



International Cost Estimating and Analysis Association

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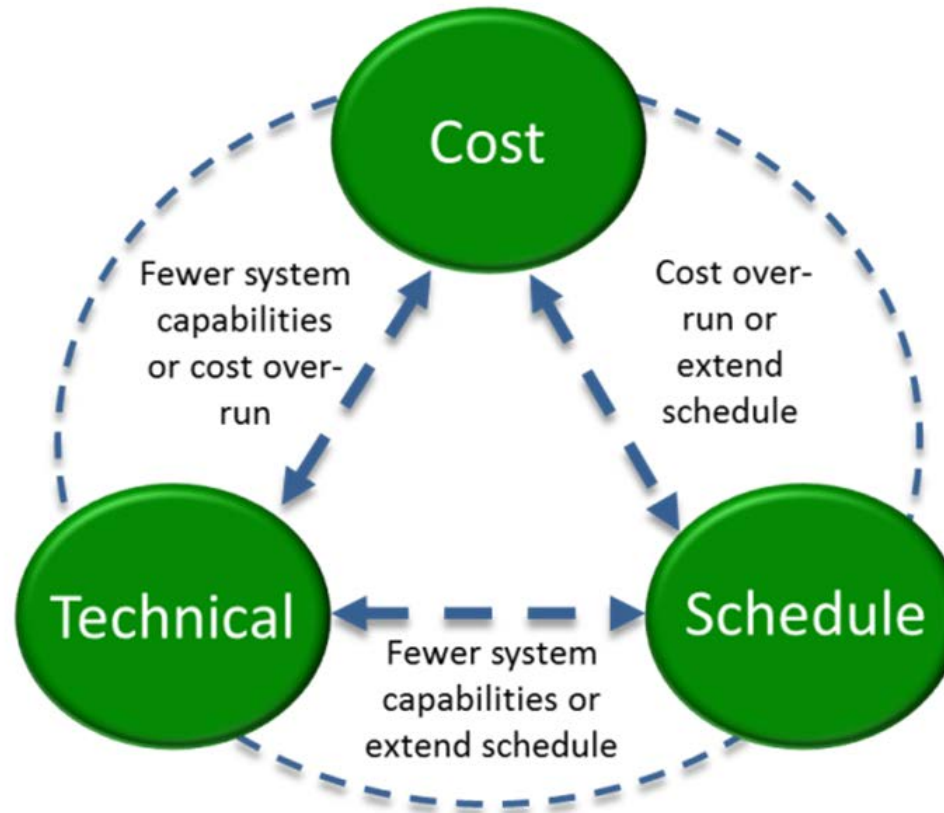
“Quality means doing it right when no one is looking.” - Henry Ford

