Toward Realistic Schedule Estimates

Panel 4

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OUTLINE

- INCREASING IMPORTANCE OF SCHEDULES
- DRAFT SCHEDULING ESTIMATING CLASSIFICATION
- SCHEDULE ESTIMATING RELATIONSHIP: CANDIDATE SCHEDULE DRIVERS
- COST-PERFORMANCE-SCHEDULE TRADEOFFS
- F-35 CASE NARRATIVE
- STATISTICAL “EXPLANATION” OF “TIME CURVE”
- DRAFT RESEARCH AGENDA FOR MORE REALISTIC SCHEDULE ESTIMATES

Schedules are now more important

- MODERNIZATION WITH RESTRICTED BUDGETS (2020S)
- LONGER TIME TO FIELD (absolute & relative)

  "The fact is that we are slower than the bad guys."

- RAPID FIELDING INITIATIVES (RCO, SCO, …)
- SCHEDULE AS SIGNIFICANT SOURCE SELECTION FACTOR ("SHOULD SCHEDULE")

DRAFT SCHEDULE ESTIMATING CLASSIFICATION

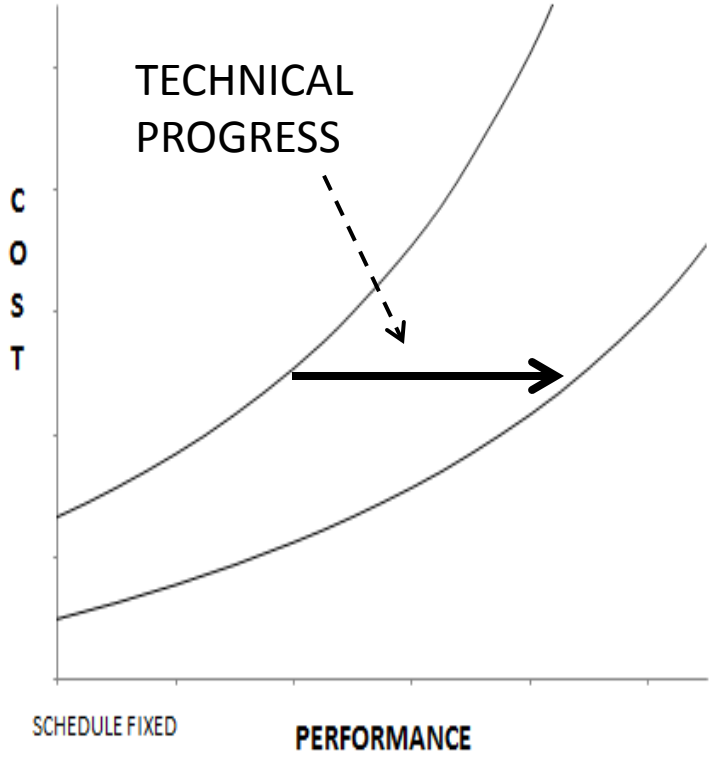
- Orderly relationship(s) between observed schedules and key variables (“Schedule Estimating Relationship”)
- Result of Management Decisions (e.g., Cost, Schedule, Performance Tradeoffs; alternatively case studies of decision making)
- Analysis of a related set of tasks (e.g., PERT, Gantt Charts)

SCHEDULE EST. RELATIONSHIPS
Some Candidate Explanatory Variables

- Risk Reduction Efforts
- Contract Type (e.g., regression below)
- Technical Maturity (TRLs perhaps)
- Requirements Growth (F-35 narrative
- Complexity (e.g., lines of code, “density”, materials) “Our complexity reach exceeds our engineering grasp”
- Funding instability (or not)

