REENGINEERING THE TANKER ALLOCATION PROCESS

GRADUATE RESEARCH PAPER

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Abstract

This research explores the need to reengineer the tanker allocation process at the Tanker Airlift Control Center using a 4 round Delphi study consisting of 22 subject matter experts throughout Air Mobility Command, Air Combat Command, the US Navy, and the US Marine Corps. The research uses business process reengineering (BPR) principles to determine the environment for reengineering, the needs of stakeholders and customers, and the underlying assumptions of current processes.

The Delphi study reveals the following findings:

- The current climate favors BPR for the tanker allocation system
- The current system requires receiver units to communicate directly with tanker units to schedule activity
- The current system requires tanker wings to control a number of aircraft for flying and ground training needs under the AATS system
- The reengineered tanker allocation system should be a centralized process with visibility and optimization control, providing one point of contact for customers
- The reengineered system should provide consistency and reliability for ARC crews

This study supports the following recommendations:

- Reengineer the tanker allocation system to allow centralized visibility, control, and optimization of all tanker assets and air refueling tracks
- A centralized IT system should be the conduit for which all tanker assets and missions are tasked
- All tanker tasking systems should be consolidated under one gatekeeper: the Tanker Resource Optimization office
- Discard AATS for tankers
- Review and revise ARC business rules
- Leadership must support the reengineering effort for it to be successful

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For my Father and Mother.

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REENGINEERING THE TANKER ALLOCATION SYSTEM

I. Introduction

Let's take the example of our tanker fleet…once a purely Cold War Asset built for the sole purpose of getting bombers over the North Pole…Now they are nothing short of the backbone of our Nation's ability to project Global Reach and Power.

General T. Michael Mosely

Background

Air refueling provides significant and critical capability to mass lethal and nonlethal forces on a global scale (Air Force Doctrine Document 1, 2003). The current tanker fleet enables combat capability world-wide in areas such as Southwest Asia, while simultaneously moving forces and supplies via the tanker's force enabling role. Tankers also provide training for Air Force, Naval, and Marine aircrews, allowing them to hone their skills in preparation for battle.

The United States Air Force is at an important juncture today when it comes to the state of its aerial refueling force. There have been major problems with the acquisition of the new tanker aircraft, while the aging tanker fleet continues to carry the burden. Within the last seven years, this burden has become much heavier due to Operations Enduring and Iraqi Freedom. And, the almost insatiable appetite for air refueling has given our tanker fleet and crews much work when they are home from deployment. In addition to this heavy load, Air Mobility Command (AMC), the largest consumer of fuel in the Department of Defense (DoD), is looking to apply major fuel efficiencies throughout the command (Haseltine, 2007). This includes increased air refueling efficiency.

Amidst the stresses on the current tanker force, the air refueling allocation process constrains the full exploitation of assets for customer use. Current business rules regarding use of tanker assets, in addition to long lead times required to schedule air refueling missions, have led Navy customers to turn to contract air refueling, or fee-for-service, for their training needs. The Navy's use of fee-for-service has become so successful, that the Air Force has now been directed to look into the feasibility of fee-for-service. Before the decision is made to allow 'competitors' to take part of this market, it is important that the Air Force to look at its air refueling allocation process through the business process reengineering lens.

Business Process Reengineering Defined

Michael Hammer and James Champy launched a worldwide movement with their book titled, *Reengineering the Corporation* (Hammer & Champy, 2001). Since the initial publication of this book in the early 1990s, the subject of reengineering has come up time and again for companies in every industry. Hammer and Champy define Business Process Reengineering (BPR) as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed" (Hammer & Champy, 2001: 35). The authors contest that reengineering has become the only choice for companies seeking to succeed in an environment full of powerful customers, intense competition, and relentless change. Businesses such as Duke Power, IBM, and Deere have used BPR to survive, regain, or continue their competitive advantage in the marketplace.

Why Reengineering?

Intuitively, it seems as if the current tanker allocation system is in good working order. No receiver units are reporting loss of mission ready status due to lack of air refueling training. Operational missions are being accomplished. However, compelling reasons exist for reengineering the tanker allocation system: competition and air refueling efficiency mandates. Additionally, stakeholder and customer interests point to some possible areas for reengineering within the tanker allocation process. Exploiting tanker assets through BPR may provide the Air Force with additional avenues for which to meet the near insatiable appetite for air refueling, thereby determining the exact requirements of future fee-for-service contracts.

Research Objectives

The goal of this research is to explore the possibilities if the Tanker Allocation Process is reengineered. The research identifies whether the environment is right for BPR, who the players are, and what the underlying assumptions are as to why we operate the way we do. In addition, this research explores the possibilities that can come when the assumptions are relaxed.

This research demonstrates that the use of BPR will enable the tanker community to accomplish highly effective mission scheduling for maximum efficiency, responsiveness, and exploitation of the tanker fleet. This scheduling will provide overall visibility on every tanker asset for optimal utilization and flexibility. In summary, I propose reengineering the tanker allocation process, with the goal of visibility, optimization and exploitation of tanker assets to meet customer needs and to determine the exact needs for fee-for-service contracts.

Research Questions

The questions addressed in this research project are:

Question 1

Should the tanker allocation process be improved, or should a new process be created?

Question 2

Who are the customers and stakeholders, and what are their needs?

Question3

What are the underlying assumptions as to why we use the current process? What is possible if we relax these assumptions?

Research Hypothesis

In order to accurately measure and improve upon air refueling efficiency, a new centralized tanker allocation process is required. This process will have visibility and control over every AMC air refueling asset.

In addition, regulatory and business rule changes regarding the use of ARC air refueling assets will help Air Mobility Command in its goal to improve air refueling efficiency, increase asset availability to meet demand, and determine the true fee-for-service requirements, without posing undue risk to the force structure and ensuring the successful accomplishment of National Military Strategy.

Research Focus and Methodology

This analysis begins with an in-depth literature review, focusing on Business Process Reengineering, Air Force Smart Operations 21 (AFSO21), and the current tanker allocation process. In addition, the literature review discusses the interests of customers and stakeholders.

This reengineering study identifies where assets are underutilized or not optimized for best value to the customer. The effort acknowledges the importance of doctrine. Success of our Air Force in meeting challenges in this ever changing world depends on understanding and application of doctrine (Air Force Doctrine Document 1, 2003). A four-round Delphi study with AMC and ARC leadership, as well as units receiving air refueling support, help to determine possible amendments to current business rules, with the goal of utilizing untapped air refueling assets. Impacts of possible amendments are discussed. Finally, recommendations will be provided to summarize appropriate changes to the tanker allocation system and ARC business rules which will maximize the exploitation of air refueling assets to meet customer needs and AMC goals for increased efficiency. Figure 1 shows Delphi study areas:

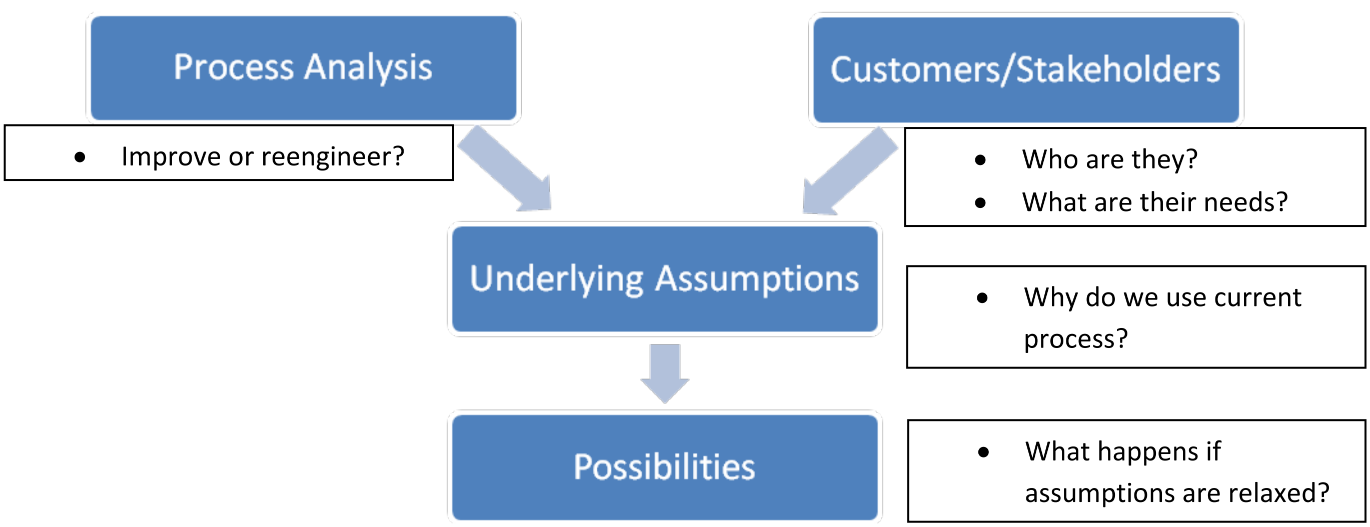

Figure 1. Areas Studied Using Delphi Approach

Research Assumptions and Limitations

This research is based on AMC and the respective ARC in-flight refueling aircraft only. While the principles and findings addressed in this paper may be tailored to airlift operations for AMC aircraft as well, this is not the intent. While air refueling aircraft do indeed accomplish a piece of Air Mobility Command's total airlift requirement, this paper assumes all tanker missions, regardless of a possible dual role nature. In addition, this paper cites tanker missions over the past several years and does not remove the missions accomplished by KC-135E aircraft. Nor does this paper discuss ramifications of the pending retirement of the KC-135E aircraft. It discusses only current tanker assets owned by the US Air Force.

This paper also assumes that doctrine provides the foundation of current planning and operations for tanker missions. As Air Force Doctrine Document 1 indicates, "we have not properly understood or consistently applied our air and space doctrine. As great operators we have preferred our ability to improvise over using sound repeatable principles. That's no longer good enough," (2003: i). The current global climate demands that the Air Force planning and employment must be understood and repeatable (Air Force Doctrine Document 1, 2003).

Finally, this paper assumes that air refueling missions must meet not only the receiver requirements, but also the tanker crew training requirements for both the active duty and the ARC.

Research Implications

The implications of reengineering the tanker allocation process as well as the business rules for the ARC have significant implications. This paper will facilitate the determination of the exact fee-for-service requirement, if any. In addition, if taken, the reengineering recommendations will provide an accurate way to measure air refueling mission efficiency and effectiveness. Leaders will be provided with actual tanker capability and effectiveness metrics for which to measure efficiency or lack thereof. Finally, these metrics will enable forecasting of future customer demand and tanker capability.

Overview

Section II of this paper incorporates a literature review of BPR, AFSO21, the tanker allocation process, and stakeholders and customers involved in this process. Section III explains the methodology used to address each research question. Section IV presents the results of the Delphi study. Finally, Section V concludes this paper by offering recommendations and topics for further research.

II. Literature Review

A Quick Look Back

The tanker has come a long way since the aerial refueling of the Air Corps' C-2A Question Mark in 1929, when the military could not see a practical application of the capability (Meilinger, 2007). Used primarily to support the strategic bomber with its extended range, the tanker was an obvious choice to be one of Strategic Air Command's assets. However, Vietnam proved that tankers were needed for fighter aircraft as well as bombers. Tankers transformed short-range fighters into long-range bombers as they provided more than 800,000 air refuelings in Southeast Asia (Meilinger, 2007).

As time marched on, crises in the Middle East proved that tankers were needed to aid cargo aircraft as well. During Operation Nickel Grass, airlift aircraft flew from the US to the Azores, then to Tel Aviv. Analysts determined that this operation would have been more efficient if airlifters were air refueled. Thus initiated the evolution to the seemingly insatiable appetite for air refueling, proved by the jump in the number of refuel-able aircraft from 1960 to 1980—from 2,000 to 4,500 (Meilinger, 2007).

In 1981, the KC-10 became operational, equipped with both a boom and a drogue. This aircraft provided air refueling and airlift capability, as well as the ability to be refueled itself. The capability of tankers was demonstrated during Operation El Dorado Canyon, where 29 air refuelers—KC-135 and KC-10—were employed to aid Air Force and Navy aircraft as they bombed Libya in retaliation for terrorist attacks (Meilinger, 2007).

Operation Desert Storm proved the necessity for tankers to refuel bombers, fighters, airlifters, and Navy aircraft. During the six month period, 100 tankers flew 16,865 sorties in support of coalition aircraft, and provided the necessary air bridge for airlifters to move 500,000 people and 540,000 tons of cargo (Meilinger, 2007). After Desert Storm, an increased emphasis was placed on air refuelers to support Navy and Marine aircraft. The tanker continued to provide tremendous air refueling support in Operations Northern Watch, Southern Watch, Noble Eagle, Enduring Freedom, and Iraqi Freedom.

