



EXCERPT FROM THE PROCEEDINGS

OF THE FIRST ANNUAL ACQUISITION RESEARCH SYMPOSIUM

USING METRICS TO MEASURE CONTRACTOR PERFORMANCE

Published: 30 September 2004

by

R. Marshall Engelbeck

**2nd Annual Acquisition Research Symposium
of the Naval Postgraduate School:**

**Charting a Course for Change:
Acquisition Theory and Practice for a Transforming Defense**

May 13, 2004

Approved for public release, distribution unlimited.

Prepared for: Naval Postgraduate School, Monterey, California 93943



ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 13 MAY 2004		2. REPORT TYPE		3. DATES COVERED 00-00-2004 to 00-00-2004	
4. TITLE AND SUBTITLE Using Metrics to Measure Contractor Performance				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School, Graduate School of Business and Public Policy, 555 Dyer Road, Room 332, Monterey, CA, 93943				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES 1st Annual Acquisition Research Symposium: Charting a Course for Change: Acquisition Theory and Practice for a Transforming Defense, 13 May 2004 in Monterey, CA					
14. ABSTRACT see report					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 22	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

The research presented at the symposium was supported by the Acquisition Chair of the Graduate School of Business & Public Policy at the Naval Postgraduate School.

To request Defense Acquisition Research or to become a research sponsor, please contact:

NPS Acquisition Research Program
Attn: James B. Greene, RADM, USN, (Ret)
Acquisition Chair
Graduate School of Business and Public Policy
Naval Postgraduate School
555 Dyer Road, Room 332
Monterey, CA 93943-5103
Tel: (831) 656-2092
Fax: (831) 656-2253
E-mail: jbgreene@nps.edu

Copies of the Acquisition Sponsored Research Reports may be printed from our website www.acquisitionresearch.org

Conference Website:
www.researchsymposium.org



ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL

Proceedings of the Annual Acquisition Research Program

The following article is taken as an excerpt from the proceedings of the annual Acquisition Research Program. This annual event showcases the research projects funded through the Acquisition Research Program at the Graduate School of Business and Public Policy at the Naval Postgraduate School. Featuring keynote speakers, plenary panels, multiple panel sessions, a student research poster show and social events, the Annual Acquisition Research Symposium offers a candid environment where high-ranking Department of Defense (DoD) officials, industry officials, accomplished faculty and military students are encouraged to collaborate on finding applicable solutions to the challenges facing acquisition policies and processes within the DoD today. By jointly and publicly questioning the norms of industry and academia, the resulting research benefits from myriad perspectives and collaborations which can identify better solutions and practices in acquisition, contract, financial, logistics and program management.

For further information regarding the Acquisition Research Program, electronic copies of additional research, or to learn more about becoming a sponsor, please visit our program website at:

www.acquisitionresearch.org

For further information on or to register for the next Acquisition Research Symposium during the third week of May, please visit our conference website at:

www.researchsymposium.org



THIS PAGE INTENTIONALLY LEFT BLANK



Using Metrics to Measure Contractor Performance

Presenter: R. Marshall Engelbeck, Lecturer, Graduate School of Business & Public Policy, Naval Postgraduate School

Abstract

This Project examines the use of metrics as a means to measure contractor performance. It is also designed to supplement the research being done on the “Characteristics of Good Metrics for Performance Based Logistics (PBL)” by Professors Ken Doerr and Ira Lewis along with Admiral Eaton.

Introduction

This Project examines the use of metrics as a means to measure contractor performance. It is also designed to supplement the research being done on the “Characteristics of Good Metrics for Performance Based Logistics (PBL)” by Professors Ken Doerr and Ira Lewis along with Admiral Eaton.

