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# Analysis of Air Force Civil Engineering Strategic Planning

Francis J. Mondo Jr.


**ANALYSIS OF AIR FORCE**

**CIVIL ENGINEERING STRATEGIC PLANNING**

THESIS

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AFIT/GEE/ENV/03-19

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# ANALYSIS OF AIR FORCE CIVIL ENGINEERING STRATEGIC PLANNING

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Finally, I would like to dedicate this thesis to my mother who passed away February 9, 2002. She supported me in whatever I did; I know she would have been proud. Thanks Mom!

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**Abstract**

Several organizations within the Department of Defense, including the Air Force Civil Engineer, are actively engaged in strategic planning in an effort to create a roadmap for future capabilities and performance. The objective of this research was to analyze the strategic planning process of the Air Force Civil Engineer (CE) as well as the effectiveness of the Civil Engineer Strategic Plan (CESP). The methodology used to complete this analysis was conducted in two distinct phases: 1) process modeling and evaluation, and 2) performance measure evaluation.

The first phase compared the CE strategic planning process to a theoretical planning model developed in this research. The results of this evaluation showed the CE process does not provide a thorough analysis of the organization's strengths, weaknesses, opportunities, and threats and lacks defined strategies on how to achieve the goals and objectives of the CESP. The research also noted the need for a defined timeline and schedule for Civil Engineers to conduct a strategic planning process review in order to analyze performance measurement data and make necessary corrections to their strategy.

The second phase of the research developed proposed performance measures (PMs) and metrics that are strategically linked to the objectives outlined in the CESP. The researcher also analyzed the PMs and metrics currently in use by CE to assess their effectiveness. This analysis showed several measures and metrics that were not strategically linked to the goals and objectives established in the CESP. The analysis also

highlighted some redundancy in the objectives, or Mission Essential Tasks (METs), of the CESP and provided suggestions for improvement.

# ANALYSIS OF AIR FORCE

# CIVIL ENGINEERING STRATEGIC PLANNING

## 1. Introduction

### Background

In an effort to better plan for their future, organizations must engage in strategic planning. This process is equally important for both profit and non-profit organizations. Mintzberg (1987) says, "Strategy deals with how leaders try to establish direction for organizations, to set them on predetermined courses of action." Strategic planning can play a vital role for military organizations as well as profit seeking corporations. Blackerby (1993) defines strategic planning as a continuous and systematic process where people make decisions about intended future outcomes, how outcomes are to be accomplished, and how success is measured and evaluated. Two key words in this definition are *continuous* and *process,* indicating that strategic planning is an ongoing endeavor and not something that stops with completion of a single task such as publishing a strategic plan. Most corporations engage in strategic planning to develop a significant "sustainable advantage" over their competitors. In an effort to achieve that sustainable advantage over enemies of our nation, the Department of Defense (DoD) and each branch of the military engage in some form of strategic planning.

In 1986, the Packard Commission reported to president Ronald Reagan, "…a need for more and better long-range planning to bring together the nation's security objectives, the forces needed to achieve them, and the resources available to support

those forces" (Westpahl, 1998: 35). Following that report and the restructuring of the DoD with the enactment of the Goldwater-Nichols Department of Defense Reorganization Act of 1986, the Air Force launched the development of its current long-range planning process (Westpahl, 1998: 35). This process continued through the late 1990s under the leadership of former Chiefs of Staff, General Ronald Fogleman and General Michael Ryan (Campbell, 2002: 1).

The President of the United States and the Secretary of Defense dictate what is published in the National Security Strategy and the National Military Strategy. These two documents are the overarching planning guidance for the Department of Defense and served as the foundation for Joint Vision 2020 which describes where the national leadership thinks the DoD will be in twenty years. It also describes the challenges that future environment will present and how the DoD will meet those challenges. Joint Vision 2020 is written in very broad terms, laying the foundation for the vision documents and strategic plans of each branch of the military. These strategic plans serve to further elaborate the goals and objectives of the national vision and how each service plans to achieve those goals. In support of Air Force Vision 2020, the Air Force Deputy Chief of Staff for Plans and Programs (AF/XP) published the Air Force Strategic Plan (AFSP). Following the guidelines described in the AFSP, each Major Command (MAJCOM) developed its own strategic plan, as did some of the functionally specific organizations, such as the Air Force Civil Engineer.

The Air Force Civil Engineer Strategic Plan (CESP), in its current form, originated in 1994 under the leadership of the Air Force Civil Engineer, Major General James McCarthy. During that year, the Office of the Civil Engineer published *Blueprint*

*2000: The Air Force Civil Engineer Modernization Plan.* The document was called a "blueprint" to indicate it was a first step. This was the first real effort at long-range, strategic planning that the CE community had undergone. The document was designed to guide Air Force civil engineers through a period of force restructuring and the dramatic post-Gulf War downsizing that swept across the DoD (BP 2000: 1). It outlined a modernization planning process for the Air Force Civil Engineer based on the guidance documented in Air Force Planning Document (AFPD) 10-14, *Modernization Planning* and Air Force Instruction (AFI) 10-1401, *Modernization Planning Documentation.* The Civil Engineering process consisted of 4 major phases: mission support area assessment, mission support needs analysis, strategy applications, and operating plans (BP 2000: 2). This process closely examined the mission of the Air Force and the Civil Engineer and broke out the goals and objectives necessary to accomplish those missions. Each component of the Civil Engineer organization developed strategies to support the goals and objectives defined by the mission support needs analysis (BP 2000: 3).

As the Air Force continued its restructuring efforts through the late 1990s, so did the Civil Engineer's strategic plan. In the spring of 1997, Major General Eugene Lupia, General McCarthy's successor, published the first *Civil Engineer Strategic Plan (CESP)*. Building upon the goals, objectives and strategies outlined in *Blueprint 2000,* the CESP sought to provide planning guidance for fiscal years 1997 through 2005 for each CE core function: Combat and Contingency Engineering, Base Development, Operations and Maintenance, Environmental Leadership, and Housing Excellence (CESP, 1997: 2). These core functions would later be refined into the current Civil Engineer core competencies: Installation Engineering, Expeditionary Engineering, Environmental

Leadership, Housing Excellence, and Emergency Services (CESP, 2000: 1). Although this initial version established a firm foundation for the CESP, it lacked detail and a performance evaluation system to ensure the strategic goals and objectives were being met.

The current CESP was published under Major General Earnest Robbins. It was released in two phases, *Volume I, Future Security Environments and Planning Implications* in 1999 and *Volume II, Mission and Modernization* in 2000. Volume I examines the future security environment and the capabilities needed to execute the Civil Engineer core competencies. It outlines the strategic endstate of each core competency as well as the capabilities needed to execute the mission in an uncertain future (CESP, 2000: 1). An endstate is defined as the destination an organization hopes to reach by the end of some future-planning horizon (CESP, 2000: 5). This planning horizon is typically 20 – 30 years in the future. Volume II, from a broad perspective, encompasses two major elements: organizational performance planning and future capabilities planning (CESP, 2000: 3). Performance planning is aimed at enhancing the performance of near-term mission essential tasks (METs) by establishing Air Force and Civil Engineer goals, aligning tasks to missions and establishing performance priorities (AFSP, 2000:3). METs are those fundamental tasks required for the performance or accomplishment of an organization's defined mission (CESP 2000, 9). An example would be: *MET 1.A: Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace*. The METs are based on legislative, legal, and mission requirements and aligned under the core competencies and goals of the Civil Engineer. Volume II also identifies several Performance Measures (PMs) that assess how well the organization is

accomplishing its METs, both near and long-term, in support of Air Force goals and mission objectives (CESP, 2000: 3). An example of a PM for the MET above as it is presented in Volume II is: *PM 1.A.1: Condition of bases, infrastructure and facilities*.

At the heart of future capabilities planning is the modernization planning process, which welds the strategic direction of the Air Force senior leaders, vision documents, METs, gap analysis, and planning priorities into action plans (CESP, 2000:3). Gap analysis is an evaluation of where an organization is and where the leadership wants it to be. The goal of the modernization plans of Volume II is to give civil engineers a roadmap from their current METs and associated PMs out to the endstates of the year 2025.

## Research Questions

This thesis will analyze the current strategic planning process employed by the Air Force Civil Engineer (CE). What improvements to the planning process can be made to more accurately reflect the goals and objectives of the Air Force Civil Engineer? Are the current performance measures effectively measuring the strategic goals and objectives of the CESP? Finally, what metrics can be used to effectively represent the performance measures of the CESP?

## Research Objectives

The following objectives were established to guide this thesis research in answering the research questions:

- Examine the strategic planning process used by the Air Force Civil Engineer

- Identify any gaps or overlap in the CESP and/or the planning process
- Provide qualitative analysis of the CESP
- Design proposed performance measures and metrics to effectively reflect the goals and objectives of the CESP.

