Special Feature

Dr Michael Hammer, a recognized leader in the field of process reengineering, notes four principles of measurement: measure what matters, rather than what is convenient or traditional; measure what matters most, rather than everything; measure what can be controlled, rather than what can not be controlled; and measure what has impact on desired business goals, rather than ends in themselves.

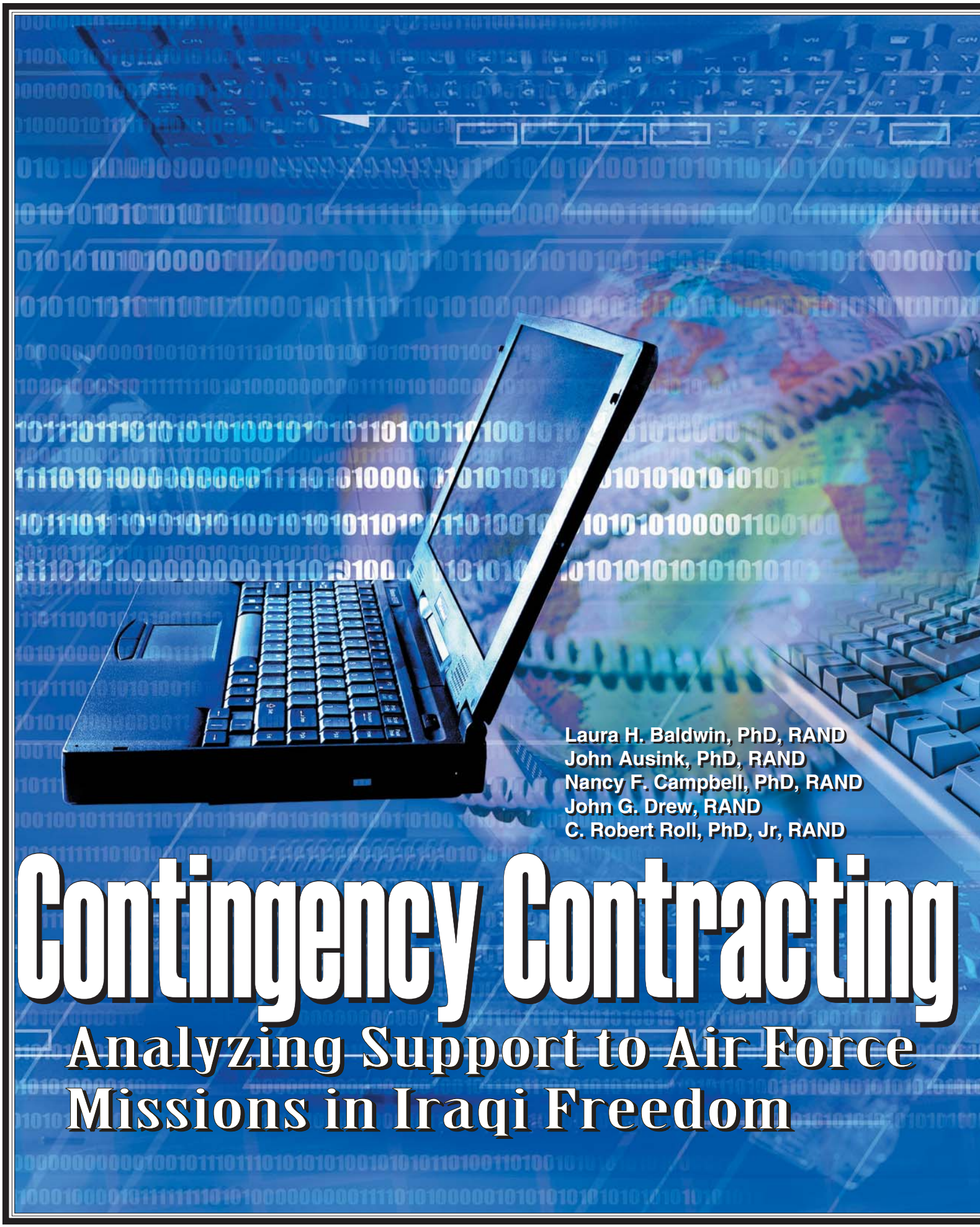
logistics Support Analysis

Contingency Contracting: Analyzing Support to Air Force Missions in Iraqi Freedom
Aligning Maintenance Metrics: Improving C-5 TNMCM

This edition of the Journal presents two featured articles: "Contingency Contracting: Analyzing Support to Air Force Missions in Iraqi Freedom" and "Aligning Maintenance Metrics: Improving C-5 TNMCM."

In "Contingency Contracting: Analyzing Support to Air Force Missions in Iraqi Freedom" the authors demonstrate how a database of contingency contracting officer (CCO) purchases can be a powerful analytic tool to inform and support policy decisions and initiatives for CCO staffing and training, combat support planning, and sharing lessons within the theater.

The second featured article is part two of a three-part series that examines total not mission capable maintenance (TNMCM) rates for the C-5 fleet. The research demonstrated that home station logistics departure reliability (HSLDR) is aligned with neither aircraft availability nor TNMCM. Maintainers at the wing level work to support operational effectiveness; however, higher levels of Air Force supervision appear more focused on improving strategic readiness. This disconnect in priorities was determined to be a root cause of the C-5 TNMCM rate being below Air Force standards.



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Contingency Contracting

Analyzing Support to Air Force Missions in Iraqi Freedom

This article is dedicated to the memory of C. Robert Roll, PhD, a great friend and a scholar.

Introduction[1]

Special Feature

Contractors have been an important part of US war efforts since they were hired to take care of cavalry horses for the Continental Army during the Revolutionary War. While the history of contracted support to US military operations is a long one, the role of that support has expanded rapidly and extensively, particularly since the end of the Cold War.[2,3,4] Today the US Air Force, as well as the other US military services, buys an enormous amount and variety of goods and services to support its contingency operations. These purchases are necessary for a wide range of activities, including feeding, housing, and protecting military personnel; repairing aircraft weapon systems; and transporting personnel and supplies. The outcomes of these purchases directly affect the Air Force's ability to succeed in a contingency environment.