# Putting Schedule Quality Checks to the Test

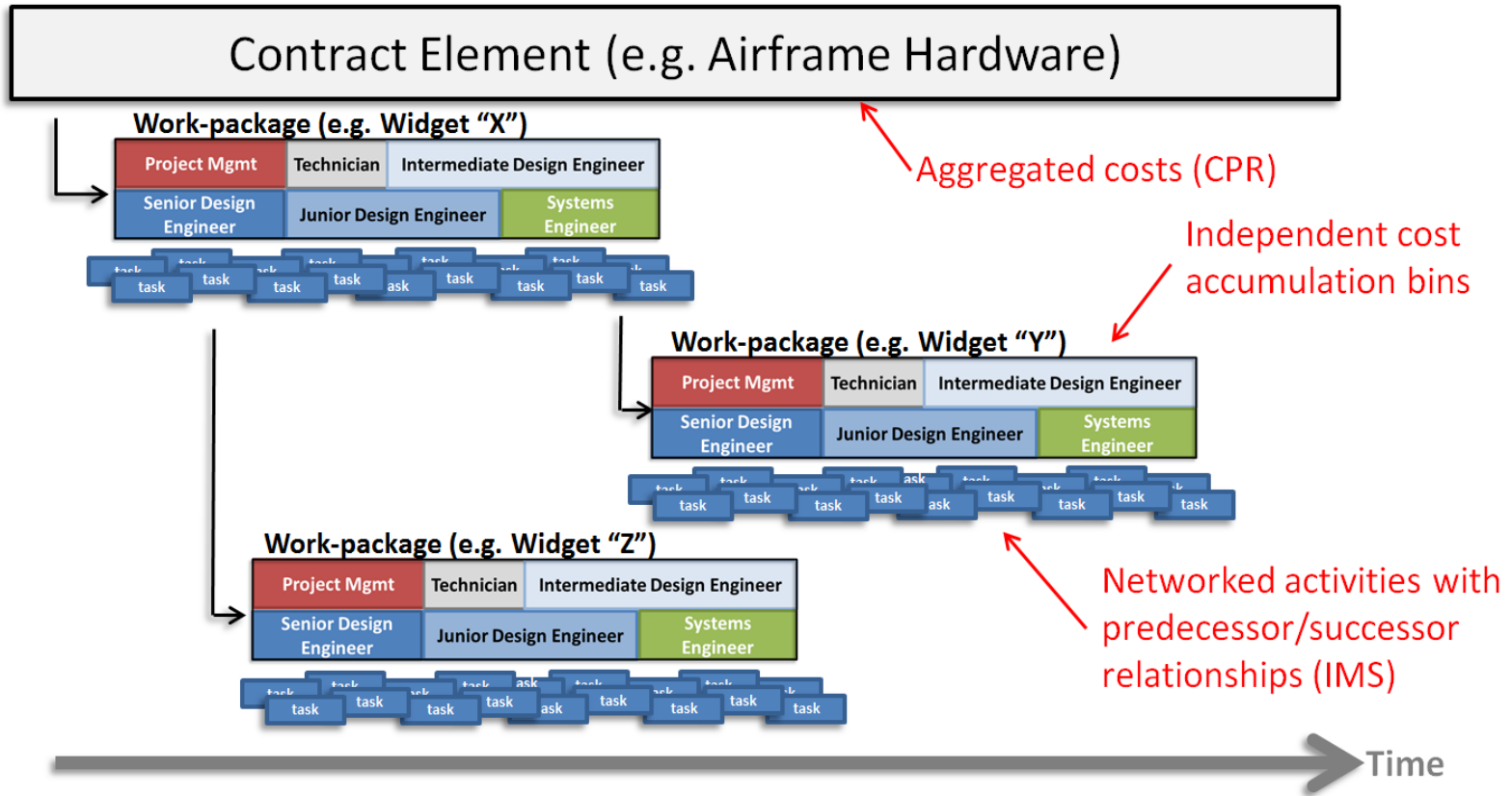
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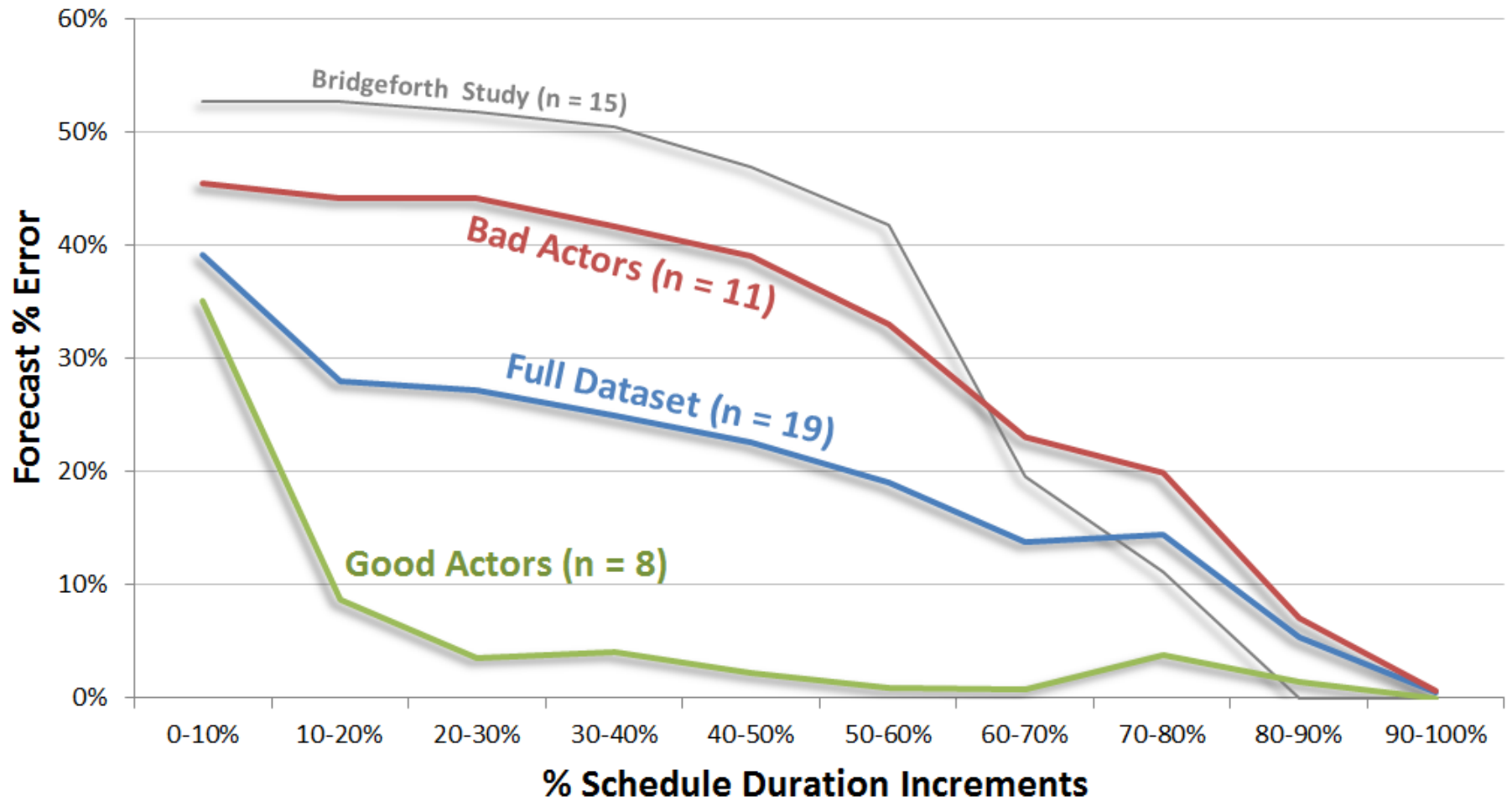
ICEAA 2016 Professional Development  
& Training Workshop



