



# **Dialing for Dollars: Improving Cost Estimating Accuracy through Data Mining**

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# Overview

- **Introduction**
- **ERP System Background**
- **Decoding the Data**
- **Cost Estimating Applications**
- **Cautions about Utilizing ERP Expenditure Data**
- **Summary**



# Introduction

- **The purpose of this presentation is to introduce a new source of data for cost estimating**
- **Current sources for detailed cost data often have limitations:**
- **Enterprise Resource Planning (ERP) database**
  - Provided for all funding vehicles
  - Updated as transactions occur



# ERP Systems Background

- **Deliver an integrated suite of business applications across a broad range of operational processes**
- **Provide organizations with**
  - IT cost savings
  - business process efficiencies
  - business innovations



# DoD ERP Systems in Use

	<b>General Fund Business Systems (GFEBs)</b>	<b>Defense Agency Initiative (DAI)</b>	<b>Navy Enterprise Resource Planning (Navy ERP)</b>	<b>Defense Enterprise Accounting and Management System (DEAMS)</b>
<b>Organizations</b>	Army	28 DoD Agencies	Navy	US TRANSCOM, DFAS, Air Force, Other DoD Agencies
<b>Deployment Year</b>	2008	2008	2007	2007
<b>COTS System</b>	SAP	Oracle	SAP	Oracle



# ERP Systems in Cost Estimating

- **ERP expenditure data provided for all funding vehicles**
- **Updated as transactions occur**
- **Ask complex questions**
- **Create parametric cost relationships**
- **Potential to increase accuracy of cost estimates**
- **Application of data mining techniques**



# Decoding the Data



# Major Fields

Expenditure Organization	Funding Year	Award Creation Date	Last Payment Date
Vendor	Award Number	Last Update Date	Currency Type
ACRN	Distribution Creation Date	Item Description	Fund
Net Obligation	Invoiced/Delivered Amount	Project/Task Numbers	CLIN
Product Service Code		Program Element	

**There are more fields within the ERP system that are useful to cost estimators besides the obligations and expenditures**





# Decode the Data

- Often need to understand the data obtained in each field
- Utilize Excel lookup functions or Access relationships to provide searchable terms
- Example – Fund Code

97 0400 14 15 D

97 – Funding Agency

0400 – Color of Money

14 – Funding Start Year

15 – Funding End Year

D – “Direct” vs “Reimbursable”

# Award Numbers

- **Contract Number**

AB0123 16 D 0001

AB0123 – DoD Activity Address (DoDAAC)

16 – Contract Issue Year

D – Type of Contract

0001 – PIID Code

- **DoDAAC Codes**

- Army – A, C, W
- Navy – N, Q, R, V
- Air Force – E, F, J
- Marine Corps – L, M
- Special Programs – Numeric + Alpha
- Coast Guard – Z
- DLA – S, U
- GSA – G, 0-9
- Other DoD Activities - H

Utilize Defense Logistics Agency (DLA)'s tool DAASINQ to decode unknown DoDAAC



# Cost Applications



# Small Contracts

- **Expenditure data can be used to find other data points from small contracts**

Contract Number	Years	Total Expenditures	Description
AB0123-12-C-6013	FY12-FY13	\$836,988.92	Polymer parts optimized for an application



# Purchase Order Example

- Expenditure data can be used to find other data points from Military Interdepartmental Purchase Requests (MIPRs)

## Excerpt from FY2015 MIPR SOW

9.1 – Labor: \$6.610M  
    9.1.1 – Full Time Equivalent for Government: 1.5  
    9.1.2 – Full Time Equivalent for Contractors: 24  
9.2 – Travel: \$0.100M  
9.3 – Material: \$0.940M  
9.4 – Administrative Fees: \$0.200M  
9.5 – Total Cost of Effort: \$7.850M

## FY15 Expenditures from Expenditure Records

FY15 Expenditures: \$5,612,243



# Expenditure Data as a Cross Check

- **Expenditure data is updated real-time and can provide a cross check to a cost report or IPMR report**