I can remember as a second lieutenant in the Air Force, the only metric I needed to know was how many aircraft are in commission and how many you could launch. This was a lesson I learned very earlier in my career when the Wing Commander, a very ambitious officer, kept reporting to higher headquarters all the aircraft were in commission. After about two or three weeks we had a team visit the base. We went to the stand-up in the morning the team leader asked the Wing Commander, “how many aircraft were in commission?” When he answered 100% the team leader told him to launch them. Only about 70% got off the ground. Now that I have more experience and realize the world is much more complex, it is clear that measuring performance, especially when it comes to multiple variables is important. This is critically important as it relates to contractor performance.



Research Questions

Research Questions

1. What is the regulatory foundation for Government oversight of contractor performance after contract award?
2. Is there a difference between contracting for supplies/equipment and services? **I**
3. Is there a difference between the metrics used to evaluate contractor performance for delivering supplies/equipment and services?
4. Is there a difference in the type of metrics valued by the User, PMO, PCO and ACO/COR? **II**

Since my research question concerns the use of metrics to measure contractor performance in an organization as large as the Department of Defense the first research question addresses what is the regulatory foundation for the use of metrics to measure performance?

The second question: Is there a difference between metrics applicable to contracts for supplies and contracts for equipment. This question was selected because I perceive we continue to view the procurement practices as if we were buying only supplies and equipment. Today, the statistics tell us that 60% of our dollars are going to purchase services.

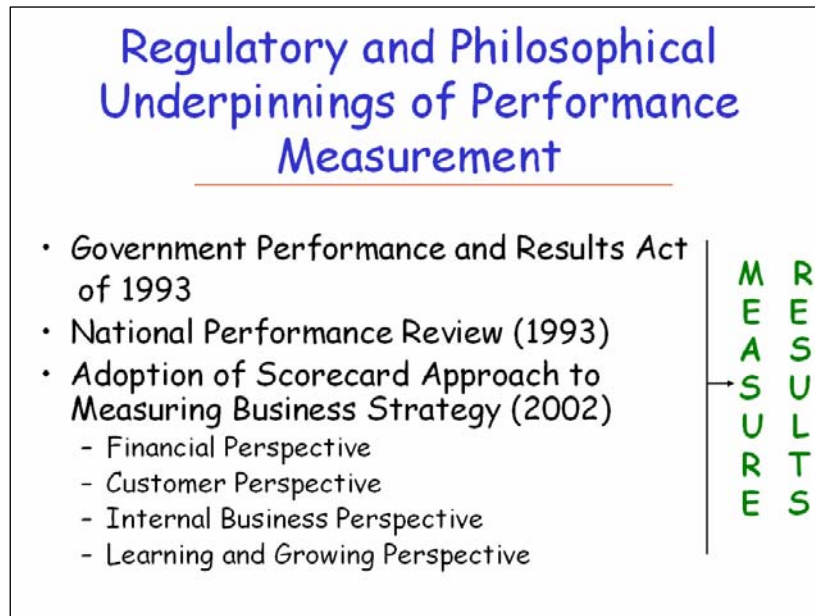
This brings us to the third question: Are there differences between the metrics used to measure contractor performance when we are buying supplies and equipment from the ones from whom services are purchased?

These three questions are addressed in phase one of my research project and represent a majority of the information that will be provided this afternoon.

Although it is part of phase II, I will touch on a fourth question in order to illustrate that various functions have their own interests. They have different concerns, which are often portrayed in the metrics they view as most valuable. This is very significant because it sends mixed signals as to what we value as being important.



Regulatory and Philosophical Underpinnings of Performance Measurement



First we have the Government Performance and Results Act of 1993. Much of the literature on this subject concentrates on the requirement that each of the departments in the Executive Branch report to Congress on program results every two years. Frankly I didn't realize the extent the management philosophy behind this piece of legislation has affected the way managers view their management responsibilities at the grass roots level. As many of you know the Act says: no longer is having a program the primary objective, nor is it the compliance with process that is most important. What is paramount is the results achieved and the fact you also need to measure the outcome in order to evaluate effectiveness. I'm hearing this philosophy expressed more frequently in day-to-day discussions with the students we have in class here in Monterey as well as from students from the buying offices throughout the country that participate in our distance learning programs.

