



LABOR BID CODE MAPPING AND JUSTIFICATION

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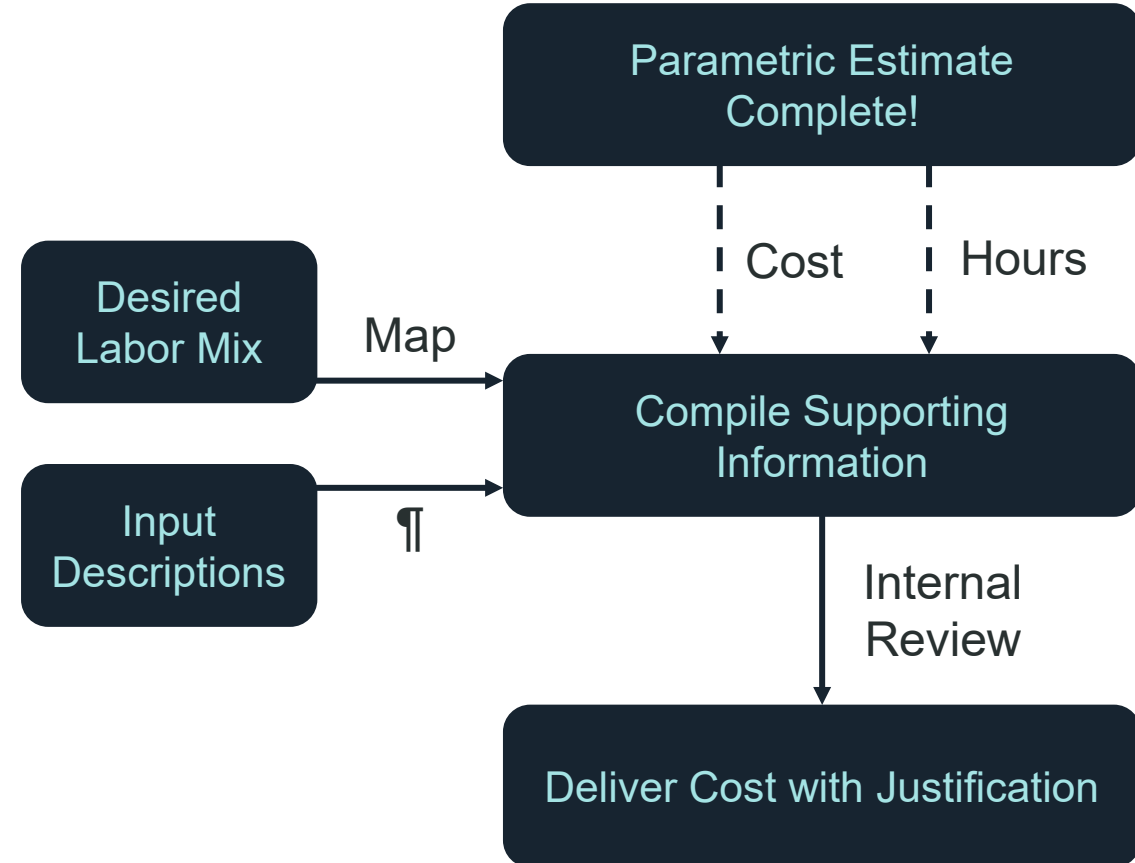
Problem Statement

Background:

- Parametric models produce either a single bucket of hours or several generic buckets of hours for a particular estimate

Problem:

- Internal functional reviews and external RFPs with BOEs require a translation of generic hours to specific enterprise resources for proper justification
- Conversion to specific labor resources can impact total cost





Hierarchy and Definitions

**TruePlanning is used as an example but this process and hierarchy can be extrapolated to different systems*

TruePlanning hierarchy:

1. Cost objects (analogous to inputs and parameters)
2. Activities: first division of hours/cost (e.g. development vs production)
3. Resources: second division of hours/cost (e.g. design engineer, test engineer, manufacturing technician)
4. Map: third division of hours/cost (e.g. WBS ID, specific enterprise resource code)