Purchasing goods and services to support contingency operations can provide several types of benefits to the Air Force. As with most types of outsourcing, contract support frees up airmen to perform core military activities. Providers that specialize in the outsourced goods or services often can offer improved performance and cost outcomes, if managed effectively. Buying in-theater reduces requirements for scarce transportation resources, potentially shortening deployment timelines, and also garners host-nation support for US military presence. Additionally, having the capability to purchase as needed, rather than being forced to predict requirements in advance, helps commanders meet emerging demands and the often-changing requirements associated with the realities of war.

Since September 11, 2001, the Air Force has been involved in two significant contingency operations in the United States Central Command (USCENTCOM) area of responsibility (AOR): Operation Enduring Freedom (OEF) in Afghanistan, and Operation Iraqi Freedom (OIF) in Iraq. To take advantage of the depth of contingency contracting experience built during recent operations, the Deputy Assistant Secretary of the Air Force for Contracting asked RAND Project Air Force to gather and analyze data on goods and services purchased to support Air Force missions in OIF to determine the size and extent of contractor support for OIF and how plans for and the organization and execution of contingency contracting activities might be improved to better support the warfighter in future operations.

The motivation for this study was that insights from comprehensive data on recent multiyear contingency contracting experiences would help inform decisions about a number of important policy issues.

First, such data could be used to improve the Air Force's ability to plan for combat operations at contingency operating locations, particularly by linking purchases to supplemental information about the phases of operations (such as deployment, the building of a base, the sustainment of operations at a base, or the closing of a base) and mission activities supported by those purchases.

Article Highlights

While price information can be a powerful tool for contingency contracting officers (CCO), additional information about the relative performance of suppliers and other factors related to meeting requirements, such as the urgency, transportation needs, or security threats, would be helpful in interpreting such comparisons.

In "Contingency Contracting: Analyzing Support to Air Force Missions in Iraqi Freedom" the authors describe the construction of a database of CCO purchases supporting Air Force activities in Operation Iraqi Freedom during fiscal years 2003 and 2004. The results of their analysis demonstrate how this database can be a powerful analytic tool to inform and support policy decisions and initiatives for CCO staffing and training, combat support planning, and sharing lessons within the theater.

They recommend the Air Force (and the Department of Defense more broadly) establish a standardized methodology for collecting contingency contracting data on an ongoing basis to facilitate planning and policy decisions for future contingencies.

To facilitate the types of analyses required, the Air Force needs to systematically gather contingency contracting data on an ongoing basis. To be most useful, the CCO data system must make it possible to quickly access detailed

For example, the Air Force could make more informed trade-offs between purchasing required assets as needed during operations in-theater or purchasing them in advance and then using airlift or other transportation assets to move materials from the United States or regional storage locations to operating locations.

Second, purchasing data could be used to improve training for future contingency contracting officers (CCOs). Insights about how purchasing evolves with operational phases could be used to design more realistic training courses. Further, information about typical goods and services purchased, types of contracts used, and supply bases at specific locations could be used to better prepare CCOs before deployment.

Third, information about contracting workloads at different types of bases and other purchasing organizations during different phases of operations could be used to better align CCO organizations and personnel assignments (both CCO numbers and skill levels) with warfighter requirements.

Finally, descriptive data on individual transactions are important inputs in efforts to improve purchasing practices across the theater. For example, CCOs could achieve more effective price negotiations based on improved visibility of prices of similar goods or services, as well as identification of potential opportunities to improve the Air Force's leverage with key suppliers through contract consolidation across commodity groups or sites.

Defining Contingency Contracting for Operation Iraqi Freedom

The Air Force Federal Acquisition Regulation Supplement (AFFARS) provides the following relevant definitions:

- A contingency is "an emergency, involving military forces, caused by natural disasters, terrorists, subversives, or required military operations."
- CCOs are people with "delegated contracting authority to enter into, administer, and terminate contracts on behalf of the Government in support of contingency…operations."[5]

In this article, we use a broad definition of contingency contracting for OIF that includes war preparations in early fiscal year (FY) 2003, the major combat operations in mid-FY 2003, and postwar activities beginning in the latter part of FY 2003. Although United States Central Command Air Forces (USCENTAF) was the primary major command involved in Air Force operations, many other commands and organizations made purchases in support of this effort. For example, purchases were made to support US Air Forces at European bases, Air Force Special Operations Command forces, and Air Mobility Command operations.

Building the Database

To develop a baseline of Air Force contingency contracting for OIF and obtain insights relevant to the policy issues introduced above, we sought to develop a comprehensive database of Air Force OIF contingency purchases, which were made by a large number of organizations around the world. Our analyses are based on CCO purchases at 24 purchasing organizations located within the USCENTCOM AOR that supported OIF during FY 2003 and FY 2004. These data include more than 24,000 transactions obligating more than $300M.

We chose these data for several reasons. The current lack of visibility into the details of the forward transactions and the decentralized nature of the CCO purchases suggest that there could be opportunities to improve planning for and execution of these activities, for example, through preplanning for certain types of goods or services, more effective price negotiation, or contract consolidation with key suppliers to the AOR. In addition, the numbers of dollars and individual transactions for USCENTAF are much greater than equivalent data received from other commands and organizations that supported OIF.

In order to create a comprehensive Air Force contingency contracting database for OIF, the RAND team used transaction logs maintained by the office of the USCENTAF comptroller, headquartered at Shaw Air Force Base, South Carolina. These data on CCO purchases were tracked in Microsoft® Excel® spreadsheets, which included similar, but not identical, data fields and spreadsheet formats for contract and government purchase card (GPC) files across purchasing organizations in fiscal years 2003 and 2004.[6] As a result, it was necessary for RAND to develop a detailed process to merge these files into an aggregated master database that would enable our analyses.[7]

The Air Force spreadsheets contained data fields such as a text description of the goods and services purchased, the date the purchase was requested, the price paid, and the supplier. In addition, the RAND team created three new variables for our analyses. First, we created a variable for the purchasing organization (the base or other organization) with which the comptroller associated the transaction. Second, we used the text description for each transaction to categorize the purchase according to one or more types of goods or services. And third, we used several pieces of data from the spreadsheets to create a variable for the type of transaction to identify whether the purchase was made using a GPC or a contract vehicle. Contracts are further broken down into blanket purchase agreements[8] (BPAs) and *other* contracts.

