



Benchmarking in the Projects Arena

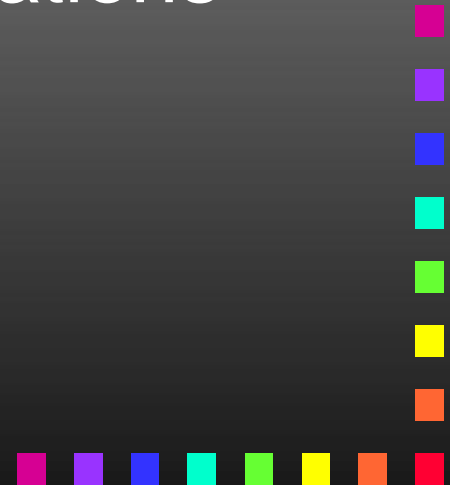
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AACE International Cascade Section

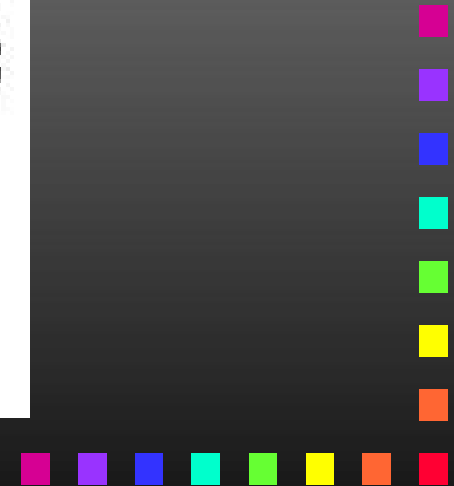
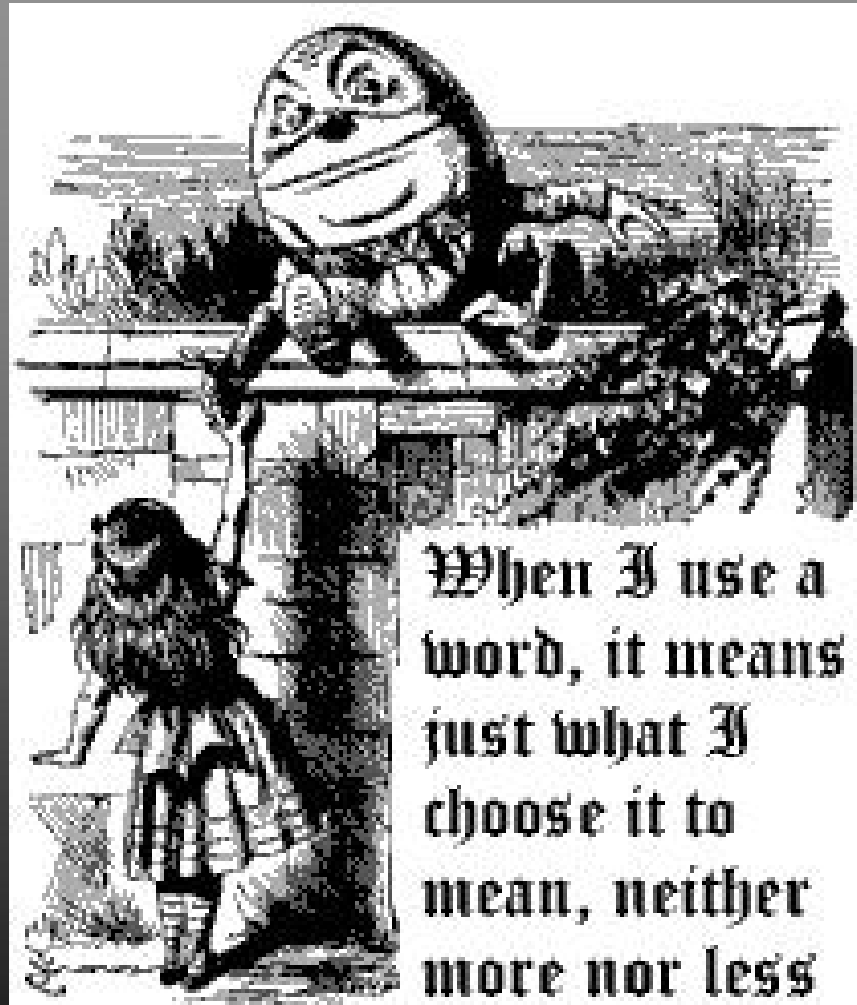


Agenda

- Definitions
- Benchmarking Process in General
- Benchmarking Process for Projects
- Project Benchmarking Organizations
- Practices vs. Metrics
- Findings & Trends

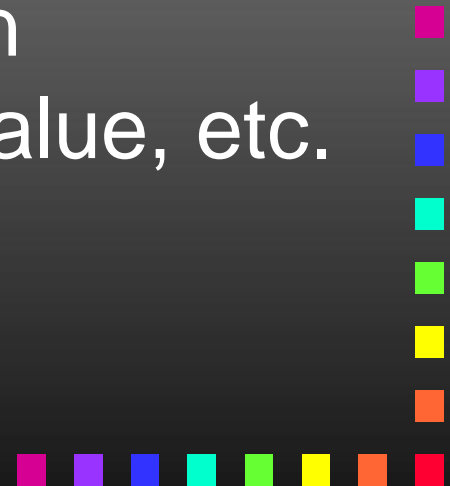


Benchmarking



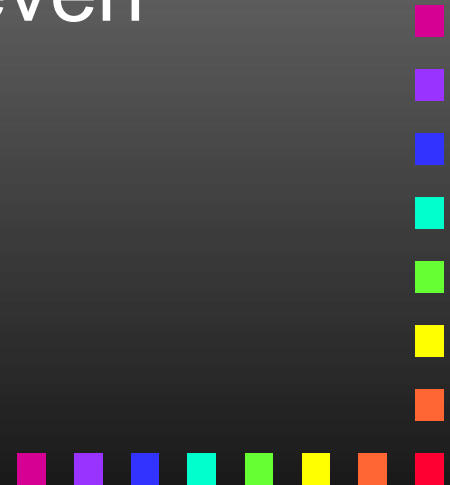
Benchmark

- A surveyor's mark made on a permanent landmark of known position and altitude - Webster's New World Dictionary
- A standard point of reference in measuring or judging quality, value, etc. - Webster's New World Dictionary



Benchmarking

- The practice of being humble enough to admit that someone else is better at something, and being wise enough to try to learn how to match and even surpass them at it - [International Benchmarking Clearinghouse](#)



