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Improving Software Cost Estimating Techniques in Defense Programs

Biancalana, Nickolas A.; Ritschel, Jonathan D.; Drylie, Scott T.; Fass, David; White, Edward D.

Monterey, California. Naval Postgraduate School

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Improving Software Cost Estimating Methods in Defense Programs

1Lt Nick Biancalana

SAF/FMCS

Overview

- Main Topic
  - Using historical cost and ESLOC data to create distributions to estimate and simulate future values
  - Formulate specific distributions for combinations of characteristics

- Assumption
  - Information known at the beginning of the program
    - Commodity, system type, service, contractor, contract type

- Research Questions
  - Shapes and parameters of distributions that map each data subset
  - How does software size and cost change within characteristics?

- Methods
  - Incremental analysis
  - Compare median values
  - Statistical tests for differences

Data

- 42 projects
- 314 data points (Cost/ESLOC)
- 351 data points (ESLOC)
- Similar proportions for data points

COST/ESLOC PROJECTS BY COMMODITY

- UAV 7%
- Aircraft 24%
- EAS 36%
- Missile 9%
- Rotary Wing 12%
- Space 12%
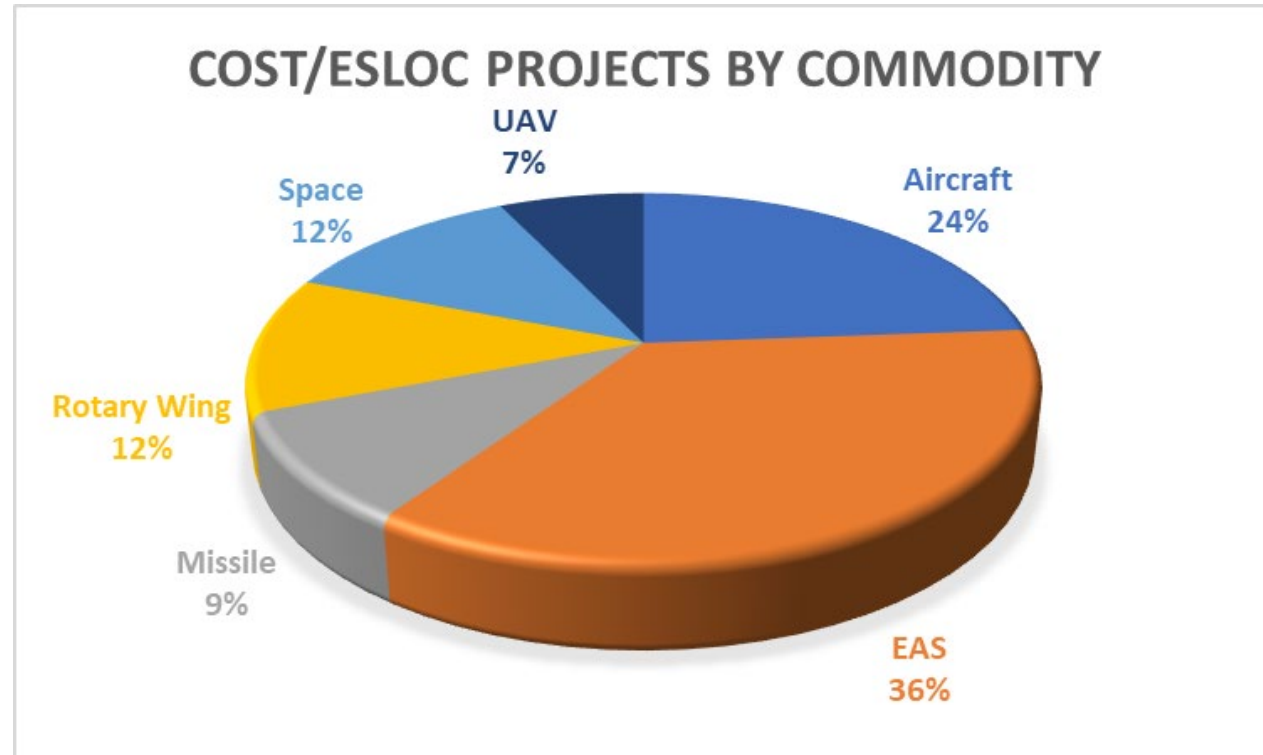
Results (Cost/ESLOC)