Baseline of Contingency Contracting for Operation Iraqi Freedom

This section provides an overview of the results of our baseline analysis of purchases supporting Air Force OIF activities during FY 2003 and FY 2004 at Air Force operating locations in the USCENTCOM AOR. RAND's database allowed the team to analyze the USCENTAF CCO purchases in several important ways. After an overview of expenditures, we describe:

- Who (which organizations) made purchases
- What types of goods and services were purchased
- When the purchases were made (time periods)
- How the purchases were made (contracting tools used)
- From whom (suppliers) the purchases were made

Who

Figure 1 provides information on the time frames for purchasing activity for each of the OIF purchasing organizations during FY 2003 and FY 2004. (Purchasing activity corresponds to operations for each of these organizations.) Only five organizations had contracting activity throughout both years. Some were active for only a few months.

An analysis of spending by location indicates that the most spending by far occurred at Al Udeid. Two things may explain this:

Article Highlights

descriptions of individual transactions, as well as aggregate those transactions according to categories of purchases, types of contract vehicles used, locations of purchases, suppliers dealt with, and so forth.

The authors also recommend establishing a standardized automated system for transaction-specific data that could be either virtually connected to a master database or regularly downloaded into such a database as a means of recording and cataloging purchases. Such a system should also include an easy method both for categorizing purchases across a wide range of commodities and services and for identifying suppliers in a standardized way. Contingency contracting representatives and logistics planners should work in concert to develop the database, ensuring that one standardized system will satisfy the requirements of both organizations.

Article Acronyms

AFFARS – Air Force Federal Acquisition Regulation Supplement
AOR – Area of Responsibility
BPA – Blanket Purchase Agreement
CAOC – Combined Air Operations Center
CCO – Contingency Contracting Officer
USCENTAF – United States Central Command Air Forces
USCENTCOM – United States Central Command
DFAS – Defense Finance and Accounting Service
FY – Fiscal Year
GPC – Government Purchase Card
OEF – Operation Enduring Freedom
OIF – Operation Iraqi Freedom
PSAB – Prince Sultan Air Base
RED HORSE – Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers

First, expenditures there include not only those for air base operations, but also for the Combined Air Operations Center (CAOC), which relocated from Prince Sultan Air Base (labeled *PSAB)* to Al Udeid during this period. Second, Al Udeid served as the forward headquarters of the Air Force in Southwest Asia during both OIF and OEF. Unfortunately, Al Udeid's and the CAOC's contract expenditures were captured only in a separate financial management system which lacks the necessary resolution to allow detailed analysis.[9]