Now, however, the tanker is an aging fleet. The average age of the KC-135 exceeds 44 years (Meilinger, 2007). The E-model KC-135s have been placed in storage, pending retirement. The KC-10, while younger than the KC-135, is not far behind. In December 2001, Congress allowed the Air Force to explore the idea of leasing 100 Boeing 767 tanker aircraft, in efforts to finance a new tanker aircraft. Unfortunately, this deal was corrupt from the start. One of the Air Force's lead acquisition officials, Darleen Druyun, after working with Boeing on the lease, took a job with the aircraft giant. This action later landed Druyun and Boeing's Chief Financial Officer in prison. In 2004, Congress terminated the Air Force's authority to lease the tanker (Reuters, 2008).

The acquisition process for a new tanker continued, and in early 2008, the Air Force announced its decision. After competition between Boeing and Northrop Grumman, the Air Force announced its acquisition of 179 tankers from Northrop Grumman. Immediately, protests from Boeing spurred an investigation by the Government Accountability Office (GAO). The GAO found fault with the USAF's methodology, stating that the Air Force changed requirements for the new tanker midstream during the bidding process. The Air Force quickly reopened the bidding process. However, in mid-September, the Pentagon announced postponement of the competition until the next President's administration was to take office. The Pentagon argued that there were breakdowns in the management of the contest and that politically charged decisions were made in the process (Hedgpeth, 2008). At this point, the new administration is in support of delaying the tanker acquisition for five more years.

Amidst the tanker acquisition struggle, the Air Force has come face-to-face with another challenge to its air refueling capability by way of competition: Omega Air Refueling Services. Omega Air is a company headquartered in Dublin, Ireland, but based in the United States. It provides air refueling services via Boeing K-707s. In 2000, director of Omega Air, Ulick McEvaddy forecasted that the demand for US military air refueling would grow as the pace of American deployments abroad increased and the availability of pilots declined (Erwin, 2000). Since then, Omega Air Refueling Services (OARS) has been providing air refueling support to the United States Navy, touting its responsiveness and reliability. OARS's adaptability to change is something that the Navy says it cannot get from the Air Force. According to the Center for Naval Analyses study accomplished in 2003, the lower-priorities Navy exercises make changing the AF tanker schedule a constant challenge (Freedman et al, 2003). Currently OARS supports both major exercise training and squadron level training for the Navy. In fact, the support OARS provides the Navy has been so successful, that Congress has directed the Air Force to look into the feasibility of fee-for-service air refueling. This mandate, appearing in the National Defense Authorization Act for FY2008, commanded the Air Force to pilot a program on fee-for-service air refueling to augment the service's air refueling requirement. Table 1 describes the details for the pilot program:

Table 1. Section 1081 of the FY2008 National Defense Authorization Act

SEC. 1081. PILOT PROGRAM ON COMMERCIAL FEE-FOR-SERVICE AIR REFUELING SUPPORT FOR THE AIR FORCE.

(a) Pilot Program Required- The Secretary of the Air Force shall conduct, as soon as practicable after the date of the enactment of this Act, a pilot program to assess the feasibility and advisability of utilizing commercial fee-for-service air refueling tanker aircraft for Air Force operations. The duration of the pilot program shall be at least five years after commencement of the program.

(b) Purpose-

(1) IN GENERAL- The pilot program required by subsection (a) shall evaluate the feasibility of fee-for-service air refueling to support, augment, or enhance the air refueling mission of the Air Force by utilizing commercial air refueling providers on a fee-for-service basis.

(2) ELEMENTS- In order to achieve the purpose of the pilot program, the Secretary of the Air Force shall—

(A) demonstrate and validate a comprehensive strategy for air refueling on a fee-for-service basis by evaluating all mission areas, including testing support, training support to receiving aircraft, homeland defense support, deployment support, air bridge support, aeromedical evacuation, and emergency air refueling; and

(B) integrate fee-for-service air refueling described in paragraph (1) into Air Mobility Command operations during the evaluation and execution phases of the pilot program.

(c) Annual Report- The Secretary of the Air Force shall provide to the congressional defense committees an annual report on the fee-for-service air refueling program, which includes--

(1) information with respect to--

(A) missions flown;

(B) mission areas supported;

(C) aircraft number, type, model series supported;

(D) fuel dispensed;

(E) departure reliability rates; and

(F) the annual and cumulative cost to the Government for the program, including a comparison of costs of the same service provided by the Air Force;

(2) an assessment of the impact of outsourcing air refueling on the Air Force's flying hour program and aircrew training; and

(3) any other data that the Secretary determines is appropriate for evaluating the performance of the commercial air refueling providers participating in the pilot program.

(d) Comptroller General Review- The Comptroller General shall submit to the congressional defense committees--

(1) an annual review of the conduct of the pilot program under this section and any recommendations of the Comptroller General for improving the program; and

(2) not later than 90 days after the completion of the pilot program, a final assessment of the results of the pilot program and the recommendations of the Comptroller General for whether the Secretary of the Air Force should continue to utilize fee-for-service air refueling.

(110th Congress, 2008)

Current Air Force Environment

Among all this tumult, the rising price of fuel over the past few years drove Air Force leaders to look at processes to create efficiencies wherever possible. In 2006, the Secretary of the Air Force, Michael Wynne, announced that the Air Force, in seeking to provide value to its customers, needed to expand LEAN concepts beyond depot operations and incorporate them into the institution as a whole (Wynne, 2006). This effort became known as Air Force Smart Operations 21 (AFSO21). AFSO21 is the Air Force's effort to focus on 'leaning' out processes in order to increase efficiencies, while still providing value to the customer. To Air Mobility Command, the leader in Air Force fuel spending, this meant discovering ways to increase efficiencies in its flying operations. Taking its lead from the Secretary of the Air Force, AMC announced its Business Process Improvement (BPI) initiatives in line with AFSO21 in early 2007. One of the initiatives was to improve air refueling efficiency by 20% while working to achieve a 30% increase over the next five years (Eichwald, et al, 2007). To understand AFSO21, it is important to first understand Lean thinking.

More About Lean and AFSO21

Lean thinking was pioneered by the Toyota company after World War II (Womack & Jones, 2003). Intuitively, lean thinking means cutting out the fat. To Taiichi Ohno, the legendary philosopher on lean thinking, this fat is considered *muda*, a Japanese term for waste. Lean thinking—the antidote to *muda*—provides a way to do more with less, while at the same time coming closer to providing customers what exactly they want (Womack & Jones, 2003). The basic ideas of lean consider value and the value stream, and terms such as flow, pull, and perfection.

Lean begins with value and the value stream. Value can only be defined by the customer at a given price, but creating value is the only reason the producer exists. Those interested in lean must consider value from the viewpoint of the customer, by concentrating on the value stream. The value stream is the course of actions that moves a product from raw materials-gathering to delivery into the hands of the customer. Lean concepts stress the importance of mapping the value stream of a product, finding steps that do not add value, and then discarding these steps.

Flow, then, is the movement of a product through the value stream. And, all of the activities that are accomplished in moving a product from raw materials to the hands of the customer can be made to flow (Womack & Jones, 2003). In order to manage flow it is important to focus intensely on the product, and to rethink process to eliminate backflow and stoppages in the system. It is important here that traditional boundaries of careers, functions, and firms are ignored in order to remove impediments to flow (Womack & Jones, 2003). The system which fosters flow contains no buffers between steps. Instead, the product flows immediately to the next step. In addition, every member that is involved in the process must be able to see and understand every aspect of the operation and status. And, every member and every machine used in the process must work properly at all times. Finally, each station must work in accordance with *takt time*, a lean concept which means synchronizing the rate of production to the rate of sales to customers (Womack & Jones, 2003). Hence, if there are no orders for a product, then there is no production.

Pull is another concept of lean. Simply stated, this term means that no one upstream should produce a good or service until someone downstream asks for it. This way, if specifications for a product change, then there are no products in inventory that will be wasted. Finally, the lean concept of perfection indicates that it is always good to strive for perfection. Lean proponents also insist that removing waste always results in the ability to remove more waste. This goal of a lean enterprise is imperative, but lean thinking also agrees that perfection can never totally be reached. That is to say that it is impossible to completely eliminate *muda* (Womack & Jones, 2003).

AFSO21 incorporates these lean concepts. According to the AFSO21 Playbook, the AFSO21 vision is to “establish a continuous process improvement (CPI) environment whereby all Airmen are actively eliminating waste and continuously improving processes" (2007). In addition to emphasizing primarily lean concepts, AFSO21 encourages the use of other CPI methods such as Six Sigma, Theory of Constraints, and Business Process Reengineering. AFSO21 incorporates these methods through the Eight-Step OODA (Observe, Orient, Decide, Act) Loop Problem Solving Model.

Steps one and two of this model fall under the Observe piece of the loop. These steps are to clarify and validate the problem, and to break down the problem in order to identify performance gaps. Value stream mapping is one tool used to clarify and validate, and break down the problem. Steps three and four, under the Orient piece, are to set improvement targets and determine root causes of the problem. Step five, under the Decide category, is to develop countermeasures. It is important here to understand that the impact of the countermeasure, or solution, depends on the quality of the solution and the acceptance by the group that must implement the solution (AFSO21 Playbook, 2007). Finally, steps six through eight fall under the Act piece. These steps include seeing countermeasures through, confirming results and processes, and standardizing the successful processes.

What About BPR?

As mentioned previously, AFSO21 incorporates other CPI methods such as Business Process Reengineering. Again, BPR is "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed" (Hammer & Champy, 2001: 35). Key terms in this definition are: fundamental, radical, dramatic, and process. When an organization considers BPR, it must answer the fundamental questions about how it operates. This forces companies to look at rules and assumptions that provide the basis for the way the business is conducted (Hammer & Champy, 2001). The term radical is key because BPR is focused on finding a whole new way of operating. Changing a business focused on functional areas to that of one based on processes is not just an improvement, but a radical reinvention. Because this change is radical it is also dramatic. Again BPR is not about incremental improvements, but is more about a business achieving huge improvements in performance. Finally, BPR is centered around processes. According to Hammer and Champy, a business process is a "collection of activities that takes one or more kinds of input and creates an output that is of value to the customer" (2001: 38). They contest that the term 'process' is the most important word in the BPR definition because most businesses need to change their focus from tasks to processes (2001).

There are three types of organizations that should consider BPR. These are those in deep trouble, those with trouble on the horizon, and those that are leading in their industry and want to continue to provide a barrier for their competition. Those businesses that are in deep trouble are those that have most likely seen trouble on the horizon and either did not act on it, or did not act appropriately. These companies are not process-oriented, but instead have large layers of management. And, their information technology or functional departments continuing to cost them. These companies are on the brink of failure.

Businesses that have trouble on the horizon see their competitors beginning to gain competitive advantage over them. Their successes in the marketplace are not what they used to be, and emerging competitors are not playing along the standard rules. Unless these businesses reengineer, they may run into deep trouble.

Finally, businesses should reengineer if they are leading competitors and they want to continue to reap benefits of their success while building barriers to their competitors' success. They must look to their business processes to stay ahead of their competition.

The Air Force is surely in the category of trouble on the horizon when considering its tanker force. Beyond the struggle for acquiring the new tanker, new competition is not playing by current business rules when it comes to scheduling air refueling. The long and arduous process of scheduling air refueling training with the Air Force has led Navy customers to look to Fee For Service from Omega Air. In fact, OARS has almost totally taken command of this niche in the market. On their website, they tout that they provide air refueling to major Navy exercises—nearly every COMPTUEX and JTFEX—as well as squadron level training. Because of this competition, and due to the mandate by Congress for the Air Force to initiate a Fee-For-Service pilot program, AMC must look at its tanker allocation process to find areas in need of reengineering. It is important to do so in order to adequately calculate how much air refueling the Air Force can actually supply and how much it needs from a contract air refueler.

AMC's Tanker Allocation Process

According to Air Force Doctrine Document 2-6, *Air Mobility Operations*, the "18 AF TACC plans, coordinates, schedules, tasks, and executes airlift missions worldwide," (2006: 8). The 618th TACC is the single tasking and execution agency for activities involving AMC assets and AMC gained assets to fulfill CDRTRANSCOM-directed requirements (Air Force Doctrine Document 2-6, 2006). The TACC schedules air refueling missions according to a priority system, much like that of the airlift priority system. However, at the time of this research, categorizations of air refueling missions are not in a joint publication like that of airlift. Tanker missions are categorized in Air Force Instruction 11-221, *Air Refueling Management*. These priorities are listed in Appendix A. Tanker aircraft are scheduled based on mission priority, with priority 1 having the highest priority. Scheduling of a tanker to a mission will fall into one of five processes that make up the tanker allocation process: Long Range, Short Range, GFMAP, Horseblanket, and Soft AR.