**Research Methodology**

This research will be accomplished in two phases: process modeling and evaluation, and performance measure evaluation. Phase one will begin with a thorough understanding of the current strategic planning models as well as the process currently in use by the Civil Engineer. That process will be evaluated against criteria derived from strategic planning literature as well as the Government Results and Performance Act of 1993. This evaluation will identify any gaps or overlaps that exist in the CE process and identify suggested areas of improvement. Phase two of the research will develop proposed performance measures and metrics to effectively measure CE's progress toward the goals and objectives of the CESP. These proposed measures and metrics will be compared to those contained in the CESP and *2002 CE Metrics End of Year Review* to provide recommendations for improvement. The goal of this phase of the research is to gauge how well the CESP is being implemented at the major commands (MAJCOMs) and bases-level CE squadrons.

**Scope of Research**

Since the scope of the CESP applies to the entire Air Force, attempts were made to include all MAJCOMs in the validation of this effort, including those that make up the reserve component of the Air Force: Air Force Reserve Command (AFRC) and the Air National Guard (ANG). These commands were included in an effort to incorporate a

"total force" perspective into the research. The Programs division of the Air Force Civil Engineer (AF/ILEP), authors of the CESP, also played a vital role in the data collection and coordination of the proposed performance measures developed in this research.

## Relevance

This research will evaluate the Civil Engineer Strategic Plan as well as the strategic planning process employed by the Air Force Civil Engineer. Air Force organizations will continue to do strategic planning for years to come; therefore it is imperative that they do it in an efficient and effective manner. A good strategic plan can serve as an effective tool for managers and senior leaders to deal with their ever-changing environment (both internal and external) that continually influences their business or organization. The past twenty years have witnessed enormous change in the nature of the threat to the Unites States and its way of life. The ability to successfully plan for the future gives the Air Force the flexibility it needs to carry out its mission and defeat these new threats. The results of this research will aid the Air Force in creating strategic plans that are "living documents," guiding daily activities of base level organizations. Civil Engineering is the cornerstone of the Air Force support structure. Therefore, it is crucial that their strategic planning process be efficient and effective; allowing the United States Air Force to continue its dominance as the world's premier military force.

## Summary

This chapter provided background information about the strategic planning process of the Air Force Civil Engineer. It also outlines the specific research objectives and method used to achieve those objectives. Chapter 2, Literature Review, provides a

critical analysis of the benefits and shortcomings of strategic planning as presented in current literature. It also includes the strategic planning models that were used in establishing the theoretical planning framework. Chapter 2 also discusses current performance measurement literature that was used to establish the framework for analyzing the performance measures and metrics of the CESP. Chapter 3, Methodology, describes the specific research protocol used to develop the strategic planning models as well as the criteria used to develop the proposed performance measures (PMs) and metrics. Chapter 4, Results and Analysis, documents the results of the evaluation of the planning process used by the CE staff. It also highlights any gaps and/or overlap in that process as compared to the theoretical model. It also reports the newly developed proposed PMs and metrics and the analysis of them as they compare to those current in use. Finally, chapter 5, Recommendations and Conclusions, provides the conclusions gleaned from this research and recommendations to the Civil Engineer Plans and Programs office (AF/ILEP), sponsor of this effort, on ways to improve the CE strategic planning process and develop strategically appropriate performance measures and metrics for the CESP and ultimately the entire Civil Engineer community.

## 2. Literature Review

### Introduction

The purpose of this chapter is to provide background information on what strategic planning is (and is not) and how it relates to strategic management. Current strategic planning literature revealed several different planning models available to today's organizations and their leadership. This chapter will outline some of those planning models that most closely relate to the planning process utilized by the United States Air Force Civil Engineer. These literary models served as the foundation for the analysis in Chapter 4 of the Air Force Civil Engineer's planning process. This chapter will also discuss the current Civil Engineering Strategic Plan; how it evolved from previous versions and how it relates to the Air Force Strategic Plan. Finally, this chapter will discuss current performance measurement literature that was used to develop the evaluation method discussed in Chapter 3, *Methodology*.

### Strategic Planning

Strategic planning is an integral part of today's business culture, and as such, there are hundreds of definitions and opinions as to what it is. Unfortunately, there are an equally large number of myths about strategic planning that often hamper its progress or even prevent it from ever happening. Strategic planning is also prevalent in the United States armed forces. Some may argue that without a financial bottom-line, strategic planning has no place in the military (USAFE SP, 2001: B1). On the contrary, strategic planning, or strategy development, began in the military. The word **strategy** is derived

from the Greek *strategos,* or "the art of the general" (Hambrick, 2001: 49). In any military unit, the general is responsible for several units on multiple fronts conducting multiple battles simultaneously. To ensure the objectives are met on the battlefield, the general must have a plan for achieving those objectives. The same applies to business leaders. They too must have a strategy – a central, integrated, externally orientated concept of how an organization will achieve its objectives (Hambrick, 2001: 49). Strategic planning takes place in an integrated system with steps that range from formulation to implementation (Nutt, 1987: 1). Armstrong (1983) defines strategic planning as "an *explicit* written process for determining a firm's long-range objectives, the generation of alternative strategies for achieving these objectives, the evaluation of these strategies, and a systematic procedure for monitoring results." The goal of any strategy, whether it is for a "for-profit" corporation or a "not-for-profit" agency, is to outline a course the organization must take to achieve a sustained competitive advantage. An organization achieves a sustained competitive advantage when it successfully formulates and implements a value-creating strategy, and competitors are unable to duplicate it or find duplication of that strategy to be too costly (Hitt, 2001: 5).

Of course, "value" can have a wide array of meanings as well. For the United States Air Force, value comes in the form of protecting the nation's interests, guarding the homeland, and promoting freedom across the globe. These goals are not financial in nature, but are certainly valuable to the American people. More important is the fact that the Air Force's competitors (enemies of the state) find its competitive advantage too difficult and costly to duplicate. That is how the Air Force became the most dominant air and space power in the world. Effective strategic planning can pull together a diverse

organization, communicate clear objectives and organizational values, and achieve the creative integration of capital, technical, and human resources (Albert, 1983: 3-2).

Another important distinction to make about strategic planning is that it is different from long-range planning, which is also different from strategic thinking. Long-range planning is accomplished with no specific regard for the risks or constraints associated with alternate futures. It recognizes different futures may require change in organizational behaviors, but does not plan specifically to offset the effects of those different futures (Westphal, 1998: 29). Therefore, strategic planning is defined as planning that understands and appreciates the risk and uncertainty of alternate futures and is thereby constrained by that awareness (Westphal, 1998: 29). Another way to look at it is long-range planning is far less constrained than strategic planning and much less tangible. Leaders that do not understand this distinction may have an aversion to strategic planning because they are confusing it with long-range planning and do not see the utility in it.

Strategic planning is often criticized for overemphasizing the planning process itself. There are expectations that planning processes will lead organizations to new and improved strategies (Campbell, 1997: 42). Focus is often lost on the elements of a truly good strategy – insight into how to create value – and redirected at "tweaking" the process. The answer to developing a good strategy is not in new planning processes or better-designed plans. The answer lies in planners' understanding of two fundamental points: 1) the benefit of having a well-articulated, stable purpose, and 2) the importance of discovering, understanding, documenting and exploiting insights about how to create more value than others (Campbell, 1997: 42). Said another way, the process of planning

and the plan itself are far less important to the organization than the organization's focus, its "original leading thought" (Westphal, 1998: 32)

Although it is important to define what strategic planning is, it is equally significant to define what it is not. A strategic plan is not a document cast in stone, nor is it an attempt to blueprint the future (Steiner, 1979: 16). Its purpose is to be flexible enough to be able to adapt to the ever-changing environment, both internally and externally. Strategic planning does not attempt to make future decisions. Decisions can only be done in the present (Steiner, 1979: 16). It is also not a predictor of product sales or a market forecaster; it goes far beyond that. Strategic planning asks questions such as "Are we in the right business?" (Steiner, 1979: 15) or "How are we going to get to where we want the organization to be in twenty years?" Strategic planning is not a simple aggregation of functional plans, but more so a systems approach to moving an organization forward over time through the uncertain waters of its changing environment to achieve prescribed aims (Steiner, 1979: 16).

Putting these ideas into a military context, strategic planning is not vision or doctrine, but something in the middle. Vision looks out 20-30 years and outlines the desired endstates and objectives for that branch of service. Doctrine is a compilation of the organization's best practices designed to guide mission execution in the very near-term. Strategic planning looks forward at how best to achieve the goals of the vision by tying those goals to the organization's core competencies and implementing doctrine to help guide them on the right track.