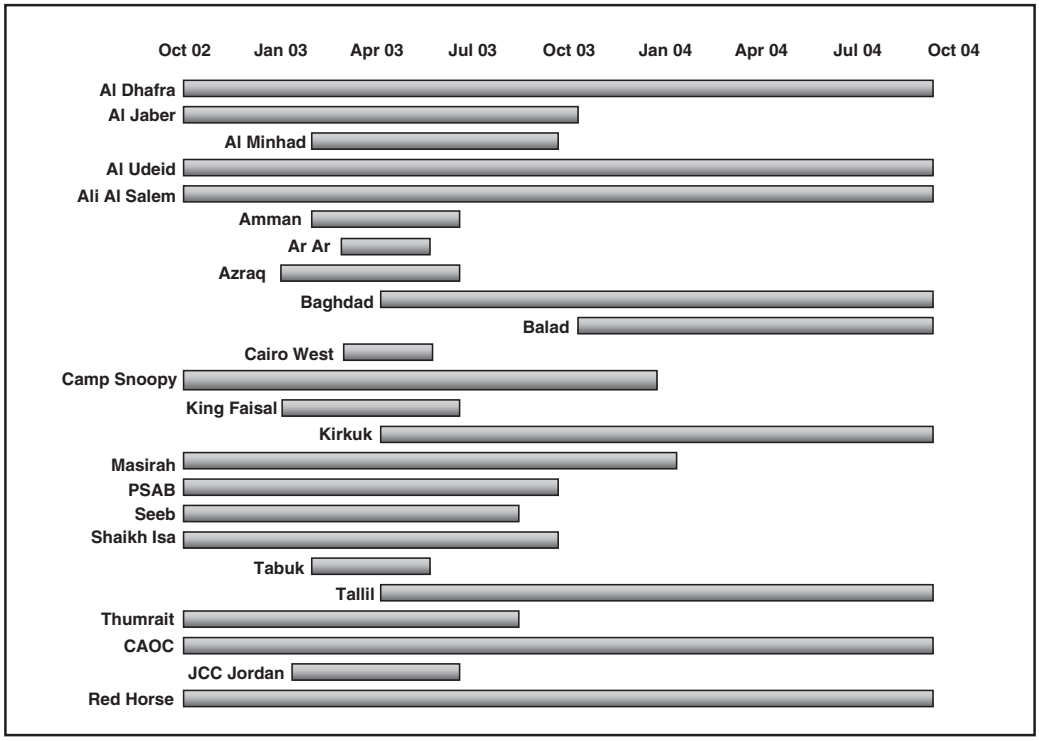

Figure 1. Timelines for Purchasing Activity, by Purchasing Organization

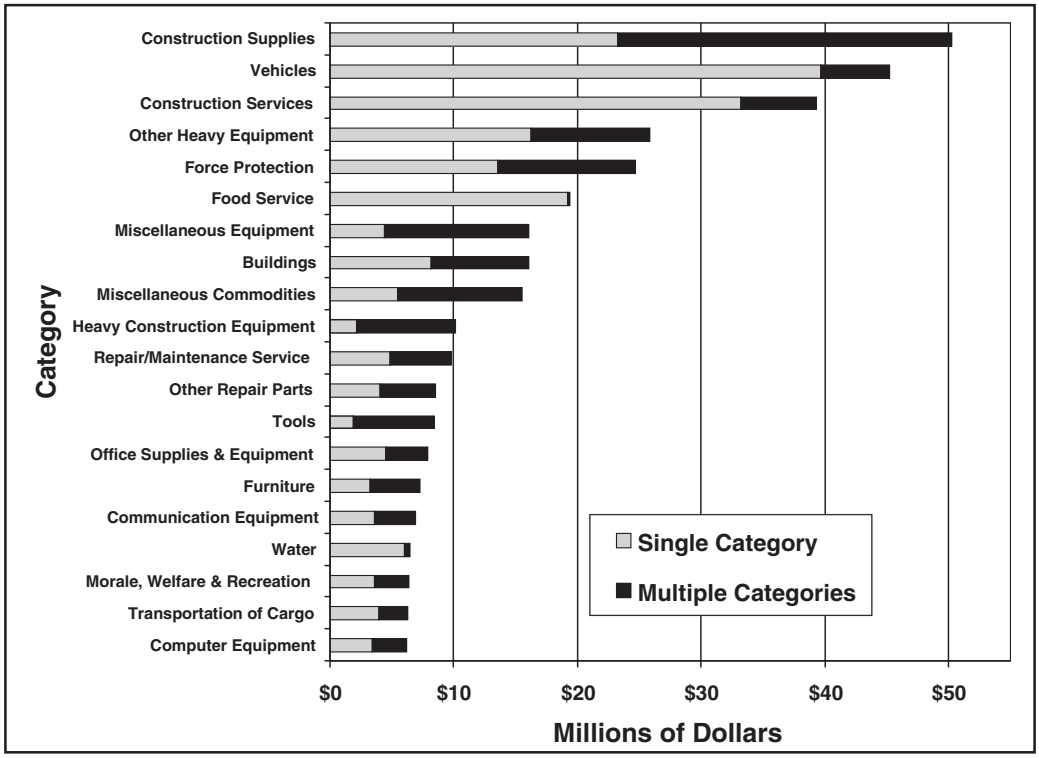

Figure 2. Obligations for the Top 20 Categories, FY 03 and FY 04

Note: the *single category* portion of the horizontal bars shows obligations that clearly belonged in only one category; the *multiple categories* portion shows obligations for transactions that could also be assigned to other categories.

What

Deployed CCOs purchased a variety of products to support OIF operations during FY 2003 and FY 2004. We created 45 categories of goods and services and used a computer program to assign transactions to these categories based on key words found in the text descriptions of the purchases. After categorizing the transactions as well as possible, we calculated both the total obligations per category as well as the number of transactions per category. The categories with the highest total obligations included construction supplies, vehicles, construction services, and other heavy equipment (see Figure 2).[10] Construction supplies, miscellaneous commodities, and office supplies and equipment represent the largest number of transactions.

When

Our database also allows analysis of purchases over time. Figure 3 shows that CCO purchases and transactions at these purchasing organizations were higher in FY 2003 than in FY 2004. This could be associated with the decline in the number of active bases or any number of other factors.

We can disaggregate these data to examine how the level of expenditures varied over time at individual bases. Such data can be used to make comparisons across locations according to characteristics such as base population, types of operational missions (for example, special operations, F-16s), existing base infrastructure, or permanency of the operating location.

While our database alone cannot address underlying causes for the observed differences in spending patterns across locations over time, an analyst with additional information about characteristics of locations such

as base population, numbers and types of aircraft, types of missions, types and maturity of base infrastructure, geographic dispersion of facilities, and Service branch responsible for base operating support, could perform more sophisticated evaluations to determine the correlation between these factors and spending patterns over time.[11] The results of such analyses could be used to make programming decisions about new bases, plan transportation requirements, match CCO resources with user requirements, and so forth.

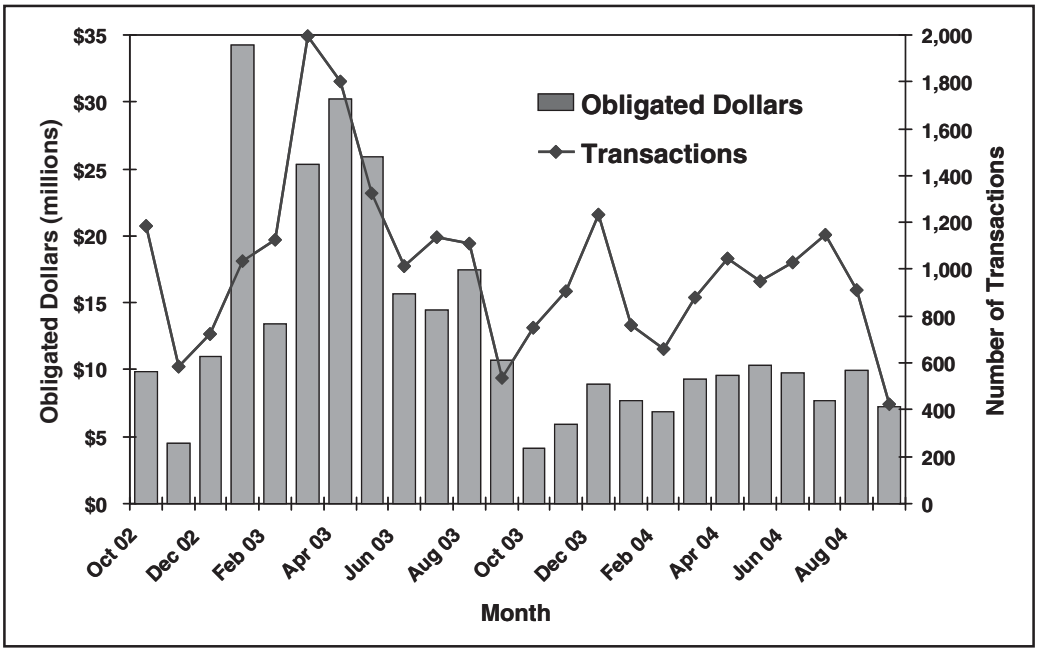

Figure 3. Obligations and Transactions by Month, FY 03 and FY 04.