Benchmarking

- The search for industry best practices that lead to superior performance - **Robert Camp**
- The process of identifying and learning from best practices anywhere in the world: A powerful tool in the quest for continuous improvement - **Independent Project Analysis**



Benchmarking

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Benchmarking

- Benchmarking can be applied to all facets of a business.
- Benchmarking implies measurement:
 - Business function metrics
 - Business practices
- Benchmarking goes beyond traditional competitive analysis



Benchmarking

- Benchmarking challenges the current way of doing business by bringing in new ideas and practices
- Benchmarking is an objective-setting process
- Effective benchmarking is a continuous process



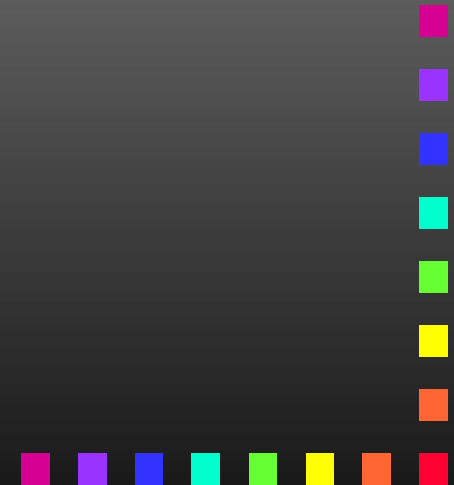
Benchmarking

- The origins of benchmarking are rooted in the basic competitive analysis and total quality management practices widespread in business
- Benchmarking has passed the test of time as a useful process and cost improvement technique



Approaches to Benchmarking

- Competitive benchmarking
- Functional benchmarking
- Internal benchmarking



Competitive Benchmarking

- Studies product designs, process capabilities, or administrative methods used by business competitors
- Competitors may not employ best-in-class practices
- Competitors can be reluctant partners for benchmarking



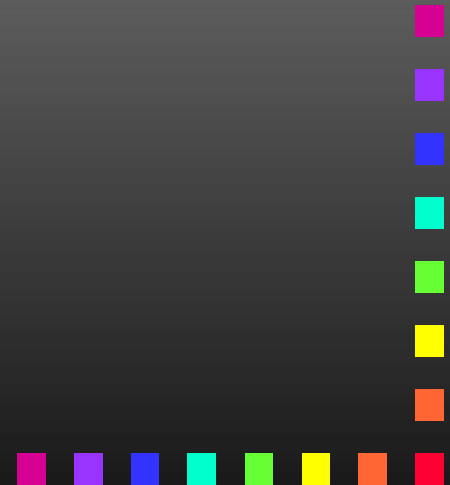
Functional Benchmarking

- Benchmarking studies performed with non-competitors
- Attempts to find the secrets of an industry leader's success
- Functional benchmarking relies on cooperation from best-in-class leaders



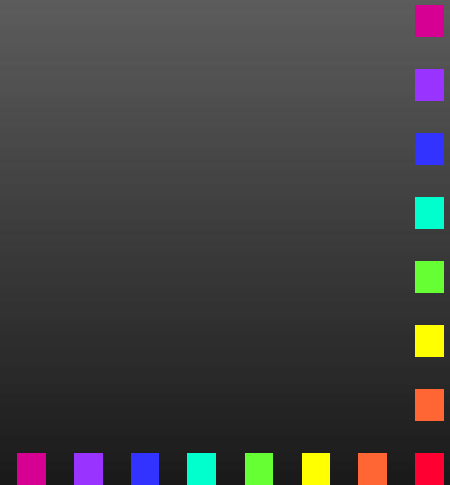
Internal Benchmarking

- Attempts to find study partners within same organization
- Fewer barriers to establish a cooperative atmosphere



Benchmarking

- Basic steps to benchmarking
 - Know your operation
 - Study the industry leaders and competitors
 - Incorporate the best
 - Gain superiority



Benchmarking Code of Conduct

(International Benchmarking Clearinghouse)

- Keep it legal
- Demonstrate willingness to share same level of information you are requesting
- Respect confidentiality
- Don't refer without permission - utilize company benchmarking representatives when possible
- Be prepared at all contacts with benchmarking partners



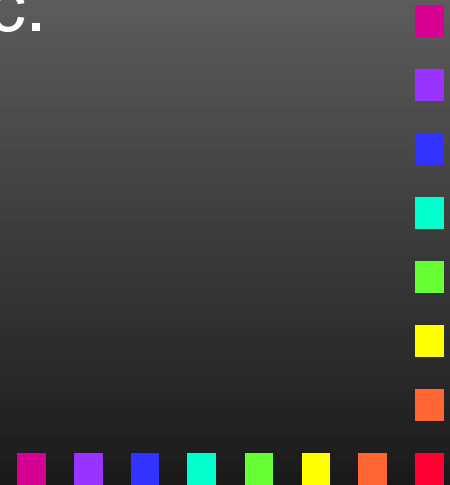
Project Benchmarking

- Several studies in early 1980's identified similar trends in project execution:
 - Reduction in project execution capabilities
 - Lack of formal project execution training programs
 - Lack of business expertise in project teams
 - Engineering practices and project management practices not being applied



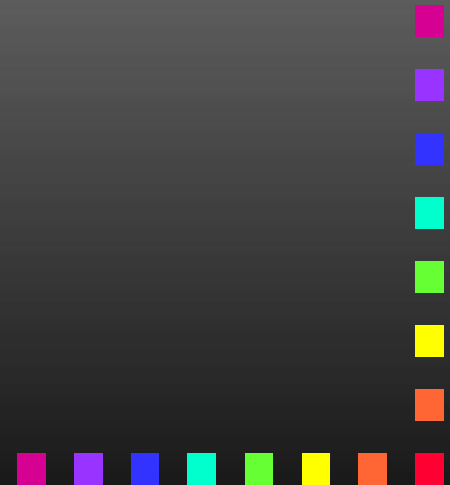
Project Benchmarking

- Project benchmarking organizations:
 - Construction Industry Institute
 - Independent Project Analysis, Inc.