# Depiction of the EVMS Process



# Evolving View of the Schedule Forecast Error



	<i>Full Model</i>		<i>13-Point Assessment</i>		<i>11-Point Assessment</i>		
	Project Level		Project Level	Subproject Level	Project Level	Subproject Level	Task Level
INT	-5.40**	1.25	-5.26***	-0.08***	-0.16	0.72***	0.10***
1. Logic	0.18	0.48	0.25	0.08	0.41	-0.05	0.01
2. Leads	1.19	1.16	0.78	-0.16*	0.23	-0.37***	-0.05**
3. Lags	0.31*	0.12	0.31**	-0.01	0.27	0.11***	0.05***
4. Relationship Types	0.38*	0.16	0.34*	-0.30***	0.19	-0.36***	-0.04***
5. Hard Constraint	0.14	0.21	0.11	0.17***	0.04	0.21***	0.02*
6. High Float	-0.14	0.15	0.19	0.03	0.33	0.03	0.01
7. Negative Float	3.97**	0.90	-0.12	-0.06***	-0.26	0.16***	0.10***
8. High Duration	0.59**	0.15	0.14	0.02	0.25	0.02	0.01
9. Invalid Dates	0.93*	0.43	3.80***	0.16***	0.52	0.01	0.03*
10. Resources	0.22	0.16	0.81	0.04	0.63	0.04	0.01
11. Missed Activities	0.71	0.37	0.55***	0.02	0.40	-0.12	0.08***
12. Critical Path Test	-0.06	0.10	0.13	0.09	0.24	0.10	0.02
13. CPLI	5.13*	1.25	0.91*	0.06***	0.01	0.06**	0.05***
14. BEI	-0.06	0.03	0.40	0.02	0.12	0.02	0.02
			0.17	-0.11***	0.19	-0.09***	0.02**
			0.13	0.02	0.19	0.02	0.01
			0.78*	0.24***	1.09	0.16***	0.00
			0.33	0.03	0.63	0.03	0.01
			—	—	—	—	—
			5.01***	0.70***	—	—	—
			1.16	0.02	—	—	—
			-0.06*	0.07***	—	—	—
			0.03	0.02	—	—	—
Degrees of Freedom	4	5	13,922	7	13,924	14,320	
F-Stat p-value	3.3%	1.6%	0.0%	50.4%	0.0%	0.0%	
Adj. R <sup>2</sup>	71.7%	75.0%	14.4%	6.4%	3.8%	3.3%	

**Green:** coefficient sign agrees with project level;

**Red:** coefficient sign disagrees with project level;

Confidence Level of Coefficient Significance: \*90%; \*\*95%; \*\*\*99%

# Project Level Cross-Validation

<i>Full Model</i>		<i>969 Data Subsets Models</i>			
	<b>Coefficient</b>	<b>Mean Coefficient</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Int	-5.40**	-5.54	4.31	-216.60	485.35
1. Logic	0.18	0.29	1.44	-6.82	76.36
2. Leads	1.19	1.24	5.32	-132.99	63.81
3. Lags	0.31*	0.26	0.35	-6.96	3.86
4. Relationship Types	0.38*	0.30	1.03	-17.33	10.59
5. Hard Constraint	0.14	0.03	0.60	-29.89	3.32
6. High Float	-0.14	-0.15	0.70	-18.63	1.70
7. Negative Float	3.97**	4.05	2.85	-16.95	29.67
8. High Duration	0.59**	0.48	0.92	-15.89	13.27
9. Invalid Dates	0.93*	0.85	1.23	-17.16	11.28
10. Resources	0.22	0.20	0.66	-6.93	6.89
11. Missed Activities	0.71	0.73	1.34	-7.51	16.77
12. Critical Path Test	-0.06	-0.04	0.49	-5.51	6.50
13. CPLI	5.13*	5.34	4.26	-485.64	228.01
14. BEI	-0.06	-0.07	0.20	-2.17	1.48

