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FAST. FORWARD.

LABOR BID CODE MAPPING AND JUSTIFICATION

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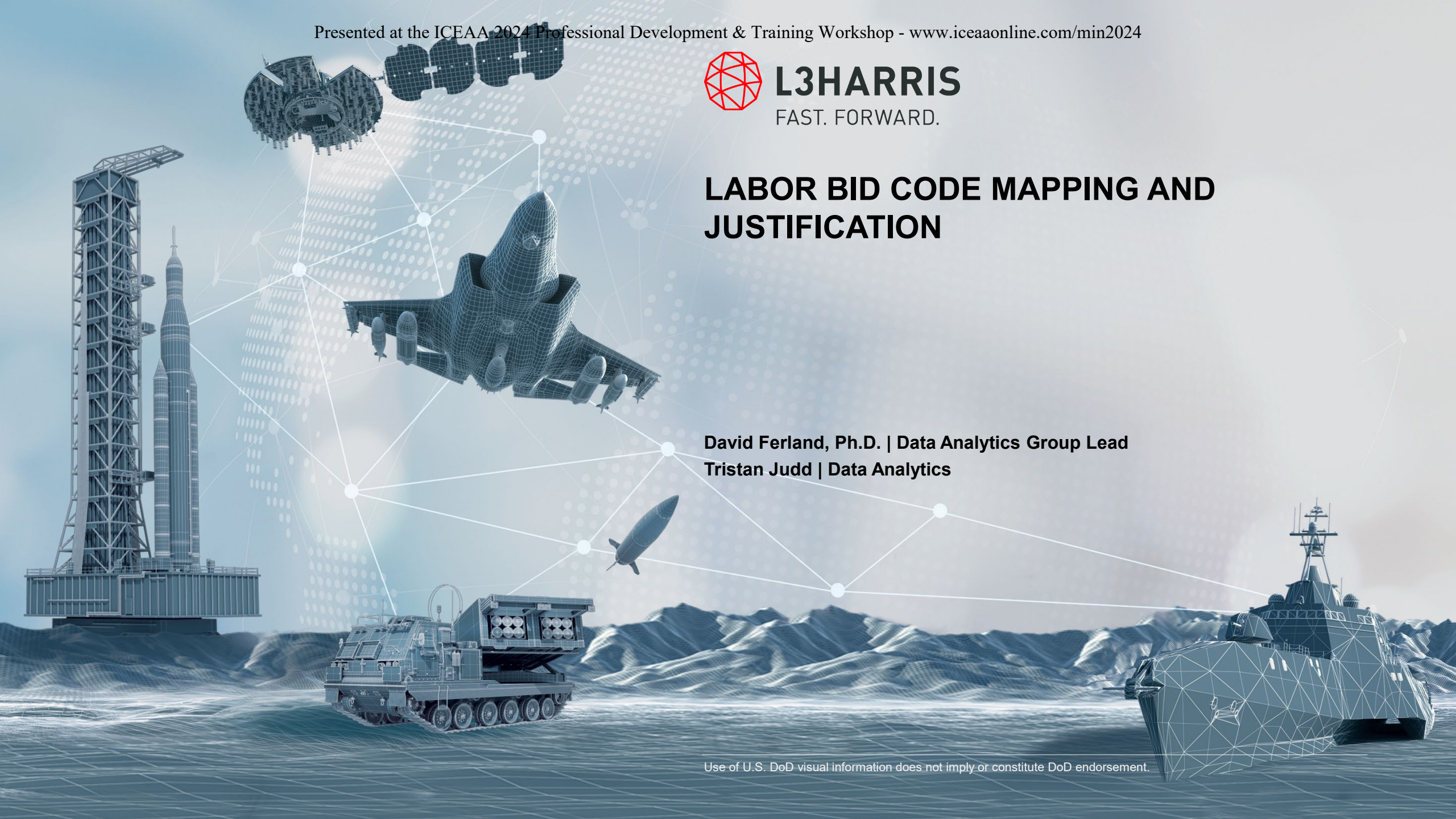