Database	Total Cost	Time Period
EVM Data	\$7.78M	08/2014 to 06/2015
Expenditure Records	\$14.13M	08/2014 to 02/2016



# Property Accountability

- The cost of Asset B was found in a contract document on one specific CLIN
- Cost can be compared to the expenditure records
  - \$13,525,309 was expended for Asset B

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0029			Monetary Value		\$14,156,413.00
	<b>Asset B</b>				
	CPFF				
	FOB: Destination				
			ESTIMATED COST		\$13,191,938.00
			FIXED FEE		\$964,475.00
			TOTAL EST COST + FEE		<u>\$14,156,413.00</u>



# Understanding Trends

- **Utility costs were captured from the expenditure records by year**
- **Costs separated by facility**
- **Costs inflated from current BY\$M to BY16\$M**

Year	Cost (BY\$M)	Cost (BY16\$M)	% Increase
2011	3.40	3.67	---
2012	3.50	3.71	1.1%
2013	3.70	3.87	4.2%
2014	3.80	3.91	1.2%
Average	3.60	3.79	2.2%





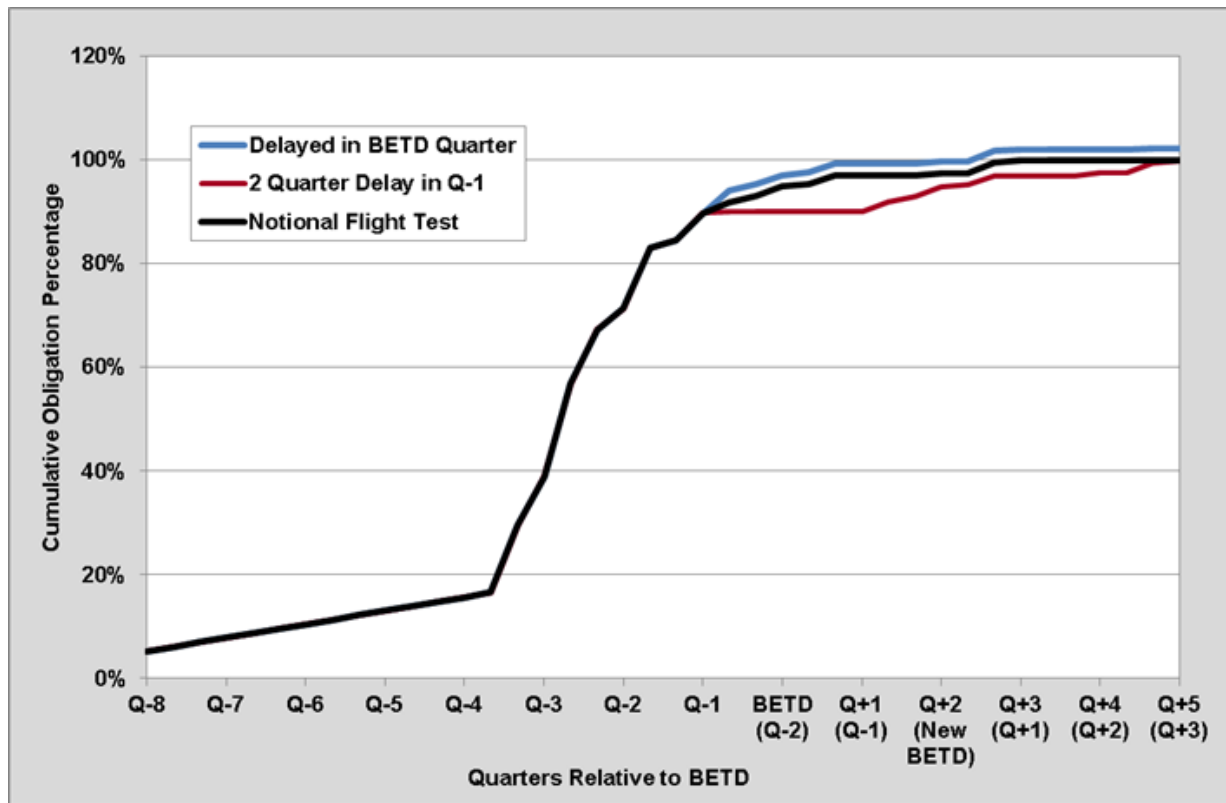
# Mapping Expenditure Records to a Test WBS