Construction Industry Institute

- 92 Companies
 - 45 Owner Companies
 - 47 Contractors
- Variety of Industries
 - Heavy Industrial
 - Light Industrial
 - Manufacturing
 - Buildings
 - Infrastructure



Construction Industry Institute

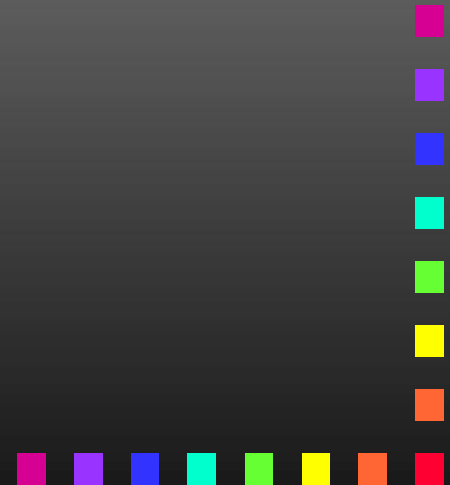
■ Objectives:

- Provide industry with performance metrics
- Measure use of “best practices” on projects
- Quantify the value of utilizing “best practices”
- Educate the industry in benchmarking practices and opportunities for improvement



Construction Industry Institute

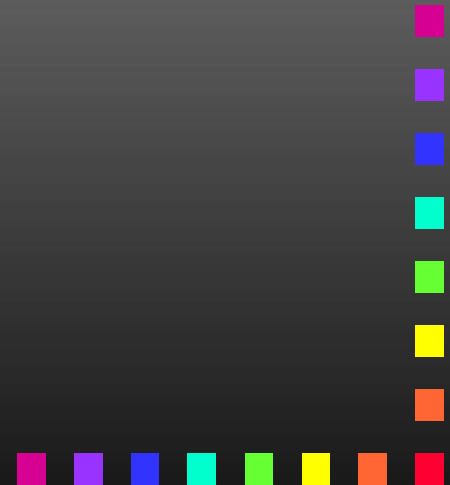
- Best Practices
 - Pre-Project Planning
 - Team Building
 - Constructability
 - Safety
 - Design/Information Technology
 - Project Change Management
 - Strategic Alliances



Construction Industry Institute

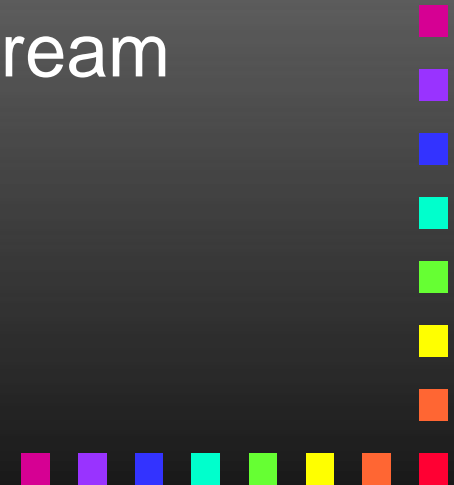
■ Performance Metrics

- Cost
- Schedule
- Safety
- Changes
- Rework



Independent Project Analysis

- Industry Benchmarking Conference
 - Voluntary association of owner firms in the **process** industry
 - Divided into Upstream & Downstream process groups



Independent Project Analysis

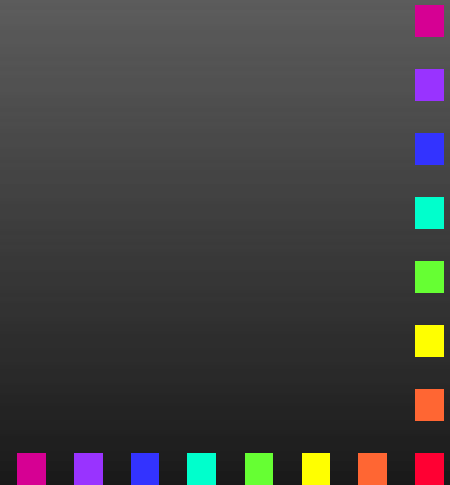
■ Objectives

- Measure and compare project performance
- Identify and share practices that drive excellence
- Conduct research into new project practices



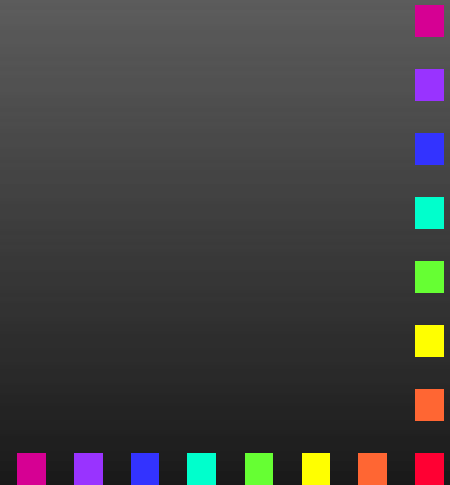
Independent Project Analysis

- Best Practices
 - Front-End Loading (FEL)
 - Use of New Technology
 - Use of Value Improving Practices
 - Integrated Teams
 - Safety



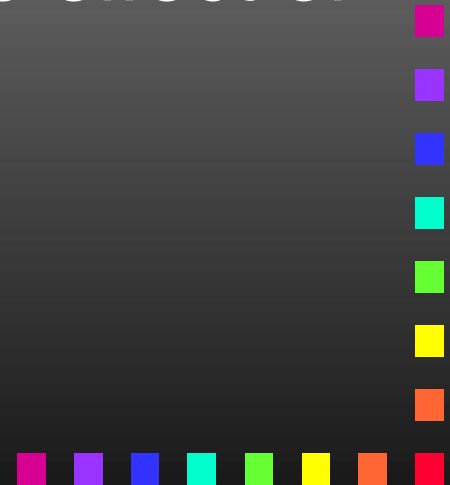
Independent Project Analysis

- Performance Metrics
 - Cost
 - Schedule (Cycle Time)
 - Operability
 - Safety



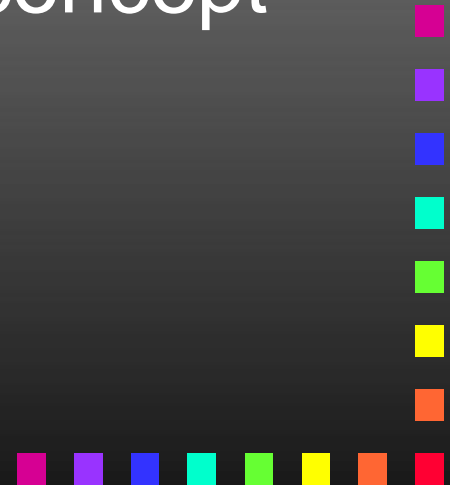
Practices vs. Metrics

- Benchmarking is the understanding of practices.
- Metrics are used to quantify the effect of practices.