Dating as far back as the mid-1960s, strategic planning has been a topic of discussion for a great number of researchers. As with most human resource and

organizational research, strategic planning research has been driven by attempts to tie it back to organizational performance. Shrader et al. (1984) present a critical analysis of studies that have shown a significant relationship between strategic planning and performance, while other studies indicate the linkage is not there. For example, several early studies report a simple, positive relationship between formal long-range planning and financial performance [i.e Baker and Thompson (1956), Warren (1966), Henry (1967), Stagner (1969), and Gunness (1971)] (Shrader, 1984: 151). But Shrader et al. (1984), also present several studies that indicate there is no such link between long-range planning and financial performance [i.e. Rhenman (1973), Grinyer and Norburn (1975), and Kallman and Shapiro (1978)] (Shrader, 1984: 151). Shrader and his associates expanded their study to include research of organizations classified by their formal planning practices (i.e. comprehensive planners, partial planners and non-planners). A study conducted by Ansoff, Avner, Brandenburg, Portner, and Radosevich (1970) reported that firms using operational and strategic planning perceived that their objectives were obtained to a more substantial degree than those firms that were considered non-planners, as did Wood and La Forge (1979) in their study of 50 large banks in 10 U.S. states (Shrader, 1984: 153). However, Sheehan (1975) found no conclusive performance difference in the different planning categories and Fulmer and Rue (1974) actually found non-planners performed better than long-range planners in service industries (Shrader, 1984: 153). The bottom-line: there is no clear systematic relationship between formal strategic planning and organizational performance (Shrader, 1984: 154). For this reason, there will probably always be "nay-sayers" when it comes to the validity and utility of strategic planning.

## Strategic Planning Models

Many strategic planning researchers have developed models in an effort to create a common planning foundation applicable for any organization. This section will describe several of these models as they are presented in the literature in order to establish the foundation for the strategic planning analysis described in Chapter 3.

Steiner (1979) presents a conceptual model that has utility for business managers as well as military planners and senior leaders. A conceptual model is one that represents what an idea should be, or an image of something formed by generalizing from particulars. This model covers the entire range of systematic corporate planning, beginning with the planning premises followed by plan formulation and ending with implementation, final review and evaluation of the plans. Steiner's strategic planning model is depicted in Figure 1.

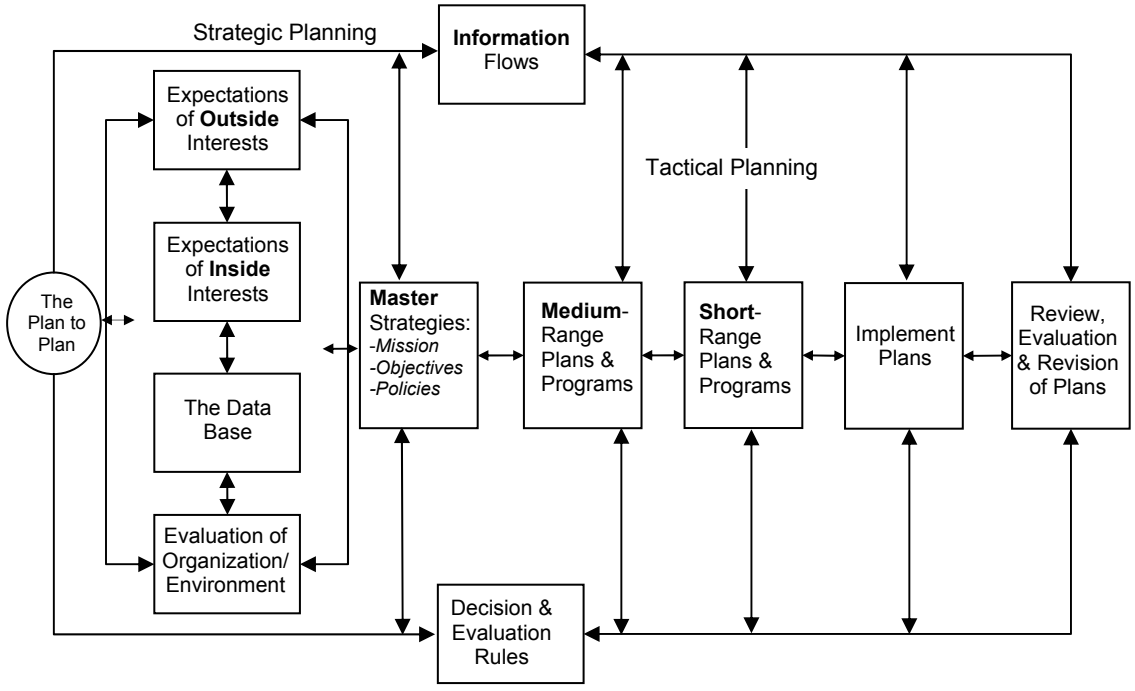


**Figure 1. Steiner's Conceptual Model of Strategic Planning (Steiner, 1979:17)**

The premise for all planning endeavors is to first gather information. The process outlined in Steiner's model begins with a "plan to plan." This can either be an oral or written statement regarding the senior leaders' intent for how the system is going to operate. In many organizations, this may also be a formal planning or revision cycle established by the organization's leadership. The next step in information gathering is referred to as the *substantive planning premises*. This phase is sub-categorized into four elements: expectations of major outside interests (i.e., society, customers, suppliers, etc.), expectations of major inside interests (i.e., managers, labor, staff), the data base (i.e., past performance, current situation, forecasts and projections), and evaluation of the environment and the organization (i.e., opportunities and threats, strengths and weaknesses). The number of elements that could conceivably be included in this "situational audit" is far too great for any organization to examine each thoroughly. Therefore, an organization must identify those elements – past, present, or future – that are most significant to its growth, prosperity, and well-being and concentrate its thought and efforts on truly understanding them (Steiner, 1979: 19). That understanding will set the tone for the strategic planning endeavor.

The first element of this step in Steiner's model is "expectations of outside interests". Understanding the interests of major constituents of an organization can play a key role in setting the course for an organization. If the customer's needs are not being met, then an organization may choose to shift its strategic priorities in order to better meet those needs. For example, a major external influence on the United States Air Force is the National Command Authority (NCA). The NCA has increased role of

airpower in protecting the American homeland which has caused the Air Force to adjust its strategic priorities. Those strategic priority shifts have a "trickle-down effect" and influence the goals and objectives of all subordinate organizations.

The second element of step two in Steiner's model is "expectations of inside interests." The internal interests of managers and employees also play a vital role in the strategic direction of an organization. The value systems of senior leaders as well as their vision for the organization's future will influence the strategic goals and objectives set by the planning team. The third element, The Data Base, refers to the data gathered on past performance, present capabilities and situation, and the future predictions. This information is essential in helping the planners to identify alternative courses of action and to evaluate ongoing efforts (Steiner, 1979: 19). The final element of the "substantive planning" phase of Steiner's model is an assessment of future opportunities and threats, and planning how to either exploit or avoid them. In executing this final step of Steiner's *substantive planning premises,* the Air Force has planned around several "alternate futures." These alternate futures paint a picture of different geo-political situations in order to lay the foundation for strategy development (CESP Vol. II, 2000: 28). Fully understanding the organization's strengths and weaknesses will aid the planning staff in positioning the organization to meet the opportunities and avoid the threats.

It is vital to the process that this information be as comprehensive as possible because it supports the next step in the strategic planning process. This next step is the *formulation of "master strategies."* This portion of the model addresses the most fundamental and important ends sought by the organization and the major approaches to achieving them. The subject matter developed during this phase includes the

organization's mission, purposes, objectives and policies. The model continues to outline the rest of the planning process with medium-range and short-range planning objectives, outlining program specific requirements, project funding plans, and day-to-day operating plans. Steiner refers to this detailed planning process as **tactical** planning. Although Steiner's model includes a considerable amount of detail, it provides a solid foundation of a strategic planning process for either a military or civilian organization.

Another important element of strategic planning is organizational commitment. Armstrong (1983) explains each step of the strategic planning process should be accompanied by an explicit procedure for gaining organizational commitment. This process is summarized in Figure 2.

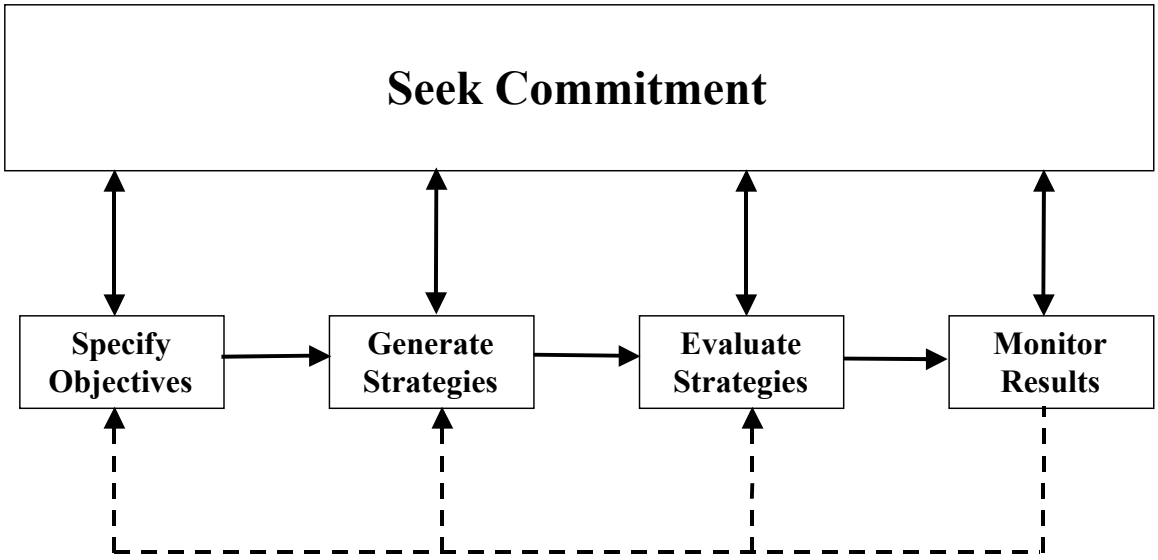


**Figure 2. Armstrong Model of Strategic Planning (Albert, 1983: 2-4)**

The horizontal arrows represent the best order in which to proceed. The dashed lines indicate the process is iterative. For instance, generating new strategies may require going back to specify new objectives, or monitoring may require a new evaluation of strategies.