Long Range and Short Range are two processes whereby TACC plans and executes priority 1 and 2 level missions. The Long Range planning section of TACC/XOB schedules refueling missions requested 3 months out to five years prior to execution (DAF, 1999: 5.3.2.2). Any priority level 1 or 2 that are requested inside of 100 days of execution go to the Short Range planning section (DAF, 1999: 5.2.2.1). Unfortunately, short-notice air refuelings usually require cancellation of lower priority missions, so it is important that requesters make every effort to plan the missions so as to meet the requirements of Long Range scheduling.

The GFMAP, or Global Force Management Allocation Plan, is handled within TACC as well. These tanker missions flown in accordance with deployments are dealt with in this process.

The horseblanket system schedules low priority air refueling missions (priority 3, 4, and 5). With the horseblanket system, TACC provides a method by which receivers can place requests and tanker units can match these requests with tanker missions. Figure 2 depicts the timeline for this process. Five months before the end of the upcoming quarter, pre-coordination requests are sent via email from receiver units to tanker units. Tanker units match these requests to tanker training needs, and then communicate back to the receivers. After matches are made, receivers enter the air refueling missions into ARMS, or the Air Refueling Management System. On the first day of the month prior to the beginning of the upcoming quarter, the horseblanket is published. This is the schedule for priority level 3, 4, and 5 air refueling missions. If any changes need to be made to a mission, the changes will be made between the individual tanker and receiver units, as TACC does not control these missions. It is important to note that TACC serves only as an enabler for creating these priority level 3, 4, and 5 Air Refueling (AR) missions. In addition, within the long range system, any air refueling requests that may be trumped by higher priority requests are sometimes requested using the Horseblanket system in order to improve chances of air refueling support. Any refueling requests that go unfilled through the horseblanket system now become what are termed 'soft AR's'.

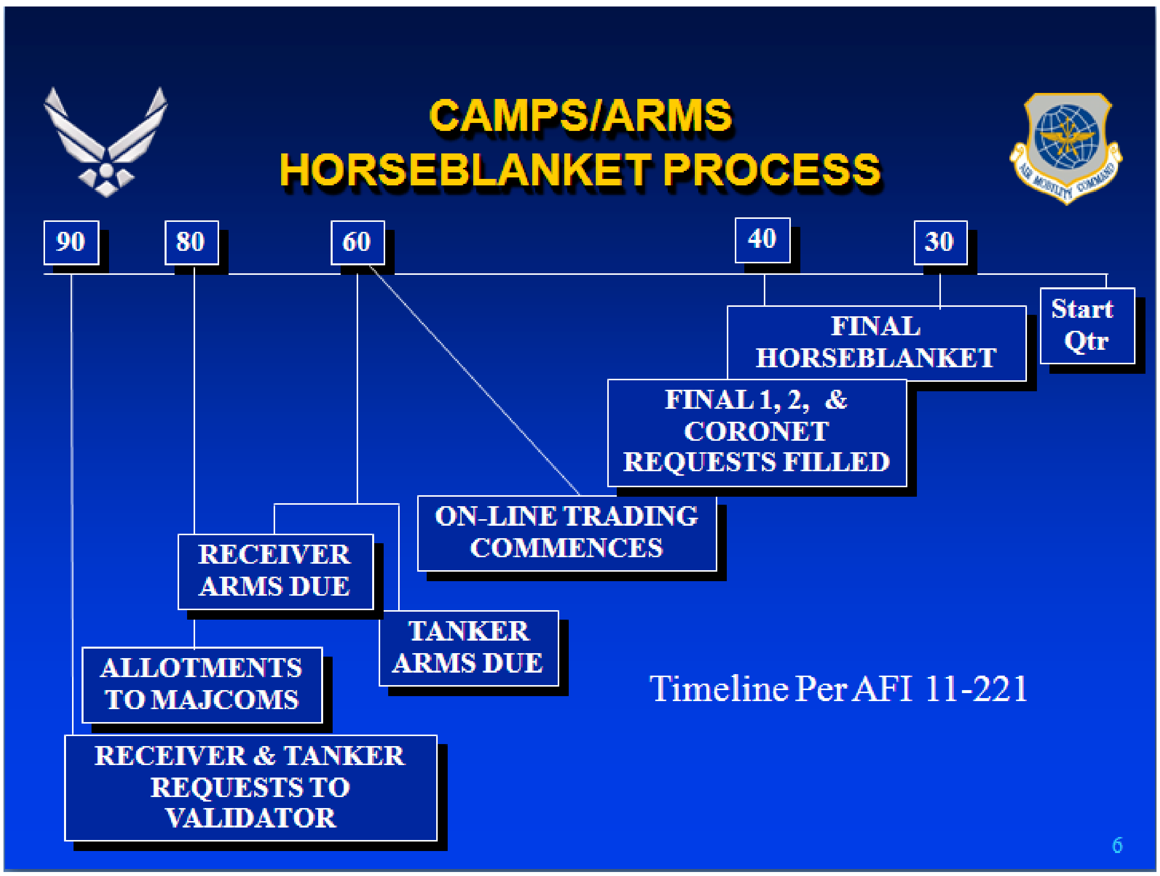

Figure 2. Horseblanket Timeline (Source: https://140.175.174.234/tacc_horseblanket/index.html)

During the Soft AR system, receivers continually seek out a tanker. This soft AR process occurs from the time that the horseblanket is published, until the day of the requested mission. In this process, receiver units communicate directly with tanker units by telephone or e-mail in order to schedule a needed air refueling. If the match is made, a mission is created. If not, the receiver is left without an air refueling mission.

Can the Command find efficiencies with this system? Or, does they system need to be reengineered? Hammer and Champy suggest three criteria which should be used to determine whether a process should be engineered: dysfunctional, important and feasible (2001). A dysfunctional process is one that is decreasing measures of performance like quality, cost, service, and speed. An important process is one that is integral to the success of the business. Finally, feasibility means that with regard to technology, economics, or culture, a process is worthwhile to reengineer. To determine this, a business must ask if BPR is too costly or will the benefits outweigh the costs. Two AFSO21 Business Process Improvement teams have looked at the tanker allocation process, and have found the process to be dysfunctional, but definitely important. The following is a summary of their efforts.

AFSO 21 Events

In January and February of 2007, a 31-member Process Improvement Team from HQ AMC convened with the goal to improve air refueling efficiency through a 20% increase in the number of receivers per tanker sortie, and to increase this by 30% over the next five years (Eichwald, et al, 2007). The team found several problems with current processes. Air refueling taskings were not grouped for efficiency, and they were not visible to all players—tanker and receiver units and leadership. In turn, if the need for an air refueling was canceled, information was not provided to the schedulers. As a result, tankers were not re-tasked for optimized utilization. Another problem that the team found was that the length of the quarterly horseblanket process caused duplication of effort and excess changes, as well as inflated requirements. The current system fostered incorrect validation and requirement planning, and no metrics were available to present misuse of the system.

A year and a half later, another team was charged, this time by 18th Air Force. An 18th AF Enterprise Value Stream Mapping analysis determined that improving the tanker allocation system had the potential to significantly increase war fighting capabilities (18 AF, 2008). The team was charged to evaluate the tanker allocation business rules in order to increase tanker availability and improve tanker efficiency.

This 16-member team determined that the absence of centralized visibility on assets and requirements was a root cause of inefficiencies in the tanker allocation process. They also found that no accountability existed to optimize resources to accomplish missions. With this, they found that no mechanism existed by which to implement optimization. The team determined that the wing training fence, a system allocating aircraft for individual Wings' use, provided only a sub-optimized solution, resulting in inefficiencies.

In addition to these findings, the team found that utilization of ARC tankers was not optimized. This was due much in part to the need for predictability by the ARC for scheduling of tanker missions, and the ARC's limited responsiveness and fidelity due to the current business rules. The quarterly lead time required to schedule air refueling missions was determined to be inadequate to the ARC. In addition, the team found that the current Flying Hour Program and funding rules limited optimization of ARC tankers.

Before discussing methodology it is important to discuss the players involved in this process, and their basic requirements.

Customers

With regard to the tanker allocation system, a customer consists of a receiver unit that requests air refueling. A receiver can be a USAF, USN, or coalition aircraft. Receiver missions requiring air refueling can range from high priority missions such as air refueling of missions in support of movements of the President of the United States, or low priority missions such as air refueling for receiver training. Appendix A of Joint Publication 4-01, *Joint Doctrine for the Defense Transportation System*, lists the priorities used in the management of DoD airlift and sealift resources. Refer to Appendix B to view these priorities. As of this date, there is no joint priority system for air refueling missions. However, USTRANSCOM is in the process of adding these in accordance with the airlift priority mission listing.

Often, the customer can be another tanker aircraft. In broad terms, customers want air refueling to support their mission needs, whether it be increased combat capability or currency training. In addition to air refueling support, customers want convenience of scheduling as well as flexibility to change the schedule at a moment's notice.

Who are the Stakeholders?

Generally speaking, stakeholders consist of AMC and USTRANSCOM, individual tanker Wings and units, and the ARC. Each of these stakeholders has specific needs. In broad terms, USTRANSCOM and AMC would like to meet customer needs in an efficient and effective manner. Individual tanker Wings like to accomplish missions tasked for air refueling while ensuring their units are trained sufficiently. ARC units require this is well. However, their requirements also involve predictability and consistency.

The research for this project will delve into the further requirements and needs of customers and stakeholders in the tanker allocation system.

III. Methodology

The Groundwork

First, it is important to acknowledge that a full BPR effort will not transpire over a single research paper. This effort requires several people in separate or a combination of roles, ready to implement reengineering. A leader--a senior executive of the organization--must emerge to make reengineering happen. Some other important roles include the process owner and a reengineering team. Reengineering is an immensely powerful tool used to reinvent companies. And, with the use of this tool comes the tremendous challenge of persuading the individuals within an organization to embrace or accept this prospect of major change (Hammer & Champy, 2003). This paper will not take on these roles. Instead, this research will ultimately determine the assumptions that drive the current process and what may happen if those assumptions are relaxed.

The thrust of this research is a Delphi study. This method, created by Olaf Helmer and Norman Dalkey in 1953, is an approach that uses the opinion of a collection of experts, with the objective to obtain the most reliable consensus of the group (Lang, 1995). To achieve this consensus, the method uses a series of questionnaires or surveys interspersed with controlled opinion feedback throughout the process (Dalkey & Helmer, 1963). Individual respondents are given a questionnaire to answer and are not permitted to interact with other respondents. The administrator of the questionnaire compiles the answers and supplies the findings to the experts, who are asked to reconsider their answers in light of the new information (Fitzsimmons & Fitzsimmons, 2008). The process continues through several iterations, with the goal of coming to a consensus among the experts.

The Delphi technique overcomes shortcomings of human judgment for planning purposes (Lang, 1995). Other methods use the expertise of one individual, which limits the study to the shortcomings or lack of knowledge of that individual. The Delphi study, however, overcomes this obstacle by utilizing several experts. In addition, by questioning the experts individually, the method replaces direct confrontation and debate. This avoids the potential pitfalls of bias transfer and intimidation if the group of experts were to officially meet (Ogden, et al 2005).

Delphi Steps

Table 2, adapted from Jain (1985) outlines the process employed in this research. The following discussion explains these steps and how they apply to the research questions.

Table 2. Delphi Steps (Jain, 1985)

Step	Activity
1	Define the Problem
2	Select willing and knowledgeable participants
3	Formulate initial questionnaire
4	Select the medium
5	Questionnaire 1: Research questions 1&2
6	Combine and refine the initial responses
7	Questionnaire 2: Research question 3
8	Combine and refine results
9	Questionnaire 3: Defend position
10	Combine and refine results
11	Questionnaire 4: Report back for reconsideration or final response
12	Draw Conclusions

1. Define the Problem. For this research, the subject matter is the tanker allocation process. The problem is to answer the following questions: should the process be reengineered, who are the stakeholders and what are their needs, what are the underlying assumptions in the process, and what happens if the assumptions are relaxed?

First, some basic data on the tanker allocation may provide some information on the problem. A dump of the Horseblanket data over the past three fiscal years was provided by HQ AMC/A9IM. This data lists the number of missions requested and supported. Data on missions, tanker unit and type, receiver unit and type, number of receivers per mission, amount of fuel offloaded, air refueling track, altitude, time on track, and priority of each air refueling mission are provided in this data dump. In addition to this data from the Horseblanket, data on missions accomplished through long and short range planning will be provided to find areas to target for inefficiencies.