Other Definitions:

- WorksheetSets: assign labor rates (overhead costs, etc) at TruePlanning Resources level
- CER: cost estimating relationship, mathematical equation relating technical inputs to cost/hours output



Parametrics vs Sim-To for Resource Allocation

	Sim-To Estimating	Parametric Estimating
Inputs	Historical program labor actuals	Cost drivers (e.g. weight, environments, etc)
Modifiers	Complexity and efficiency factor	Complexities (placement on CERs), coefficients, intercepts
Outputs	Historical labor actuals scaled by the modifying factors	Mathematical result of CER(s)
Source of Resources	Original historical program	Standard resource map

Example:

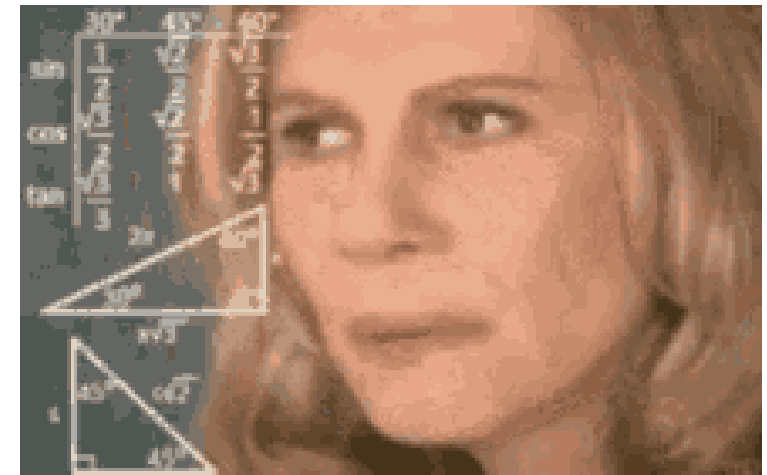
Cyber engineering requirements have changed drastically in the past five years. If the prior program did not contain any cyber engineering hours then...

	Sim-To Estimating	Parametric Estimating
Cyber results:	No cyber hours. Supplement with bottoms-up.	Adjusted map will produce hours. Make sure inputs reflect additional work.

