

***PRICE***<sup>®</sup>

***ICEAA 2019***

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**Enhance Estimator  
Success &  
Organization  
Competitiveness in  
Supplier Assessment**

Presented by:  
John Swaren

**Estimate with Confidence™**

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# Outline

- Introduction
- What is Supplier Assessment?
- What Does it Take?
- How can Predictive Cost Analytics support Supplier Assessment?
- Value Proposition
  - Validating Quotations
  - Assessment of Bidders
  - Ceiling Prices
  - Preferred Suppliers
- Summary

## Overview: Abstract

- Review use of an effective methodology to perform Supplier Assessment (“SA”), in the context of Predictive Cost Analytics (“PCA”).
- Derive a quantitative method to benchmark, monitor and evaluate potential suppliers of a customer-specified technology.
- Obtain timely consistent bid evaluations as well as ceiling prices for negotiation.

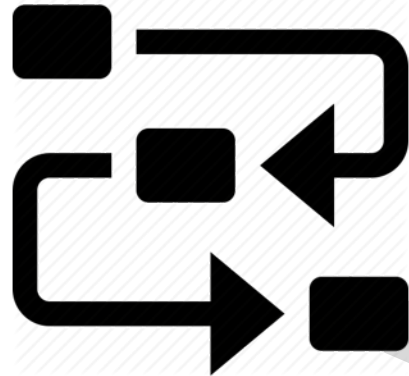
# Overview: Methodology

- Establish best practices to leverage evidence from past procurements.
- Create a rich repository that can be mined to find specific relationships or comparable data points.
- Analysis of the latter knowledge creates a basis for establishing ceiling prices used in supplier negotiations.

## Overview: Benefits

- Validate and evaluate potential suppliers of common technology.
- Portfolio of preferred suppliers for use during the proposal process and post-award.
- Benchmark/ monitor performance to evaluate if a provided quotation is a reasonable expectation prior to commencing negotiations.

# What is Supplier Assessment ?



**A PROCESS**

The *lower* Price associated with a *higher* level of productivity-performance... hence a better value than by other suppliers.

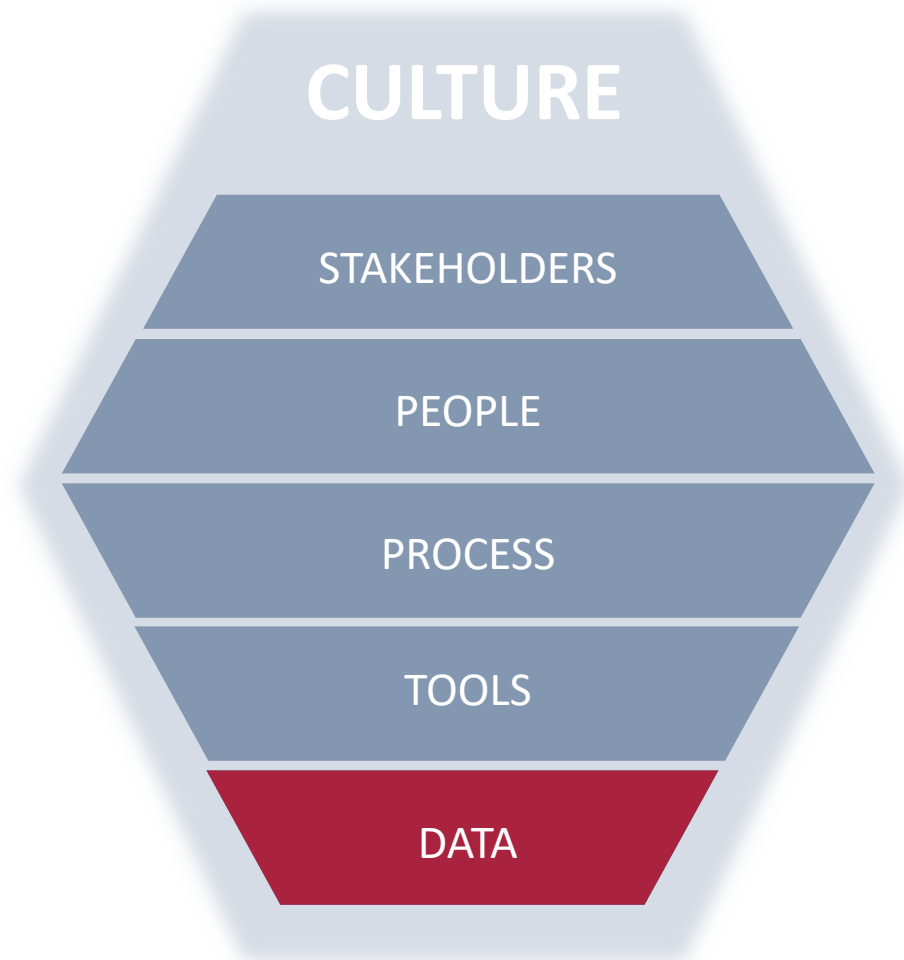
The business process of evaluating and approving potential suppliers by **quantitative assessment**.