How

CCOs have a variety of instruments with which to make purchase payments. Our data allow us to identify two particular types of instruments for further analysis: GPCs (essentially government-issued credit cards) and BPAs. Here, we compare purchases made using GPCs to purchases made through contract instruments that are recorded in USCENTAF comptroller files. As shown in Figure 4, GPC purchases represented more than one-third of the transactions made in fiscal years 2003 and 2004 , but they represented less than one-tenth of the dollars spent.

Since GPCs are designed for purchases of small items, such as office supplies—many of which can be made over the Internet—this is an understandable finding. The dollar amount for the average contract transaction was about 6 times larger than the amount for the average GPC transaction.

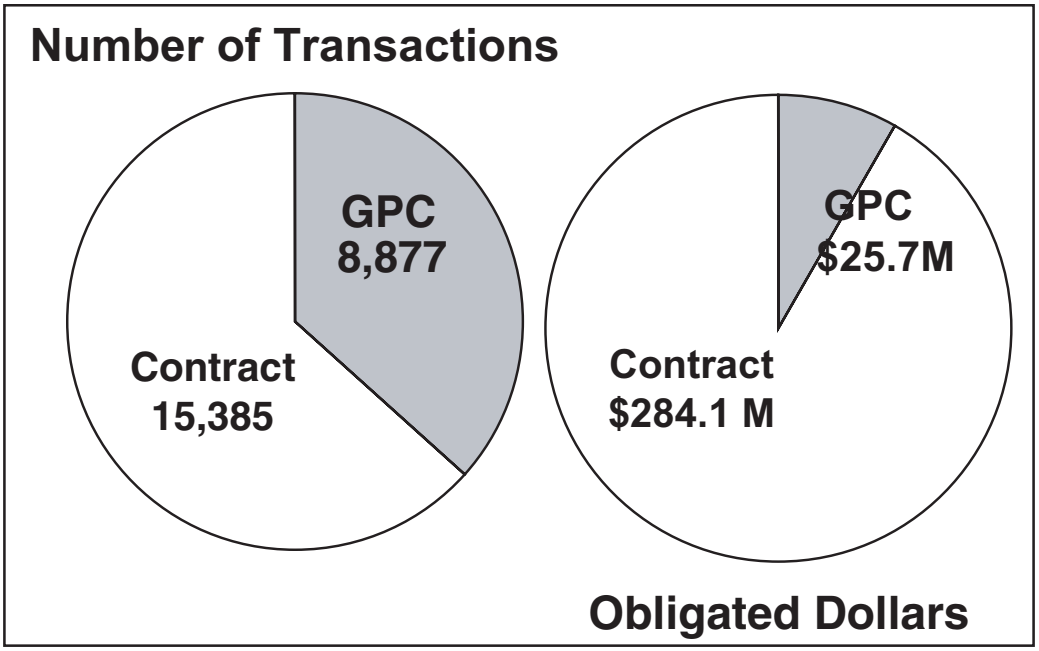

Figure 4. GPC versus Contract Purchases in FY 03 and FY 04.

Although GPCs are intended for the purchase of small items, it is interesting to note that construction supplies are the largest category for both GPC and contract transactions. Other contract transactions were concentrated in construction services and larger goods, including vehicles and heavy equipment, while GPC purchases included smaller equipment, tools, and office supplies.

From Whom

Having examined who made what purchases, and when and how the purchases were made, we now turn to the question of from whom goods and services were purchased. We examined the top 10 suppliers (in terms of dollars obligated) in fiscal years 2003 and 2004 by all obligations, for contract obligations alone, and for GPC obligations alone.[12]

Based on firm names, the top firms by contract expenditures appear to be regional firms primarily, whereas GPCs were often used to make purchases from US firms, presumably over the Internet. To get a better sense of what percentage of Air Force CCO purchases were with regional firms, we examined the top 100 firms used in fiscal years 2003 and 2004, which represented 78 percent of the obligations during this period. Of these, 55 were regional firms. Breaking this out by type of transaction, 59 of the top 100 firms for contract transactions were regional, while the number was much smaller for GPC purchases, where only 11 out of 100 were regional.

The top-ranked suppliers provided goods and services from a variety of categories. For each of the top five suppliers in fiscal years 2003 and 2004 (noted as Firms A through E), Figure 5