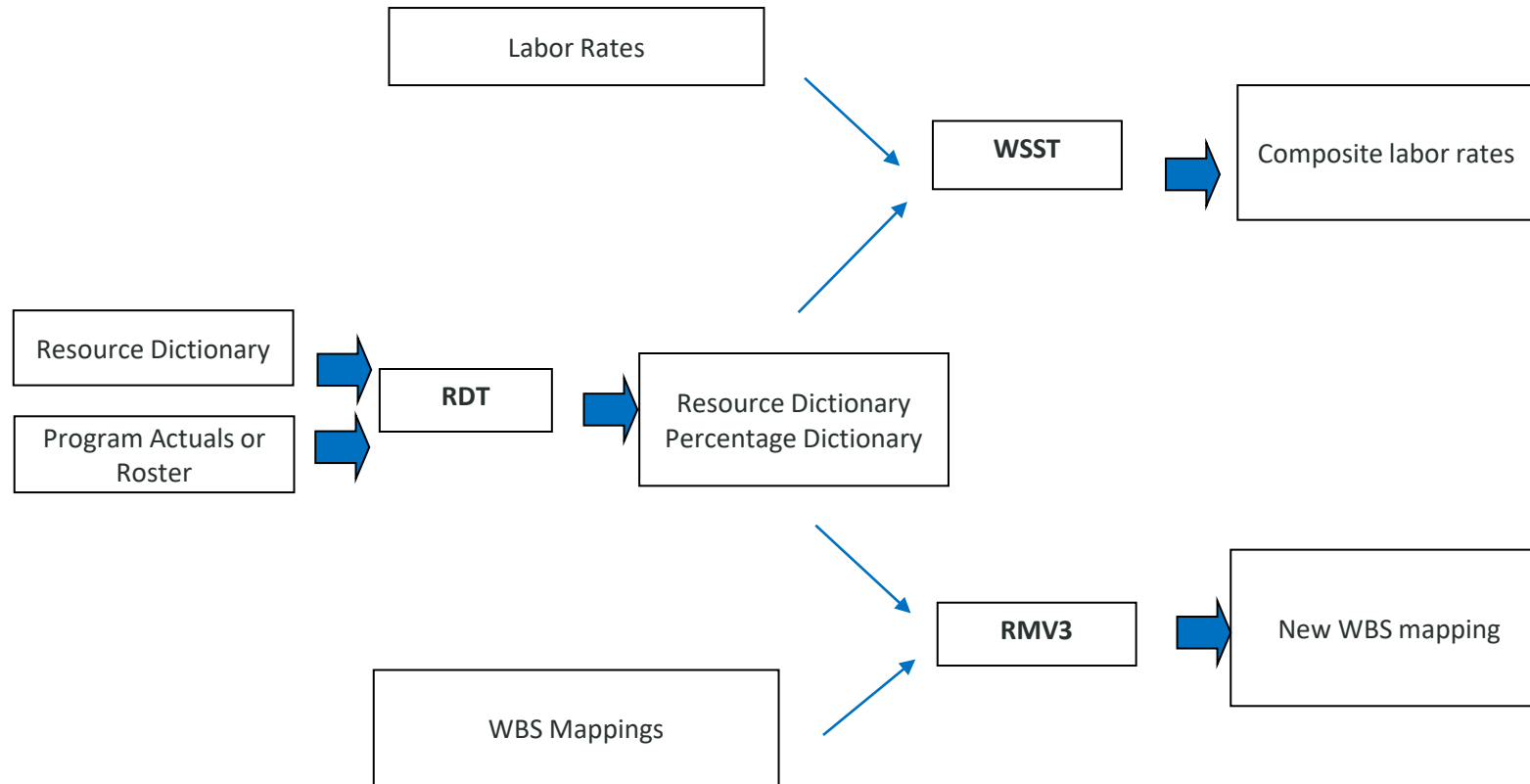


Labor Mapping Tools

- Resource Dictionary Tool (RDT)
 - Language: python
 - Objective: Use a roster or set of composite labor actuals from prior programs to set the likely distribution of specific labor codes to buckets of parametrically-driven hours.
 - Inputs: Roster or actuals, applicable functions within each bucket of hours.
 - Outputs: Percentage distribution of labor codes within each bucket.
- Resource Mapping Tool (RMV)
 - Language: python
 - Objective: Apply the distribution as a layer of the WBS map.
 - Inputs: RDT distribution and WBS current mappings.
 - Outputs: New WBS map.
- WorksheetSet Tool (WSST)
 - Language: python
 - Objective: Convert labor distributions to cost. Apply the distribution to the model.
 - Inputs: RDT distribution and current labor rates.
 - Outputs: WorksheetSet (composite labor rates).