The first three steps of Armstrong's model (specify objectives, generate strategies, and evaluate strategies) are very similar to the process described by Steiner (1979). However, the differences come in Armstrong's description of a result monitoring system as well as the importance commitment plays in the entire planning process. There are five items the monitoring system should measure to allow for corrective action. They are: changes in the environment, changes in the organization's capabilities, actions actually taken by the organization (did they implement the desired strategy?), actions by major competitors, and results (Armstrong, 1983: 2-10). Monitoring these items may indicate the need to make changes in the existing strategy, in which case the process would revert back to generation of strategies or perhaps even specification of objectives. Unfortunately, this step in the strategic planning process is often forgotten by many organizations. Horovitz (1979) surveyed the planning practices of 52 large firms in Great Britain, France and West Germany and found that virtually none of them had formal procedures for monitoring the results of their long-range plans (Armstrong, 1983: 2-11).

The other crucial process described by Armstrong (1983) is seeking commitment to the strategic planning process. This vital element is not discussed in the Steiner model. The process must first start with the key stakeholders in the organization. A stakeholder is defined as any group that contributes resources to the organization. Examples range from stockholders and creditors to employees, consumers, and the local community. Information gathered from these stakeholders is essential in developing the organization's objectives. Playing such a crucial role in the development of objectives leads to greater commitment or buy-in from the stakeholders. Self-set objectives are more likely to be attained than objectives set by others. Participation by stakeholders is also helpful in the

generation and evaluation of alternative strategies (Van de Ven, 1980). The two-headed arrows drawn between "seek commitment" and all four phases of Armstrong's model depict this vital interaction of the organization's stakeholders. Armstrong also explains commitment can be maintained more effectively if the monitoring system provides quantitative feedback on success in meeting the objectives.

Dyson (1990) presents a model of strategic planning based on a simple control system design. The goal of any control system is to reach a particular target by following certain procedures that were designed to meet that target. This basic idea can be translated into strategic planning where the target is some desirable future state of the organization and strategic decisions are taken aimed at guiding the organization in that direction (Dyson, 1990: 3). This basic planning control system is modeled in Figure 3.

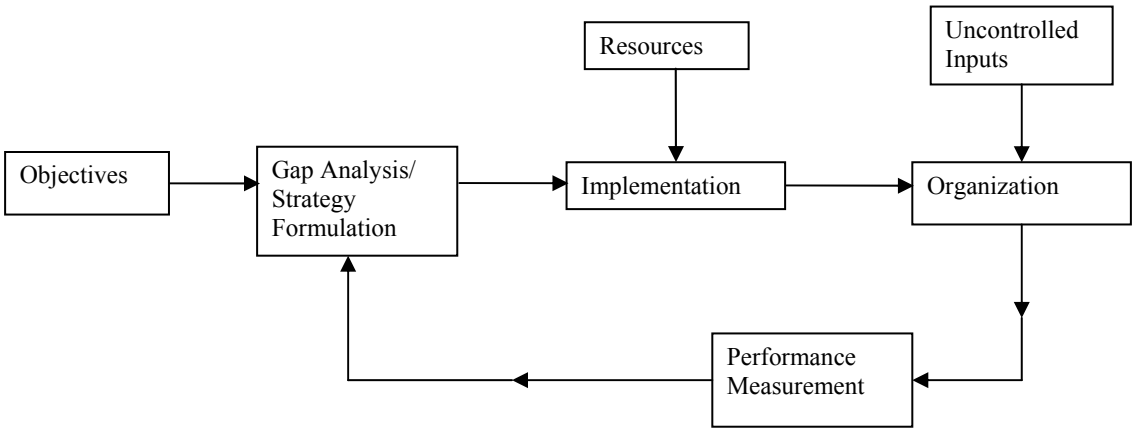


**Figure 3. Dyson's Reactive Strategic Decision Making Model (Dyson, 1990: 3)**

The model requires the organization to have a set of objectives against which the current performance can be compared through a gap analysis. If the gap is too great, strategic options are formulated and appropriate ones selected. Necessary resources are

used to implement these options, which in turn affect the state of the organization in conjunction with the uncontrolled inputs of external forces (Dyson, 1990: 5). This *reactive* model suggests only current performance of the system is being assessed through a feedback loop for comparison with current objectives. This model lacks the flexibility planners need to examine different future scenarios. If this performance is deemed unsatisfactory, a new strategic decision is made (Dyson, 1990: 5). Dyson later improved his model to depict a more accurate strategic planning system because strategic decisions may take a significant amount of time to affect the performance of the organization. He suggests a strategic planning process must be pro-active, considering not just the organization's present performance, but also predicting possible future performances and be able to take anticipatory action (Dyson, 1990: 5). This revised *pro-active* model is depicted in Figure 4.

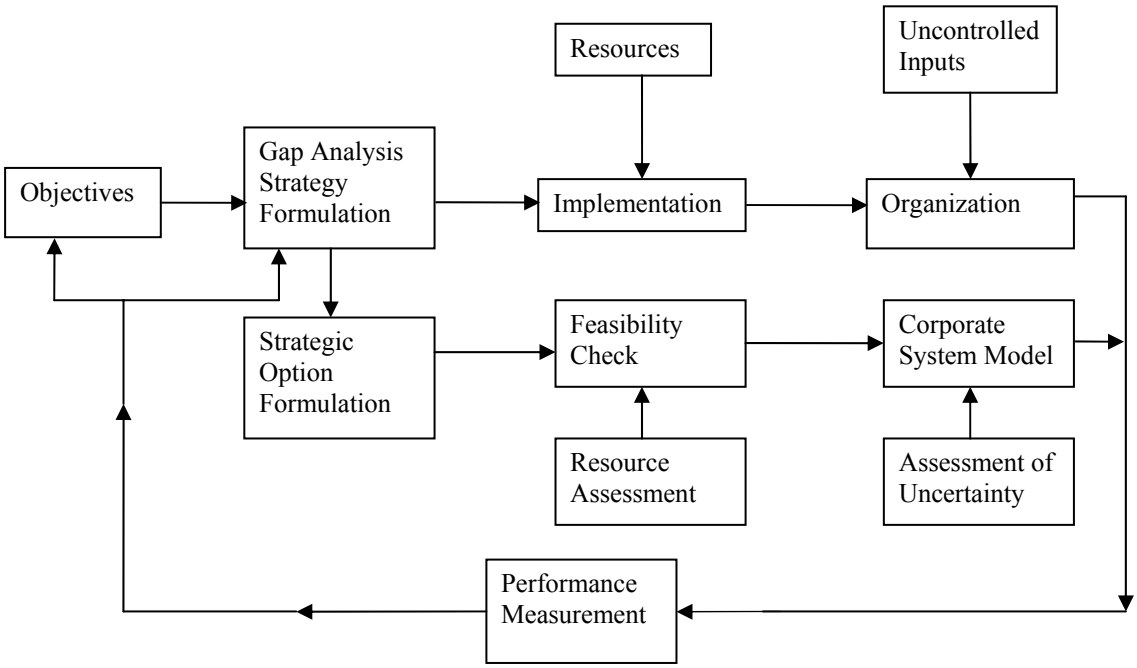


**Figure 4. Dyson's Pro-active Strategic Planning Model (Dyson, 1990: 5)**

This model includes much of the reactive decision making model; however, it also includes a forward loop that involves strategic option formulation, feasibility check, resource assessment, a system model for predicting future states of the organization, and assessment of the uncertainty. These planning elements set this model apart from previous ones discussed in this chapter. The output of this additional loop is a prediction of future states of the organization that allows the model to be pro-active instead of reactive. The task of setting and reviewing objectives is necessary in any strategic planning system, as is the gap analysis (Dyson, 1990: 7). The forward loop calls for a constant flow of strategic options to give the organization the flexibility it needs to adjust to the changing environment. The feasibility of any option must be thoroughly checked against the available resources such as finance, manpower, materials and so on. Analyzing the uncertainty surrounding an organization is most effectively accomplished through the use of scenarios (Dyson, 1990: 7). The feasibility check and assessment of uncertainty serve as inputs to a corporate system model. The purpose of this model is to act as a test-bed for the various strategic options so they can be tested and evaluated without imposing change in the real world (Dyson, 1990: 12). Many organizations use computer simulation models to assist them with this process. Research conducted with members of the Planning Executives Institute (PEI) reported that 50.8 percent of the respondents stated that computer-based models and simulations were being used in their strategic planning process (Ginter, 1984: 15). With the enormous advances made in information technology over the past ten years, strategic planning models and simulation give today's executives greater planning flexibility and a tool for maintaining or even increasing their competitive advantage. Following this modeling phase, a performance

measurement tool must be used to determine if the strategic objectives are being met. These measurement tools, often known as metrics, provide quantitative data to support changing the current strategy or keeping the status quo.