The next major event that has affected the application of metrics to the acquisition process has been the National Performance Review, which as you remember, also occurred in 1993. The Core Vision of that review was that government works for the people and should be free from red tape and useless rules no doubt facilitated acquisition streamlining.

The Federal Acquisition Streamlining Act of 1994 has been heralded as changing the way we buy goods and services. It prompted major changes to the Federal Acquisition Regulations (FAR), which hit the field in 1995. As a practitioner I was most appreciative of the "guiding principles" and "performance standards" stated in the preamble to the FAR.¹ They were

¹ FAR Part 1.102



very significant because for the first time in my memory, and I go back to the Armed Services Procurement Regulations (ASPR), a procurement regulation made it clear the primary goal was to support the ultimate user. This revision to FAR also included four results oriented performance standards by which the process can be measured. We all owe a debt of gratitude to Professor Steve Kelman, a member of this panel, who was head of OFPP at the time, for putting acquisition in the right perspective.

Next on the philosophical side, we have the “balanced scorecard” concept. Because the federal government does not operate in a “profit” environment some advocate use a modified “balanced scorecard” approach when applied to government operations.² “Balanced scorecard” is a concept introduced by Robert S. Kaplan and David P Norton of Harvard in 1996. It evolved from their study of how four corporations measured their performance and set corporate strategy.³ This concept represents a good guide for establishing a strategic measurement system. However, we need to be cautious. We shouldn’t just adopt what business is doing. It is important that we take good ideas from industry and adapt them to our needs.

You Get What You Measure!

You Get What You Measure!*

- You Should ... “State Objectives in Terms of Measurable Results.”
 - People Are Better Motivated With Measurable Objectives Than Without Them. (Schleh 1961)
- “If You are Not Measuring You are Not Managing-You Are Just Along for the Ride.” **

* Marshall W. Meyer, *Rethinking Performance Measurement*, Cambridge University Press, UK, 2002, 4.

** Luke Campbell and Brian Koster, “Software Metrics: Adding Engineering Rigor to a Currently Ephemeral Process,” briefing presented to the McGrumwell F/A-24 CDR course, 1995

As Dr. Marshall Meyer points out “You get what you measure.”⁴ This means when measuring performance it is vital to consider what to measure and the unintended consequences on what is not measured. This can lead to mixed signals as to what is important.

² James B. Whittaker, *President’s Management Agenda: A Balanced Scorecard Approach*, Management Concepts, Vienna, VA. 2003.

³ Robert S. Kaplan and David P. Norton, “Putting the balanced Scorecard to Work,” *Harvard Business Review*, September-October 1993.

⁴ Marshall Meyer, *Rethinking Performance Measurement*, Cambridge University Press, UK, 2004.



We must state our objectives in terms of measurable results. All agree with the comment made earlier that experience tells us, when we say to contractors this is what we want and what we will measure, we do not always say it in a way they can understand it. Some of the results we desire are not quantifiable. Case in point: How clean is clean? How do you measure clean? We want a facility maintained in the cleanest manner. How do you define that?

Consider the quote 'people are better motivated with measurable objectives than without them', made back in 1961. The lesson from this for our students sitting in the back, don't throw away your old textbooks. This quote came from the textbook titled "Management by Results" that was popular in 1961.⁵ I kept mine all these years. I knew it would come in handy sometime.

Last, but not least, is a statement that moves metrics from a measurement to a management tool. This is a statement made by Luke Campbell. It was made at a software metrics conference in the mid-1990's where he said, "If you're not measuring, you're not managing. You're just along for the ride!"⁶ That management philosophy says a lot.

Performance Measurement

So what are we talking about? Here's performance measurement, I'll let you read the definitions as they came out of the President's management agenda and the scorecard approach published just last year.⁷

Performance Measurement

- Process of Assessing Progress Toward Achieving Predetermined Goals
- Includes Information on,
 - Efficiency Resources are Transformed into Quality Outputs
 - Extent to Which Customers are Satisfied
 - Effectiveness of Government Operations in Terms of Specific Contributions to Program Objectives

James B. Whittaker, Presidents Management Agendas: Balanced Scorecard Approach, Management Concepts, Vienna, VA, 2003, p. 259

⁵ Edward C. Schleh, *Management by Results*, McGraw-Hill, New York, 1961.