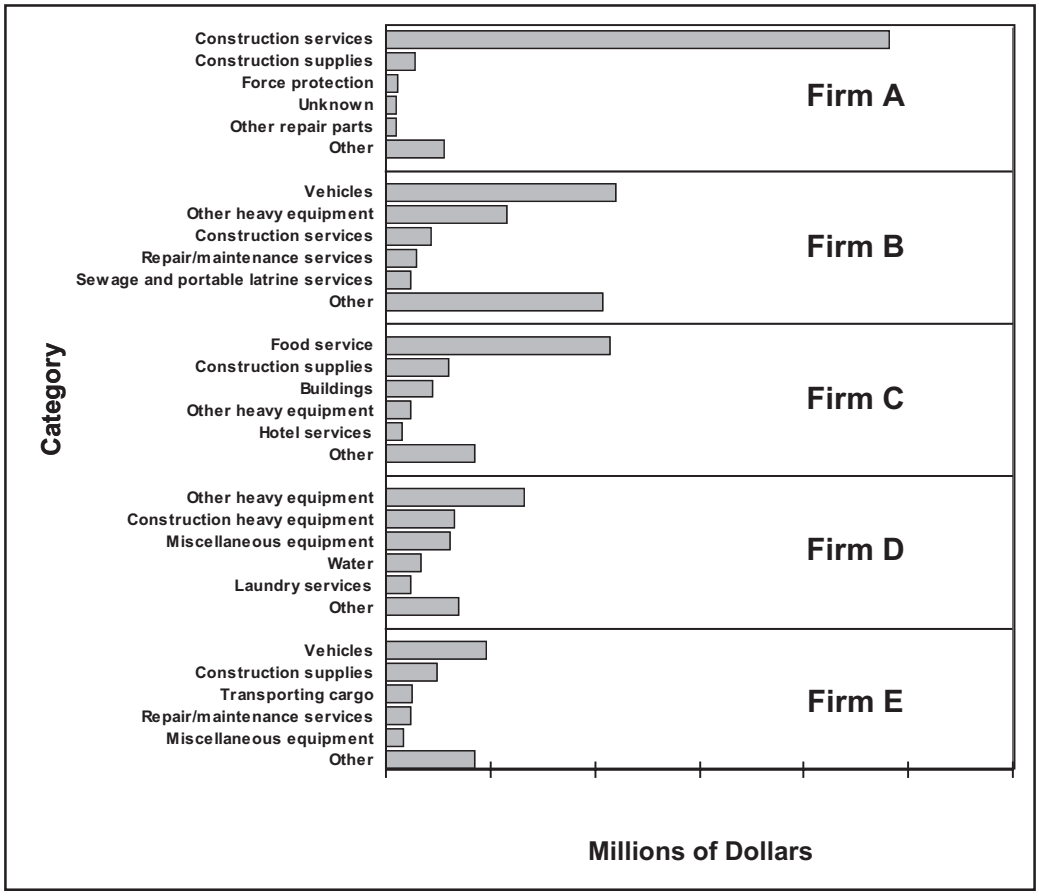

Figure 5. Top Five Purchase Categories for the Top Five Suppliers
Note: one of the top categories of purchases from firm A consisted of items that our computer program found difficult to categorize and so placed in the *unknown* category.

displays the top five categories of purchases made through the supplier (with all other purchases counted in the bar labeled *Other*).

Top suppliers worked across multiple locations as well. In particular, Firm E supplied goods and services not only in Iraq, but also in Qatar and Oman.

Such detailed information on suppliers' activities across the theater can assist CCOs in planning future acquisitions. While no contracts in our database encompassed more than one purchasing organization, there may be opportunities for the Air Force or the Department of Defense to increase leverage with providers by combining contracts across organizations and encouraging competition among providers. RAND's data analyses of suppliers point to more detailed analyses that could inform such strategic purchasing decisions.

Implications for Policy Issues

In this section, we use insights from the data and from interviews we conducted in the course of our research to address issues related to CCO staffing, CCO training, combat support planning, and the sharing of lessons within the theater.

CCO Staffing

Lacking hard data for detailed workload analyses, the Air Force traditionally has used general rules based on perceptions of past experience to determine how many contracting officers to allocate to deployed locations. This approach can lead to the need for adjustments after the fact to reflect real demands on CCOs' time.

One potentially important use of our database could be the systematic assessment of CCO workloads — measured in dollars obligated or transactions executed — across purchasing organizations. While neither measure is perfect (some small-dollar transactions may require more time and attention than do some big-dollar transactions), both measures are potentially important indicators of CCO time requirements. Having received supplemental data from USCENTAF on CCO staffing for selected purchasing organizations for FY 2004, we compared the workload of contracting officers in terms of the average number of transactions per CCO and the average number of dollars obligated per CCO.

Our analyses indicate that there were large differences in CCO activities across locations during fiscal year 2004. However, a better understanding of the nature of activities at individual locations is necessary to draw conclusions. With additional information on the nature of the work within these organizations—such as mission activities supported, types of goods and services purchased, and the number of transactions completed—statistical analyses such as regressions could be used to understand the factors associated with these differences.

CCO Training

Anecdotes from our interviews indicate that a number of factors make contracting in-theater challenging, including differences in the nature of contingency contracting duties as opposed to duties of a contracting officer at a nondeployed location, variation in the contracting environments among countries within the AOR, the short duration of most deployments for contracting personnel,[13] and differences in contracting culture among the military branches operating in a Joint environment.

At first glance, there appears to be abundant guidance available to CCOs to help mitigate any adverse effects associated with these challenges, including AFFARS Appendix CC for Air Force contingency contracting support;[14] Air Force Instruction 10-401, *Air Force Operations Planning and Execution*;[15] the 2003 Air Force Logistics Management Agency contingency contracting handbook;[16] as well as formal training through the Defense Acquisition University[17] and predeployment orientation programs (limited to office chiefs) provided by USCENTAF contracting.

However, one officer we interviewed likened learning CCO procedures from formal training to learning to play golf by reading the rulebook. In contrast, several people mentioned the

importance of providing deploying CCOs with opportunities to engage in training simulations (such as Silver Flag exercises[18]) which present them with scenarios they can expect to encounter when they go into the AOR.

A database of CCO purchases such as the one RAND developed (as described above), could supplement classroom and predeployment training by providing insights into ongoing activities in the theater. Information could be tailored to locations where trainees would be deploying. It also could assist in creating more realistic environments for exercises. In addition, a CCO who is getting ready to deploy could use the database to prepare by becoming familiar with the detailed contracting environment at his or her future location, including the types of purchases made, the predominant types of contracts used for these purchases, and the local supply base. Similar data on contracting for other military branches and coalition partners could be used to better prepare CCOs who will be operating in a Joint requirements environment.

Combat Support Planning

Combat support planners are responsible for making sure all of the resources the Air Force needs to go to war are in place in time to support contingency operations and associated personnel. After determining all the necessary resources, planners must make choices about where to obtain them and how to get them to the theater to shorten the deployment-to-employment timeline, make the best use of scarce airlift and other transportation resources, and reduce the military footprint in-theater.

Since one option that planners consider is the availability of resources in-theater, a motivation for the development of the OIF CCO database was that such data could be used to improve combat support planners' ability to make effective, efficient trade-offs between purchasing items in-theater and purchasing them elsewhere and then using scarce transportation resources to bring them to the theater. In addition, these data can be used to describe the local supply base for different types of purchases.