**A NUMBER**

# What Does it Take?

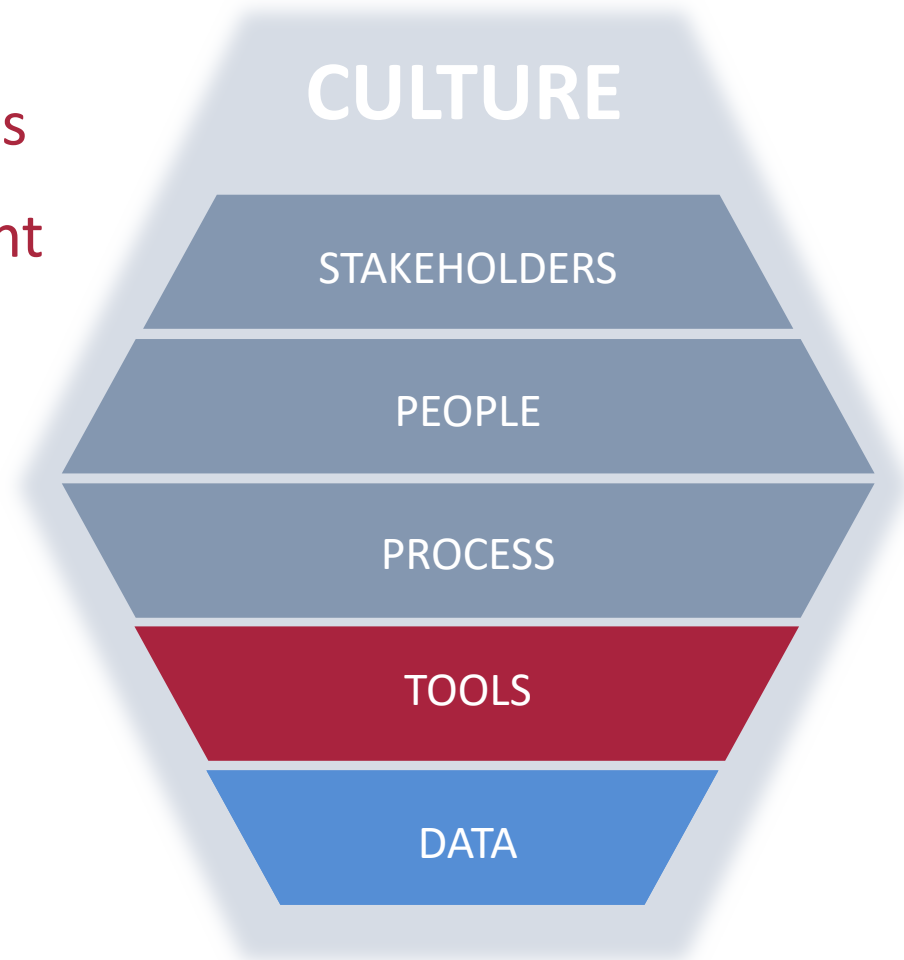
- Cost/Price History
- Technology/ Design Details
- Labor Rates & Factors
- Schedule Constraints
- Other Programmatic



\* Partial credit for this slide is given to Mr. Dale Shermon and Mark Gilmour for their book entitled "Cost Engineering Health Check"

# What Does it Take?

- Predictive Cost Analytics
- Knowledge Management Resources
- SME & PM Interviews

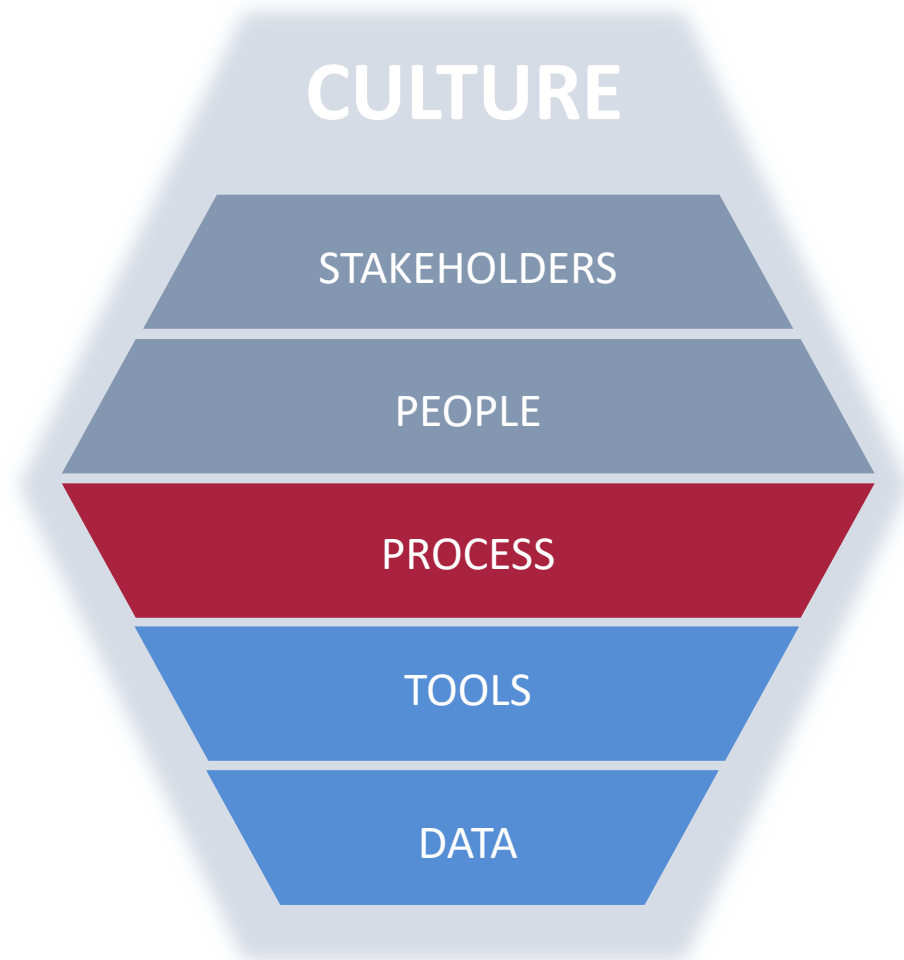


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# What Does it Take?