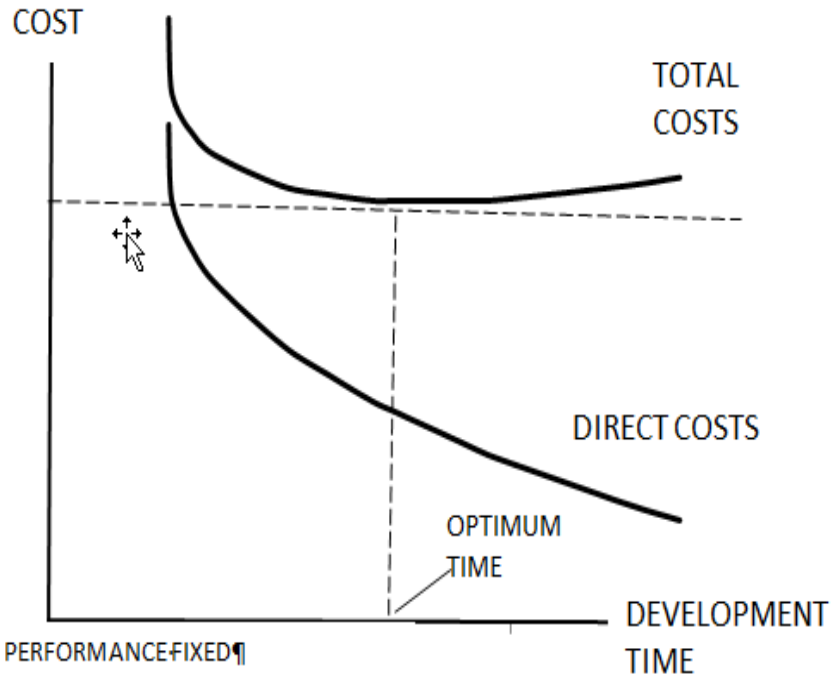
TRADEOFFS

COST VS PERFORMANCE



Sources: Gansler (87), Sullivan (81)

COST VS. SCHEDULE



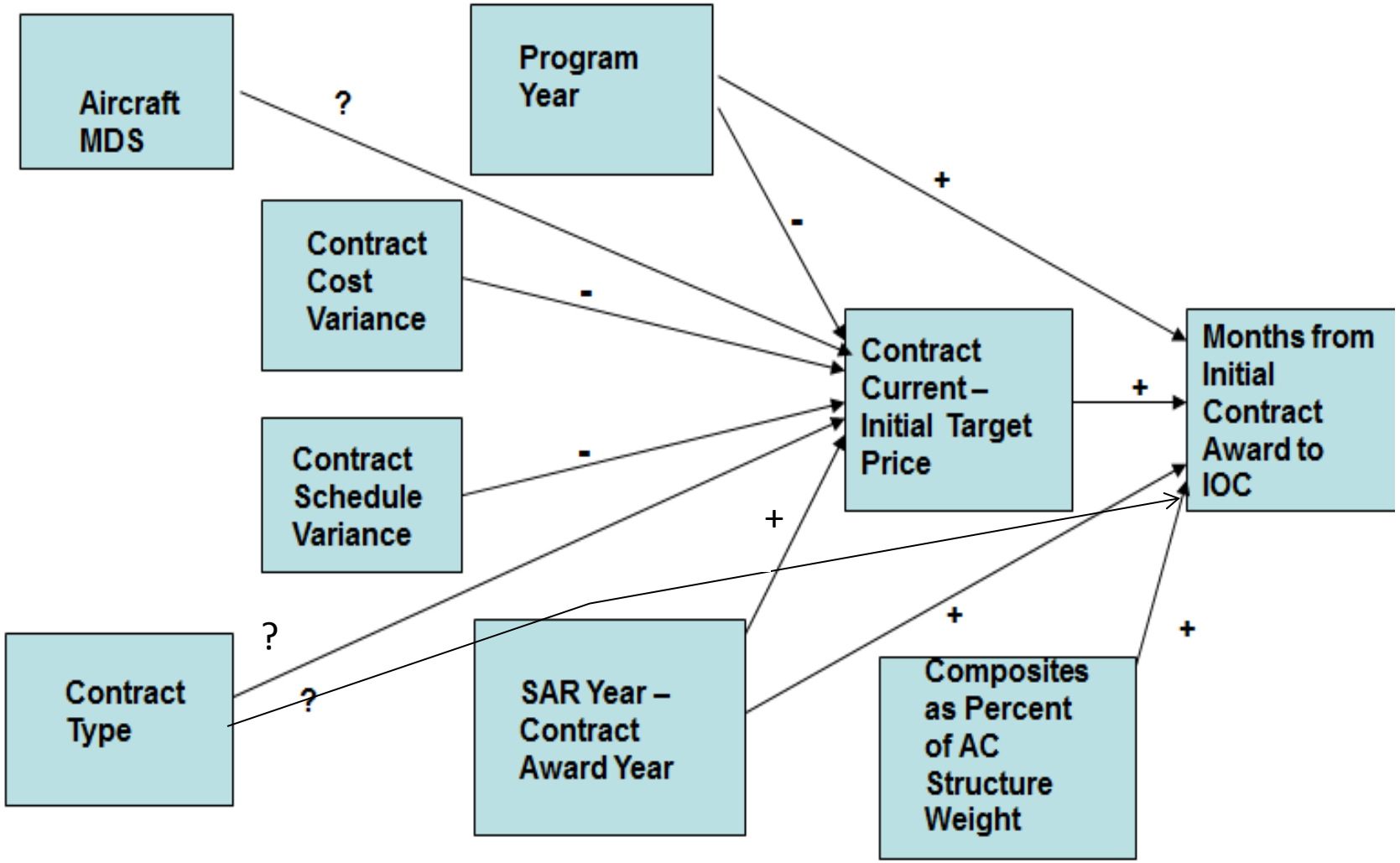
Sources: DSMC (01), Zschau (69)