⁶ Luke Campbell and Brian Koster, "Software Metrics: Adding Engineering Rigor to a Currently Ephemeral Process," 1995.



Acquisition Program Baseline

Acquisition Program Baseline (DoD 5000 Series Regulations)

- User Performance Requirements
- Schedule Requirements
- Interoperability
- Supportability
 - Cost of Ownership
- Applicable Environmental Requirements
- Estimate of Total Program Cost

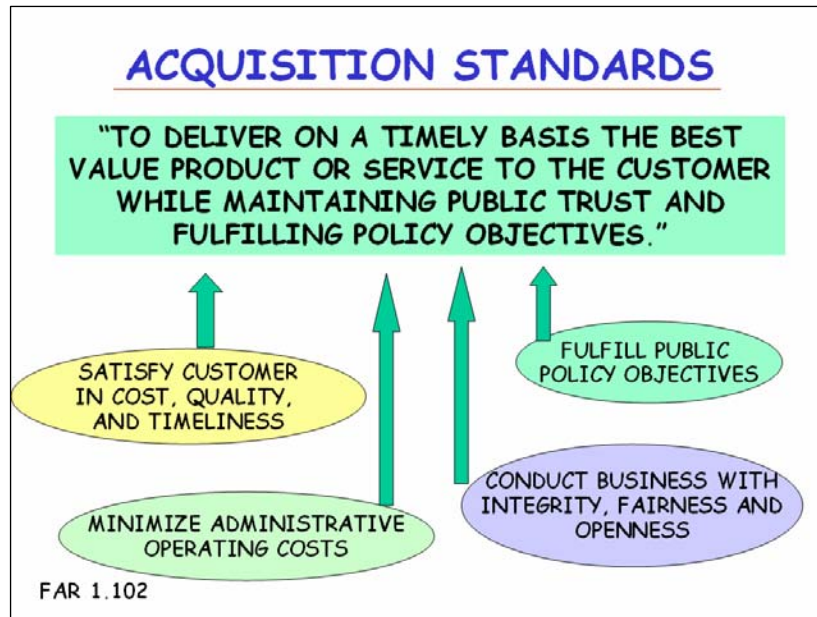
5000.2-R dated April 5, 2002, Paragraph C 1.4.

Next, what overarching metrics do we have? What are our objectives as stated by from OSD? They are cited in the DoD 5000 series regulations. These are the performance factors the program manager must report on when reviewing program milestones. They are mandatory for high-value or high-priority programs. They include performance requirements, schedule requirements, interoperability, supportability, cost-of-ownership, applicable environmental requirements, and estimate of total program cost.⁸

⁷ James B. Whittaker, *President's Management Agenda: A Balanced Scorecard Approach*, Management Concepts, Vienna, VA. 2003.

⁸ Paragraph C 1.4 of DoD 5000.2-R dated April 5, 2002.





Moving into the contracting side, this came out of the Acquisition Streamlining Act FAR 1.102. Doctor Kelman, thank you for putting this in there, because we in the contracting community were working so hard to follow the regulations, which we sometime forget about keeping our eye on the ball.

Comment by Dr. Kelman: Will you also please thank Dave Drabkin who played a very important role as a civil servant and worked with Colleen Preston in OSD.

Note, that performance standards flow upward, illustrating that in order to achieve results, the acquisition process must successfully meet the standards established in four areas of performance. I would venture to say each of these areas are where performance metrics would be useful.