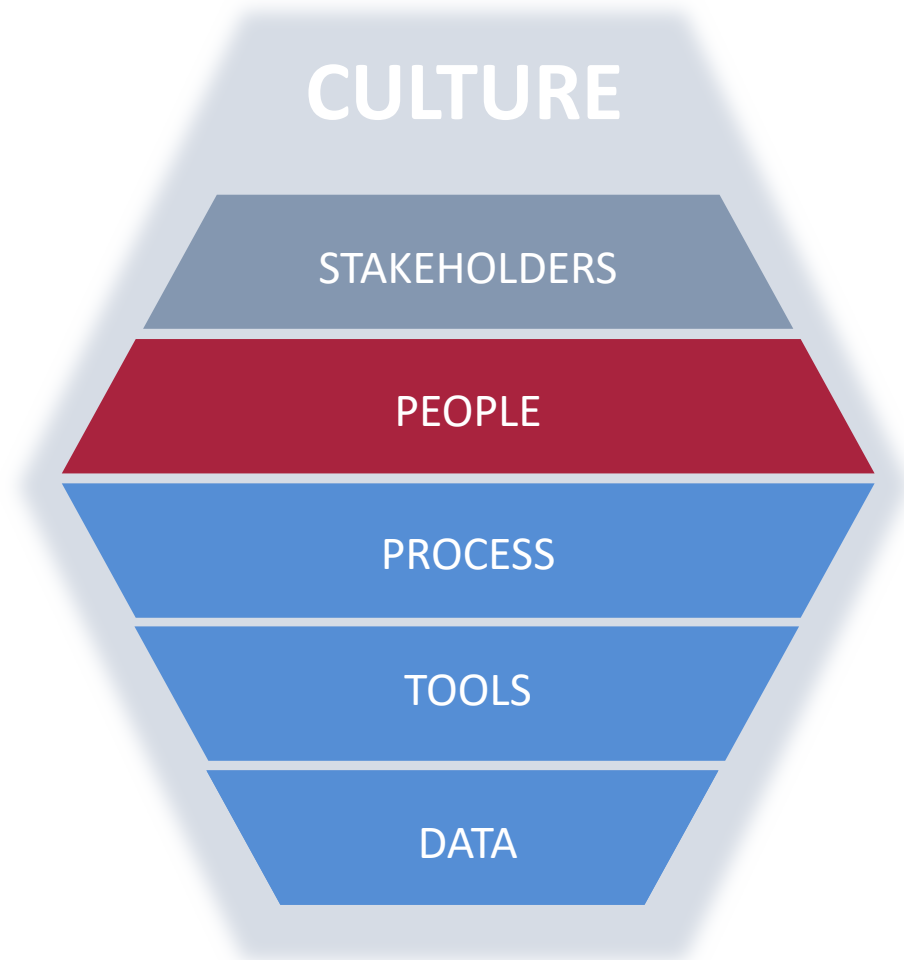
- Data Normalization
- Requirements Understanding
- Cost Modeling
- Productivity Metric Determination
- Comparison



\* Partial credit for this slide is given to Mr. Dale Shermon and Mark Gilmour for their book entitled "Cost Engineering Health Check"

# What Does it Take?

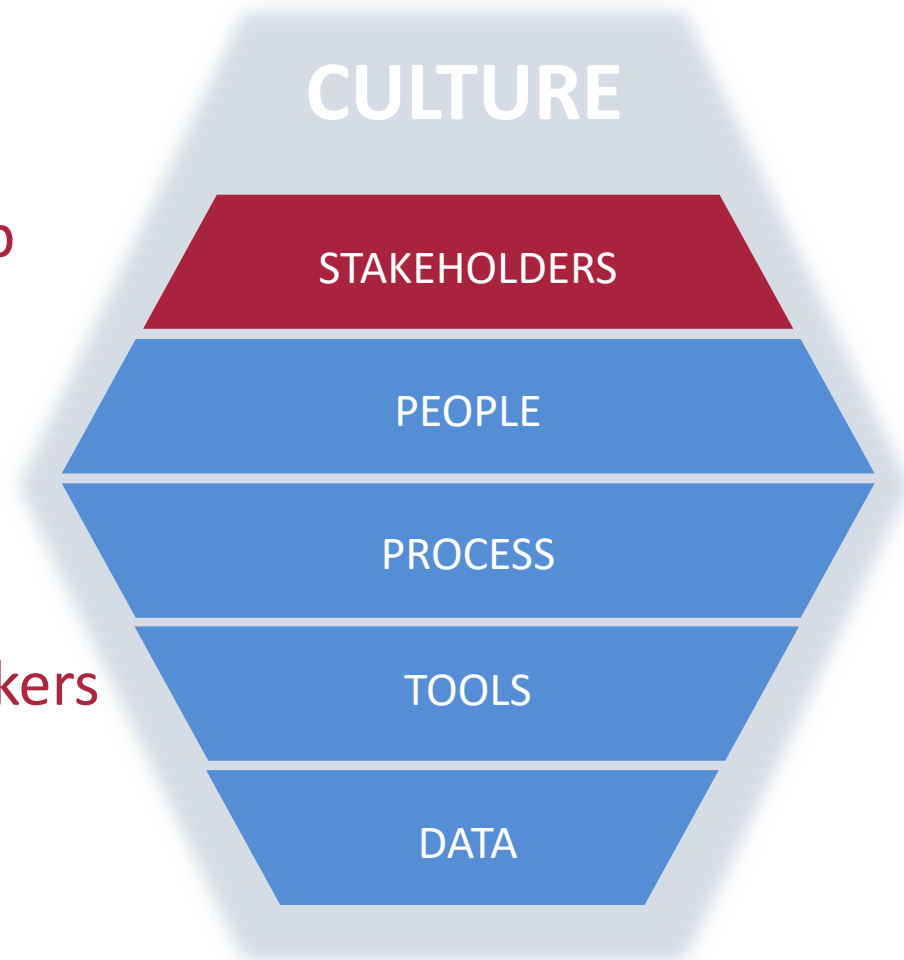
- Project Management
- System Engineering
- Cost Engineering
- Subject Matter Experts
- Finance/CAMs



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# What Does it Take?