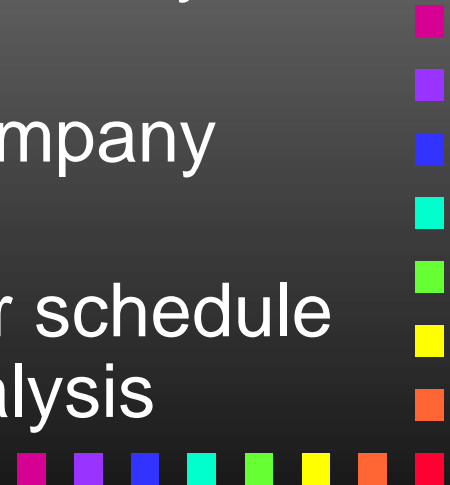
Practices vs. Metrics

- Metrics have value beyond the process of benchmarking
- Project cost and schedule metrics can improve asset evaluation and concept development



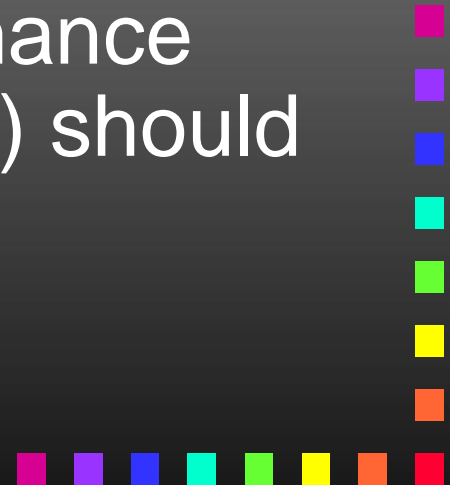
Practices vs. Metrics

- Metrics collection can be used for:
 - Validation tool in estimating
 - Strategic tool in estimating
 - Setting project goals (“should” costs, target schedules)
 - Assess internal metrics versus industry norms
 - Support calibration of internal company tools and databases
 - Improve understanding of cost or schedule drivers for value engineering analysis



Practices vs. Metrics

- To use benchmarking effectively, it is important to stress practices in addition to metrics
- Ensure that “best practices” are identified, and utilized. Performance gains (as measured by metrics) should follow



Sample Metrics

METRIC: PROJECT DEFINITION \$ / TOTAL PROJECT \$

Accounts: Project Definition = all owner & contractor costs up to authorization excluding early purchases
 Total Project = total project \$ excluding start-up costs

Project Characteristics	Number Records	Average Value	Median (50%)		Standard Deviation		10 Percent		90 Percent		Relative Factor
			Value	% of avg	Value	% of avg	Value	% diff	Value	% diff	
Overall:											
Total in dataset	2412	0.033	0.022	67%	0.038	115%	0.000	-100%	0.084	155%	
This report period	448	0.052	0.040	77%	0.042	81%	0.010	-81%	0.115	121%	
This metric not=0 & eqmt > 0	1644	0.044	0.035	80%	0.036	82%	0.009	-80%	0.095	116%	
Size (2003\$MM):	(Criteria: non-zero, U.S. or Eur/Can/Aus, no OSBL)										
This dataset	1273	0.046	0.036	78%	0.037	80%	0.009	-80%	0.097	111%	1.00
<= 1	222	0.055	0.045	82%	0.044	80%	0.009	-84%	0.118	115%	1.20
>1 to <=5	346	0.051	0.040	78%	0.041	80%	0.011	-78%	0.109	114%	1.11
>5 to <=25	399	0.043	0.037	86%	0.033	77%	0.008	-81%	0.087	102%	0.93
>25 to <=100	212	0.038	0.032	84%	0.028	74%	0.009	-76%	0.077	103%	0.83
>100	94	0.031	0.024	77%	0.023	74%	0.009	-71%	0.068	119%	0.67



Sample Metrics

METRIC: LEVEL1: CONSTRUCTION INDIRECT \$ / TOTAL PROJECT COSTS \$
Accounts: Construction Indirects = all owner & contractor CM labor, plus those Indirect costs expended by the CM
 Total Project Costs = Total project capital and expense, excluding start-up and special costs
note: Indirects exclude the indirects expended by subcontractors normally (i.e., included in all-in labor rates)

Project Characteristics	Number Records	Average Value	Median (50%)		Standard Deviation		10 Percent		90 Percent		Relative Factor
			Value	% of avg	Value	% of avg	Value	% diff	Value	% diff	
Overall:											
Values >0	274	0.065	0.045	69%	0.059	91%	0.013	-80%	0.150	131%	
Size (2003\$MM):	(Criteria: >0, US/Eur/Can/Aus)										
This dataset	257	0.063	0.044	70%	0.059	94%	0.011	-83%	0.145	130%	1.00
<= 1	44	0.054	0.035	65%	0.048	89%	0.018	-67%	0.109	102%	0.86
>1 to <=5	69	0.060	0.044	73%	0.060	100%	0.010	-83%	0.143	136%	0.95
>5 to <=25	71	0.064	0.046	72%	0.056	88%	0.013	-80%	0.150	134%	1.02
>25 to <=100	47	0.074	0.047	64%	0.071	96%	0.014	-81%	0.184	149%	1.17
>100	26	0.068	0.053	78%	0.055	81%	0.010	-85%	0.163	140%	1.08
Location:	(Criteria: >0)										
This dataset	274	0.065	0.045	69%	0.059	91%	0.013	-80%	0.150	131%	1.00
U.S.	223	0.064	0.043	67%	0.061	95%	0.011	-83%	0.150	134%	0.98
Europe/Can/Aus	34	0.061	0.052	85%	0.037	61%	0.021	-68%	0.105	72%	0.94
Other	17	0.092	0.060	67%	0.054	59%	0.016	-83%	0.183	99%	1.42