- Any expenditure record naming a specific test event was a variable cost
- First utilized “Program Element” code for “Test”
- Mapped to the lowest level possible
  - Applied specific mapping rules



# Test Obligation Profile

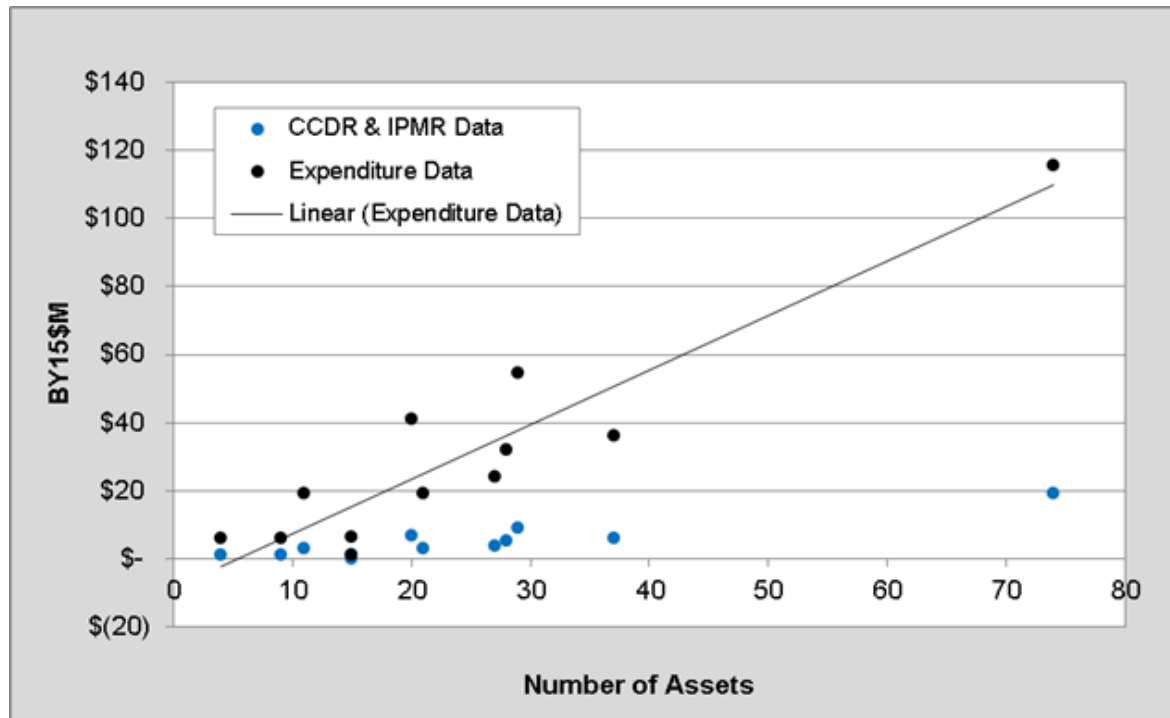
- Utilized “Distribution Date” field to graph obligations by quarter relative to test event
- Two scenarios





# Ground Test CER

- Utilized mapped test records
- Total asset count as an independent variable
- Tests in progress and tests prior to 2011 were removed
- Strong positive correlation
  - $y = 1.6x - 8.44$  where  $y$  is in BY15\$M
  - $R^2 = 0.87$ ,  $F=65.43$





# Cautions About Utilizing ERP Expenditure Data

- **Data is dependent upon:**
  - Analyst entering the data
  - Contract structure
- **Doesn't provide background information**

# Summary

- **ERP Financial System data is available for all contracts and purchase requests**
- **Expenditure data updates as transactions occur**
- **Several cost applications demonstrated**
- **Potential to transform cost analysis into cost analytics**



# References

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