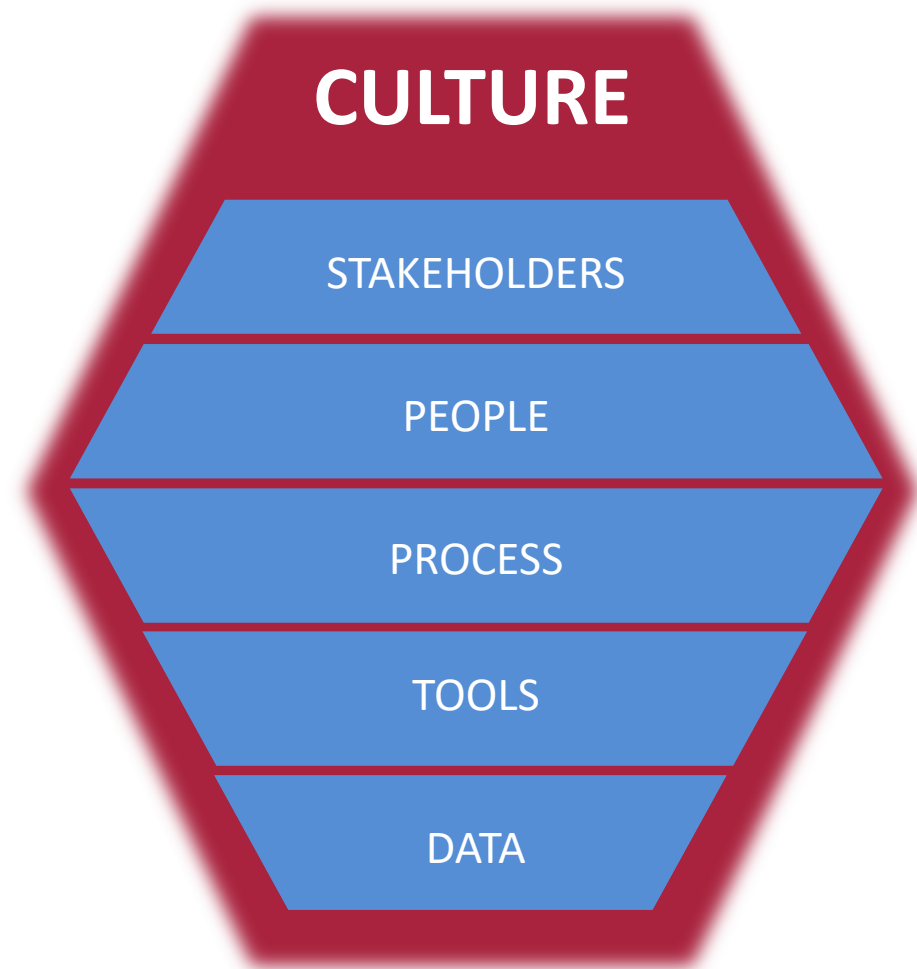
- Executive Team
- Product Line Leadership
- Acquisition Team
- Strategic Partners
- Vendors/Suppliers
- Influential Decision Makers



\* Partial credit for this slide is given to Mr. Dale Shermon and Mark Gilmour for their book entitled "Cost Engineering Health Check"

# What Does it Take?

- Realistic
- Flexible
- Open Minded
- Adaptive
- Committed to Success



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# How Can PCA Support Supplier Assessment?



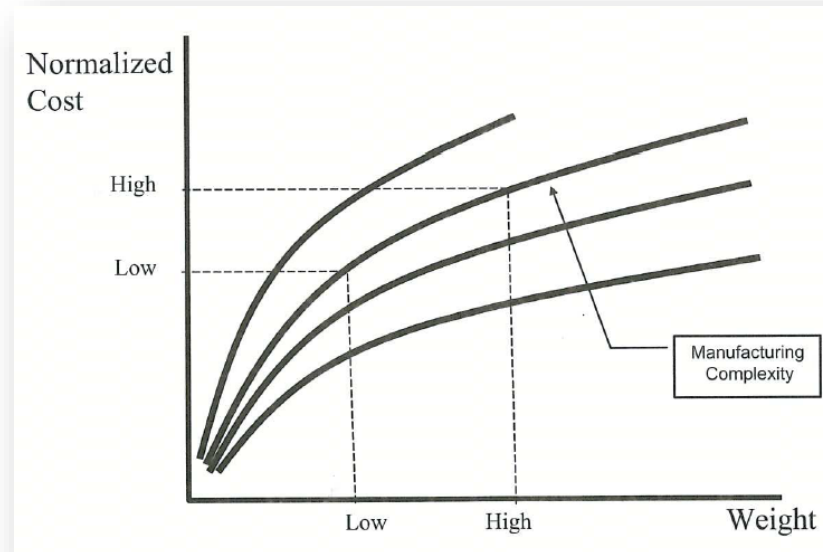
# Technology Normalization

- Goal: Identify key product cost metrics to--
  - Estimate reasonable cost expectation
  - Evaluate different suppliers proposing similar technology



- Accomplished through calibration of the unitless Manufacturing Complexity factor, a normalized representation of cost density, comprising both:

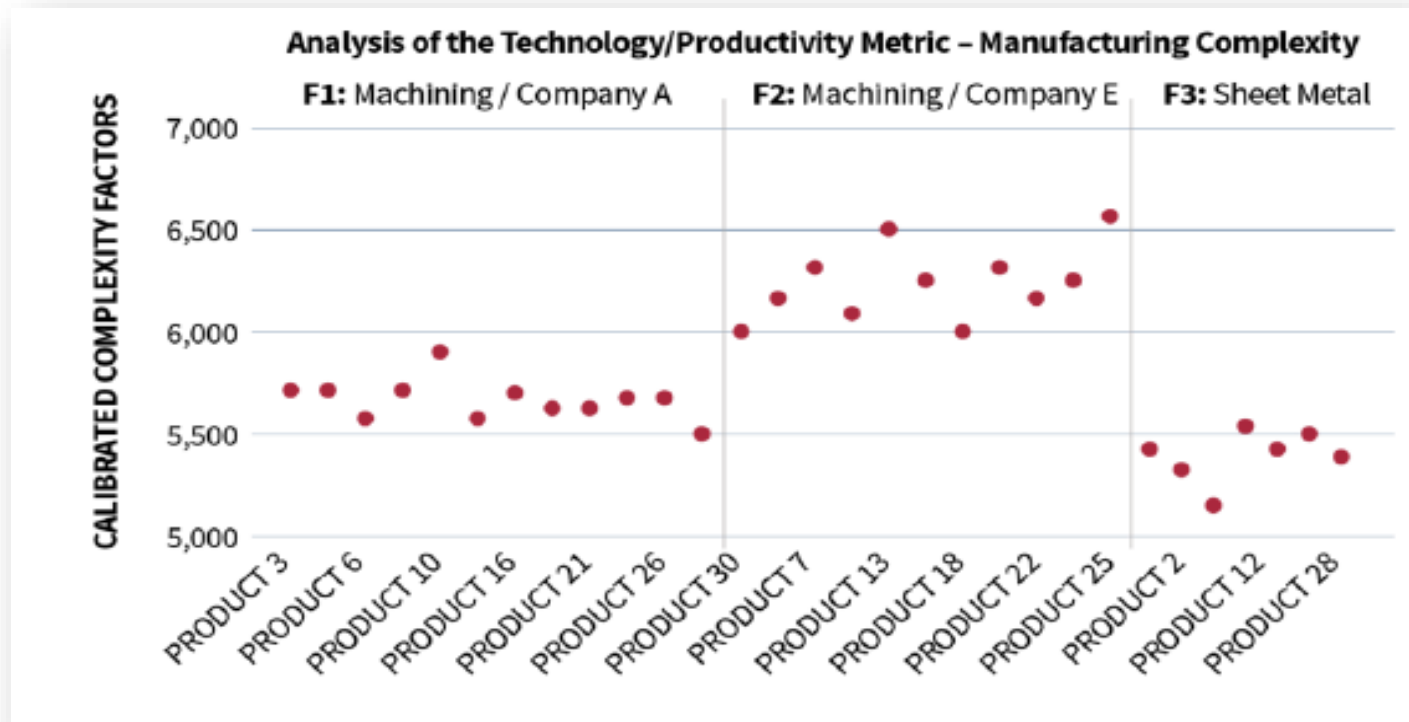
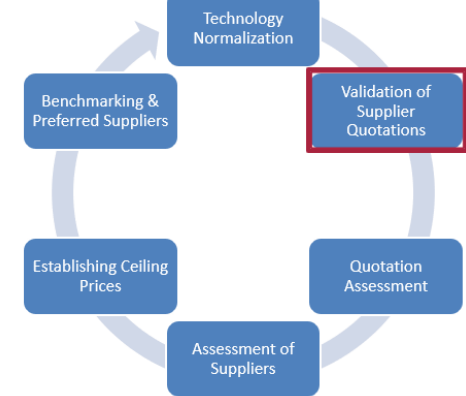
- Productivity
- Technology



- For common technology, it is possible to understand productivity differences among multiple suppliers

# Validating Quotations from Supplier

- If the Technology is held constant, then the difference between two suppliers is their Productivities.



# Knowledgebase Tool

- Search, Filter and Analysis



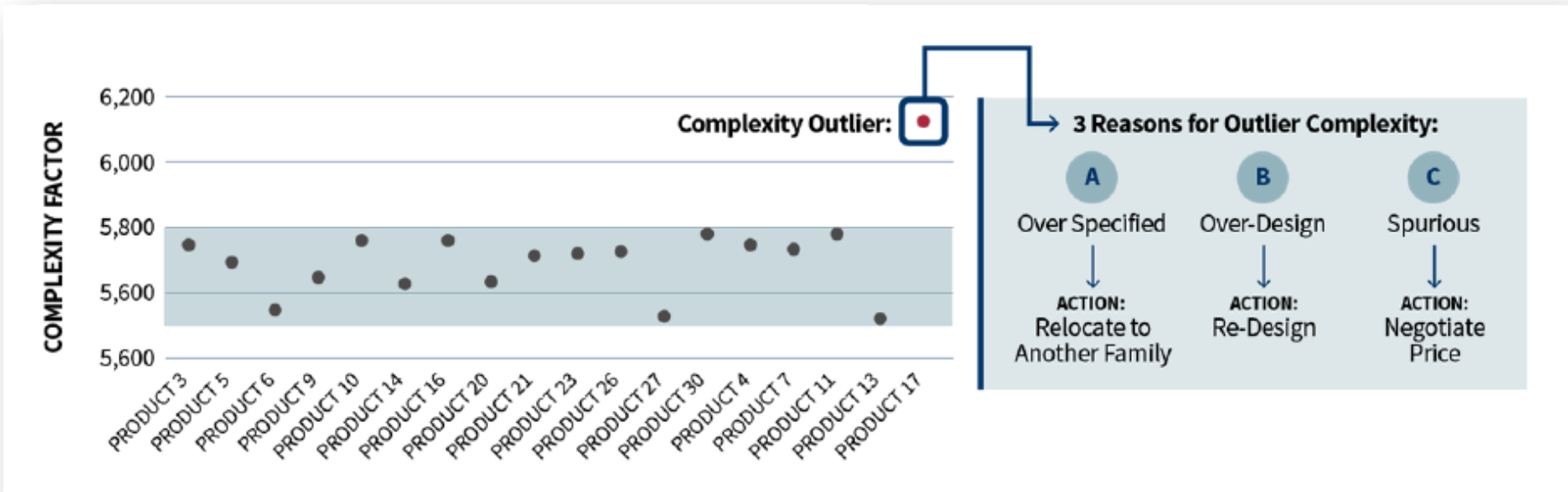
The screenshot displays the TrueFindings software interface. At the top, there's a menu bar with 'File', 'Database', and 'View'. Below it, a 'Findings' table lists various items with columns for Name, Group Name, Value, and Met. The main area is divided into several panes:

- Search KnowledgeBase Database:** A search bar and a tree view showing categories like Classification, Sensor, and Sensor Type.
- MultiCurve Finder:** A section for selecting independent variables. 'Max Rated Airspeed (knots)' is selected under 'Manufacturing Complexity for Electronics'.
- Regression Statistics:** A table showing statistics for the linear model, including Multiple R (0.95778812479102238), R Square (0.91735809199070306), and Adjusted R Square (0.87603713798605454).
- Anova Table:** A table showing the sum of squares, degrees of freedom, mean squares, p-values, and f-statistics for the regression, error, and total.
- Coefficients Table:** A table showing the coefficients, standard errors, t-statistics, p-values, upper and lower bounds for the mean, and weights for various variables.
- Graph:** A scatter plot titled 'Manufacturing Complexity for Electronics' showing 'Calculated' vs 'Actual' values with a regression line and data points.



# Quotation Assessment

- The calibrated Manufacturing Complexity can be outside the range, due to three reasons linked consistency with the requirements and the design.



# Assessment of Suppliers

- Requires best practices to leverage historical data
  - Collection / Tracking
  - Monitoring / Evaluation
- Allows historical trends to inform future decisions
  - What is the reasonable range in price for an item?
  - Does the vendor proposal fall within this range?
  - What is the ceiling price for an item?
- Offers great benefits in the procurement of equipment:
  - Establishing of cost targets for Requests for Proposals
  - Evaluation of bids and their justifications
  - Selection of the most appropriate suppliers



METHODOLOGY



# Establishing Ceiling Price for Negotiations

- Establish ceiling price based on:
  - Historical data
  - Established bench marks
  - Use of predictive analytics
- Vendor and buyer can work towards common goal
  - Fair price
  - Mutually beneficial agreement
  - Long term (secure) supply chains
- Ceiling prices determined by simple or complex analytics
  - Analogies
  - Descriptive statistics
  - Bivariate regression
  - Multivariate regression



# Benchmarking & Preferred Suppliers

- Provides process to analyze data

- Measure performance
- Identify cost trends over time
  - *Within product family*
  - *Within supplier organization*