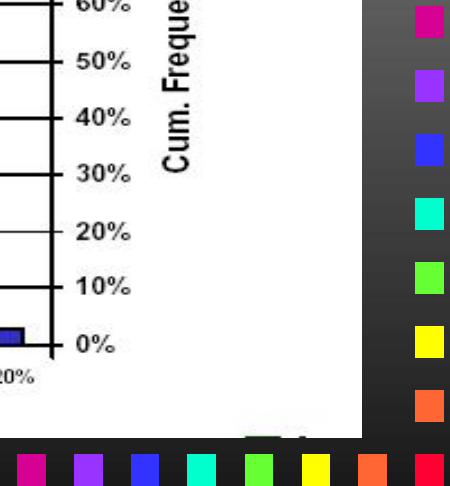
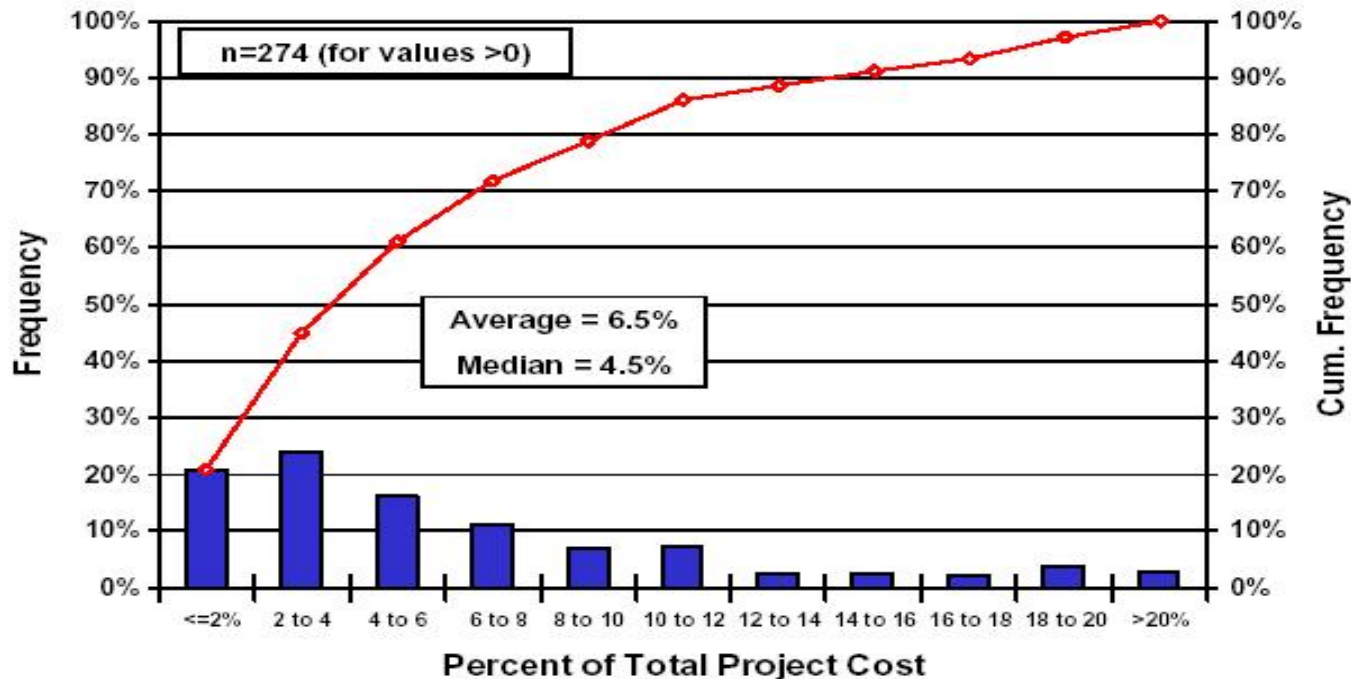


Sample Metrics

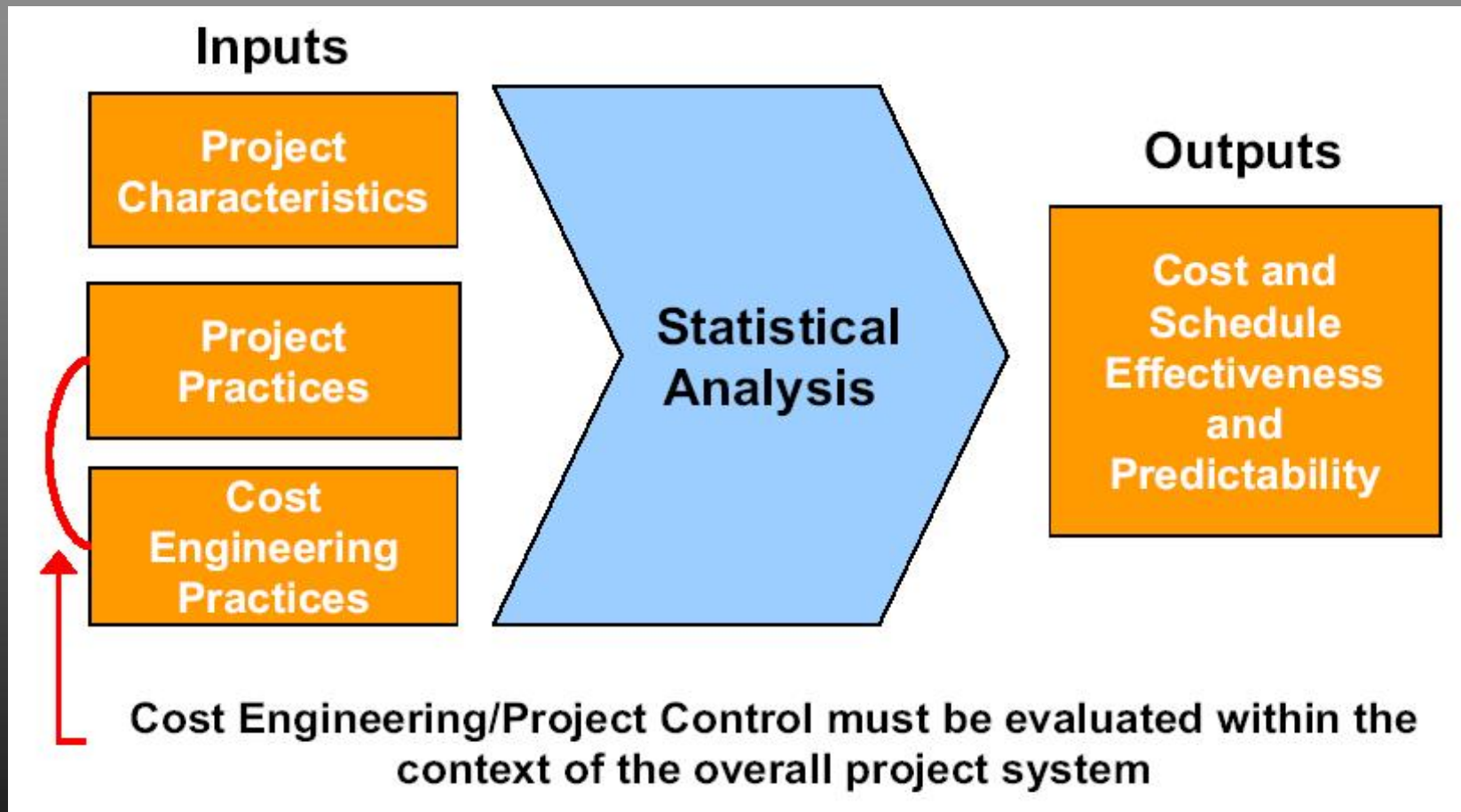


Construction Indirects Percent of Total Project Cost

For this chart, Indirects includes:
CM + Construction Equipment +
Temporary Facilities