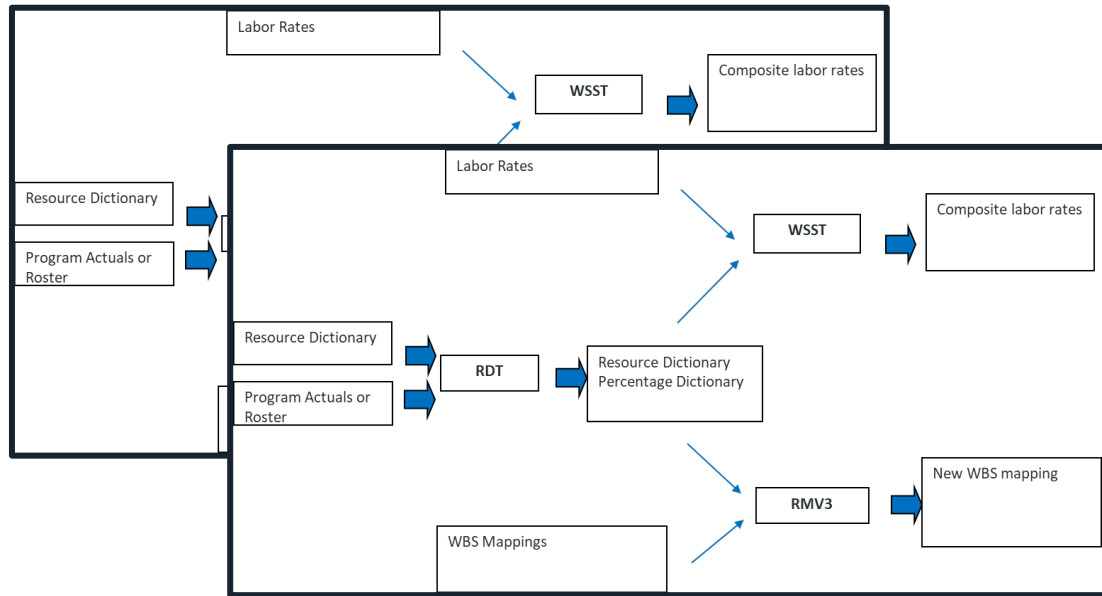
Synchronization Pipeline





Handling Multiple Maps

Problem: if using generic resources, in different CERs or instances of a CER, the specific resource needs to change for a generic resource.





BOE Justification

Now for the implications of the resource mapping...

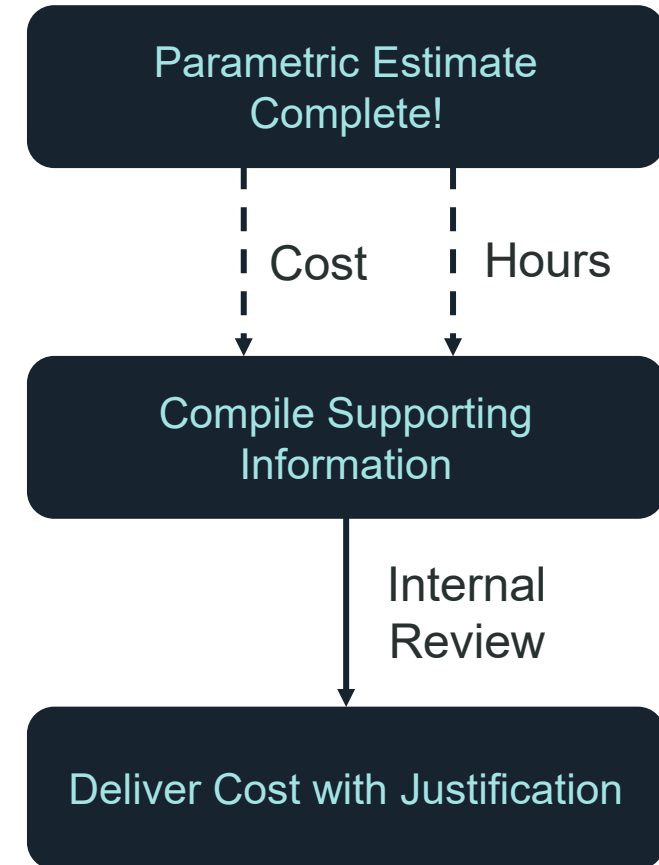
BOEs vs RCEs

RCEs may more efficiently utilize its inherent elements (traceability of parameters, methods, etc) for justification but these are still far off.

What do BOEs require with parametric models?

- Justify all specific input parameters
- Justify cost of all outputs at the labor resource level with description of labor grade

You Are Here





Potential Gaps in RFP Language

Sample RFP Language:

Parametric cost estimates and/or cost estimating relationships shall be accompanied by a description of the inputs, equations, and/or models along with any unique parameter values. Commercial and/or proprietary cost models used to generate a BOE shall be accompanied by a clear and concise description of inputs, parameters, key decision variables, consumption metrics, and common usage, indicating the Offeror's rationale for using the model. When a commercial model is used, include the model name, vendor and version number.