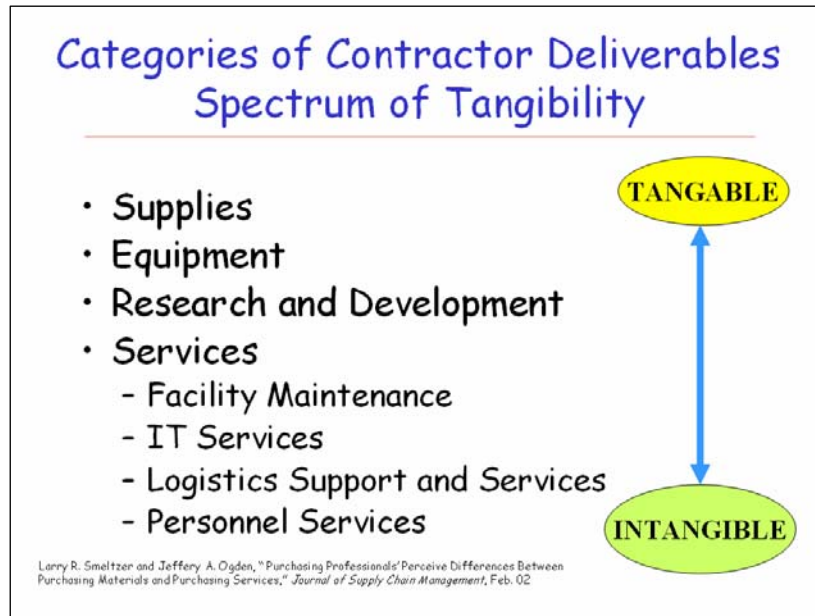
Categories of Deliverables



As you recall two of the first three research questions dealt with the three different categories of deliverables. First is the delivery of supplies and equipment. This category includes the High-Value and High-Priority systems that are covered by the DoD 5000 series regulations we discussed earlier. This is the area that in the past has received most of our attention when it came to regulations and our policies. However, dollar wise we're not buying as much in this area as we did prior to the end of the cold war. Currently approximately 60% of procurement dollars go to purchase services. This includes installation support, food service and installation maintenance. Then we have weapons system support and other mission capabilities, component repair, sustaining engineering, advisory services, research and development, logistics/sustainment services including depot level maintenance and computer software support.



Categories of Contractor Deliverables Spectrum of Tangibility



The next research question was: Is there is a difference between contracting for Supplies/equipment and buying services? A study from the *Journal of Supply Chain Management* reported a survey of about 1400 contracting personnel in the commercial world and concluded: (1) supplies and equipment are more tangible than services. (This slide illustrates a range of tangibility as it applies to the categories of deliverables purchased by DoD.); (2) there is a difference in the degree of difficulty between writing requirements for tangible vs. intangible items; and (3) it's much harder to write requirements documents for the intangible items.⁹ There have been other studies that reached the same conclusion. Just yesterday I was talking to Laura Baldwin of the RAND Corporation and she commented that she continues to be surprised at the problems the acquisition community is having in stating performance-based requirements. We've gone to defining "what" we want rather than describing "how" we wanted it done. She also said there are more contracting issues that span the differences between the two methods than she had ever imagined. I agree with what Ken Doerr said previously, we still want to measure the how.

⁹ Larry R. Smeltzer and Jeffery A. Ogden, "Purchasing Professional's Perceive Differences Between Purchasing Materials and Purchasing Services." *Journal of Supply Chain Management*, Feb., 02.

Top Ten Categories

Top Ten Categories		
CATEGORIES/(PERCENTAGE)	RELATIVE IMPORTANCE	
- Quality and Process Control (24.9)	1	
- Continuous Improvement (9.2)	2	No Statistical Difference
- Facility Environment (8.2)	2	
- Customer Relationship (8.2)	2	
- Delivery (8.1)	2	
- Inventory and Warehousing (7.0)	2	
- Ordering (5.8)	2	
- Financial Condition (5.5)	2	
- Certifications- ISO (3.6)	3	
- Price (3.6)	3	

Penny M. Simpson and Judy A Siguaw, "Measuring the Performance of Suppliers: An Analysis of Evaluation Processes," *Journal of Supply Chain Management: A Global Review of Purchasing and Supply*, Institute of Supply Management, February 2002, Tables III and IV, pages 13 - 14