Confidence Level of Coefficient Significance: \*90%; \*\*95%; \*\*\*99%

	<b>Value</b>
Degrees of Freedom	4
F-Stat p-value	3.3%
Adj. R <sup>2</sup>	71.7%

<b>Avg. Value</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
1	0	1	1
0.0%	8.4%	0.0%	39.4%
66.1%	35.6%	-78.2%	100.0%

*(Mean / Standard Deviation) of Estimated Coefficients*

	Project Level	Subproject Level	Task Level
Int	-1.29	-2.21	3.95
1. Logic	0.20	1.88	0.35
2. Leads	0.23	-2.74	-0.58
3. Lags	0.75	-0.42	0.31
4. Relationship Types	0.29	-14.73	-1.14
5. Hard Constraint	0.05	5.43	4.68
6. High Float	-0.21	-3.84	22.70
7. Negative Float	1.42	6.82	1.40
8. High Duration	0.53	0.44	6.10
9. Invalid Dates	0.69	2.81	1.79
10. Resources	0.30	-9.32	0.87
11. Missed Activities	0.55	8.64	3.85
12. Critical Path Test	-0.07		
13. CPLI	1.25	28.83	
14. BEI	-0.35	6.73	

# of Subset Obs.	16	6,961	7,160
# of Trails	969	50	50

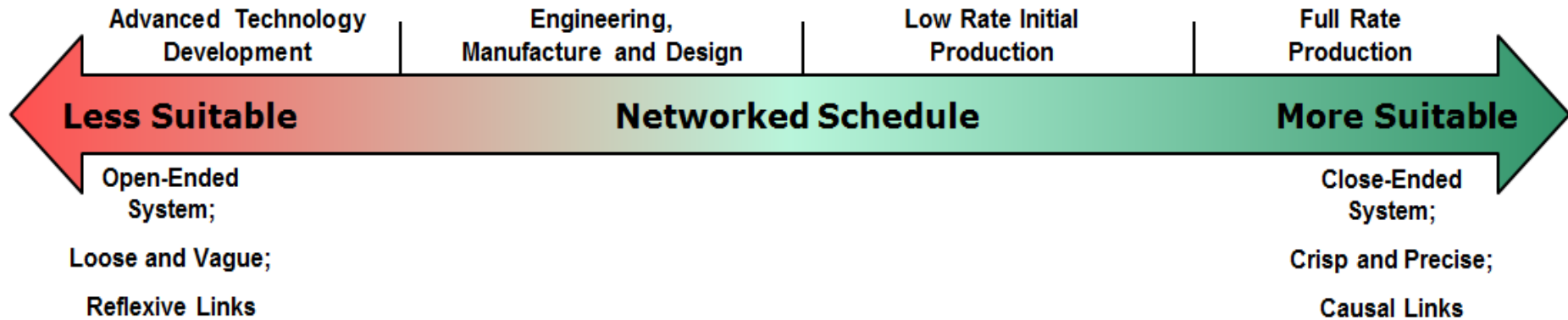
**Green:** One standard deviation away from the mean does not include zero;

**Red:** One standard deviation away from the mean includes zero

- At first glance, the 14-Point Assessment on the first IMS submission appears a relatively good predictor of the forecast's mean absolute percent error (MAPE)
- Additional tests suggest marginal predictive ability
  - Cross-validation shows highly unstable coefficients
  - Sub-project and task level analyses suggest far less variation in schedule quality can be attributed to the 14-Point Assessment
- Cannot measure absolute schedule quality as distinct from project assumptions and execution
- A definition for schedule quality: **the effective incorporation of localized project knowledge into an activity-based network**



# Applicability of the Networked Schedule in the Acquisition Life-Cycle



- The 14-Point Assessment has limited use in predicting a schedule forecast's accuracy and timeliness
  - Cannot measure absolute schedule quality as distinct from project assumptions and execution
  
- Using common-sense heuristics, one can expect a fair gauge of quality by systematically searching for evidence of poor quality
  - The 14-Point Assessment misses several important margins of schedule quality, namely the ability of the schedule to evolve consistently and incorporate new information reliably
  - Simple longitudinal checks are advocated to increase the confidence in schedule quality assessments
  
- Further study is required on exactly which longitudinal checks provide the best value
  - Additionally, studies on where the heuristics should be flexible with respect to project type (e.g., R&D) and alternative schedule approaches are advocated

# Questions & Answers