While some areas of the problem can be answered with data, other areas rely on the expert opinions of those with experience in the system. Because of this, it is important at this time, to introduce both AFSO21 Teams' recommendations.

The first team determined that tankers should be distributed, or based, in order to meet a regional ratio distribution. With this, optimizing air refueling track and anchor locations would be in order. In addition, the current ARMS system would need to be updated so that it could match receiver requests to tanker availability based on time windows and regional location for all mission priority levels. In order for this to happen, the system would have to provide full visibility of receiver and tanker requirements and availability, facilitating the ability to optimize the tanker taskings for maximum efficiency. This means multiple air refuelings per tanker mission. The team determined that air refueling tracks would need to be scheduled through this central system as well.

Both teams determined that the horseblanket system should be replaced with a moving window based on business rules, and that there should be a centralized scheduling allocation process by which the Air Force and sister services would be allocated tanker time based on needs and asset availability. Validation, quality assurance, and metrics process holders would be assigned here. Accountability would be incorporated into the system at this point as well. Both teams determined that incentives would be required for Air Reserve Component buy-in. And, AMC/A4 would be required to validate commit rates.

In essence, these experts determined that having a centralized scheduling system would ensure optimization of tanker utilization, all unit training events met, wings share in the 'not-so-desirable' air refueling events, and development of metrics to measure effectiveness and efficiencies. To the teams, this solution would improve the visibility of receivers in order to schedule more receivers per tanker mission. This would result in savings by way of more training accomplished per pound of fuel, reduced man-hours, reduced fee-for-service need, and improved safety.

In tackling these issues, the second team recommended several changes to current processes. First, in order to centralize visibility on assets and requirements, they recommended the requirement for all tanker and receiver air refueling events to be entered into ARMS. In addition, compliance with AFI 11-221 for receiver unit air refueling forecasting and tanker unit availability would need to be enforced in order to improve visibility for annual training requirements, allocation forecasting, and flying hour efficiency. Once these changes were in motion, the team recommended the establishment of a Tanker Resource Optimization Steering Group (TROSG), and a Tanker Resource Optimization office (TRO) for tanker resource optimization at the enterprise level. This meant not only a development of a MAJCOM two digit coordination plan, but reallocation or acquisition of manpower to form the TRO. In order to implement optimization of tanker allocation, the team recommended fielding a centralized mechanism to facilitate optimized allocation against all mission requirements. This would require a re-write of AFI 11-221 to include business rules for the allocation system as well as coordination with the ARC.

In order to increase responsiveness from the ARC, a recommendation was made to implement an ARC Tanker Task Force (TTF) concept. This concept would maximize the ARC's long term MPA construct through clarification of business rules and revision of the regular Air Force's funding stream, to include flying hours, operations and maintenance personnel, and TDY costs. To aid the ARC's need for predictability and lead time a single allocation process, with a rolling window, managed by the TRO, would provide more firm options to choose from, resulting in more ARC volunteerism. Because all air refueling missions would be handled by a single office, the team believed that actual numbers of air refueling requests would be more realistic and stable. To the ARC, stability meant predictability, which results in an increase in ARC volunteerism. Finally, to further increase ARC tail utilization, the team determined that removal of the Flying Hour Program and funding limiting factors would be required. This would require an Air Force Level Flying Hour Program consolidation and regulatory changes to Title 10, 32, and financial management.

A summary of each AFSO21 teams' recommendations are listed in Table 3:

Table 3. AFSO21 Team Recommendations

Recommendation	2007 Team	2008 Team
Tanker/Receiver Regional Distribution	**X**	
One Common Central IT System	**X**	**X**
Centralized Scheduling Process for all AR Missions	**X**	**X**
Incorporate Accountability into System	**X**	
Money Incentive for ARC Buy-in	**X**	**X**
A4 Validation of Commit Rate	**X**	
Annual Joint Training Conference	**X**	
One Allocation Process for all AR Missions	**X**	
Enforce Compliance with AFI 11-221		**X**

To sum up the findings of the two AFSO21 Teams, no agency, method, or mechanism exists for which to measure AMC's Business Process Improvement (BPI) goal to improve air refueling efficiency by 20% while working to achieve a 30% increase over the next five years. In addition, no current method or mechanism exists for which to accurately measure demand. So, if demand is unknown, and air refueling assets at any given time are unknown, then there is no current way in which to meet this goal.

Both teams recommended a central agency for visibility, control, and optimization of all tanker assets, with the goal to provide value to the customer in terms of maximum use of tankers through increased stability, reliability, predictability of tanker assets.

These recommendations form the basis of this research and, hence, the Delphi study. The Delphi study will solicit the help of several experts to determine if the current system should be reengineered, using the criteria of dysfunctional, feasible, and important. Further, the Study will reveal who the stakeholders are and what their needs entail. Finally, the Study will establish the fundamental assumptions for the process and the possibilities if these assumptions are changed.

2. Select willing and knowledgeable participants. Selecting the experts for the Delphi Study is one of the most critical steps. Consensus from a group of experts helps to give credibility to the study. "Respondents should be tailored to the issue, having reasonable familiarity with the area but also coming from varied backgrounds within the subject under investigation," (qtd in Lang, 1995: 1). According to Scheele, in "The Delphi Method: Techniques and Applications," membership of the panel should include stakeholders, those with expert knowledge, and facilitators who stimulate and clarify alternative views (1975).

In an effort to select knowledgeable participants, members from the AFSO21 teams were solicited. These include members from HQ AMC, 618th TACC, AMC Tanker Wing schedulers, and the ARC. These individuals are considered experts with regard to the scheduling process. Additionally, the tanker wing schedulers are considered facilitators as they take on both the provider and receiver roles when considering air refueling. All members share in the stakeholder role, as they each have a vested interest in the efficiency and effectiveness of the system. However, other agencies are required to acquire a more thorough understanding and consensus of the problem and its possible solutions. Because of this, receiver schedulers from Air Mobility Command, Air Combat Command, the USMC, and the USN were solicited.

The method of finding appropriate receiver scheduling experts was determined from the quarterly horseblanket data ascertained from HQ AMC/A9. Receiver unit schedulers were selected for the Study based on frequency of request and service component.

In an effort to ensure these participants were willing to take part in the study, a message requesting participation was sent to individuals and their unit commanders. Approval from unit commanders was required for the individual to take part in the questionnaire. In all, 22 respondents were selected and approved. The AFIT Survey Control Number Authorization can be found in Appendix H.

3. Formulate Initial Questionnaire. The initial questionnaire consists of questions used in the first and second questionnaires. The questions are posed in the format for answering on a five-point Likert scale, ranging from "Strongly Agree" to "Neutral" to "Strongly Disagree." One segment requests respondents to list stakeholders. The initial questionnaire is formulated with statements that help to determine answers to each research question. The initial questionnaire can be found in Appendix C.

4. Select the Medium. WebSIRS, or Web Survey Information Retrieval System, is the internet-based survey tool used for collection of data. This internet-based system, which is used by the Air Force Institute of Technology, is governed by the Department of Defense. Benefits of using this system are that respondents have global access, their responses remain anonymous, and results are immediately compiled in spreadsheet format. Global access is important as some respondents travel often or are deployed.

5. Questionnaire 1. This first survey solicits members to answer questions supporting research questions 1 and 2. It is first important to have a consensus on the identities of the stakeholders and whether the system needs to be fixed or changed, before ideas for change are considered. Therefore, in this first round, members are asked to respond to statements considering the importance and dysfunction of the process, as well as the feasibility of reengineering the process. Additionally, the respondents are asked to choose or list the stakeholders and customers. Finally, the experts are asked to respond to statements identifying the needs of customers and stakeholders with regards to the tanker allocation process. Questionnaire 1 can be found in Appendix D.

6. Combine and Refine Initial Predictions. This step of the Delphi Process allows the answers of the first questionnaire to be combined and refined in order to eliminate any overlap in predictions in order to better evaluate and discuss conclusions in further rounds. Once the results from this first questionnaire arrive, the mode and mean from each question are identified. From this, further questions for Survey 3 are formulated.

7. Questionnaire 2. Because of the length of the survey, the first survey was divided into two separate surveys. The first survey establishes enough of a consensus as to support the need of survey 2. In this survey, members are asked to respond to statements about the underlying assumptions as to why the current tanker allocation process is used. In addition, they are asked to respond to initial statements regarding the ramifications of relaxing the assumptions. Questionnaire 2 can be found in Appendix E.

8. Combine and Refine Results. Again, this step allows for combining any overlap in questions or predictions to evaluate and discuss in further rounds. During this step, the average and mode of answers for Questionnaire 2 are computed. From these results, questions for Survey 3 are formulated.

9. Questionnaire 3. This questionnaire consists of combined items from the first two rounds. For this survey, a summary of the average and mode of Surveys 1 & 2 are provided to respondents. The members are invited to defend their positions with supporting comments if their opinion fell outside the mean and/or mode. In addition, respondents are able to list any other assumptions of the tanker allocation process that have been missed, and any consequences of relaxed assumptions. Questionnaire 3 can be found in Appendix F.

10. Combine and Refine Results. During this step, answers provided by the survey respondents are combined for feedback in Questionnaire 4. These answers are combined to list conclusions on the group's overall answer to each research question.

11. Questionnaire 4. For this survey, a summary of the results from Surveys 1-3 are provided to the respondents. Respondents are given the added assumptions and feedback provided in Survey 3. They are asked to comment if they disagreed with the results, and to defend their positions.

12. Draw Conclusions, Further Analysis. Here, conclusions are discussed, as well as areas for further analysis and research.

IV. Results and Analysis

Results

Research Question 1, Process Consideration

Should the tanker allocation process be improved, or should a new process be created?

First, it is important to review the data on missions accomplished and requested in the Long and Short Range Planning, as well as the Horseblanket process. In the first quarter of FY09, only six missions requested in the Long and Short range planning processes were not accomplished. In the second quarter of FY09, only 6 of 2483 missions scheduled by this process were not accomplished. Within the Horseblanket system, however, the number of unscheduled air refueling requests was significantly higher. The following figures depict the number of missions requested and supported by the tanker Horseblanket allocation system, as ascertained from the Horseblanket data dump provided by AMC/A9:

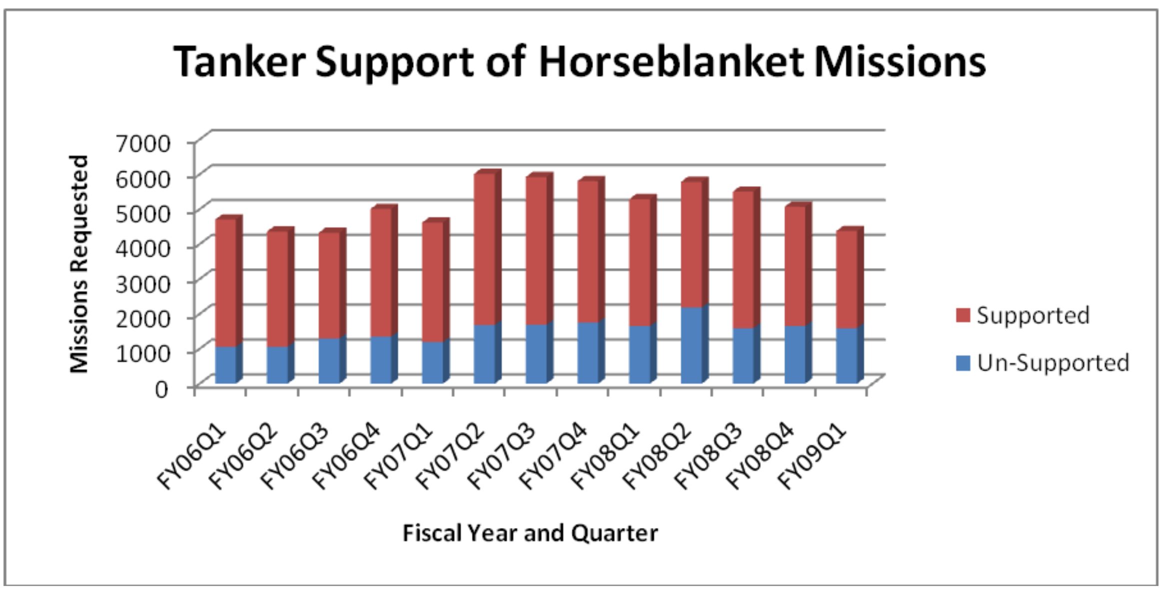

Figure 3. Horseblanket Missions

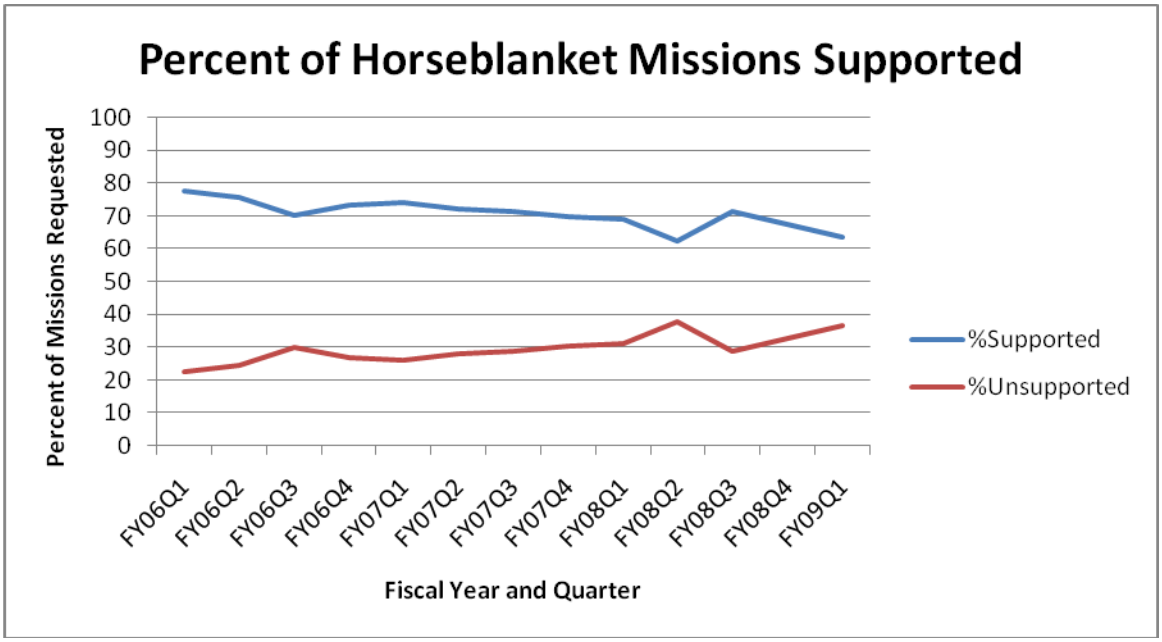

Figure 4. Support for Horseblanket Missions

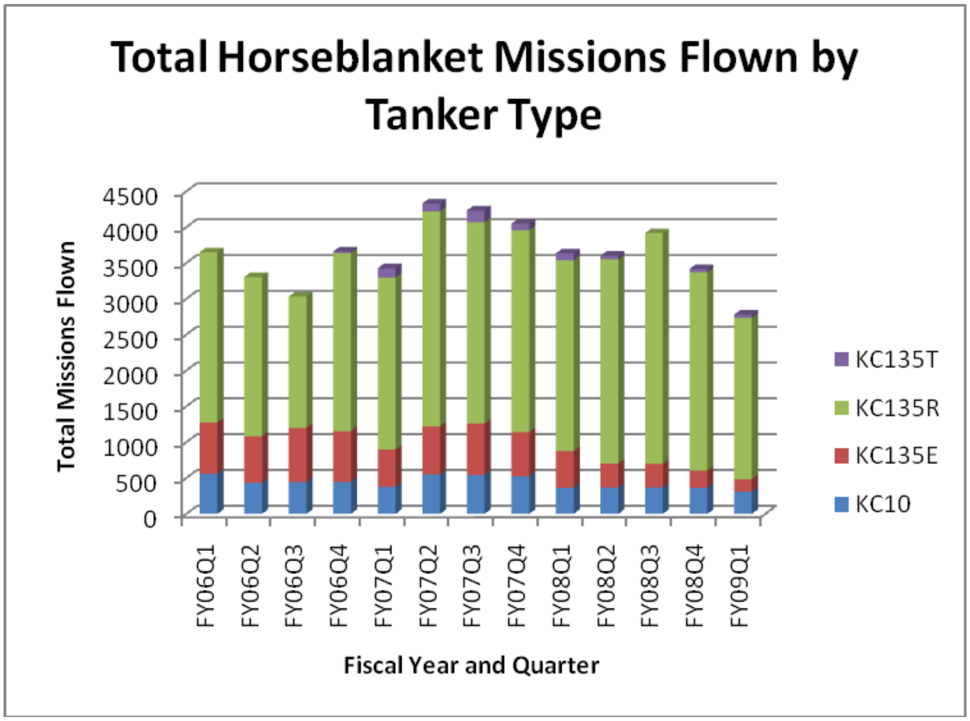

Figure 5. Total Horseblanket Missions Flown

From this data, as well as the result data from the AFSO21 and their recommendations, questions were formulated for the Delphi Study Respondents. To answer this first research question, Hammer and Champy's criteria for process reengineering—dysfunctional, important, feasible—is applied. The Delphi Study investigated the dysfunction and importance of the tanker allocation system. In addition, the feasibility of reengineering the system was determined. Respondents were asked to answer on a 5-point Likert scale (1-5: Strongly Disagree/Disagree/Neutral/Agree/Strongly Agree). The results of the survey responses regarding these questions are on the following table:

Table 4. Research Question 1 Results

Should the tanker allocation process be improved, or should a new process be created?	Mean	Mode
The tanker allocation system meets the air refueling needs of customers.	2.65	2
Customers overinflate their air refueling needs in order to get the service they require.	3.5	4
Customers require a Tanker Allocation system that meets their air refueling training and mission requirements.	4.6	5
It is important that customers are able to change a refueling request when a mission changes, and that the new AR requirement is met.	4.15	4
The Tanker Allocation System contains broken processes.	3.75	5
Tanker and receiver units bypass the Horseblanket process by communicating directly with each other via email or telephone.	4	4
The tanker allocation system focuses on the customer.	3.05	4
Only minor fixes are required in order to gain utility in the Tanker Allocation Process.	2.35	2
Reengineering is too costly.	2.4	2
Leadership will support reengineering.	3.2	3
Leadership must support reengineering.	3.85	4
Likelihood of success in reengineering the Tanker Allocation System is low.	3.25	4
Reengineering the Tanker Allocation Process will have a high impact on customer satisfaction.	3.5	4
The performance of the Tanker Allocation Process is far below "best-in-class" standard.	3.35	4
The Tanker Allocation Process is antiquated.	3.6	4
More can be gained from the Tanker Allocation Process without reengineering.	3.35	4

According to the survey results, the group *moderately—strongly* agrees that the system is important. The group also agrees *slightly—moderately* that the system is dysfunctional. Finally the group agrees *slightly* that reengineering the system is feasible.

Question 2, Customers and Stakeholders

Who are the customers and stakeholders, and what are their needs?

The basic customers and stakeholders were identified in the literature review. However, a more specific list of customers and stakeholders and their needs have been determined from the BPI team results, Horseblanket data, and Long/Short Range planning data and the Delphi study. The stakeholders include 18th AF and TACC, AMC, the National Guard Bureau, and AFRC. The customers include receivers, both US and allied. Groups that are both stakeholders and customers include Wings, Tanker Wings, ARC tanker Units, the Navy, USMC, the COCOMs and their AOCs.

Regarding the needs of stakeholders and customers, the Delphi Study group agreed *moderately* that:

1) Customers should have easy access to the Tanker Allocation Process and that this system should be the same as that used for scheduling the support.

2) Customers should have one point of contact for their questions and concerns.

3) TACC requires a process that has superior process design and execution, that it has visibility on all tankers, and that it optimizes tanker use.

4) NGB/AFRC crews require a constant and reliable schedule for tanker activity.

5) Customers should request the exact number of AR missions that they need

The group agreed *slightly* that:

1) The process should maximize customer satisfaction.

2) NGB/AFRC aircraft/crews require a process that schedules in excess of 30 days.

3) Tanker Wings require control of some tanker aircraft for ground requirements.

The group *disagreed* that tanker crews can meet their training needs if TACC scheduled all their missions.

Question 3, Underlying Assumptions

What are the underlying assumptions as to why we use the current process? What is possible if we relax these assumptions?

The Delphi Study investigated underlying assumptions of the current tanker allocation system and why it is used today. These questions came from underlying assumptions discussed during the AFSO 21 BPI events. First, the group agreed that under the current process Active Duty Tankers require 3-4 weeks advance notice to schedule tanker missions, and that receivers are required to request support 2-3 months in advance. The remaining questions were asked on a 5-point Likert scale (1-5: Strongly Disagree/Disagree/Neutral/Agree/Strongly Agree). The results of the survey responses to these questions are listed in Table 4.

<u>AATS Assumption:</u>

The group agreed moderately that, under the current process Tanker Wings must have some aircraft under their control for scheduling to ensure flying and ground training needs are met. The group agreed slightly that the AATS is required. However, if AATS was discarded, the group was neutral as to whether TACC would be responsible for ensuring ground and flying training opportunities were available, or whether training would be lost for crews, maintenance personnel, or the Formal Training Unit.

Table 5. Research Question 3 Results

Underlying Assumptions	Mean	Mode
Tanker Wings must have a certain number of aircraft under their control for scheduling in order to meet flying and ground training needs.	4.00	5
The current process meets the Air Reserve Component requirements of predictability.	2.59	3
The flying hour program limits the Air Reserve Component's ability to become more responsive to customer needs.	3.47	3
Receiver units must be able to communicate directly (telephone, email, fax) with tanker units to schedule air refueling missions.	4.18	5
AMC leadership supports changing the Tanker Allocation system.	3.13	3
Operations within TACC render it too busy to reengineer the Tanker Allocation System.	3.69	4
The Air Refueling Management System (ARMS) requires training from Tanker and Receiver Units.	4.06	4
The Horseblanket system is based on tanker needs	3.38	2
Too much manpower would be required at TACC if the Tanker Allocation System was reengineered.	2.65	3
The Aircraft Aircrew Tasking System (AATS) used by AMC for tanker aircraft is required.	3.23	3
If AATS was discarded, tanker crews and maintenance personnel would not maintain currency due to lost training.	2.93	3
If AATS was discarded, TACC would be responsible for ensuring tanker crews and maintenance personnel were provided the opportunity for accomplishing training items to maintain currency.	2.79	3
If AATS was discarded the KC-10 Formal Training Unit would be affected.	3.08	3

<u>Communication:</u>

The group agreed moderately that under the current system, receiver units need to communicate directly with tanker units to schedule AR missions effectively.

<u>Operations Tempo:</u>

The group agreed slightly that TACC is too busy to reengineer the Tanker Allocation Process, but that reengineering would not require a large increase in manpower.

Additional Ideas:

Finally, the group provided additional comments to supplement the research. The following are some ideas of what is possible that if we relax some assumptions about how the process works:

1) Consolidate the GFMAP and long-range scheduling into one long-range look with a single gatekeeper.

2) Include fighter receivers in the long-range allocation process.

3) Combine the short-range process into ARMS—or similar system—with a single gatekeeper. Or, have all receiver units post their AR events in ARMS, allow every tanker unit to go into ARMS and buy the AR events based on availability.

4) Have the horseblanket system sort by preferred tracks and times and provide visibility on all requests in the system.

Overall, the environment supports reengineering the tanker allocation system. Several agencies have a stake in the success and effectiveness of this system. The group agreed on the general requirements of a system that would improve effectiveness and efficiency in allocating tankers to all missions.

V. Discussion

"Both Afghanistan and Iraq were air mobility wars. Every single flight into these areas of operation needed some kind of air refueling– fighters, bombers, lifters and even other tankers needed air refueling. Navy carrier-based fighters needed dramatic air refueling to get them the "legs" they needed."

General John W. Handy
(Airlift/Tanker Quarterly, 2003)

Analysis

Air refueling is obviously an integral part of the USAF's air mobility structure. The tanker's role as a force enabler allows aircraft to go beyond their normal ranges, allowing significant impact to global strike and global mobility operations (Air Force Doctrine Document 2-6, 2006). Hence, the system by which tankers are allocated for missions and training is also important. This concept is supported by the Delphi study. Because the Delphi respondents also agreed that the current system is dysfunctional, and that reengineering is feasible, it is clear that the current environment supports reengineering of the Tanker Allocation System. In addition, respondents agree that reengineering will not require a large increase in manpower. However, there are some feelings that TACC is too busy to reengineer and that uncertainty exists as to whether leadership will support reengineering.

