair and reasonable price. (DFARS 252.215-7002(d)(4)(xvi & xvii)) For those proposals in which estimates based on CERs were subjected to audit, summarize the reported exceptions resulting from unsound estimating policies and/or practices. For the remaining proposals, determine that the policies and practices reasonably ensure that:	
a) The frequency and method by which the CER is evaluated and updated will result in reasonably accurate estimates for prospective contracts. [Refer to CAM D-102 in determining whether to request specialist assistance, and if needed, to formulate the questions to be addressed by the specialist.]	
b) The proposed CER is consistent with established/disclosed practices (CAS 401/CAS 402/FAR 31.202 and 31.203(a)). (DFARS 252.215-7002(d)(4)(vi))	
c) A comparison of projections using the CER and the actual results is periodically accomplished. (DFARS 252.215-7002(d)(4)(xiii))	

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Olympus DCAA Compliance

d) The estimating team used appropriate analytical methods to arrive at the CER (e.g., regression with sound correlation). Verify that historical non-recurring activities were properly identified and removed. (DFARS 252.215-7002(d)(4)(x))	✓
e) Reasonable steps were taken to ensure that the CER calculation does not result in a duplication of direct or indirect estimated costs included elsewhere in the proposal. (DFARS 252.215-7002(d)(4)(viii))	✓
3. Discuss and confirm findings with the contractor.	
4. Document the audit evaluation steps and conclusions. Discuss with the audit team and obtain supervisory approval.	