To get an idea what industry measures, this slide shows the top ten supplier performance categories evaluated by over 2,000 randomly selected members of the Institute for Supply Management (ISM) and reported in the *Journal of Supply Management*.¹⁰ Note that way and above the rest is quality and the importance placed on continuous improvement. Also note at the bottom is price, which was evaluated by less than 4% of the respondents. In the middle section are facility environment (9.2%), customer relationship (8.2%), delivery (8.1%), inventory and warehousing (7%), ordering (5.8%), and financial condition (5.5%). Notice there are no statistical differences between these categories. This tells us what industry thinks are the most important supplier performance indicators. It also says buyers, as a supplier or as a producer of a product, want to have a good supply base to deliver quality product.

¹⁰ Penny M. Simposn, Judy A. Siguaw and Susan C. White, "Measuring the Performance of Suppliers: An Analysis of Evaluation Processes, *Journal of Supply Chain Management*, February 2002.



How Commercial Firms Measure Services

How Commercial Firms Measure Services

- Customer-Provider Relationship
 - Call Center Metrics
- Customer Satisfaction Metrics
 - Overall Customer Satisfaction
- Operations
 - Total Cost of Ownership
 - Occupancy Cost
- Special Interest
 - Number of Contracts With Small Businesses

Laura H. Baldwin, Frank Camm, and Nancy Moore, *Strategic Sourcing: Measuring and Managing Performance*, RAND DB-287-AF, Santa Monica, CA, 2000, Appendix B

Let's look at services. In a study published by RAND, Laura Baldwin studied 14 corporations that purchase services to determine what they measure. Customer-provider relationship, like a call center response, is an important metric. The question asked was, "were you satisfied with the response you got on the call?" This question could be applied to a maintenance technician after being dispatched to repair an aircraft on the line or it can also apply to a repair of a water heater in a facility at a Navy installation.

Customer satisfaction metrics, overall customer satisfaction: That's hard to quantify. The only way is through some type of a survey. We all get them all the time; when we stay in hotels, things like that.

Next is Operations: This I found very interesting. Many companies measure the cost of ownership of a facility. They track the cost of repairs by building or they evaluate its ownership cost by the number of occupants.

Last, but not least, are special interests: The number of contracts with small business or socioeconomic programs. The message here is the metrics are different for services than for hardware.



Conclusions

Conclusions

1. GPRA Confirms Need to Design Performance Metrics that Measure Program Results
2. Customer Satisfaction Should be the Number One Standard Metric
3. There is a Difference Between Metrics Used to Evaluate Contractor Performance between Supplies/Equip. and Services?
4. There Should be Relatively Few Key Performance Indicators (KPIs)

In conclusion; The Government Performance results Act (GPRA) of 1993 establishes the need for government managers to define desired program results and to establish performance metrics so that results achieved can be measured. Customer satisfaction should be the number one standard metric.

There is a difference between metrics used to evaluate contractor performance for supplies/equipment and services.

There should be relatively few key performance metrics. However, achieving this with the number of competing interests will be difficult. Currently a company working out of New York is walking the halls of the Pentagon saying that it has an IT program that will measure contractor performance. It contains between 100 and 1,000 factors that can be measured and report contractor performance. They advertise that their program can be tailored to individual contracts. Their theme is, if we're not measuring and managing all the contract requirements then the taxpayer is getting short changed. I would ask, if we had to measure 1,000 factors that could be measured in a contract and managers feel there are only 10 or so of these they feel are important, then are we paying for something we really don't need that much.



Conclusions

5. Metrics Selected Should be able to Project Subsequent Outcomes (Results)
6. Metrics Selected Should Facilitate Continuous Improvement
7. Metrics Selected Should Cross-Functional Boundaries
8. Should Provide Capability to Compare Contractors
9. Metrics Selected Should be Used to Award/Penalize Contractors

Metrics selected should be able to project subsequent outcomes. They should give you the ability, by looking at trend analysis, where you will be in the future. Answer the question; will this contractor be able to support the organization's mission?