F-35: CASE NARRATIVE FOR REQUIREMENTS GROWTH

- “ALPHABET SOUP” (Aboulafia, 2015) OF STUDIES AND CONCEPTS
- … MERGED INTO JAST
- … WHICH EVOLVED TO JSF
- WELL-KNOWN COST AND SCHEDULE DIFFICULTIES

“ … stakeholders despite their best intentions can derail your program.” (Bogdan, 2012)

“Explaining” the Structure of Time Curve Model (F/A-18E/F, F-22, F-35 Data)



REGRESSION RESULTS

(Financial Variables, $M)

DIRECT MODEL

Months from **Initial** Contract Award to IOC (mos.)

Explanatory Variable	Coefficient	t-statistic
(Constant)	50.409	12.478
Contract Current Target - Initial Target Price	0.001	2.880
Program Year	2.030	10.015
SAR Year - Contract Award Year	0.986	3.853
Composites as Percent of Structural Weight	3.051	21.242
FFP Contract	12.450	5.920
Dependent Variable: Months from Initial Contract Award to IOC		
$R^2 = 0.846$; N = 164		

INDIRECT MODEL

Contract Current Target – Initial Target Price

Explanatory Variable	Coefficient	t-statistic
(Constant)	3.222	3.941
Cumulative Contract Cost Variance	-4.810	-4.725
Cumulative Contract Schedule Variance	-6.072	-3.339
Program Year	-0.213	-3.934
SAR Year - Contract Award Year	0.168	3.506
F-35	-1.333	-3.867
F/A-18E/F	-1.979	-4.257
CPAF Contract	-0.860	-2.019
Dependent Variable: Contract Current Target - Initial Target Price		
$R^2 = 0.665$; N = 110		

DRAFT RESEARCH AGENDA

- ASSESS CURRENT STATE OF ART (Comp. lit. review; SME interviews). Identify methodology gaps.
- IDENTIFY FACTORS MOST LIKELY TO BE SCHEDULE DRIVERS (empirical & case studies)
- REFINE AND AMPLIFY OPERATIONAL PERFORMANCE METRICS FOR NETTED WARFARE
- PREDICTION MARKETS FOR PROGRAM DIFFICULTIES (design and test)
- IMPROVED MODELS FOR COST-PERFORMANCE-SCHEDULE METRICS AND TRADE-OFFS METRICS

➔ AMBITIOUS BUT DECOMPOSABLE