Profit seeking corporations are not the only organizations that can benefit from proper strategic planning. The federal government also requires its organizations to conduct strategic planning. In 1993, Congress passed the *Government Performance and Results Act (GPRA)*. The GPRA requires government agencies to set goals, measure their performance, and report their results. It requires government agencies to develop strategic plans, performance plans, and report performance results. An excerpt of Chapter 3, Section 306 of the GPRA states:

> (1) No later than September 30, 1997, the head of each agency shall submit to the Director of the Office of Management and Budget and to the Congress a strategic plan for program activities. Such plan shall contain-
>
> > (a) a comprehensive mission statement covering the major functions and operations of the agency;
> >
> > (b) general goals and objectives, including outcome-related goals and objectives, for the major functions and operations of the agency
>
> (2) The strategic plan shall cover a period of not less than five years forward from the fiscal year in which it is submitted, and shall be updated and revised at least every three years.
>
> (3) The performance plan required by Section 1115 of Title 31 shall be consistent with the agency's strategic plan. A performance plan may not be submitted for a fiscal year not covered by a current strategic plan under this section.
>
> (4) When developing a strategic plan, the agency shall consult with the Congress, and shall solicit and

consider the views and suggestions of those entities potentially affected by or interested in such a plan.

(5) The functions and activities of this section shall be considered to be inherently Governmental functions. The drafting of strategic plans under this section shall be performed only by Federal employees.

The GPRA addressed a broad range of concerns about government accountability and performance. Its goals were to improve the confidence of the American people in federal government, focus on the actual results of government activity and services, support congressional oversight and decision-making, and improve the managerial and internal workings of agencies within the federal government (OMB, 2000: 1). The GPRA is also unique in requiring that agencies integrate their "results" into their budgetary decision-making process and its performance measurement is required by law.

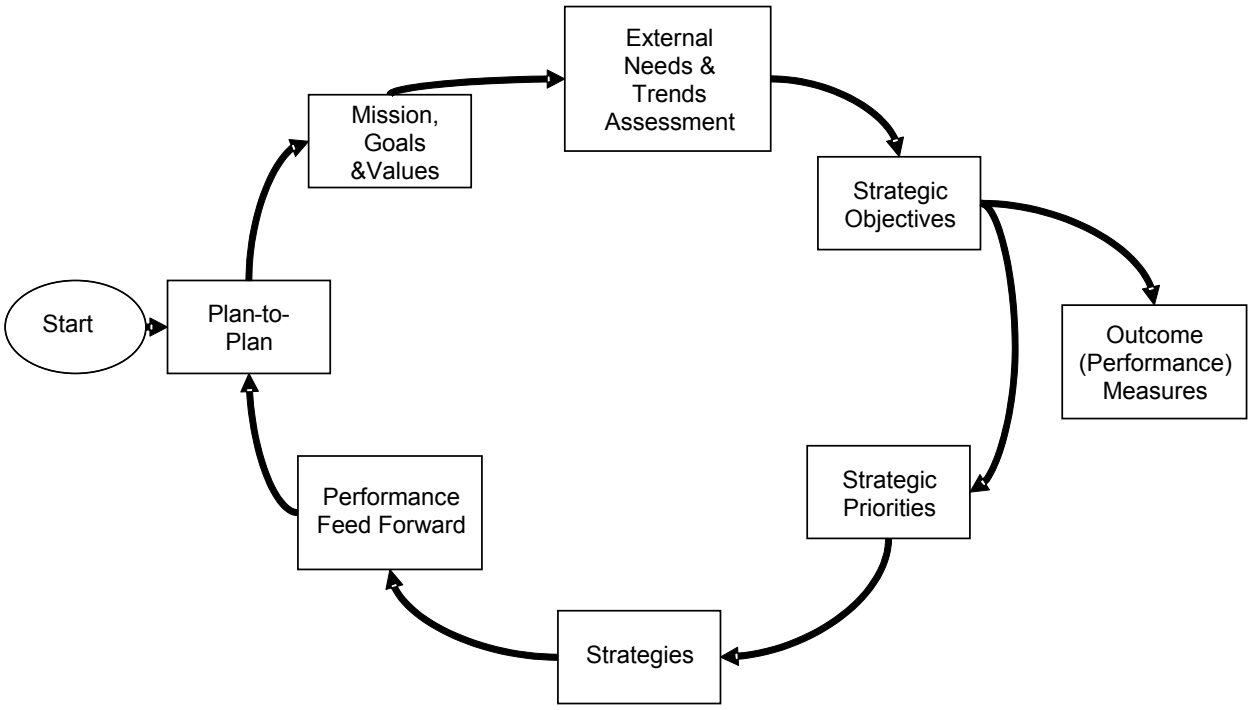


**Figure 5. GPRA Model: "Strategic Planning Cycle" (Blackerby, 1994: 4)**

In an effort to clarify the directive mandated by the GPRA, Blackerby (1994) developed a strategic planning model based on the GPRA's requirements. Blackerby first defines strategic planning as "a continuous and systematic process where people make decisions about intended future outcomes, how outcomes are to be accomplished, and how success is measured and evaluated" (1994: 2). Blackerby's model contains six basic elements that he believes should be included in any strategic planning model: mission, needs assessment, strategic objectives, outcome measures, strategies and performance feed forward. The GPRA inspired model includes two additional elements – plan-to-plan and strategic priorities. Figure 5 shows how these elements relate to each other. The arrows indicate a general sequence of the elements. However, this too is an iterative process and the model does not preclude planners from backing up to re-examine an element they may have already completed.

The first element is the *plan-to-plan*. This step, similar to that described by Steiner (1979), simply describes the sequence of steps that will be followed in executing the strategic planning process. It identifies key participants for each step as well as the key decisions those participants will be expected to make. Step two is *mission, goals & values.* This element requires the participants to define the broadest possible description of the organization's vision for the future (Blackerby, 1994: 4). The GPRA requires, "…a comprehensive mission statement covering the major functions and operations of the agency." In this step, the organization should also set its goals and state the values it intends to espouse in order to achieve those goals. This step is also similar to the one in Steiner's (1979) model that considers the "expectations of inside interests." Incorporating the organization's values adds legitimacy to the strategic planning process

and represents the importance of the process. The third step is *external needs assessment.* This step examines the forces outside the organization that pose either a threat or an opportunity to the organization. This scan of the environment identifies those key external factors that have the potential to significantly affect the achievement of the organizations goals and objectives (Blackerby, 1994: 4).

Step fourth step in the GPRA model is setting the *strategic objectives.* As with the previous models described, this step identifies the future goals and missions of the organization and establishes attainable objectives for meeting those goals. Step five is *outcome measures.* This step involves measurement of strategic objectives against a standard to determine if the organization is reaching its goals. This step is crucial in determining if an organization is achieving its strategic objectives and staying on track with management's vision of the future.

To this point, the Blackerby's (1994) model does not differ very much from those already discussed in this chapter. However, the sixth step, setting *strategic priorities,* is unique to this model because it explicitly describes the process of rank ordering each strategic objective by relative importance to the organization (Blackerby, 1994: 5). The other planning models simply imply that this prioritization is an important element of the strategic planning process. This ranking of objectives can help management make important budgetary and resource allocation decisions and dedicate their time and resources to only those strategic objectives that are truly important to the success of the organization.

The next step in the GPRA model is to define *strategies.* A strategy is defined as an approach or methodology that will be used to achieve the organization's strategic

objectives (those previously established in step four of the process) (Blackerby, 1994: 5). Defining a strategy requires planners to consider alternate approaches with regard to cost, timeliness, and effectiveness in achieving the strategic objectives and then select a set of strategies that will best achieve those objectives. The final step in this planning model is the *performance feed forward.* This step is a systematic procedure for comparing actual performance to planned performance, and for using that information in subsequent planning cycles (Blackerby, 1994: 5). It allows planners to examine their plan as well as their process and correct any weaknesses for future revisions. Since the GPRA was signed in law in 1993, several federal agencies in the United States have established their own strategic planning processes and models.