Product: Zeus 240XR

Integrated INS GPS ADAHRS Flight Controls

Olympus Defense Corporation

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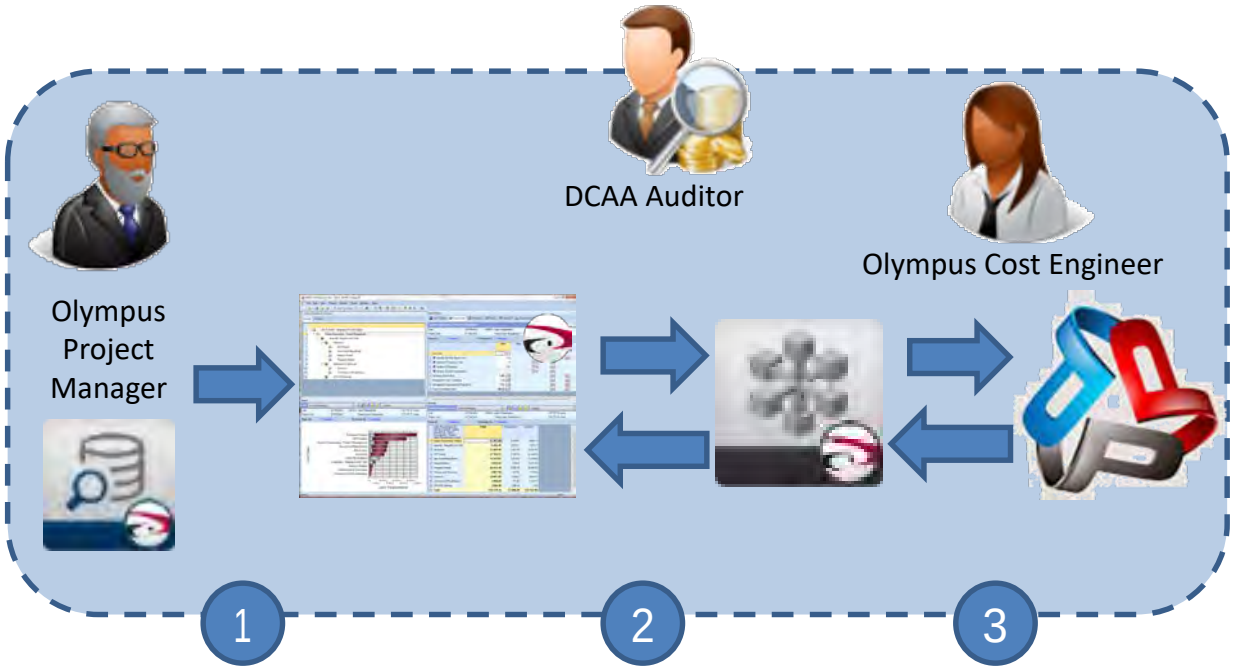
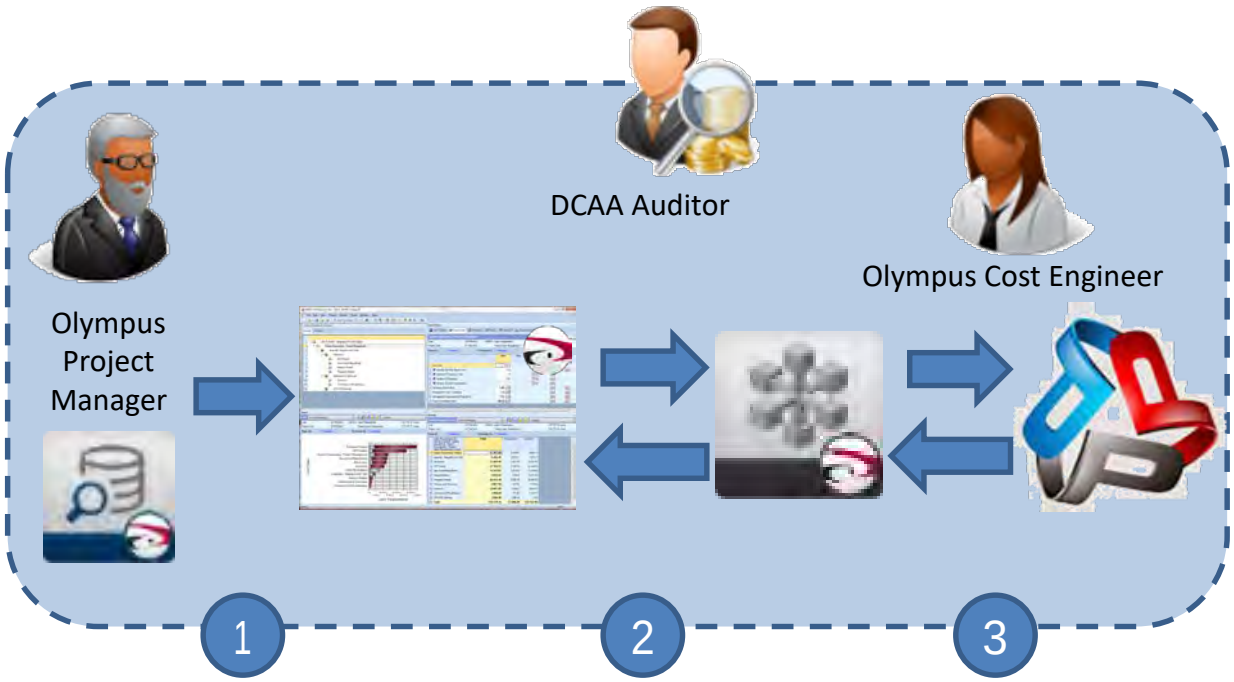
Zeus 240XR Estimate



1. Project Manager models the Zeus 240XRi in Cost Model, with Findings for complexity and productivity from most recent completed projects
2. Cost Model estimates hours and costs, which are mapped to the Proposal cost element structure
3. Mapped hours and costs are transferred to Pricing Tool. DCAA approved forward pricing rates are used to price final proposal

Zeus 240XR Estimate

But Wait!! *Management & Customers want Options, Price Sensitivity and What ifs!*



1. Project Manager & Engineers rapidly models Zeus 240XR options in Cost Model, Sensitivity Analyses charts are compiled. Results are verified before fully priced
2. Cost Model mappings to the Proposal cost element structure remain consistent, do not need to be redone
3. Mapped hours and costs for each option and what if are transferred to Pricing Tool for full pricing

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Olympus Key Benefits

1. Customers love the speed and transparency of estimates and excursions
2. Management is happy because customer is happy, and that estimates are based on recent actual projects
3. Olympus is able to achieve sustainable, profitable growth with key, long term customers
4. Olympus is able to acquire new customers by increasing their number of bids and improving bid quality

Summary

- What is Predictive Cost Analytics?
  The field of predictive analytics with Business Intelligence specifically targeting cost and schedule estimating for products, projects, on-going operations, other cost-incurring activities
- How can Predictive Cost Analytics be used for a DCAA-compliant estimating system?
  Disciplined data capture, measurement, and estimating using proven Cost Models satisfies the DCAA estimating criteria
- What are the key benefits?
  Speed, confidence, productivity – Winning!

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Questions?

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