The Search for Best Practices

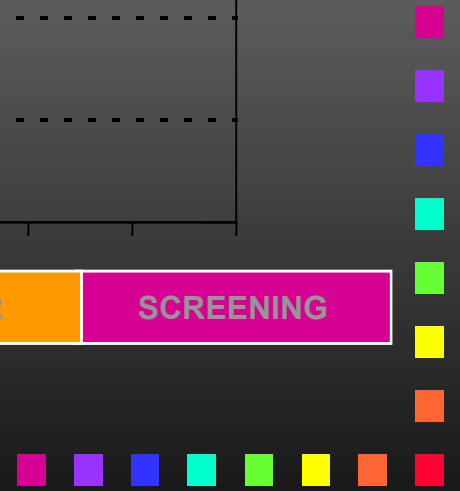
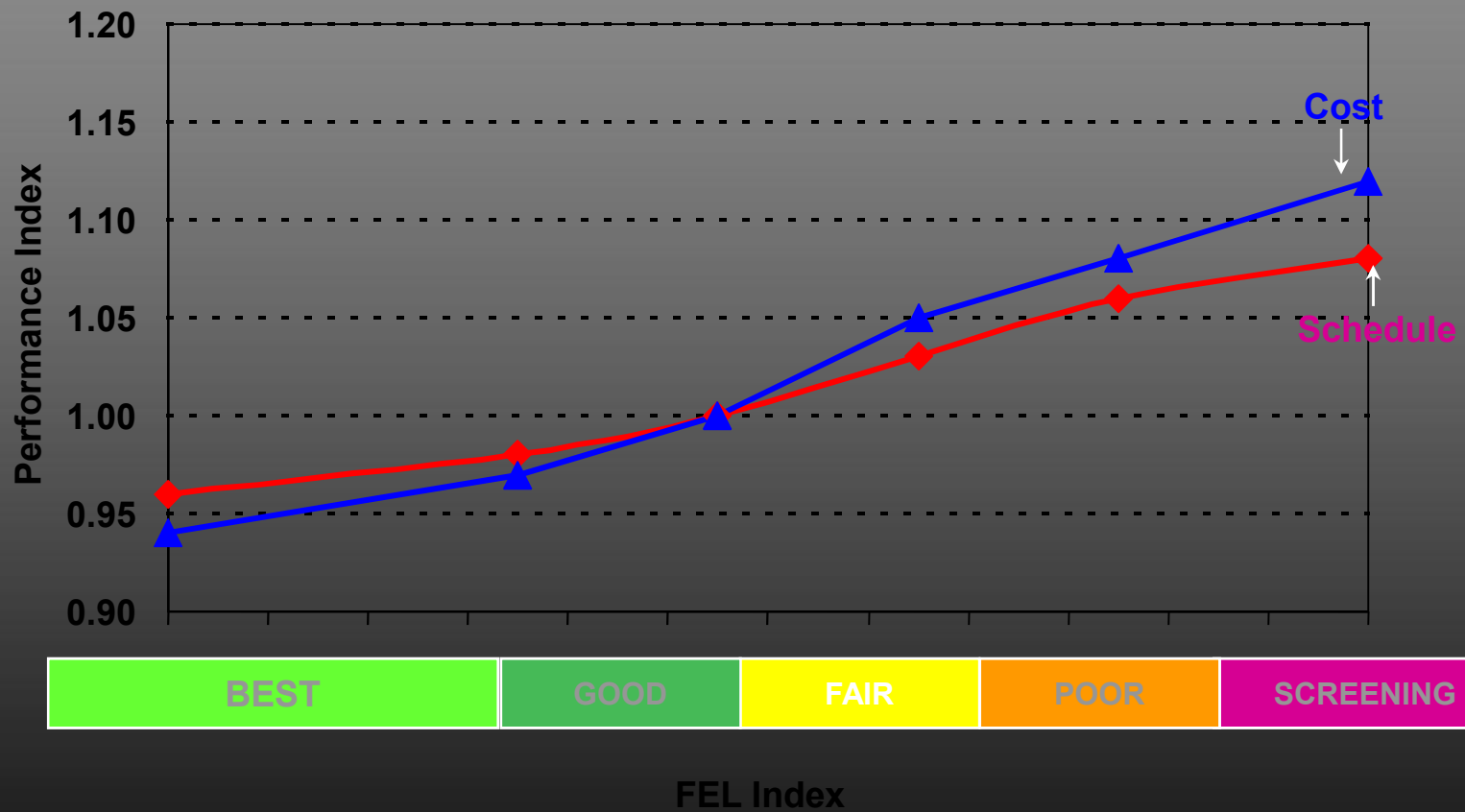