The customers and stakeholders in the tanker allocation system have been identified, and their requirements have been made known. The Delphi respondents agreed with the AFSO21 teams' recommendations that a central IT system is required. When considering the use of information technology, however, it is important to use it in an enabling role. Hammer and Champy contend that "merely throwing computers at an existing business problem does not cause it to be reengineered," (2001: 87). Instead IT should be used to help break old rules and create new ways of working (Hammer & Champy, 2001). In this way, it is important to know what rules to break, or what ways to reengineer, before the technology is at hand. Fortunately, the respondents have agreed with much of what the AFSO21 teams had proposed.

The respondents agreed that TACC requires a system that has visibility on all tankers. This system should provide the ability to optimize use of all tankers in the system. This system should have a single gatekeeper and point of contact for customer questions and concerns. The system should allow receiver customers access and the ability to request the exact amount of refueling missions needed. The system should provide ARC units a constant and reliable schedule, while allowing the flexibility of late changes to other missions, if required. Finally, this system must work to achieve customer satisfaction to a greater extent than in the past. These recommendations have some serious implications to the way current business is conducted.

First, providing visibility and optimization power to a single gatekeeper at TACC has serious implications on the Aircraft Aircrew Tasking System (AATS) used by AMC. AATS is a system by which tasking authority for AMC aircrews and aircraft is split between TACC and the individual AMC wings (and groups). Introduced in November 2000, the system was designed to balance out wing training needs and operational requirements (Hawkins, 2005). Through a mathematical calculation of possessed, deployed, and training aircraft, TACC and the wings are allocated a certain number of aircraft. The numbers change often depending on the commitment rate and change of possession of aircraft. Because of this, TACC currently only has a view and control over the TACC allocated aircraft. These TACC allocated aircraft are tasked based on the priority of missions requested. Hence, the lower priority missions fall into the hands of the individual Wings as they allocate their training missions based on their needs. In turn, the receiver requesters of these low priority missions are victims of the Horseblanket and Soft AR system, often making telephone calls or sending emails to obtain air refueling support.

The Delphi respondents, when asked about the AATS System, agreed that Tanker Wings must have some aircraft under their control to ensure flying and ground training needs are met. And, they agreed that tanker crews would not meet their training needs if TACC scheduled all their missions. However, when asked about the responsibilities of TACC if AATS were discarded, the group was not sure whether TACC would be responsible for ensuring that ground and flying training opportunities were available. They were also not sure if training would be lost for crews, maintenance personnel, or the FTUs (in the case of the KC-10), if AATS were discarded.

In addition to the ramifications on the current assumptions regarding AATS and the tanker allocation system, implementing an IT system with visibility and optimization control over all air refueling assets has ramifications on the underlying assumptions regarding the ARC. First, controlling all ARC tanker assets for optimization may require regulatory changes to Title 10 and Title 32, and business rules regarding funding for these missions. In addition, as this single IT system optimizes tanker use, some undesirable missions may flow to the ARC. And, some last minute mission adjustments may detract from the required predictability and lead time for ARC missions. Because of these implications, the ARC may not support this type of reengineering effort.

Recommendations

In light of the recommendations of the two AFSO21 BPI teams and the Delphi Study respondents, the tanker allocation system should be reengineered to allow centralized visibility, control, and optimization of all tanker assets and air refueling tracks. This idea is in line with the first Tenet of Air and Space power: Centralized Control, Decentralized Execution (Air Force Doctrine Document 1, 2003). While centralized control maximizes flexibility and effectiveness, it must not turn into micromanagement thereby stifling subordinate agencies' need to deal with inevitable uncertainties (Air Force Doctrine Document 1, 2003). This is why decentralized execution is key to this process. Decentralized execution allows subordinates to exploit the opportunities as the situation changes (Air Force Doctrine Document 1, 2003). With regard to the tanker allocation system, the centralized system should be only used to have visibility and to control the scheduling and optimization of tanker use—to task the units. The units themselves will be responsible for executing the missions once tasked.

The centralized IT system with visibility and optimization capability should be the conduit for which all tanker assets and missions are tasked. This means consolidating the GFMAP, long-range, short-range, and horseblanket systems into one central system. This system should have a single gatekeeper. In accordance with the 2008 AFSO21 BPI team recommendations, this gatekeeper should be in the form of a Tanker Resource Optimization office and Tanker Resource Optimization Steering Group. This would mean reallocation of manpower for this office. The IT system should provide visibility to both tanker and receiver units, and should provide a rolling window so that long-range missions are visible for planning purposes.

With this centralized system of visibility, optimization, and tasking of all tanker assets, some underlying assumptions or business rules will need to be broken and redesigned. First, it is recommended that AATS be discarded for the tanker. This way, TACC is responsible for all assets. With this responsibility, however, comes the responsibility to keep tanker crews and maintenance personnel trained and equipped. Therefore, the Tanker Resource Optimization office must have a department that communicates directly with training agencies at the AMC level as well as at the Wing level to ensure that enough training opportunities are available for crews and maintenance personnel. Again, an allocation of manpower will be necessary to maintain this office. In addition to this issue, without AATS, no aircraft surge capability will be visibly set aside for TACC use. Because of this, it is inherently important that tanker mission priority be created and maintained, and that the TRO be responsible for ensuring missions with training as the priority make up a certain percent of all tanker missions each day.

Before TACC begins to have visibility and control the tasking of all tanker assets under one optimized system, the business rules regarding the ARC must be reviewed for change. This includes regulatory changes to Title 10 and 32 regarding the Flying Hour Program, and other funding limiting factors. In addition to funding incentives, the ARC needs an environment that promotes volunteerism. Therefore, the centralized agency must task the ARC with missions that provide for enough lead time for planning, predictability, and stability.

Finally, it is crucial that leadership support this reengineering effort. Hammer and Champy indicate that failure of senior leadership support is a common thread in reengineering failure. They explain that if reengineering fails, "no matter what the proximate cause, the underlying reason can invariably be traced to senior managers' inadequate understanding or leadership of the reengineering effort," (Hammer & Champy, 2001: 234). However, with strong executive leadership, Hammer and Champy contend that the reengineering effort will succeed (2001). This idea is supported by the Delphi Study respondents, as they agreed that leadership must support reengineering.

Areas for Further Study

Because reengineering is centered on breaking current rules with the intention of dramatic change and radical redesign, several areas for further study can easily surface. With regards to reengineering the tanker allocation process, it is important to fully understand the current business rules and conduits for tasking tankers. Considering the recommendations, it is important to understand the current IT systems that TACC uses to investigate whether the required IT is already in place. A further study of the capabilities of the ARMS and CAMPS systems would answer these questions and determine the exact need of the future IT system.

In addition, with the recommendation to eliminate AATS, business rules and methods will need to be determined to aid TACC in their responsibility for ensuring training opportunities are provided to individual units. Determining the ramifications of the future tanker structure may be necessary. And, the manpower makeup of the Tanker Resource Optimization office is another area for research.

Regarding funding limitations for the ARC, considering TWCF for tankers may be an area for further study. In addition, a review and plan for the change of business rules for the ARC will be necessary.

Finally, in order to reach air refueling efficiency goals as stated by senior leadership, it is important to determine the metrics needed within the IT system. As visibility and optimization occur, metrics on efficiencies will be necessary. Only then will the Air Force really know the full requirement for a supplemental fee-for-service program.

Conclusion

This study identified key problems with the current tanker allocation system and determined through a Delphi Study that the environment supports a business process reengineering effort. Underlying business assumptions were identified and recommendations were made for the reengineering effort.

These are tumultuous times for the Air Force tanker. Not only have the operating expenses for these aging aircraft been increasing, but a new competitor has come to the market. And, no reprieve is available. Instead, as the Air Force waits for the next tanker, it must determine the requirements for a fee-for-service program. Before the requirements for this program can be determined, however, it is important to know how well current operations are performing. The current tanker allocation process does not optimize assets, nor does it measure efficiencies. Trouble is definitely on the horizon for this process, and it is time to reengineer.

Appendix A. AFI 11-221 AIR REFUELING SUPPORT PRIORITIES

A1.1. Priority 1A.

• Priority 1A1--Presidential-directed missions and operational National Emergency Airborne Command Post (NEACP) support.

• Priority 1A2--Wartime or contingency combat support designated by the Joint Chiefs of Staff (JCS).

• Priority 1A3--Special operations support and other programs approved by the President for top national priority.

A1.2. Priority 1B.

• Priority 1B1--Deployments to conduct contingency operations and special missions directed by the Secretary of Defense or the JCS.

• Priority 1B2--Missions in support of counterdrug operations and operational reconnaissance.

NOTE: Although you may credit activity accomplished on Priority 1 missions toward training requirements, you cannot program these missions within the forecasting process. Therefore, units and MAJCOMs should identify tradeoff sorties when possible. These missions are eligible for tanker spare aircraft or 24-hour slip capability, when available.

A1.3. Priority 2A.

• Priority 2A1--Nonscheduled JCS-directed operational deployments. (Does not include scheduled aircraft swap-outs.)

• Priority 2A2--JCS-directed exercise missions which require air refueling to meet JCS objectives.

• Priority 2A3--Extended over water deployments (aircraft range will not allow a fuel stop en route) or deployments of aircraft tasked for Priority 1 missions for which an en route fuel stop is not practical.

A1.4. Priority 2B.

• Priority 2B1--Foreign Military Sales (FMS) case support. (Unless mission qualifies for a higher priority).

Priority 2B2--Aircraft test operations.

• Priority 2B3--Extended over water redeployments (aircraft range will not allow a fuel stop en route). Redeployments of aircraft tasked for Priority 1 missions for which an en route fuel stop is not practical. Deployments of scheduled aircraft swap outs (aircraft range will allow en route fuel stops).

A1.5. Priority 2C.

• Priority 2C1--JCS exercise missions which require air refueling to meet MAJCOM, NAF, or wing objectives.

• Priority 2C2--Employment missions in support of MAJCOM-directed exercises or operations or MAJCOM-, NAF-, or wing-directed over water deployments.

NOTE: MAJCOM equivalent for the Navy is CINCPACFLT or CINCLANTFLT. MAJCOM equivalent for the Marines is FMFPAC or FMFLANT.

• Priority 2C3-Predeployment qualification training.

A1.6. Priority 3A.

• Priority 3A1--MAJCOM-, NAF-, or wing-directed redeployments or NAF-directed exercises and ORIs.

NOTE: NAF equivalent for the Navy is AIRPAC or AIRLANT. NAF equivalent for the Marines is Marine Expeditionary Force (MEF).

• Priority 3A2--Intratheater deployments and redeployments.

A1.7. Priority 3B.

• Priority 3B1--Combat Crew Training School (CCTS), Replacement Training Unit (RTU), and requalification training and upgrade training, when air refueling training is accomplished during the mission.

• Priority 3B2--Wing-directed exercises and evaluations.

NOTE: Wing equivalent for the Navy is Carrier Air Wing. Wing equivalent for the Marines is Marine Expeditionary Brigade (MEB).

A1.8. Priority 4A.

• Priority 4A1--Missions launched to satisfy US Air Force, Navy, and other DoD agency training requirements.

NOTE: Priority 4 sortie requests must show the number of tanker sorties needed to support training requirements specified by the appropriate training publication.

A1.9. Priority 5A1.

• Priority 5A1-- Unit to unit scheduled non-allocated air refueling (soft air refueling).

Appendix B: Excerpt from Joint Publication 4-01, Appendix A

4. DOD Transportation Movement Priority System

a. This subparagraph provides applicable word descriptions for priorities used in the management of DOD common-user airlift and sealift resources. An urgency of need or the existence of valid circumstances to use a priority other than normal channel lift must be established by competent authority before these priorities can be used.

b. The following list of priorities is in descending order. When requirements for lift exceed capability, lift managers should apply capability to the highest priority category first. All eligible traffic will be categorized into one of the following.

(1) **Priority 1A.** Covers requirements in support of the following.

(a) 1A1 — Presidential-directed missions: including support to the national airborne operations center (NAOC) when operating in direct support of the President.

(b) 1A2 — US forces and other forces or activities in combat designated by the Chairman of the Joint Chiefs of Staff in accordance with applicable Secretary of Defense guidance.

(c) 1A3 — Programs approved by the President for top national priority including:

1. Real-world contingency deployment operations supporting CONPLANs for special operations;

2. Deployment of special category overseas law enforcement missions (This priority would also include redeployment of such missions, if the return of the aircraft to the United States were considered integral to mission accomplishment); and

3. Deployment of designated search and rescue teams when directed by Secretary of Defense. This priority shall only be assigned to missions in which the immediate deployment could result in the saving of human lives.

(d) 1A4 — Special weapons.