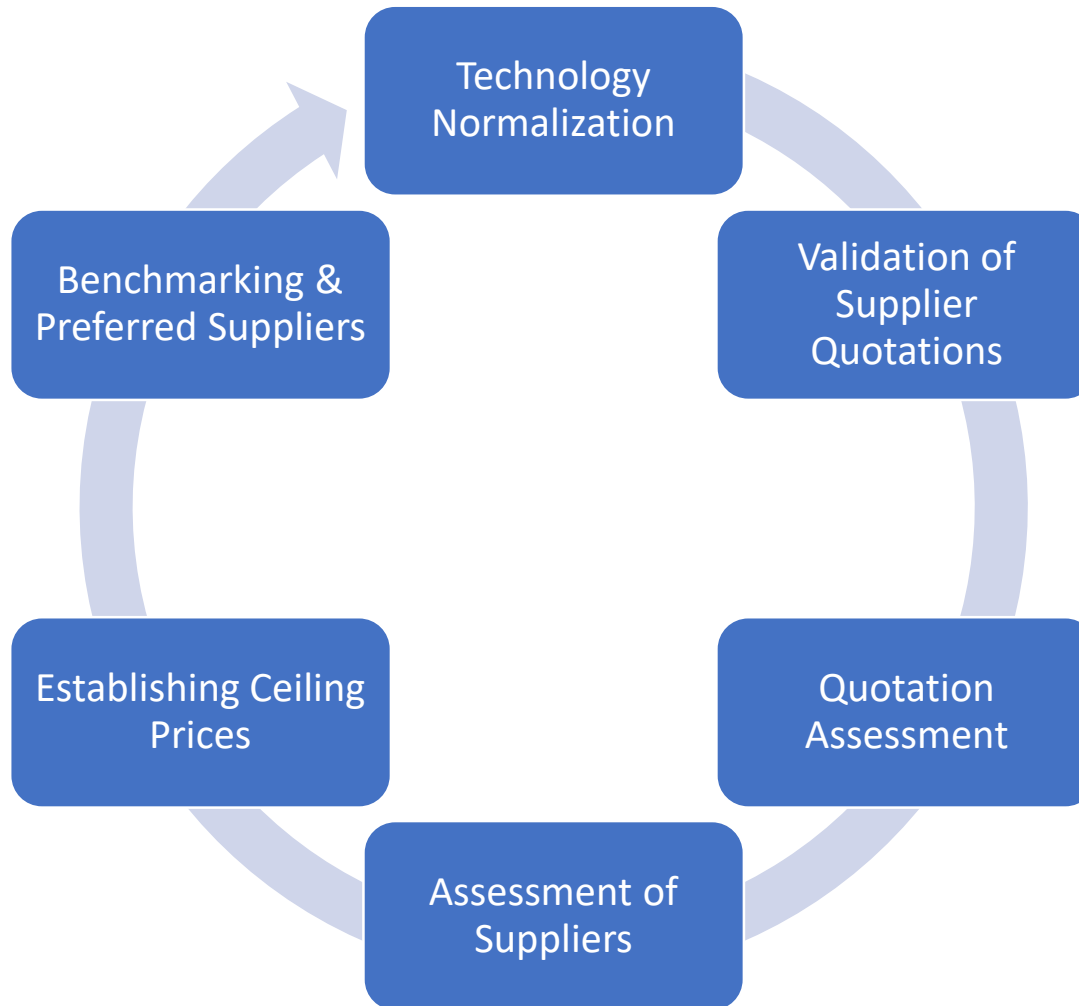


- Identify range of reasonable expectations for given end item

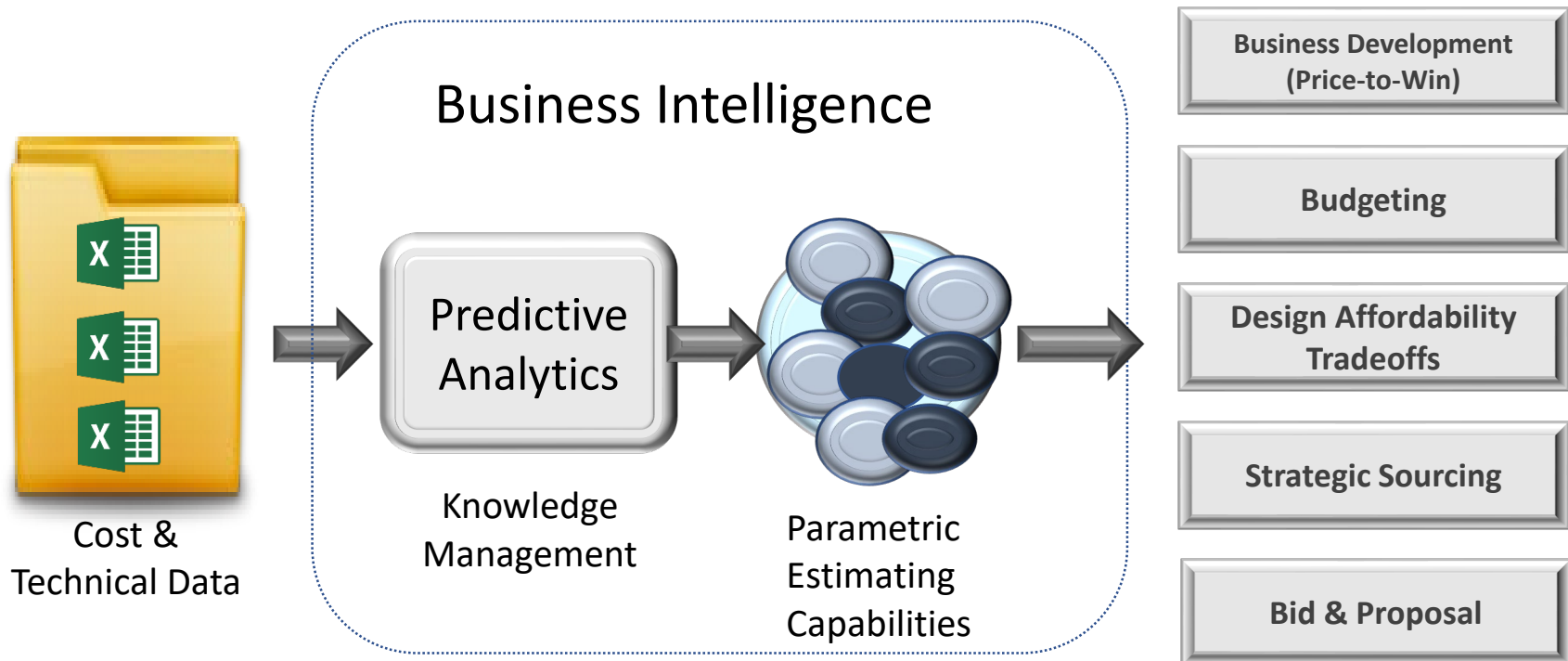
- Suppliers consistently outside this range may be avoided
- Periodic deviations from established range may aid in negotiations

- Ability to harness and understand historical data is critical!

# How Can PCA Support Supplier Assessment?



# Predictive Cost Analytics



# Baseline Manufacturing Complexity input

PRICE TruePlanning 16.1 - [Untitled\*]

File Edit View Project Reports Tools Window Help

Product Breakdown Structure

Simple Detailed

- 1 Humvee in 881C
  - 2 SV\_1.0\_1.4\_1.5\_1.8 Surface Vehicle System\_System Engineering\_Pro...
  - 3 SV 1.1\_1.1.1 Primary Vehicle\_Primary Vehicle Integration, Assem...
  - 4 SV\_1.1.2 Hull/Frame/Body/Cab
    - 5 Hatch Assembly (L/R)
    - 6 Hull Assembly
    - 7 Crew Compartment Assembly
    - 8 Ballistic Liners
    - 9 Covers and Access Assemblies (Battery, Lubricant, Precl...
    - 10 Rear Door Assembly
    - 11 Sponson Assembly (L/R)
    - 12 Engine Compartment Roof
    - 13 Top Deck EMI Seal Assy
    - 14 Skirt Assy (L/R)
  - 15 SV\_1.1.3 System Survivability
    - 16 Crew Fire Supression
    - 17 Control Electronics Unit
    - 18 Weapons Fire Supression
    - 19 Engine Fire Supression
    - 20 NBC Control
    - 21 Environmental Control
    - 22 Defensive Armament Gun System
    - 23 Armament Armor
    - 24 Signal Acquisition Unit (SAU 15)