Findings & Trends

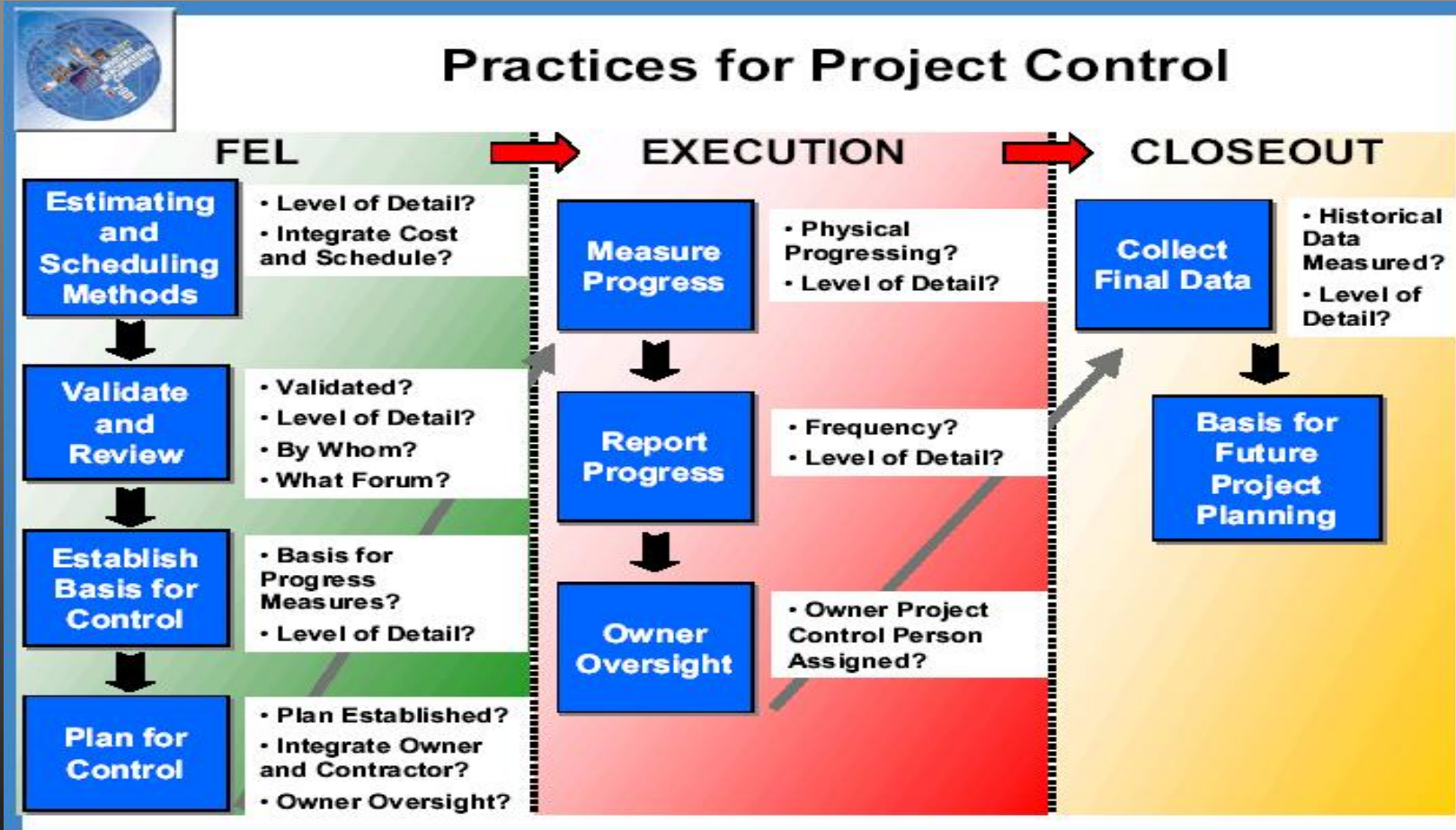
- Cost risk is highly correlated with project definition
 - Good project definition results in smaller cost deviations
 - Good project definition results in significantly less variability
 - Good project definition results in more cost effective projects