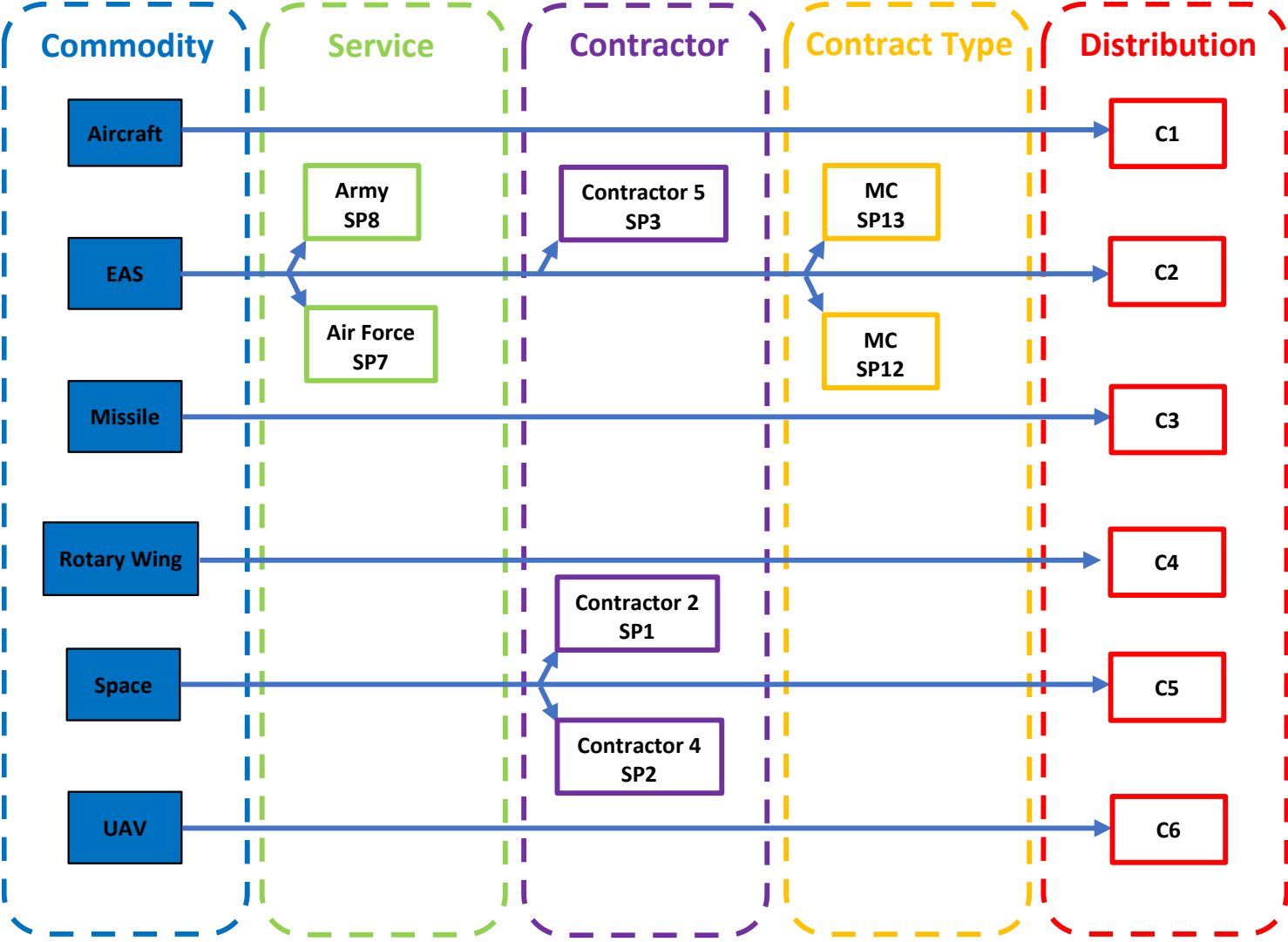| Commodity/Contractor	Contractor 1	Contractor 2	Contractor 3	Contractor 4	Contractor 5
Aircraft	0.183	0.185	0.174	0.088^b	0.043^b
EAS	0.278	0.177^a	0.056	0.134^a	0.071^a
Missile		0.708			$0.511^{a,b,c}$
Rotary Wing	0.202	0.467	0.218	0.327	
Space	0.798	1.331^a	0.131	$1.051^{a,b}$	0.078
UAV			0.173		0.141^c
N	96	46	89	52	68
Median	0.205	0.377	0.119	0.28	0.122
KW	0.303	0.004	0.05	0.001	0.008

Note: Commodities that share a letter within the same contractor are members of a Steel-Dwass Pair

- Analysis performed for nearly all combinations of characteristics for both Cost/ESLOC and ESLOC

Results

- Distributions for each division of dataset
  - Space and Missile most expensive commodities, Aircraft largest

- Cost and ESLOC vary within the same program characteristics
  - Some commodities are more expensive depending on contractor
    - Fewer effects for ESLOC
  - EAS is cheapest yet also largest for the Army
  - Specific Contract Type can impact size/cost
    - Impacts mostly lost when contract type is generalized
  - EAS, Missile, and UAV experienced different ESLOC depending on service

- Arsenal of distributions for all situations
  - Decision tool

Specific Distributions – Cost/ESLOC

Questions