Input Sheet

Cost Objects Input Sheet Attributes Results Chart Metrics Schedule Uncertainty Analysis

Control Electronics Unit Detailed Estimate

Cost \$28,504,087 0.10% Labor Requirement 325,267.54 hours  
 Project Cost \$29,013,308,712 Project Labor Requirement 324,977,610.36 hours

Phase Set A <Inherited> Worksheet Set Buy Level <Inherited>

	Value	Units	Spread	Notes
1 Start Date				
2 Quantity Per Next Higher Level		1.00		
<b>3 Additional Units</b>				
4 Number of Additional Production Units		0.00		
5 Number of Additional Prototypes		0.00		
<b>6 Cost Sharing Units</b>				
7 Total Number of Production Units Produced		0		
8 Total Number of Prototypes Produced		0.00		
<b>9 Technical Description</b>				
10 Equipment Type	None			
11 Operating Specification	1.400			
12 Weight of Structure	0.2000	kg		
13 Weight of Electronics	0.0300	kg		
14 Volume	0.093	l		
15 Manufacturing Complexity for Structure	6.737000			
16 Percent of New Structure	50.00%		%	
17 Percent of Design Repeat for Structure	0.00%		%	
18 Manufacturing Complexity for Electronics	7.508984			
19 Percent of New Electronics	50.00%		%	

# Sensitivity Analysis: Understand productivity



## differences within & between suppliers

PRICE TruePlanning 16.1 - [Untitled\*]

File Edit View Project Reports Tools Window Help

Product Breakdown Structure

Simple Detailed

Input Sheet

Cost Objects Input Sheet Attributes Results Chart Metrics Schedule Uncertainty Analysis

Product Breakdown Structure

- Humvee in 881C
  - SV\_1.0\_1.4\_1.5\_1.8 Surface Vehicle System
    - SV\_1.1\_1.1.1 Primary Vehicle\_Primary
      - SV\_1.1.1.2 Hull/Frame/Body/Cab
        - Hatch Assembly (L/R)
        - Hull Assembly
        - Crew Compartment Assembly
        - Ballistic Liners
        - Covers and Access Assemblies
        - Rear Door Assembly
        - Sponson Assembly (L/R)
        - Engine Compartment Roof
        - Top Deck EMI Seal Assy
        - Skirt Assy (L/R)
        - SV\_1.1.3 System Survivability
          - Crew Fire Suppression
          - Control Electronics Unit
          - Weapons Fire Suppression
          - Engine Fire Suppression
          - NBC Control
          - Environmental Control
          - Defensive Armament Gun System
          - Armament Armor
          - Signal Acquisition Unit (SAU)
          - Supplemental Ballistic Protection
          - Non-Ballistic Protection
        - SV\_1.1.4 Turret Assembly

Sensitivity Analyzer: Manufacturing Complexity for Structure (Current Value = 6.737000)

Input Settings

Control Electronics Unit

Manufacturing Complexity for Structure

Low: 4.000000 Min = 2.100000

High: 8.000000 Max = 20.000000

Iterations: 10 Max = 100.000000

Apply

Output Settings

Control Electronics Unit

Resource Costs

Name	Value	U...
<input type="checkbox"/> Production Engineering:Contractor	0	
<input checked="" type="checkbox"/> Production Manufacturing:Test Engineering	4,631,990	
<input checked="" type="checkbox"/> Production Manufacturing:Fabricator	2,698,674	
<input checked="" type="checkbox"/> Production Manufacturing:Assembler	3,914,095	
<input type="checkbox"/> Production Manufacturing:Support Engineering	3,504,728	
<input type="checkbox"/> Production Manufacturing:Material	8,449,633	
<input type="checkbox"/> Production Manufacturing:Contractor	0	
<input type="checkbox"/> Production Tooling and Test:Tooling and Test Engineering	48,770	

Chart Grid

Resource Costs (Control Electro...)

Manufacturing Complexity for Structure (Control Electronics Unit)

Legend

- Production Manufacturing:Test Engineering
- Production Manufacturing:Fabricator
- Production Manufacturing:Assembler

Chart Configuration

Legend

- Show
- Year

Title

Font Size 8

Trendline

- Display Uncertainty No
- Show R Square No
- Show Trendline Equation No
- Type

X Axis

- Grid Lines

Type

Define the trendline equation type(s), best fit to the data, that are displayed.

Close

Detailed Estimate

325,267.54 hours

324,977,610.36 hours

Notes Analyzer



# Supplier Assessment Methodology

- Requires best practices to leverage historical data
  - Collection / Tracking
  - Monitoring / Evaluation
- Allows historical trends to inform future decisions
  - What is the ceiling price for an item?
  - What is the reasonable range in price for an item?
  - Does the vendor proposal fall within this range?



# Summary - Supplier Assessment

- If your suppliers are selected on an ad-hoc basis then you are less competitive yourself. The application of cost analytics in the supplier assessment process can help:
  - Selecting the preferred supplier can be conducted on a rational basis
  - Bids can be evaluated **quickly**
  - Bids can be compared on a **consistent** basis
  - In complexity terms the difference between two suppliers providing the same technology is the **productivity**
  - Cost analytics can be used at **any level** of the supply chain
  - A stipulated solution, **Predictive Cost Analytics**, can provide a common language between organizations and countries
  - Detailed discussion around **parametrics** can avoid commercial taboos
  - Usage in procurement or purchasing can **improve accuracy** of future bids