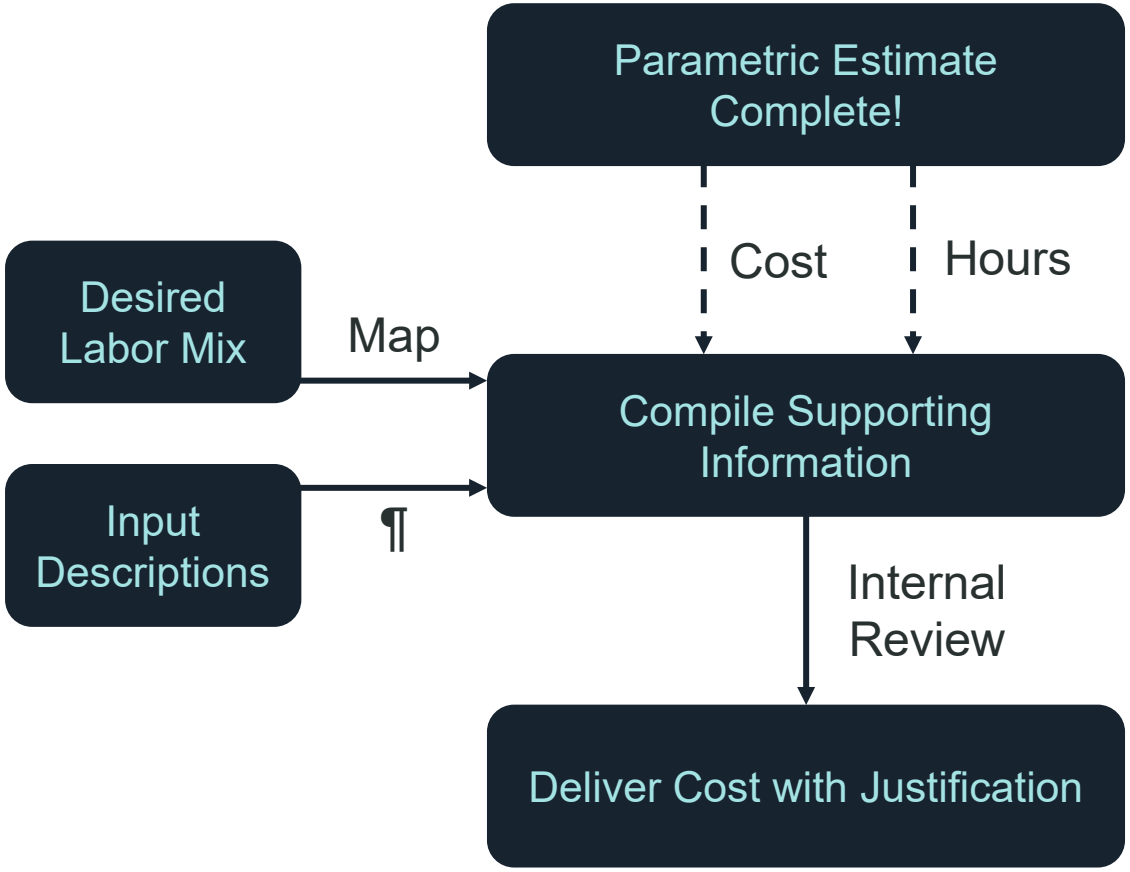
Problem Statement

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:

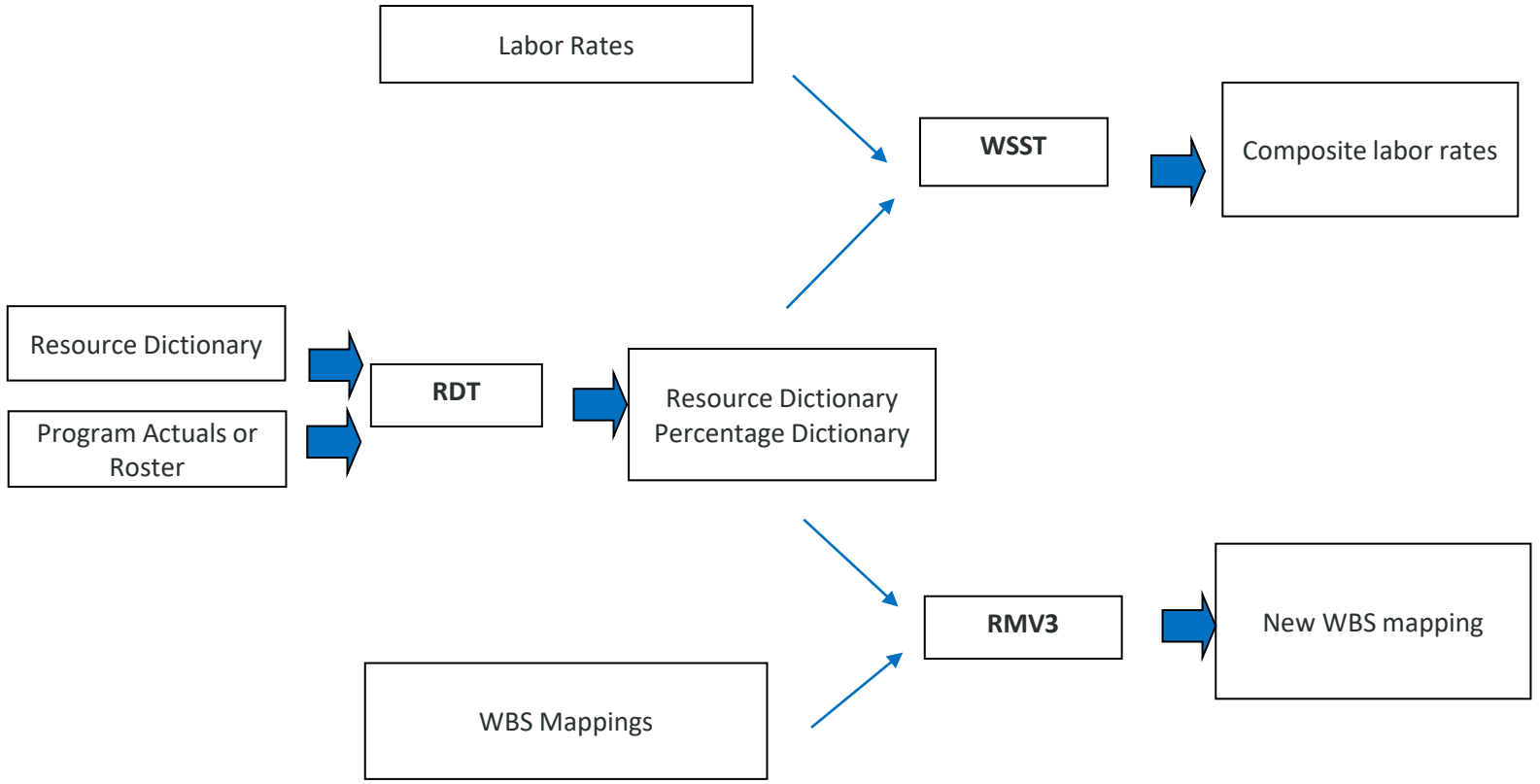
Cyber engineering requirements have changed drastically in the past five years. If the prior program did not contain any cyber engineering hours then…