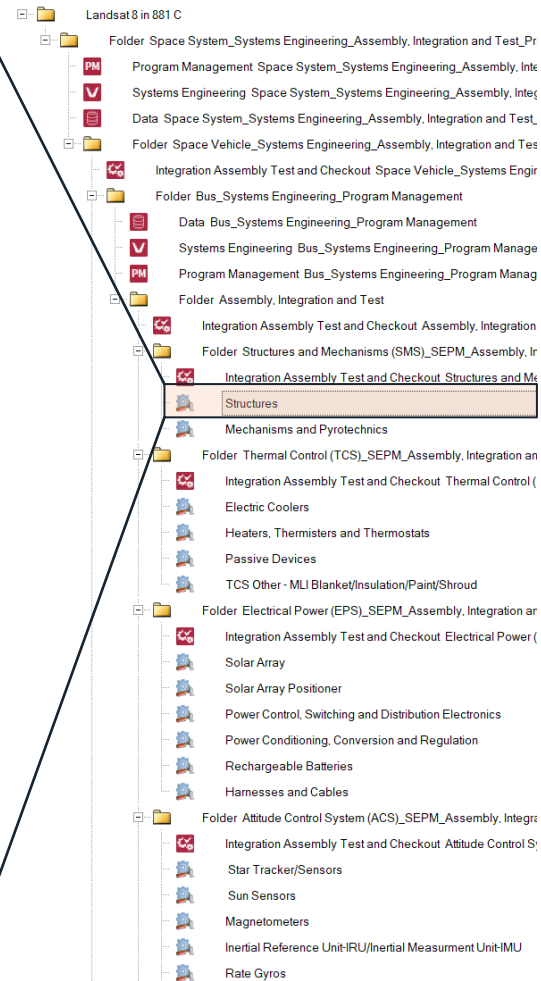
Recommended RFP Language:

Parametric cost estimates and/or cost estimating relationships shall be accompanied by a description of the inputs, equations, and/or models along with **any** unique **cost-driving** parameter values. Commercial and/or proprietary cost models used to generate a BOE shall be accompanied by a clear and concise description of **cost-driving** inputs, **or** parameters **that differ from default, the source of default values,** key decision variables, consumption metrics, and common usage, indicating the Offeror's rationale for using the model. When a commercial model is used, include the model name, vendor and version number. **Cost-driving inputs are defined as those that indicate the size of the component/subsystem or those where a 10% change in the parameter value results in a minimum of a 10% change in the program value.**