There are several other strategic planning models found in the current literature, however, those presented in this chapter cover a rather wide spectrum of planning elements. Additional models may have one or two unique features, but the basic elements of strategic planning are well represented by the models discussed in this chapter. In fact, Blair (1998) reports that most researchers of strategic planning agree the process consists of some variation of the following sequential steps: 1) Mission statement or goal identification; 2) Review of external and internal environments (also know as an environmental scan) and an analysis of the organization's strengths, weaknesses, opportunities, and threats; 3) Establishment of priority strategies and action steps; and 4) Implementation of action plan and evaluation of results. A summary of the planning elements presented in this chapter can be found in Table 1. This table is a representation of the presence of a planning element in a particular planning model. The purpose of this table is to highlight the commonalities as well as the differences present in the models. It

serves as a foundation for the analysis of the Civil Engineering strategic planning process presented in Chapter 4.

| | Characteristic | **Steiner** | **Armstrong** | **Dyson (Reactive)** | **Dyson (Proactive)** | **GPRA** |
|---|---|---|---|---|---|---|
| 1. | Plan-to-plan | X | | | | X |
| 2. | Evaluation of Environment/ Organization | X | | | X | X |
| 3. | Strategic Objectives | X | X | X | X | X |
| 4. | Strategy Formulation | X | X | X | X | X |
| 5. | Implementation | X | | X | X | |
| 6. | Performance Measurement | X | X | X | X | X |
| 7. | Data Base | X | | | | |
| 8. | Medium Range Plans & Programs | X | | | | |
| 9. | Short Range Plans | X | | | | |
| 10. | Seek Commitment | | X | | | |
| 11. | Resources (outside influence) | | | X | X | |
| 12. | Uncontrolled Inputs/ External Needs Assessment | | | X | X | X |
| 13. | Feasibility Check | | | | X | |
| 14. | Corporate System Model | | | | X | |
| 15. | Resource Assessment | | | | X | |
| 16. | Assessment of Uncertainty | | | | X | |
| 17. | Organizational Values | X | | | | X |

Note: "X" represents characteristic present in specified model.

**Table 1. Qualitative Analysis of Strategic Planning Models**

## The United States Air Force and the Air Force Strategic Plan

The United States Air Force uses an organizational structure designed to provide a clear chain of command, clarify capabilities of a given unit/activity, and to facilitate resource allocation (AFPD 38-1, 1996). The senior headquarters is located at the Pentagon and is known as the Air Staff (HQ USAF). This headquarters staff is divided into several functionally specific directorates, such as aerospace operations (AF/XO), plans and programs (AF/XP), personnel (AF/DP), and installations and logistics (AF/IL) to name a few. Each of these functional entities is responsible for budgets, personnel, and resource allocation across the entire Air Force.

Figure 6 depicts the nine Major Commands (MAJCOMs) that are subordinate to the Air Staff. They are: Air Combat Command (ACC), Air Mobility Command (AMC), Pacific Air Forces (PACAF), United States Air Forces in Europe (USAFE), Air Force Space Command (AFSPC), Air Force Special Operations Command (AFSOC), Air Force Material Command (AFMC), Air Education and Training Command (AETC), and the Air Reserves Command (AFRC).

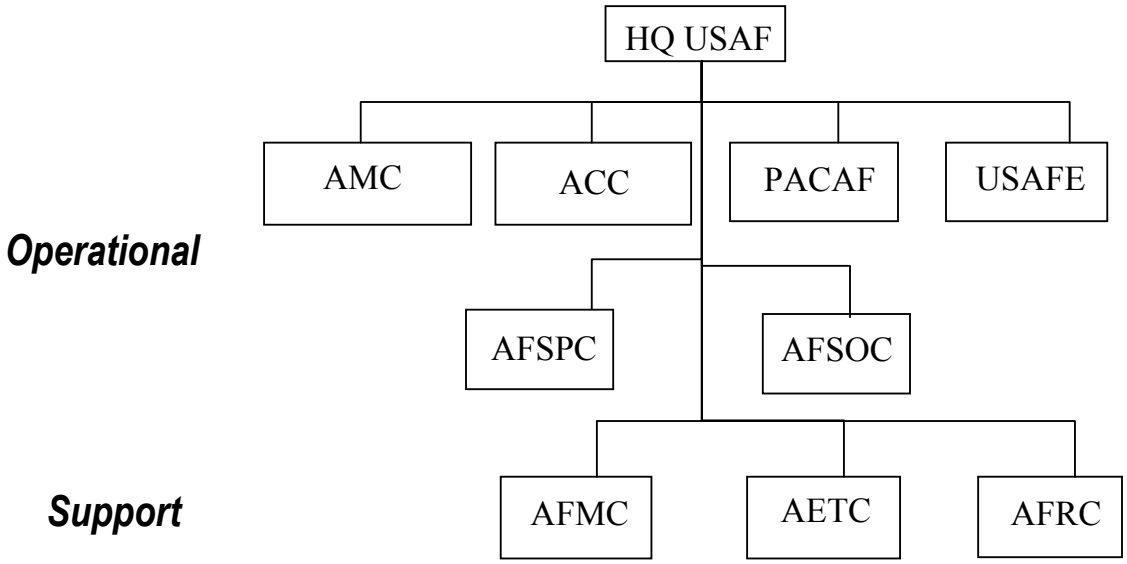


**Figure 6. USAF MAJCOMs (AF38-101)**

MAJCOMs have the responsibility to organize, train, and equip their forces as well as support the war-fighting combatant commanders in their designated unified command as directed by the President or the Secretary of Defense (AFDD 1, 1997: 61-63). MAJCOMs are organized similarly to HQ USAF; each has a headquarters staff with functional directorates such as operations, logistics, personnel, etc. The MAJCOMs are responsible for several Wings, which in turn have subordinate Groups and Squadrons. Each of these organizational echelons is lead by a commander who holds Title 10 (USC) authority to organize, train, and equip troops for operational employment.

In order to provide clear planning guidance for all of these various organizational units, the Air Force published the *Air Force Strategic Plan* (AFSP). The Air Force has played a significant role in the military conflicts of the past fifty years, including its most recent engagements in the war on terrorism. Under the leadership of

former Chiefs of Staff, General Ronald Fogelman and General Michael Ryan, the United States Air Force underwent two major strategic planning exercises from 1996 through 1999. The Air Force has since institutionalized the concept of corporate strategic planning and greatly increased its sub-units awareness of the importance of future planning (Campbell, 2002: 425). The AFSP established a firm foundation for functional units (such as Civil Engineering) to develop their own strategic plans to better meet the goals and objectives established by the Air Force senior leadership.

The AFSP is designed to support and guide the implementation of the Air Force vision, *Global Engagement: A Vision for the 21st Century Air Force.* It encompasses two basic elements: 1) organizational performance planning, aimed at enhancing the performance of near-term mission essential tasks and 2) future capabilities planning, aimed at developing the future capabilities the Air Force needs to achieve its vision. The AFSP prescribes areas of emphasis and objectives for use by Air Force planners at all organizational levels and includes four distinct, but closely integrated volumes:

Volume 1 – *Future Security Environments*
Volume 2 – *Air Force Mission Performance Plan*
Volume 3 – *Long-Range Planning Guidance*
Volume 4 – *Exploring New Challenges, Opportunities, and Concepts*

Volume 1 provides the security environment framework and common planning assumptions that serve as the basis for all Air Force planning. It defines the future security environment in which US forces will have to operate as well as the various areas that will challenge the efficiency and effectiveness of the future Air Force. Volume 2 establishes Air Force-wide goals, HQ Air Force Mission Essential Tasks (HQ AFMETs), Performance Measures (PMs), and standards to improve organizational performance and

quality (AFSP Vol. 2, 1999, 4). This volume uses a "**plan**, **do**, and **assess**" model to help "operationalize" quality and address the requirements for goals, objectives, and performance measures as directed by the Government Performance and Results Act (GPRA) of 1993. This planning model will be discussed in greater detail later in this chapter. Volume 3 uses the security environments discussed in Volume 1 and the shortfalls identified in Volume 2 to establish Critical Future Capabilities. These capabilities are based on senior leadership guidance on major force modernization and investment strategies that are essential to achieve the Vision and adjust doctrine accordingly. Volume 3 incorporates the broad tenets of foundational strategic documents such as the *National Military Strategy, Joint Vision 2020, Air Force Doctrine,* and *Air Force Vision 2020* and translates them into actionable items. The goal of this volume is to define the set of essential capabilities that will "drive modernization planning to realize the Vision and ensure the United States remains the premier aerospace power in the world" (AFSP Vol. 3, 1999, 2). Lastly, Volume 4 generates strategic direction by defining the planning agenda and identifying issues of strategic importance for senior leadership consideration and decision-making during the planning cycle. It also helps guide the investment strategy of the Science & Technology community of the Air Force by identifying promising concepts for future capabilities and high-leverage technological opportunities (AFSP Vol. 1, 1999, 4).