	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

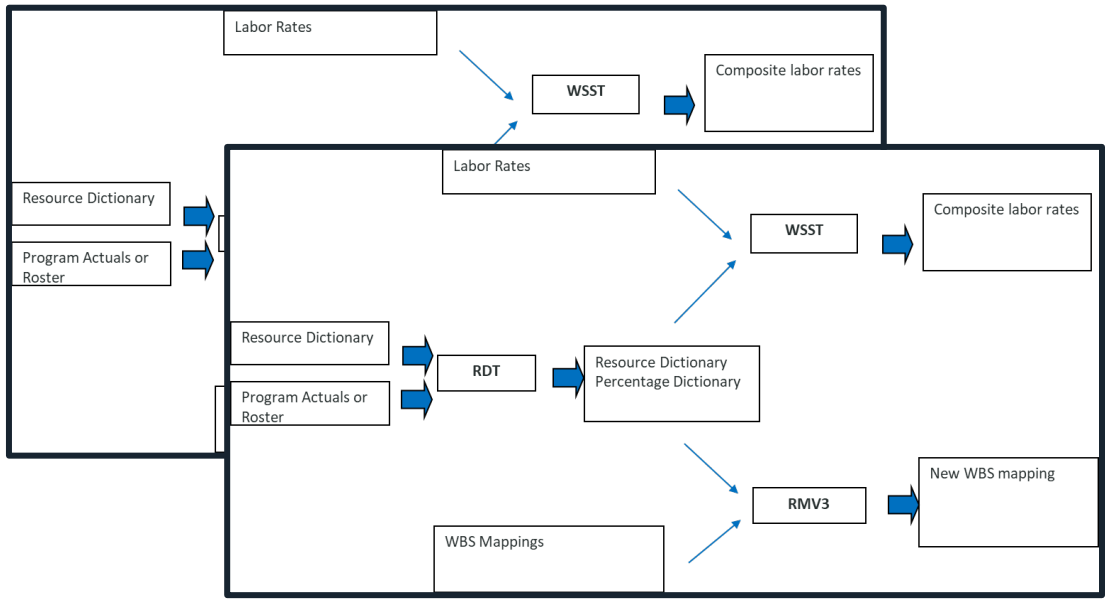
- Resource Dictionary Tool (RDT)
  - Language: python
  - Objective: Use a roster or set of composite labor actuals from prior programs to set the likely distribution of specific labor codes to buckets of parametrically-driven hours.
  - Inputs: Roster or actuals, applicable functions within each bucket 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

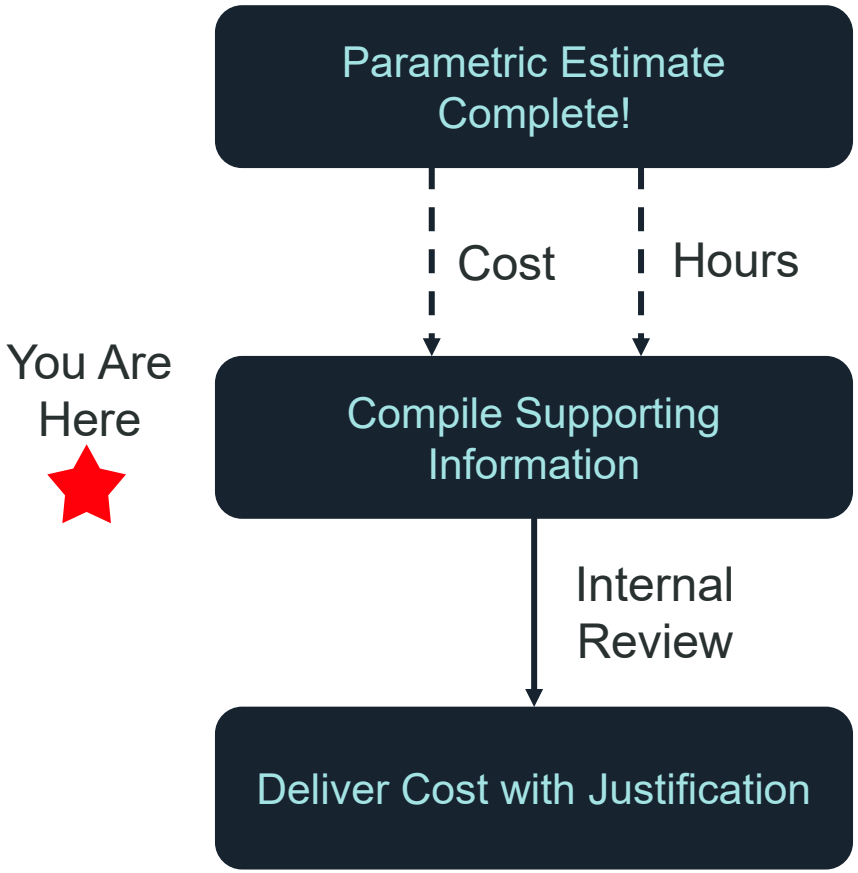
Now for the implications of the resource mapping…

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



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

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 defendable BOEs