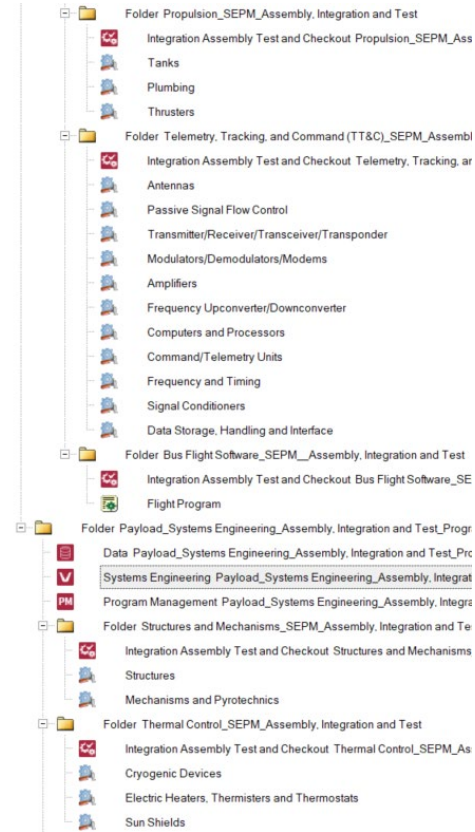


Problems with Justifying Inputs

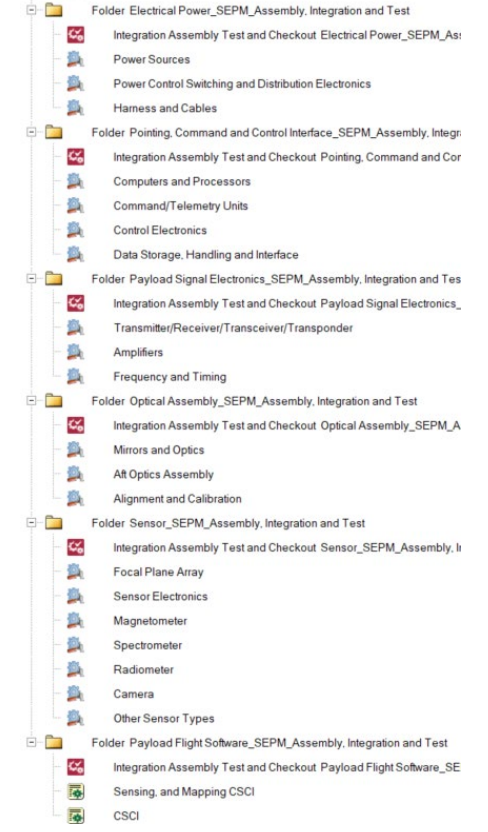
Start Date	1/1/2007		
Quantity Per Next Higher Level	1.00		
Additional Units			
Number of Additional Production Units	0.00		
Number of Additional Prototypes	0.00		
Cost Sharing Units			
Total Number of Production Units Produced	0		
Total Number of Prototypes Produced	0.00		
Technical Description			
Equipment Type	None		
Operating Specification	2.000		
Weight of Structure	384.6500	kg	
Weight of Electronics	0.0000	kg	
Percentage of Structure which is Passive EL	0.00%	%	
Volume	300.00000	l	
Manufacturing Complexity for Structure	7.329102		
Percent of New Structure	50.00%	%	
Percent of Design Repeat for Structure	0.00%	%	
Manufacturing Complexity for Electronics	0.000000		
Percent of New Electronics	50.00%	%	
Percent of Design Repeat for Electronics	0.00%	%	
Engineering Complexity	0.200000		
Electronic Density	0.0000	kg/l	
Labor Learning Curve	0.00%	%	
Material Learning Curve	0.00%	%	
Beginning Production Unit (for Learning Curve)	1		
B Factor	0.00%	%	
Manufacturing Process Index for Labor	0.000		
Manufacturing Process Index for Material	0.000		
Technology Improvement Control	1.0		
Technology Obsolescence Control	0.0		
Year of Technology	0		
External Integration Complexity for Structure	3.00		
External Integration Complexity for Electronics	3.00		
Hardware Software Integration Factor	0.50		
Prototype Support Adjustment Factor	1.00		
Material Index for Development/Manufacturing	0.00%	%	
Material Index for Production/Manufacturing	0.00%	%	
Completion Date of First Prototype			
Completion Date of First Production Unit			
Multiplier for Development Tooling and Test	1.000000		
Multiplier for Production Tooling and Test	1.000000		
Multiplier for Initial Electronic Tooling and Test	1.000000		
Multiplier for Initial Structural Tooling and Test	1.000000		
Multiplier for Sustaining Electronic Tooling and Test	1.000000		
Multiplier for Sustaining Structural Tooling and Test	0.000000		
Multiplier for Electronic Engineering Change Notices	0.00		
Multiplier for Structural Engineering Change Notices	0.00		
Electronic Engineering Change Notices	0.00%	%	
Structural Engineering Change Notices	0.00%	%	
Raw Material Weight of Structure (Production)	0.000	lbs	
Raw Material Cost (Production)	0.000	\$/lb	
Raw Material Weight of Structure (Prototype)	0.000	lbs	
Raw Material Cost (Prototype)	0.000	\$/lb	
Contract Service Options	In-House		



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Conclusions

Compiling Support Information

- We have a repeatable process to load current labor resources and justify those hours based on cost-driving inputs
- Tools can generate resource distributions that can be used as a basis for BOEs

Justification

- Analytics can't solve this problem but we are developing tools to provide authors with the information they need to generate defensible BOEs