(2) **Priority 1B.** Covers requirements in support of the following.

(a) 1B1 — Missions specially directed by the Secretary of Defense including:

1. Urgent contingency deployments (This priority is intended for deployment of forces supporting contingency operations of a sudden, time-sensitive nature and is not intended for routine, planned rotations of forces into theater);

2. Redeployment of forces conducting real-world operations in support of CONPLANs for special operations (This priority is assigned as a result of the stringent reconstitution requirements placed on these assets);

3. Routine law enforcement deployment missions;

4. Time-sensitive deployment of Joint Strategic Reconnaissance Office directed air missions;

5. NAOC operations when not in support of the President;

6. Validated minimal frequency channels; and

7. Patients requiring urgent or priority aeromedical evacuation.

(b) 1B2 — Units, projects, or plans specially approved for implementation by the Secretary of Defense or the Chairman of the Joint Chiefs of Staff including steady-state contingency deployments. This priority is intended for deployment or rotation of forces supporting
contingency operations of an enduring nature (including, for example, planned rotations of aircraft
squadrons, air expeditionary forces, missile battery equipment and personnel, communications support, and security forces). Also includes real-world counterdrug deployments.
(c) 1B3 — Covers requirements in support of all contingency redeployments, regardless of whether the deployment was urgent or steady state (except for forces deployed for routine aeromedical evacuation missions.)
(3) **Priority 2A.** Covers requirements in support of:
(a) 2A1 — US forces or activities and foreign forces or activities deploying or positioned and maintained in a state of readiness for immediate combat, combat support, or combat service support missions including CONUS-based units for exercise and training events directly related to CONPLANs for special operations; and
(b) 2A2 — Industrial production activities engaged in repair, modification, or manufacture of primary weapons, equipment, and supplies to prevent an impending work stoppage or to re-institute production in the event a stoppage has already occurred or when the material is
required to accomplish emergency or controlling jobs and movement of aircraft in support of FMS.
(4) **Priority 2B.** Covers requirements in support of:
(a) 2B1 — CJCS-sponsored exercises (under the CJCS Exercise Program); and
(b) 2B2 — Combatant commander-sponsored exercises (under the CJCS Exercise Program).
(5) **Priority 3A.** Covers requirements in support of:
(a) 3A1 — Readiness or evaluation tests when airlift is required in support of the unit inspection or evaluation tests including deployment missions for major command (or equivalent) -directed exercises or operations (fleet commanders for Navy, major Army commands
for Army and Marine Forces, Pacific and Marine Forces, Atlantic for Marines).
(b) 3A2 — US forces or activities and foreign forces or activities that are maintained in a state of readiness to deploy for combat and other activities essential to combat forces; and
(c) 3A3 — Approved requirements channels.
(6) **Priority 3B.** Covers requirements in support of joint airborne/air transportability training (JA/ATT), including:
(a) 3B1 — Service training when airborne operations or air mobility support is integral to combat readiness (e.g., field training exercise, proficiency airdrop, and air assault);
(b) 3B2 — Requirements in support of
1. Combat support training (e.g., flare drops and special operations missions); and
2. Counterdrug training missions (deployment and redeployment).
(c) 3B3 — Service schools requiring airborne, airdrop, or air transportability

training as part of the program of instruction; and
(d) 3B4 — Airdrop and/or air transportability or aircraft certification of new or modified equipment.

Note: Two special provisions exist for JA/ATT requirements: (1) The Chairman of the Joint Chiefs of Staff has authorized a JA/ATT priority of 2A1 to CONUS-based units for exercise and training events directly related to CONPLANs for special operations; and/or (2) JA/ATT will be removed from this priority system and protected with the same criteria extended to AMC unilateral training when AMC publishes the JA/ATT Monthly Operations Tasking, Appendix 1, Annex C, HQ AMC OPORD 17-76 (30 days prior to the month of execution). Higher priority users who submit their requirements before Annex C is published will be supported per the usual priorities.

(7) **Priority 4A.** Covers requirements in support of:
(a) 4A1 — US forces and foreign forces or activities tasked for employment in support of approved war plans and support activities essential to such forces; and
(b) 4A2 — Static loading exercises for those units specifically tasked to perform air transportability missions.

(8) **Priority 4B.** Covers requirements in support of:
(a) 4B1 — Other US forces or activities and foreign forces or activities;
(b) 4B2 — Other non-DOD activities that cannot be accommodated by commercial airlift; and
(c) 4B3 — Static display for public and military events.

c. Lift priorities are intended to support intertheater deployments into the AOR and do not address retrograde movements. Retrograde movements including cargo (e.g., repairables, containers), passengers (noncombatant evacuation operations, medical evacuees), and their associated lift priority are a responsibility of the supported combatant commander. Specific guidance and priorities are established by the supported combatant commander in an OPORD and/or contingency environment, consistent with the overall operations.

Appendix C. Initial Questionnaire

Tanker Allocation Process Survey

Questions 1&2 on 1st Survey. Question 3 covered on 2nd Survey

1) Research Question 1: Should the tanker allocation process be improved, or should a new process be created? (*All questions will be answered in a "Strongly disagree/Disagree/Neutral/Agree/Strongly Agree" format*)

   a. The Tanker Allocation System is important. (p132)
      i. The tanker allocation system meets the air refueling needs of customers.
      ii. Customers overinflate their air refueling needs in order to get the service they require.
      iii. Customers require a Tanker Allocation system that meets their air refueling training and mission requirements.
      iv. It is important that customers are able to change a refueling request when a mission changes, and that the new AR requirement is met.

   b. The Tanker Allocation System is dysfunctional. (p127-128)
      i. The Tanker Allocation System contains broken processes.
      ii. Tanker and receiver units bypass the Horseblanket process by communicating directly with each other via email or telephone.
      iii. The tanker allocation system focuses on the customer.

   c. Reengineering the tanker allocation system is feasible. (Reengineering is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed) (p35, 133)
      i. Only minor fixes are required in order to gain utility in the Tanker Allocation Process.
      ii. Reengineering is too costly.
      iii. Leadership will support reengineering.
      iv. Leadership must support reengineering.
      v. Likelihood of success in reengineering the Tanker Allocation System is low.

   d. Reengineering the Tanker Allocation Process will have a high impact on customer satisfaction. (p133)
   e. The performance of the Tanker Allocation Process is far below "best-in-class" standard. (p133)
   f. The Tanker Allocation Process is antiquated. (p133)
   g. More can be gained from the Tanker Allocation Process without reengineering. (p133)

2) Research Question 2: Who are the customers and stakeholders, and what are their needs?

a. *Answered as "Customer/Stakeholder/Both/Neither":*
   i. Receiver Aircraft and their Units
   ii. Tanker Aircrews
   iii. Tanker Squadrons
   iv. Tanker Wings
   v. Air Reserve Component Tankers and their Units
   vi. 18^{th} Air Force/618 Tanker Airlift Control Center (TACC)
   vii. AMC
   viii. National Guard Bureau (NGB)
   ix. Air Force Reserve Component (AFRC)
   x. Other(list)___________________

QUESTIONS b-o WILL BE ANSWERED IN THE "Strongly Disagree/Disagree/Neutral/Agree/Strongly Agree" FORMAT:

b. Customers should have easy access to the Tanker Allocation Process. (p23)
c. The Tanker Allocation Process should focus on maximizing customer satisfaction.
d. Customers should be able to request the AR missions that they require—no more, no less.
e. Customers should get exactly the number of AR missions that they request.
f. Customers and stakeholders require that the Tanker Allocation Process have superior process design and execution.
g. Customers should be able to request AR support in the same electronic system that is used for scheduling the support.
h. Customers should have one point of contact available to them for questions/concerns regarding their air refueling requests.
i. Tanker aircrews can meet their training needs if TACC scheduled all their missions.
j. Tanker Wings have ground requirements that require control of some tanker aircraft.
k. TACC requires a Tanker Allocation Process which optimizes tanker use.
l. TACC requires a Tanker Allocation Process which has visibility on all tankers—Active duty, Guard, and Reserve.
m. NGB and AFRC aircraft/aircrews require a constant, reliable schedule for their tanker activity.
n. NGB and AFRC aircraft/aircrews require a schedule that has little or no change.
o. NGB and AFRC aircraft/aircrews require a Tanker Allocation Process which schedules in excess of 30 days.

3) What are the underlying assumptions as to why we use the current process? What is possible if we relax these assumptions? (*Questions will be answered in a "Strongly disagree/Disagree/Neutral/Agree/Strongly Agree" format*)

   a. What are the assumptions?
      i. Tanker Wings must have a certain number of aircraft under their control for scheduling in order to meet flying and ground training needs.
      ii. The current process meets the Air Reserve Component requirements of predictability.
      iii. The flying hour program limits the Air Reserve Component's ability to become more responsive to customer needs.

      (*Questions iv-vi will be answered in a "1-2 weeks/3-4 weeks/1-2 months/3-4 months/6 months" format*)

      iv. The Air Reserve Component needs at least __ process lead time in order to maximize the use of its tankers and crews.
      v. Active Duty Tanker units require ___ advance notice in order to schedule tanker missions.
      vi. Receivers are required to request AR support ___ in advance of the mission execution.
      vii. Receiver units must be able to communicate directly (telephone, email, fax) with tanker units to schedule air refueling missions.
      viii. AMC leadership supports changing the Tanker Allocation system.
      ix. Operations within TACC render it too busy to reengineer the Tanker Allocation System.
      x. The Air Refueling Management System (ARMS) requires training from Tanker and Receiver Units.
      xi. The Horseblanket system is based on tanker needs
      xii. Too much manpower would be required at TACC if the Tanker Allocation System was reengineered.

   b. What happens if we relax these assumptions.
      i. The Aircraft Aircrew Tasking System (AATS) used by AMC for tanker aircraft is required.
      ii. If AATS was discarded, tanker crews and maintenance personnel would not maintain currency due to lost training.
      iii. If AATS was discarded, TACC would be responsible for ensuring tanker crews and maintenance personnel were provided the opportunity for accomplishing training items to maintain currency.
      iv. If AATS was discarded the KC-10 Formal Training Unit would be affected.

Appendix D. Questionnaire 1

1) *Questions will be answered in a "Strongly disagree/Disagree/Neutral/Agree/Strongly Agree" format*:
    a. The tanker allocation system meets the air refueling needs of customers.
    b. Customers overinflate their air refueling needs in order to get the service they require.
    c. Customers require a Tanker Allocation system that meets their air refueling training and mission requirements.
    d. It is important that customers are able to change a refueling request when a mission changes, and that the new AR requirement is met.
    e. The Tanker Allocation System contains broken processes.
    f. Tanker and receiver units bypass the Horseblanket process by communicating directly with each other via email or telephone.
    g. The tanker allocation system focuses on the customer.
    h. Only minor fixes are required in order to gain utility in the Tanker Allocation Process.
    i. Reengineering is too costly. (Reengineering is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed)
    j. Leadership will support reengineering.
    k. Leadership must support reengineering.
    l. Likelihood of success in reengineering the Tanker Allocation System is low.
    m. Reengineering the Tanker Allocation Process will have a high impact on customer satisfaction.
    n. The performance of the Tanker Allocation Process is far below "best-in-class" standard.
    o. The Tanker Allocation Process is antiquated.
    p. More can be gained from the Tanker Allocation Process without reengineering.
2) Who are the customers and stakeholders?
    Answered as "Customer/Stakeholder/Both/Neither":
    a. Receiver Aircraft and their Units
    b. Tanker Aircrews
    c. Tanker Squadrons
    d. Tanker Wings
    e. Air Reserve Component Tankers and their Units
    f. 18th Air Force/618 Tanker Airlift Control Center (TACC)
    g. AMC

h. National Guard Bureau (NGB)
i. Air Force Reserve Component (AFRC)
j. Other(list)____________________

3) *QUESTIONS WILL BE ANSWERED IN THE "Strongly Disagree/Disagree/Neutral/Agree/Strongly Agree" FORMAT:*
   a. Customers should have easy access to the Tanker Allocation Process.
   b. The Tanker Allocation Process should focus on maximizing customer satisfaction.
   c. Customers should be able to request the AR missions that they require—no more, no less.
   d. Customers should get exactly the number of AR missions that they request.
   e. Customers and stakeholders require that the Tanker Allocation Process have superior process design and execution.
   f. Customers should be able to request AR support in the same electronic system that is used for scheduling the support.
   g. Customers should have one point of contact available to them for questions/concerns regarding their air refueling requests.
   h. Tanker aircrews can meet their training needs if TACC scheduled all their missions.
   i. Tanker Wings have ground requirements that require control of some tanker aircraft.
   j. TACC requires a Tanker Allocation Process which optimizes tanker use.
   k. TACC requires a Tanker Allocation Process which has visibility on all tankers—Active duty, Guard, and Reserve.
   l. NGB and AFRC aircraft/aircrews require a constant, reliable schedule for their tanker activity.
   m. NGB and AFRC aircraft/aircrews require a schedule that has little or no change.
   n. NGB and AFRC aircraft/aircrews require a Tanker Allocation Process which schedules in excess of 30 days.