The purchase of bottled water in Iraq provides a simple case study of how a detailed database of CCO purchases can be used to help assess the trade-offs among options. The US military required a great deal of bottled water for personnel stationed in locations supporting OIF during fiscal years 2003 and 2004. Our database indicates that CCOs in 15 purchasing organizations in-theater purchased bottled water through 38 contracts with more than 30 suppliers. Alternatively, planners could have elected to set up contract vehicles for large quantities of water in advance (or purchase and store the water) and then ship the water to appropriate locations in-theater as needed. Presumably, such advance planning would result in a lower cost per liter than CCOs were able to negotiate in real time during contingency operations. However, shipments of water into the theater would either delay the transport of troops and other supplies or would require the purchase of additional transportation.[19]

A combat support planner could use RAND's database to determine the best way to meet water requirements in-theater during operations. The database would assist the planner by enabling the assessment of costs associated with purchasing water in-theater, an analysis of the amount of airlift required for an alternate approach, and the identification of any potential effects on the mission.

In addition, data on Joint contracting in-theater, similar to those analyzed in this article, could be used by the combatant commands to construct more realistic and detailed contract support plans. These plans are intended to outline personnel requirements, organizational structures, and so forth, which will be used for Joint contingency contracting to support operations executed by the combatant commands (for example, at what point contracting should transition from a decentralized, service-specific structure to Joint organizations).

Sharing Lessons

The nature of particular requirements and the local environment may limit the CCOs' ability to reduce costs. However, awareness of details of purchases made by other CCOs in the theater should assist in negotiating better prices where this is possible. For example, Table 1 shows the maximum, minimum, and average prices paid per liter of water in fiscal years 2003 and 2004 transactions in our database.

The purchase for Baghdad in Table 1 was for 64 pallets of bottled water, which under our assumptions, equates to 110,592 half-liter bottles, or 55,296 liters. If the Baghdad CCO had been able to obtain this water for the price paid at Al Jaber, he or she would have saved more than $53K. Of course, the majority of the cost for the Baghdad purchase may be attributable to the challenges of delivering into that location.

While price information can be a powerful tool for CCOs, additional information about the relative performance of suppliers and other factors related to meeting requirements, such as the urgency, transportation needs, or security threats, would be helpful in interpreting such comparisons.

Recommendations

In this article, we have described the construction of a database of CCO purchases supporting Air Force activities in OIF during fiscal years 2003 and 2004. We have demonstrated how this database can be a powerful analytic tool to inform and support policy decisions and initiatives for CCO staffing and training, combat support planning, and sharing lessons within the theater.

Based on our experience creating the database and analyzing the CCO data for OIF, we recommend the Air Force (and the Department of Defense more broadly) establish a standardized methodology for collecting contingency contracting data on an ongoing basis to facilitate planning and policy decisions for future contingencies.

To facilitate the types of analyses illustrated here in a timely way, the Air Force needs to systematically gather contingency contracting data on an ongoing basis. To be most useful, the CCO data system must make it possible to quickly access detailed descriptions of individual transactions, as well as aggregate those transactions according to categories of purchases, types of

Category	Maximum	Minimum	Average
Price per liter ($)	1.08	0.12	0.38
Date	March 2004	June 2003	
Location	Baghdad	Al Jaber	

Table 1. Range of Prices CCOs Paid per Liter of Drinking Water, FY 03 and FY 04

contract vehicles used, locations of purchases, suppliers dealt with, and so forth.

Table 2 contains our recommendations on the types of data that would be most useful to collect. These recommendations encompass data about the transactions themselves, as well as supplemental information about the activities supported by individual purchasing organizations and the relevant supply bases, that would enhance the types of analyses illustrated in this article and provide a basis for interpreting their results.

We understand the complex and austere conditions in which CCOs often operate. Additionally, we do not propose to overburden these hard-working individuals with new reporting requirements. We do suggest a standardized automated system for transaction-specific data that could be either virtually connected to a master database or regularly downloaded into such a database as a means of recording and cataloging purchases.[20] Such a system should also include an easy method both for categorizing purchases across a wide range of commodities and services and for identifying suppliers in a standardized way. For example, drop-down menus with category options and supplier name options from which to choose would make it easier for CCOs to identify these in a consistent manner. Contingency contracting representatives and logistics planners should work in concert to develop the database, ensuring that one standardized system will satisfy the requirements of both organizations.

The Air Force is in the process of reviewing current contracting organizations, including those overseas, to determine what future organizations should look like. In addition, the Air Force is actively engaged in discussions about how to improve the effectiveness and efficiency of contracting in a Joint contingency environment, in which forces from different military branches are collocated and are operating together. The analytic capabilities recommended in this article as well as the corresponding RAND monograph[21] can provide key inputs to these important organizational and operational decisions.

End Notes

1. This article is based on the RAND monograph *Contingency Contracting Purchases for Operation Iraqi Freedom (Unrestricted Version)*, MG-559/1-AF, 2008. We thank our RAND colleague Mike Neumann for his help creating this short article.
2. George A. Cahlink, "Send in the Contractors," *Air Force Magazine*, Vol 86, No 1, [Online] Available: http://www.afa.org/magazine/jan2003/0103contract.asp, January 2003.

