Presented at the ICEAA 2017 Professional Development & Training Workshop - www.iceaaonline.com/portland2017

Deployment Cost Estimation for Electronic/IT Systems

Gurney Thompson

ICEAA 2017

Agenda

- Introduction
- Research Approach
- Deployment Studies Model
  - Scope/Activities
  - Cost Drivers
  - Demo
- Site Survey and Deployment Model
  - Scope/Activities
  - Cost Drivers
  - Demo
- Data
- Ongoing/Future Work

Introduction

- Need to estimate complex multi-site electronic/IT system deployment costs.
  - Air Traffic Control systems
  - C4I Systems deployed to existing military equipment
  - Electronic Warfare equipment for aircraft
  - Naval Tracking

- "Operational / Site Activation" in MIL-STD-881C terminology
- Begins at end of development phase, continues through the installation phase of the site's systems.
  - Deployment Studies (Nonrecurring)
  - Site Survey and Deployment (Recurring)

Research Approach

- PRICE Researchers teamed with deployment SMEs
  - Head SME 30+ years experience on deployment projects with Thales and Airbus Defence.
- Model structured based on SME experience on what the major cost drivers are and how they impact costs.
  - 14+ activities, further broken down to 49+ subactivities (CER level)
  - Multiple iterations on model structure completed to reach expert consensus.
- Model costs based on mix of data and experience from past projects that SMEs have managed.

Deployment Studies

- Estimates non-recurring design work and preparation for the deployment project.
- This includes:
  - Working Groups (Coordinate deployment team, various end users, customer, etc.)
  - Technical studies (System diagrams, study interfaces to existing systems, migration plan, etc.)
  - Installer Tools and Training
  - Qualification of the process, resources, deployment skills
  - Management

Deployment Studies – Cost Drivers

- "Size" based on 4 drivers
  - Number of System Architectures
    - *Number of system architecture diagrams, describing the hardware and/or software components and how they integrate with each other.*
  - Number of Alternative Configurations
    - *Minor adaptations of the system architecture.*
  - Max Number of Equipment Types
    - *Unique equipment types defined in System Architecture diagram*
  - Number of External Interfaces
    - *Power, networking, satellite datalink, sensors, etc.*
- "Complexity" score based on 9 different areas of complexity
  - Operating Specification, Foreign Language Complications, SW and System Config Files, Cabling/Mechanical, Power Distribution, Systems, Communication, Equipment Processing, Software.

Site Survey and Deployment (Recurring)

- Site Surveys - Visits to prepare for deployment of a system on a site. Occurs before deployment studies.
  - Site Survey preparation
  - Site Survey
  - Management

- Deployment work performed onsite
  - Identify/Document initial state of site configuration
  - Installation and Configuration of equipment for the new system, and their connections to pre-defined interfaces (network, radio, energy, etc.). Includes testing in "stand-alone" mode.
  - Implementation of operational software and system configurations, full system testing.
  - Acceptance of system in fully operational environment with client/users.
  - Migration of previous configuration data.

Site Survey and Deployment – Cost Drivers

- "Size" based on
  - Number of System Deployments
  - Percentage of Sites Surveyed
  - End User Workspaces per Site
- "Complexity" score based on 9 different areas of complexity
  - Operating Specification, Foreign Language Complications, SW and System Config Files, Cabling/Mechanical, Power Distribution, Systems, Communication, Equipment Processing, Software.

Data

- 4 major projects modeled using mostly actual cost/effort data, and some proposal data verified by project managers.
  - New communication system deployed to fleet of military ships in 2013
  - C4I system deployed to land vehicles fleet in 2008-2009
  - Naval tracking system deployed to 6 warships around 2001
  - Air Traffic Management System deployed to 10 locations
- Also considered notional mission planning and execution systems and SAP deployments with SMEs experienced in these projects.
- Multiple design iterations completed
  - Model trends agreed upon by expert consensus, costs validated by data.

Ongoing Work

- Applying model to upcoming projects.
- UK - Air Traffic Control – Modeling as 7 distinct projects
  - ATC Radios, Air Defense Radios, Radars, Networking, Tower Integrations, etc.
  - ~100 sites, spanning major Hub airports, regional airports, military, standalone ATC sites, islands
  - Model updates completed to address missing pieces from version 1
    - *Added "End User Workspace Setup" activity and associated drivers.*
    - *Clarifications for complexity values*
  - Preliminary results generally approved by project leads, working on refinements.
- Germany - Train Signaling Equipment
  - Kickoff by end of June 2017
- C4I System for Kuwaiti Defense Forces
  - Kickoff in Fall 2017

Questions?

 | *Decades of Cost Management Excellence*

Backup

Other Topics

- MIL-STD-881C
  - Mapping to 881C “Operational/Site Activation” (O/SA) activities
  - Coverage of O/SA for Automated Information Systems (AIS) and others.
- Metrics
- Notional IT Infrastructure Test Cases

Other Topics

- Modeling Deployment to Multiple Site/System Types
  - Generally, each category (ground stations, vehicles, aircraft, ships, etc.) will need its own instance of the model.
  - Major subcategories (e.g. Fighter aircraft, Transport, Bomber, Recon, etc.) will be modeled in a single Deployment Studies cost object (with unique "System Architectures"), but each will have its own "Site Survey and Deployment" cost object.
    - *Each subcategory will have distinct user personas*
    - *Each division will collect/consume different data/information, probably translating to a different System Architecture*
  - Minor divisions (e.g. different models of aircraft performing the same role) should generally be modeled as "Alternative Configurations."
    - *The key is that the System Architecture diagram follows the same basic structure, but has minor differences (dif quantities of equipment, dif versions of equipment that serve same basic function, etc.)*