Appendix E. Questionnaire 2

1) *Questions will be answered in a "Strongly disagree/Disagree/Neutral/Agree/Strongly Agree" format*
   a. Tanker Wings must have a certain number of aircraft under their control for scheduling in order to meet flying and ground training needs.
   b. The current process meets the Air Reserve Component requirements of predictability.
   c. The flying hour program limits the Air Reserve Component's ability to become more responsive to customer needs.

2) *Questions will be answered in a "1-2 weeks/3-4 weeks/1-2 months/3-4 months/6 months" format*:
   a. The Air Reserve Component needs at least __ process lead time in order to maximize the use of its tankers and crews.
   b. Active Duty Tanker units require ___ advance notice in order to schedule tanker missions.
   c. Receivers are required to request AR support ___ in advance of the mission execution.

3) *Questions will be answered in a "Strongly disagree/Disagree/Neutral/Agree/Strongly Agree" format*
   a. Receiver units must be able to communicate directly (telephone, email, fax) with tanker units to schedule air refueling missions.
   b. AMC leadership supports changing the Tanker Allocation system.
   c. Operations within TACC render it too busy to reengineer the Tanker Allocation System.
   d. The Air Refueling Management System (ARMS) requires training from Tanker and Receiver Units.
   e. The Horseblanket system is based on tanker needs
   f. Too much manpower would be required at TACC if the Tanker Allocation System was reengineered.
   g. The Aircraft Aircrew Tasking System (AATS) used by AMC for tanker aircraft is required.
   h. If AATS was discarded, tanker crews and maintenance personnel would not maintain currency due to lost training.
   i. If AATS was discarded, TACC would be responsible for ensuring tanker crews and maintenance personnel were provided the opportunity for accomplishing training items to maintain currency.
   j. If AATS was discarded the KC-10 Formal Training Unit would be affected.

Appendix F. Questionnaire 3

1) In the first Survey, you were asked to rate the following questions on a scale of 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree. Below are the average answers, as well as the most common answers:

	Avg Answer	Most Common
1A The tanker allocation system meets the air refueling needs of customers.	2.65	2
1B Customers overinflate their air refueling needs in order to get the service they require.	3.5	4
1C Customers require a Tanker Allocation system that meets their air refueling training and mission requirements.	4.6	5
1D It is important that customers are able to change a refueling request when a mission changes, and that the new AR requirement is met.	4.15	4

If your Answers were outside the average by more than 1 point, please take a moment to defend your position in the space below:

2) You were asked to rate the following questions on a scale of 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree. Below are the average answers, as well as the most common answers:

	Avg Answer	Most Common
1E The Tanker Allocation System contains broken processes.	3.75	5
1F Tanker and receiver units bypass the Horseblanket process by communicating directly with each other via email or telephone.	4	4
1G The tanker allocation system focuses on the customer.	3.05	4

If you disagreed with these statements, please take a moment to defend your position in the space below:

3) You were asked to rate the following questions on a scale of 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree. Below are the average answers as well as the most common answers:

	Avg Answer	Most Common
1H Only minor fixes are required in order to gain utility in the Tanker Allocation Process.	2.35	2
1I Reengineering is too costly.	2.4	2
1J Leadership will support reengineering.	3.2	3
1K Leadership must support reengineering.	3.85	4
1L Likelihood of success in reengineering the Tanker Allocation System is low.	3.25	4

1M Reengineering the Tanker Allocation Process will have a high impact on customer satisfaction.	3.5	4
1N The performance of the Tanker Allocation Process is far below “best-in-class” standard.	3.35	4
1O The Tanker Allocation Process is antiquated.	3.6	4
1P More can be gained from the Tanker Allocation Process without reengineering.	3.35	4

If your Answers were outside the average by more than 1 point, please take a moment to defend your position in the space below:

4) You were asked to rate the following questions on a scale of 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree. Below are the average answers, as well as the most common answers:

	Avg Answer	Most Common
3A Customers should have easy access to the Tanker Allocation Process.	4.15	4
3B The Tanker Allocation Process should focus on maximizing customer satisfaction.	3.65	4
3C Customers should be able to request the AR missions that they require—no more, no less.	3.75	4
3D Customers should get exactly the number of AR missions that they request.	2.85	2
3E Customers and stakeholders require that the Tanker Allocation Process have superior process design and execution.	3.9	4
3F Customers should be able to request AR support in the same electronic system that is used for scheduling the support.	3.9	4
3G Customers should have one point of contact available to them for questions/concerns regarding their air refueling requests.	3.8	4
3H Tanker aircrews can meet their training needs if TACC scheduled all their missions.	2.15	1
3I Tanker Wings have ground requirements that require control of some tanker aircraft.	3.65	4
3J TACC requires a Tanker Allocation Process which optimizes tanker use.	3.9	4
3K TACC requires a Tanker Allocation Process which has visibility on all tankers—Active duty, Guard, and Reserve.	4	4
3L NGB and AFRC aircraft/aircrews require a constant, reliable schedule for their tanker activity.	4.1	4
3M NGB and AFRC aircraft/aircrews require a schedule that has little or no change.	3.4	4

3N NGB and AFRC aircraft/aircrews require a Tanker Allocation Process which schedules in excess of 30 days.	3.7	4

If your Answers were outside the average by more than 1 point, please take a moment to defend your position in the space below:

5) In the Second Survey, you were asked to rate the following questions on a scale of 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree. Below are the average answers, as well as the most common answers:

	Avg Answer	Most Common
1A Tanker Wings must have a certain number of aircraft under their control for scheduling in order to meet flying and ground training needs.	4.00	5
1B The Tanker Allocation process meets the Air Reserve Component requirements of predictability.	2.59	3
1C The flying hour program limits the Air Reserve Component's ability to become more responsive to receiver air refueling needs.	3.47	3

If your Answers were outside the average by more than 1 point, please take a moment to defend your position in the space below:

6) You were asked to rate the following questions on a scale of 1: 1-2 Weeks,2: 3-4 Weeks, 3: 1-2 Months, 4: 3-4 Months, 5: 6 Months. Below are the average answers, as well as the most common answers:

	Avg Answer	Most Common
2A The Air Reserve Component needs at least __ process lead time in order to maximize the use of its tankers and crews.	None	None
2B Active Duty Tanker units require ___ advance notice in order to schedule tanker missions.	1.82	None
2C Receivers are required to request AR support ___ in advance of the mission execution.	3.33	4

If your Answers were outside the average by more than 1 point, please take a moment to defend your position in the space below:

7) You were asked to rate the following questions on a scale of 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree. Below are the average answers, as well as the most common answers:

	Avg Answer	Most Common
3A Receiver units must be able to communicate directly (telephone, email, fax) with tanker units to schedule air refueling missions effectively under the current system.	4.18	5
3B AMC leadership supports changing the Tanker Allocation system.	3.13	3

3C Operations within TACC render it too busy to reengineer the Tanker Allocation System.	3.69	4
3D The Air Refueling Management System (ARMS) requires training from Tanker and Receiver Units.	4.06	4
3E The Horseblanket system is based on tanker needs as well as receiver needs.	3.38	2
3F Too much manpower would be required at TACC if the Tanker Allocation System was reengineered.	2.65	3
3G The Aircraft Aircrew Tasking System (AATS) used by AMC for tanker aircraft is required.	3.23	3
3H If AATS was discarded, tanker crews and maintenance personnel would lose training opportunities.	2.93	3
3I If AATS was discarded, TACC would be responsible for ensuring tanker crews and maintenance personnel were provided the opportunity for accomplishing training items to maintain currency.	2.79	3
3J If AATS was discarded the KC-10 Formal Training Unit would lose training opportunities.	3.08	3

If your Answers were outside the average by more than 1 point, please take a moment to defend your position in the space below:

8) In the space below, please list any business rules or assumptions of the current tanker allocation process that have been missed in the previous surveys. Also, please list possible ramifications if these business rules/assumptions were relaxed.

Appendix G. Questionnaire 4

1) The main thrust of the first research question is to determine if the Tanker Allocation System is important, dysfunctional, and if reengineering this system is feasible. (Reengineering is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed)

   According to the survey results, the group *moderately—strongly* agrees that the system is important. The group also agrees *slightly—moderately* that the system is dysfunctional. Finally the group agrees *slightly* that reengineering the system is feasible.

2) The second research question was to determine the customers and stakeholders, and their needs within the process.

   From the results, the group agreed that the stakeholders are:
   18 AF/618 TACC
   AMC
   NGB
   AFRC

   From the results, the group agreed that the customers are:
   Receiver Commands
   Allied Forces

   From the results, the group agreed that the following are both stakeholders and customers:
   Receiver Units
   Tanker aircrews
   Tanker squadrons
   Tanker Wings
   The ARC Tanker Units
   Navy, USMC
   COCOMs and their AOCs

   The group agreed *moderately* that:
   Customers should have easy access to the Tanker Allocation Process and that this system should be the same as that used for scheduling the support. In addition, customers should have one point of contact for their questions and concerns. TACC requires a process that has superior process design and execution, that it has visibility on all tankers, and that it optimizes tanker use. NGB/AFRC crews require a constant and reliable schedule for tanker activity. Customers should request the exact number of AR missions that they need

The group agreed *slightly* that:
The process should maximize customer satisfaction. NGB/AFRC aircraft/crews require a process that schedules in excess of 30 days. Tanker Wings require control of some tanker aircraft for ground requirements.

The group *disagreed* that tanker crews can meet their training needs if TACC scheduled all their missions.

3) The third question was to determine some underlying assumptions of the current process.

AATS Assumption:
The group agreed moderately that, under the current process Tanker Wings must have some aircraft under their control for scheduling to ensure flying and ground training needs are met. The group agrees slightly that the AATS is required. However, if AATS was discarded, the group is neutral as to whether TACC would be responsible for ensuring ground and flying training opportunities were available, or whether training would be lost for crews, maintenance personnel, or the Formal Training Unit.

AR Scheduling Lead Time:
The group agreed that under the current process Active Duty Tankers require 3-4 weeks advance notice to schedule tanker missions, and that receivers are required to request support 2-3 months in advance.

Communication:
The group agrees moderately that under the current system, receiver units need to communicate directly with tanker units to schedule AR missions effectively.

Ops Tempo:
The group agrees slightly that TACC is too busy to reengineer the Tanker Allocation Process, but that reengineering would not require a large increase in manpower.

4) Finally, the group provided additional comments to supplement the research. The following are some ideas of what is possible that if we relax some assumptions about how the process works:

Consolidate the GFMAP and long-range scheduling into one long-range look with a single gatekeeper.

Include fighter receivers in the long-range allocation process. Red Flag and demonstration teams (T-Birds, Blue Angels) are on a fixed schedule months in advance. These ARs should be listed as CONUS ALTRAVs, i.e. Coronets.

Combine the short-range process into ARMS—or similar system—with a single gatekeeper. This gives the priority system of scheduling ARs a little more meat by spreading the “good deals” and the “bad deals” more equitably. Another idea is to have all receiver units post there AR events in ARMS, allow every tanker unit to go into ARMS and buy the AR events based on availability.

The horseblanket system should sort by preferred tracks and times and provide visibility on all requests in the system. (It is very difficult to juggle numerous emails while building a long range schedule.)

Appendix H. Survey Control Number Approval Letter

TO:	Maj Allison Trinklein

FROM: Dr. William A. Cunningham

SUBJECT:	Survey Control Number

This is to inform you that I have issued you AFIT Survey Control Number SC 09 007 for the administration of your survey. This issuance is granted due to your having Commander approval to administer your survey.

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14. ABSTRACT

This research explores the need to reengineer the tanker allocation process at the Tanker Airlift Control Center using a 4 round Delphi study consisting of 22 subject matter experts throughout Air Mobility Command, Air Combat Command, the US Navy, and the US Marine Corps. The research uses business process reengineering (BPR) principles to determine the environment for reengineering, the needs of stakeholders and customers, and the underlying assumptions of current processes. The Delphi study reveals that current climate favors BPR, and a centralized process with visibility and optimization control for allocating tankers is in need. Several ramifications of this process are discussed.

15. SUBJECT TERMS

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