TYPE OF DATA	EXPLANATION
Individual Transactions	**Data to be Entered by Purchasing CCO**
Purchasing organization	Organization that purchases the goods or services
CCO	Individual responsible for the transaction
Recipient	Organization or location that benefited from the purchase, if different from the purchasing organization (such as base that benefited from a RED HORSE repair project)
Text description	Description of full range of goods and services purchased through the transaction
Units	Number of goods purchased or period of time for which service is to be provided; break out according to types of goods or services covered within the transaction
Purchase category	General class(es) of goods or services purchased; break out according to types of goods or services covered within the transaction
Price	Price paid for the goods and services; when multiple goods and services are purchased within a single transaction, prices should be broken out by type
Supplier	Firm that provides the goods and services
Location of supplier	Identifies whether supplier is a local firm, regional firm, or other
Transaction ID	Unique identifier for the transaction, such as contract number
Payment mechanism	GPC or contract
Type of contract	For contracts, type of contract, such as BPA, Form SF44
Date of request	Date on which purchasing organization received the formal request for goods and services
Date of payment	Date on which supplier was paid
Date of delivery	Date on which goods were delivered or services began
Comments	Any explanatory comments CCO deems useful
Activities Supported by Purchasing Organizations	**Supplemental Data Needed to Explain Purchasing Trends (will vary over time)**
Population	Number of personnel supported by the purchasing organization
Mission activity	Description of mission activity supported by the purchasing organization's transactions (number and types of aircraft, special operations)
Responsibility for base operating support	Service branch responsible for providing base operating support for the location
Infrastructure	Number of buildings, acres supported by the purchasing organization
Condition of infrastructure	Condition of infrastructure supported by the purchasing organization, particularly for new locations
Outlook	Plans for the purchasing organization (temporary operating location)
Supply base	Supplemental data to facilitate improved purchasing over time
Supplier ratings	Performance ratings of suppliers (perhaps only key suppliers) based on, for example, the quality of goods and services, reliability, and ease of working relationship

Table 2. Recommended Data to Be Collected on an Ongoing Basis

3. Frank Camm and Victoria A. Greenfield, *How Should the Army Use Contractors on the Battlefield? Assessing Comparative Risk in Sourcing Decisions*, Santa Monica, CA: RAND Corporation, MG-296-A, 2005, [Online] Available: http://www.rand.org/pubs/monographs/MG296, as of 7 February 2008.
4. Congressional Budget Office, *Logistics Support for Deployed Military Forces*, Washington, DC, [Online] Available: http://www.cbo.gov/ftpdocs/67xx/doc6794/10-20-MilitaryLogisticsSupport.pdf, October 2005, as of 7 February 2008.
5. *Air Force Federal Acquisition Regulation Supplement*, Appendix CC, paragraph CC-102, 14 March 2007.
6. In most cases, these databases represent all available data on CCO purchases at the identified locations. However, seven of these purchasing organizations recorded some or all of their contract transactions during this period in a centralized electronic database called the BQ system, rather than in the financial management spreadsheets. (The BQ system is the US Air Force's standard base-level general accounting and finance system. Its structure and use are described in DFAS [2000].) Although we were given information about the dollar amount of purchases recorded in BQ, the BQ data do not provide detailed descriptions of these purchases. In addition, we do not know the number of transactions associated with the dollars in the BQ system. Because data for these locations are incomplete, encompassing only GPC expenditures in some cases, we are unable to include them in some of the analyses in this article.
7. As part of the process, we reviewed and corrected several variables, including dates associated with each purchase and information related to contractors.
8. BPA contracts are used to satisfy anticipated recurring requirements for goods or services. They are designed to reduce transaction costs and speed up the procurement process "by establishing *charge accounts* with qualified sources of supply" (Air Force Audit Agency, 2004). The contracts specify the range of goods and services covered by the agreement, price lists, total dollar limits, and time limits. Contracting officers (or other authorized and trained personnel) can then place *calls* against those agreements to meet specific user requirements that fall within the bounds of the agreements.
9. See Footnote 6. In many of the detailed analyses presented in this article, we exclude seven organizations for which we have only partial contracting information; those excluded are Al Dhafra, Al Jaber, Al Udeid, Ali Al Salem, CAOC, Prince Sultan Air Base, and Seeb.
10. In many cases, the description of a purchase clearly fits into only one category. Other transactions included purchases of more than one disparate item or items that were ambiguously described and might, because of the use of key words in the program, fit into more than one category. For example, the text description might include a laptop computer (computer equipment) and a printer (office supplies and equipment), or the purchase may be described as a *desk for chapel* which could be interpreted by the computer program as furniture (the desk) or MWR (the chapel). The *single category* portion of the horizontal bars in Figure 2 shows obligations that clearly belonged in only one category; the *multiple categories* portion shows obligations for transactions that could also be assigned to other categories.
11. Such information would need to be dynamic due to the fluid nature of wartime operations.
12. We cannot list firm names here due to operational security considerations.
13. Typical deployments increased from 3 months to 4 months during our data timeframe, fiscal years 2003 and 2004.
14. *Air Force Federal Acquisition Regulation Supplement*, Appendix CC, paragraph CC-102.
15. AFI 10-401, *Air Force Operations Planning and Execution*, 25 April 2005.
16. James Roloff, *Contingency Contracting: A Handbook for the Air Force CCO*, Maxwell AFB, AL: Air Force Logistics Management Agency, February 2003. [Online] Available: http://www.aflma.hq.af.mil/lgj/contingency%20Contracting%20Mar03_corrections.pdf. In 2007 the AFLMA released a new handbook entiled *Contingency Contracting: A Joint Handbook*.
17. Defense Acquisition University, *2006 Defense Acquisition University Catalog*, Ft Belvoir, VA: DAU Press, October 2005. The course CON 234 (Contingency Contracting) is designed to help develop "skills for contracting support provided to Joint Forces across the full spectrum of military operations" (DAU, 2005, 36). The Defense Acquisition University was updating its contingency contracting curriculum at the time of our research.
18. GlobalSecurity.org, *Silver Flag*, [Online] Available: http://www.globalsecurity.org/military/ops/silver-flag.htm., last updated August 21, 2005. The Silver Flag exercises provide civil engineers, services, and other support personnel training on building and maintaining bare bases in deployed locations.
19. One or more contracts with regional providers that could easily distribute water to multiple locations would reduce the need for airlift.
20. Since the beginning of our study, USCENTAF Contracting and the USCENTAF Comptroller have introduced tools to address some of the data difficulties encountered in our analyses.
21. Laura H.Baldwin, John A. Ausink, Nancy F. Campbell, John G. Drew, and Charles Robert Roll, Jr, *Contingency Contracting Purchases for Operation Iraqi Freedom* (Unrestricted Version), Santa Monica, CA: RAND Corporation, MG-559/1-AF, 2008.

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