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Cost Engineering

Real-World Data Transformation Challenges in the DoD Supply Chain

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Today's Agenda:

- Data Transformation Overview
- Real World Challenges with Data Transformation
  - Data Normalization
  - Data Enrichment
  - Data Mapping
- Steps for Process Improvement

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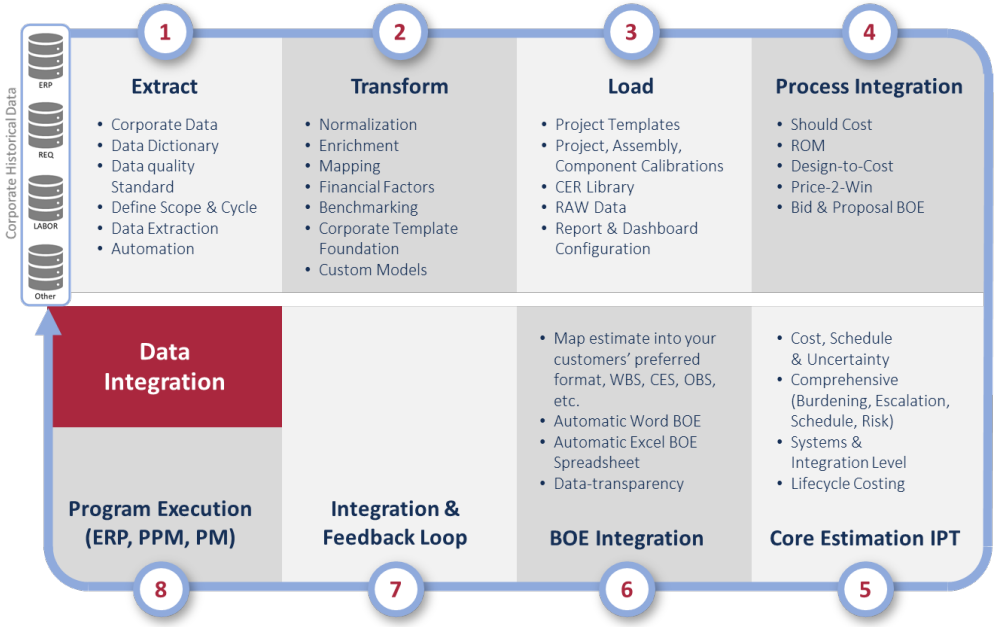
Data Transformation Overview

"The goal of the data transformation process is to extract data from a source, convert it into a usable format, and deliver it to a destination. This entire process is known as ETL (Extract, Transform, Load)."



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Data Set Challenges in Industry

Common Problems:

- Historical Data Sets often lack fidelity
  - Do not align with the product
  - Can't Differentiate Recurring Vs Non-Recurring Costs
- Technical Data is not readily available
- Lack of a Sole Source of Truth
- Heavy Reliance on Subject Matter Experts

Solution:

- Link the Technical and Cost Data together

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Root Causes of Data Transformation Challenges

- Cost Data:
  - Lack of Standard WBS
  - Multiple sources of data
- Technical Data
  - Lack of consistent collection of technical data
  - Lack of product performance in technical data

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The Impact of Data Challenges that Hinder Data Normalization

"Data normalization is a key step in creating comparisons necessary for applying costing techniques. Estimates have no credibility without a firm basis in historical data, making data collection a critical component of cost estimating." –CEBOK

- Challenge:
  - Identification of Data Normalization that is required can be time consuming: Cost Engineers need to be aware of data definition coming from source systems.
- Examples:
  - Normalization of cost data for escalation purposes
  - Normalization of technical data to a common size

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The Impact of Data Challenges that Hinder Data Enrichment

Data enrichment refers to the process of appending or otherwise enhancing collected data with relevant context obtained from additional sources.

- Challenges
  - Heavy reliance on Subject Matter Experts. SME time is a scarce and valuable resource
  - Organizations are struggling to link technical data with cost data and turn expertise into intellectual property
- Example
  - When it comes time to incorporate historical data to support an estimate, resources who work on the historical projects are often unavailable to enrich historical data. This results in resources who are unfamiliar with a historical project using data

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The Impact of Data Challenges that Hinder Data Mapping

"Data mapping is the process of connecting a data field from one source to a data field in another source."

- Challenges
  - Inability to use like product data across similar programs with differing data structures
  - Data mapping of a historical program can become a time-consuming activity to transform data so that it may become usable for analysis.
- Example
  - Often at program start-up a program a WBS can stem for customer requirements. This can result in cost collections that differ across phases within the same programs.
  - Data collected in structures with little fidelity, can result in assumptions made to decompose data to lower levels. – It is easier to roll data up to a higher level than to break data down for a historical progams

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Successful Processes deployed for Data Transformation Improvement

- Cost and Labor Data
  - Alignment of a Product Breakdown Structure (PBS) with a Standard Work Breakdown Structure (WBS) such as the Mil-Std 881
  - Well defined Data Definition within source systems
- Technical and Programmatic Data
  - Standardized collection of Product Sizing data
  - Collection of product performance data that can be used for development and refinement of Cost Estimating Relationships.
  - Incorporation of program schedule data

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