- Metrics selected should facilitate continuous Improvement.
- Metrics selected should also cross-functional boundaries. Our processes cross-organizational boundaries horizontally. They are no longer confined to functional stovepipes as we learned with the introduction of the computer.
- The performance measurement system should provide the capability to compare contractors and should be use to award/penalize contractors.

Final Thoughts

Research results concludes, performance measurement can be used to manage contractor performance after award. Private industry uses performance measurement primarily to evaluate the effectiveness and efficiency of its purchasing department and to guide contractor selection. However, the Government Performance and Results Act (GPRA) of 1996 makes measurement of contractor performance a very appropriate way to manage contracts in the public sector.

GPRA requires managers in the executive branch to develop strategic plans as use performance indicators to record output and evaluate the outcome of each program. The study recommends that the Kaplan and Norton's Balanced Scorecard method can be adapting to the contract in a manner that would enable performance indicators to flow down to major contractors. The goal would be to add joint accountability for results to the buyer-seller relationship.



Past performance is also an integral part of the contract management process. It is primarily seen as a way to mitigate the risk of selecting a contractor with a poor performance track record by reporting on contractor performance annually. Examples of information that must be reported to a centralized data base by the contracting officer includes, (a) A contractor's record of conforming to contract requirements and standards of good workmanship, (b) A contractor's record of forecasting and controlling cost, (c) A contractor's adherence to contract schedules, including the administrative aspects of performance contractor's history of reasonable and cooperative behavior and commitment to customer satisfaction and, (d) A contractor's business-like concern for the interests of the customer. The study concludes that both parties would jointly benefit managing these indicators concurrent throughout the life of the contract rather than reporting after the fact.



THIS PAGE INTENTIONALLY LEFT BLANK



2003 - 2006 Sponsored Acquisition Research Topics

Acquisition Management

- Software Requirements for OA
- Managing Services Supply Chain
- Acquiring Combat Capability via Public-Private Partnerships (PPPs)
- Knowledge Value Added (KVA) + Real Options (RO) Applied to Shipyard Planning Processes
- Portfolio Optimization via KVA + RO
- MOSA Contracting Implications
- Strategy for Defense Acquisition Research
- Spiral Development
- BCA: Contractor vs. Organic Growth

Contract Management

- USAF IT Commodity Council
- Contractors in 21st Century Combat Zone
- Joint Contingency Contracting
- Navy Contract Writing Guide
- Commodity Sourcing Strategies
- Past Performance in Source Selection
- USMC Contingency Contracting
- Transforming DoD Contract Closeout
- Model for Optimizing Contingency Contracting Planning and Execution

Financial Management

- PPPs and Government Financing
- Energy Saving Contracts/DoD Mobile Assets
- Capital Budgeting for DoD
- Financing DoD Budget via PPPs
- ROI of Information Warfare Systems
- Acquisitions via leasing: MPS case
- Special Termination Liability in MDAPs

Logistics Management

- R-TOC Aegis Microwave Power Tubes



- Privatization-NOSL/NAWCI
- Army LOG MOD
- PBL (4)
- Contractors Supporting Military Operations
- RFID (4)
- Strategic Sourcing
- ASDS Product Support Analysis
- Analysis of LAV Depot Maintenance
- Diffusion/Variability on Vendor Performance Evaluation
- Optimizing CIWS Life Cycle Support (LCS)

Program Management

- Building Collaborative Capacity
- Knowledge, Responsibilities and Decision Rights in MDAPs
- KVA Applied to Aegis and SSDS
- Business Process Reengineering (BPR) for LCS Mission Module Acquisition
- Terminating Your Own Program
- Collaborative IT Tools Leveraging Competence

A complete listing and electronic copies of published research within the Acquisition Research Program are available on our website: www.acquisitionresearch.org





ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL
555 DYER ROAD, INGERSOLL HALL
MONTEREY, CALIFORNIA 93943

www.acquisitionresearch.org