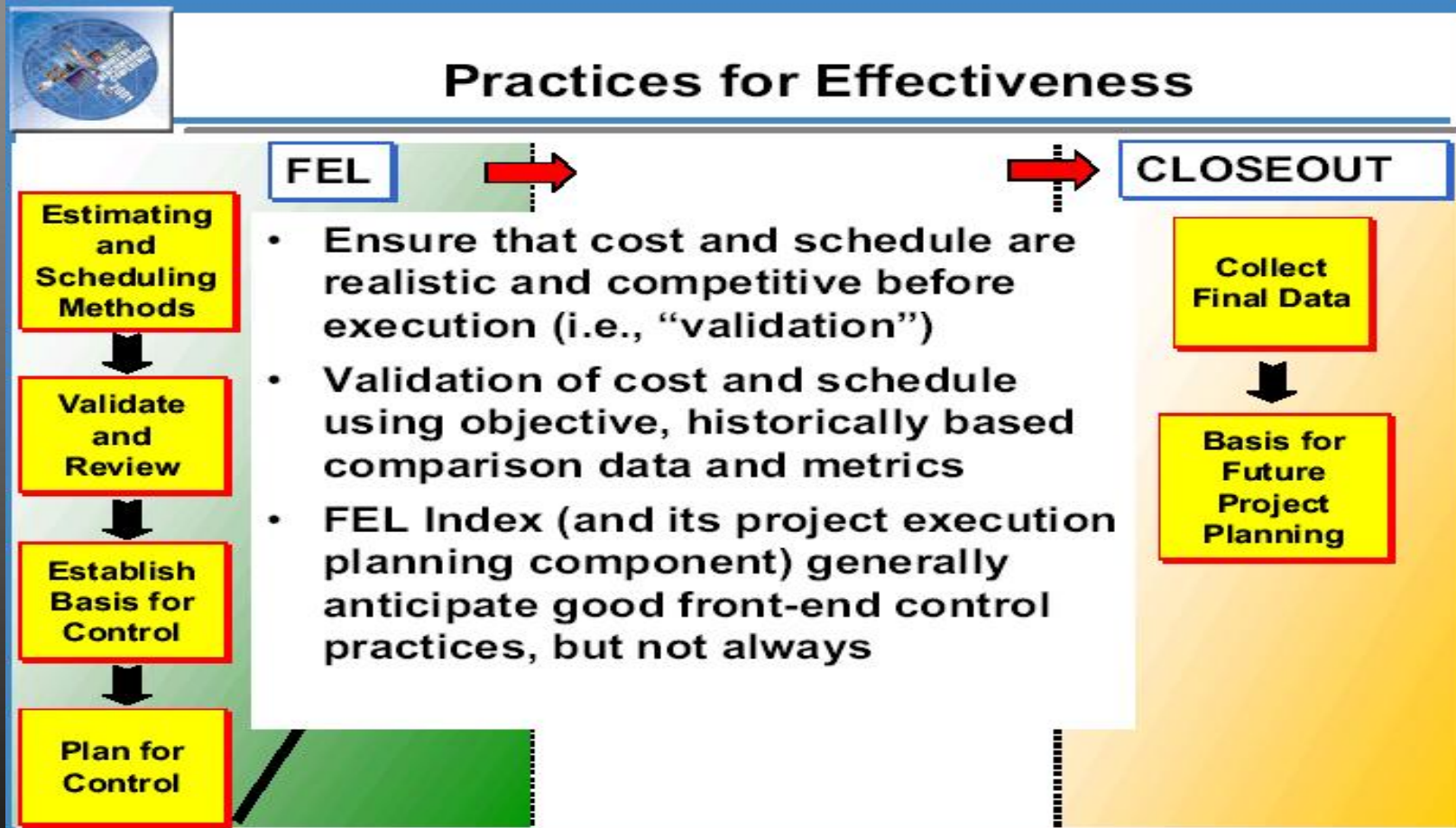
Results of Good Project Definition



Best Practices for Project Control



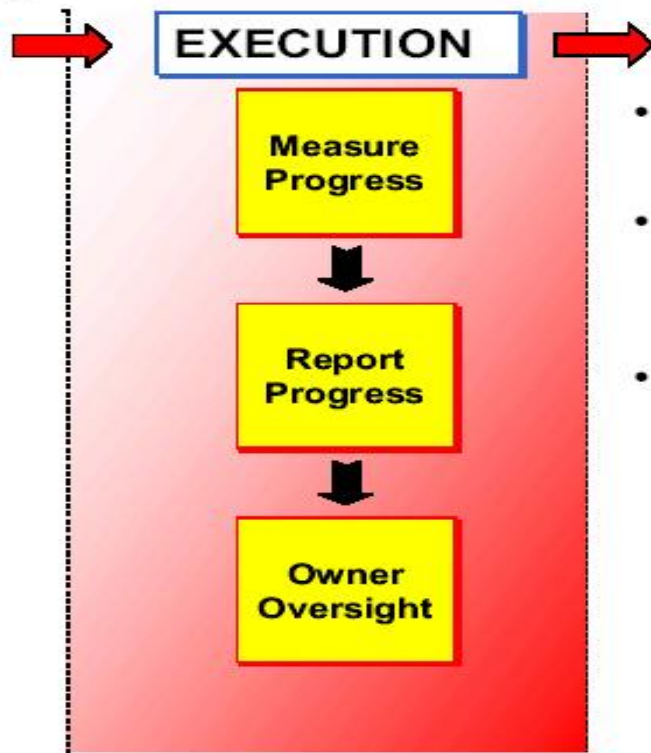
Achieving Cost/Schedule Effectiveness



Achieving Cost/Schedule Predictability



Practices for Predictability



- Ensure that planned effectiveness is achieved
- Improves effectiveness to the extent that growth and slip are minimized
- FEL Index is not strongly correlated with project control practices during execution – good definition is often not followed up with good control, especially for small projects



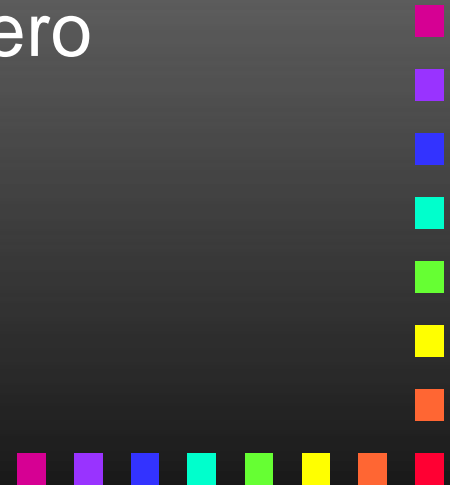
Project Control Best Practices

- Owner cost specialist validates cost estimate
- Detail physical progressing
- Frequent and detailed progress status reporting
- Actual cost data captured in an owner database
- Benchmarking/Metric Analysis systems in place



Findings & Trends

- Overall, project costs are becoming more predictable
 - Absolute cost deviation is decreasing
 - Median % deviation is close to zero
 - Variability is still relatively high



Findings & Trends

- Cost effectiveness is improving very slightly
 - Cost predictability does not yield cost effectiveness
 - Progress in developmental projects is limited
 - Cost engineering is not playing a large enough role in project selection



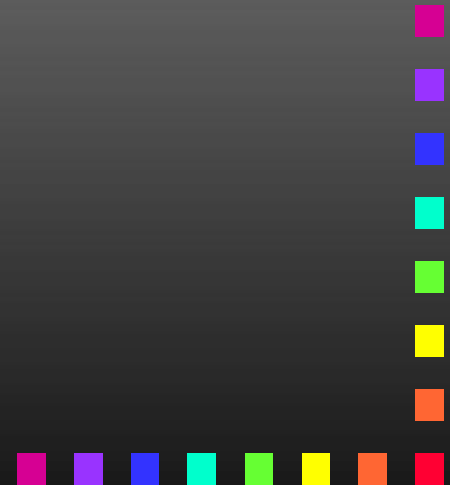
Findings & Trends

- Schedules are becoming more important
 - Schedules are getting faster
 - Schedule slip is declining
 - Contributes to lack of improvement in cost effectiveness



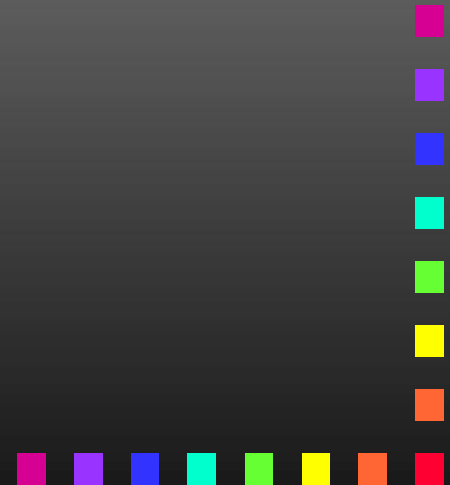
Reasons for Non-Competitive Results

- Non-competitive target setting
 - Corporate culture requires underruns
 - Lack of benchmarks/metrics
 - Previous projects overran cost or schedule
- Turnover in key personnel
 - Lack of team continuity
 - Lose contact with contractors
 - Team stretched too thin



Reasons for Non-Competitive Results

- Business Issues
 - Changes in product characteristics
 - Cash flow delays
- Contractor Issues
 - Inexperience at site/company
 - Poor change management
 - Unqualified contractors
 - Lack of contractor cooperation



Reasons for Non-Competitive Results

- Practices Are Not As Good As They Appear
 - Funding with inadequate project definition
 - VIP's not effective
 - Thorough schedule analysis not done
 - Links to other projects not incorporated into plan
 - Emphasis on saying we're the best instead of being the best



Benchmarking Reality Check

“The government are very keen on amassing statistics. They collect them, add them, raise them to the nth power, take the cube root, and prepare wonderful diagrams. But you must never forget that every one of these figures comes in the first instance from the village watchman who just puts down what he damn pleases.” - **Sir Josiah Stamp (1869-1919)**



Summary

- Benchmarking is a positive, pro-active approach to change project processes to achieve superior performance
- Benchmarking, by its nature, challenges the current methods of doing business
- Benchmarking is an objective-setting process
- Benchmarking should be a continual, long-term process (and requires management commitment)