## Civil Engineer Strategic Plan

The Civil Engineer Strategic Plan (CESP) was released in two volumes: *Volume I, Future Security Environments and Planning Implications* in 1999 and *Volume*

*II, Mission and Modernization* in 2000. These documents detail the mission, goals, and capabilities of the Air Force Civil Engineer and follow the outline of the AFSP. Volume I focuses on the future security environment and the capabilities needed to execute the Civil Engineer core competencies while Volume II is dedicated to organizational performance and future capabilities planning.

Volume I of the CESP is broken down into four main sections. Chapter 1 establishes the foundation for the future of the organization. It describes the nature of the military environment and importance of strategic planning for the Civil Engineering community. Chapter 2 discusses four alternate future scenarios in which civil engineer forces will play a vital role in the success of the Air Force mission. Each alternate future paints a "worse-case scenario" and outlines the strategic challenges associated with each. These scenarios are summarized as: 1) Conflict will migrate into Space and Information Operations, 2) Proliferation of Weapons of Mass Destruction 3) Non-traditional Operating Environments, and 4) Vulnerability of the U.S. Homeland. Chapter 3 outlines the overarching concepts of the National Security Strategy and the National Military Strategy, as well as Air Force Vision 2020 and Air Force Basic Doctrine (AFDD 1) in order to establish the "aerospace force" (CESP Vol. I, 1999: 21). Chapter 4 defines the five CE core competencies and the associated capabilities required for implementing them. The CE Core Competencies are the inherent abilities that enable civil engineering forces to achieve the goals and objectives of the Air Force and the Civil Engineer. The CE core competencies are: Installation Engineering, Expeditionary Engineering, Environmental Leadership, Housing Excellence, and Emergency Services (CESP Vol.I, 2000: 1). Chapter 4 also identifies two endstates that are based on the strategic emphasis

placed on infrastructure in Volume 3 of the AFSP. These endstates are meant for civil engineers to achieve by 2025. They are defined as:

- An efficient and effective base operating environment that maintains a strong sense of community and quality of life, and

- A corporate process and a strategic direction for basing that reduces unnecessary cost and improves operational efficiency (CESP Vol. I, 1999: 26).

Volume II of the CESP begins with the setting of goals, which were established by the CE leadership and designed to support the Air Force goals of: Quality People, Operational Performance, and Modernization. The CE goals are: Quality Engineering, Agile Engineering, and Focused Engineering. This volume of the CESP also outlines performance and future capabilities plans aimed at achieving the vision and endstates contained in Volume I. Volume II is divided in 5 chapters: 1) Intentions, 2) Tasks, 3) Gaps, 4) Plan, and 5) Challenges. Chapter 1 provides an overview of the contents of the document and a description of how the CE goals were derived from the DoD and Air Force goals. These goals set the foundation for the tasks described in Chapter 2. Chapter 5 provides a brief conclusion to Volume II and outlines some of the challenges and responsibilities that lie ahead for Civil Engineers. The main focus of Volume II is contained in chapters 2, 3, & 4.

Chapter 2 presents a description of the five Civil Engineer Mission Essential Tasks (CEMETs) that correlate directly to the Civil Engineer Core Competencies. Mission Essential Tasks (METs) are derived from the Air Force Task List (AFTL) outlined in Air Force Doctrine Document 1-1 and are those tasks fundamental to the

performance or accomplishment of an organization's assigned mission (CESP Vol. II, 2000, 9). The CEMETs are designed to encapsulate the mission responsibilities as they apply to each core competency are summarized below.

> **Provide Installation Engineering -** Engineers will develop, operate, sustain, restore, and preserve bases, airfields, infrastructure, and facilities at Air Force locations, permanent and contingency, worldwide. Installation engineering is primarily focused on our network of bases that provide fixed operating locations and enroute infrastructure for operating, deploying, employing, and sustaining aerospace forces to the point of engagement and re-deploying and reconstituting the force.
>
> **Provide Expeditionary Engineering -** Engineers will organize, train, equip, provide, sustain, protect, and recover combat ready forces to support expeditionary aerospace forces (EAF) requirements. Expeditionary forces include military, civilian, and contract augmentation personnel. These forces will beddown, provide, sustain, defend, recover, transition, reconstitute engineer capabilities, and execute base denial activities to support global aerospace power.
>
> **Provide Environmental Leadership -** Engineers will create an environmentally secure and sustainable operating infrastructure and a responsive workforce through leadership, comprehensive training, awareness, and monitoring. Environmental leadership also includes environmental planning and execution to conserve Air Force resources, ranges and airspace and maintain an operating state that allows the Air Force to meet its primary war-fighting mission.
>
> **Provide Housing Excellence -** Engineers will ensure that all airmen and their family members have access to adequate, safe, and cost-effective housing that meets or exceeds Air Force minimum quality and space standards in CONUS, overseas, and deployed locations. For the Air Force, commitment to provide housing applies equally to accompanied and unaccompanied personnel in both CONUS and overseas locations.
>
> **Provide Emergency Services -** Engineers will provide the full spectrum of emergency services support to include fire protection, explosive ordnance disposal (EOD), disaster preparedness, and readiness support. Readiness support includes nuclear, biological and chemical (NBC) protective operations, weapons of mass destruction (WMD) protective operations, and consequence management of natural and manmade disasters. Fire Protection, EOD, and Readiness are mission critical operations required for safe aerospace operations regardless of the mission or location. These services must be provided without interruption in every location employing Air Force personnel and resources.
>
> (CESP, Vol. II, 2000: 10-12)

Additionally, in an effort to tie the CEMETs back to the CE goals, they were broken down into eight, more specific METs that have direct correlation to one of the three goals of the Civil Engineer. Each MET was also assigned a notional, or example, Performance Measure (PM). A performance measure is used to gauge how effective an organization is at achieving the objectives it set for itself. The notional PMs contained in Volume II were included to provide guidance to the MAJCOMs as to the type of data they should collect to effectively measure their performance toward the MET. The CE goals, METs, and notional PMs described in Volume II are summarized in Table 2. A more detailed analysis of each PM will be discussed in Chapter 4 of this thesis.

| GOALS | MISSION ESSENTIAL TASKS | PERFORMANCE MEASURES |
|---|---|---|
| **Goal 1: QUALITY ENGINEERING** - Provide well-trained and equipped civil engineer (CE) forces to construct, operate and maintain facilities, housing, infrastructure and utilities that preserve sense of community and uphold quality of life | MET 1.A: Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace | PM 1.A.1: Condition of bases, infrastructure and facilities |
| | MET 1.B: Provide adequate, quality housing and dormitories that preserve our sense of community for Air Force members | PM 1.B.1: Number and percentage of housing units meeting Air Force standards |
| | MET 1.C: Improve quality of life and protect Air Force people through conscientious and rigorous management of our pollutants and wastes | PM 1.C.1: Number of open enforcement actions |
| **Goal 2: AGILE ENGINEERING** - Develop and modernize CE forces and equipment that are light and lean to provide support across the full range of military operations | MET 2.A: Provide well-trained and fully capable forces to support military operations anywhere in the world | PM 2.A.1: Percentage of CE Forces fully mission ready (SORTS) |

| | | |
|---|---|---|
| | MET 2.B: Provide robust and well-trained forces and equipment to respond to the full spectrum of emergencies | PM 2.B.1: In-service rates for mission essential equipment<br><br>PM 2.B.2: Status of CE training and certification |
| **Goal 3: FOCUSED ENGINEERING** - Provide strategic direction to modernize Air Force installations that efficiently and effectively support Air Force missions and people | MET 3.A: Optimize Air Force resources through proper planning, programming and execution of our facility and infrastructure programs | PM 3.A.1: Funding allocated versus requirement by major funding (i.e. program) category |
| | MET 3.B: Maximize housing opportunities and efficiency through balance of construction, revitalization, maintenance and privatization | PM 3.B.1: Funding allocated versus requirement for housing and dormitories |
| | MET 3.C: Effectively manage our environmental programs, ranges and airspace to maximize operations and training of Air Force weapons and units well into the future | PM 3.C.1: Funding allocated versus requirement for environmental requirements |

MET - Mission Essential Task
PM - Performance Measure

**Table 2. Civil Engineer Mission Essential Task List (CEMETL) (CESP, 2000: 14)**

Chapter 3 of Volume II explores the gaps in Civil Engineering capabilities of today and its desired endstates of tomorrow. (CESP Vol. II, 2000: 17). The goal of this gap analysis is to facilitate discussion on how best to link planning priorities with resource allocation as well as manage tradeoffs between current systems, readiness, future capabilities, and modernization (CESP Vol. II, 2000: 17). Process Action Teams (PATs), headed by a "core competency champion," were assigned to conduct this analysis. These champions are senior CE officers assigned from each division of the HQ USAF Civil Engineer staff to lead their PATs in actions necessary to plan, program,

execute, monitor and refine the modernization plan for their respective CE core competency (AFPD 32-XX, 2001: 1) Each gap was assigned a rating based on the following criteria:

- **Critical** – Severely impedes or halts mission accomplishment if not corrected
- **Priority** – Serious mission impact if not corrected.
- **Important** – Limited mission impact that will increase if not corrected.
- **Contextual** – Definite mission impact but beyond civil engineering's ability to control or correct. (CESP Vol. II, 2000: 18)

An example of a Gap Analysis of Installation Engineering and the assigned rating is:

> **Gap** – Facility aging and modernization
>
> **Rating** – Priority
>
> **Discussion** – Facilities and infrastructure are continuing to degrade due to inadequate manpower and funding of real property maintenance (RPM) and military construction (MILCON)… (CESP Vol. II, 2000: 19)

The fourth chapter of Volume II outlines the modernization plans for each core competency. These plans were developed by the core competency process action teams and divided into five year increments, with the PATs selecting appropriate courses of action designed at reaching the strategic endstate. Similar to the model used in Volume 2 of the AFSP, each of the CE core competency teams used the "**plan, do, assess"** approach to develop their modernization plans. The first step in this process is to **plan.** This is done by identifying mission essential tasks. These tasks are complied in the CEMETL previously discussed in this chapter. The next step is to **do**, or execute the mission. This portion of the modernization plan outlines how civil engineers plan to accomplish the task identified in the CEMETL. The third step is to **assess.** Assessment

is attained through the proper use of performance measures (PMs) and metrics to accurately measure if and how the task and/or goal was accomplished. At the heart of this planning process must be a commitment to continuous improvement. This allows planners to adjust their plans accordingly if the PMs demonstrate the task is not being met or perhaps the mission has changed as the world security environment has changed. Continuous improvement provides the flexibility needed to develop a plan that is best suited for their organization today, not how it was a year ago. The **plan, do, assess** model is shown in Figure 7.

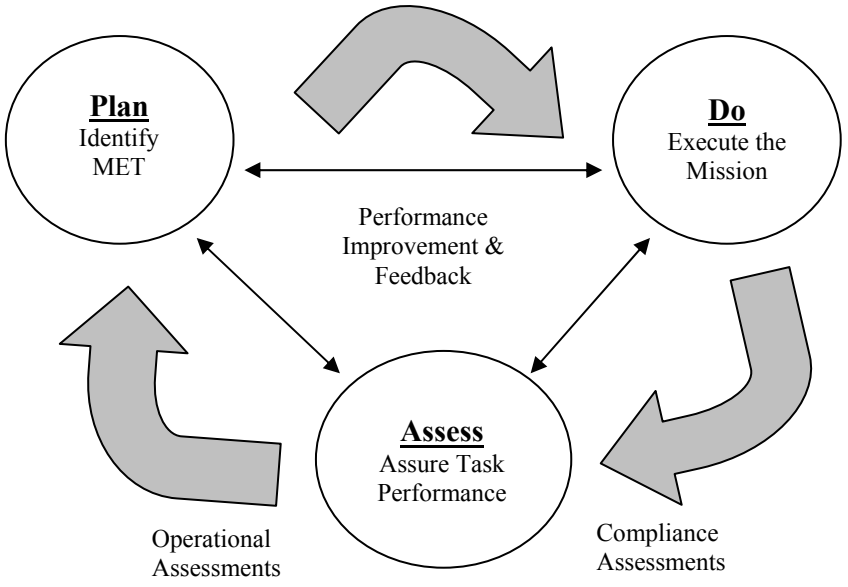


**Figure 7. "Plan, Do, Assess" Planning Cycle (CESP Vol. II, 2000: 27)**

In addition to the "plan, do, assess" planning cycle, each team utilized a "strategic planning space" shown in Figure 8 to define possible future states.

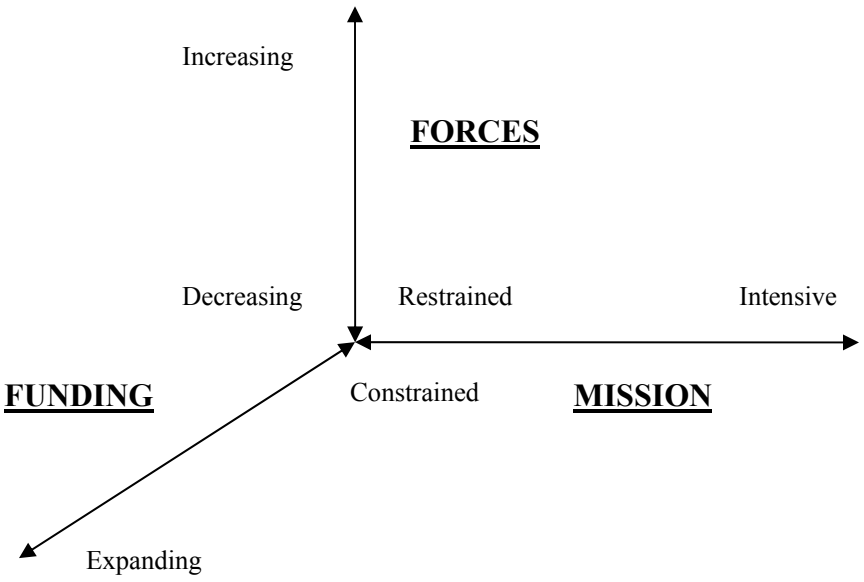


**Figure 8. Civil Engineer Strategic Planning Space (CESP Vol. II, 2000: 28)**

The planning space was developed using three strategic drivers: Forces, Mission, and Funding. A strategic driver is defined as a force that has the potential to cause significant change in the environment. These drivers produce possible future scenarios based on the intersection of their different conditions (e.g. one driver increasing versus another declining) (CESP Vol. II, 2000: 28). The CESP identified four future "worlds" based on the various three dimensional intersections of these strategic drivers. Each future environment had the following dimensions: 1) **"Engagement" –** intensive mission, declining forces, and constrained funding; 2) **"Golden Era"** – intensive mission, increasing forces, and expanding funding; 3) **"Retreat"** – restrained mission, declining forces, and constrained funding; and 4) **"New Wave"** – restrained mission, increasing forces, and expanding funding. Each core competency modernization plan was guided by the implications of each of these potential future environments (CESP Vol. II, 2000: 29).

**Civil Engineer Annual Report**

Another element of the Civil Engineer strategic planning process is the *Civil Engineer Annual Report*. This report is used to document progress on modernization plans, support civil engineer mission essential tasks, and compile performance measures (AFPD 32-XX: 2). Each core competency process action team is required to submit inputs to this report to the Programs division of the HQ CE staff (HQ AF/ILEP). This report is the tool used to convey the success of the core competency process action teams (PATs) in achieving the goals and objectives of the CESP. The Annual Report is divided into six chapters. The first five are dedicated to the five CE core competencies and the sixth reports the status of Civil Engineering manning and professional development.

Within the five core competency chapters, each is broken down into at least three main sections. These are: 1) significant planning milestones and goals; 2) progress, key accomplishments, and significant events; and 3) direction, plans, programs, and new initiatives for the upcoming year. The first section of these chapters (significant planning milestones and goals) identifies the core competency champion for each PAT as well as the key players. It also reports how often the PAT met during the previous year and what actions they are taking in regard to the CESP. Finally, this section defines the purpose of each PAT and outlines their goals for the coming year.

The second section (progress, key accomplishments, and significant events) contains the bulk of the information contained in the report. This section describes in a concise manner all the significant progress and accomplishments the MAJCOMs had in achieving their objectives outlined in the CESP. Within this portion of the report, several metrics from the annual *Civil Engineer Metrics End of Year Review,* a briefing prepared

by the HQ CE staff, are included to give a visual representation of some of the significant accomplishments. A more detailed description of this briefing is provided in the next section of this thesis. The final section of the core competency chapters of the Annual Report provides a roadmap for the upcoming year. It outlines the objectives each core competency PAT hopes to achieve as well as some of the programs and initiatives that will take place to help bring the MAJCOMs closer to meeting the goals of the CESP.

Finally, the last chapter of the CE Annual Report contains data about the status of the career field's personnel issues. It provides information about officer and enlisted manning rates as well as retention and professional education of the entire CE populous. Although this chapter of the Annual Report is not directly linked to a specific CE core competency, without properly trained personnel and fully staffed billets, the organization can not function at its maximum potential and therefore would have difficulty ever achieving its strategic goals.

**Civil Engineer Metrics Review**

The *CE Metrics Review* is a semi-annual presentation developed by the Programs division of the HQ CE staff (AF/ILEP). It compiles data from all the MAJCOM CE staffs and reports the career field's overall progress toward meeting the goals and objectives of the CESP twice a year. For the purpose of this research, the briefing presented at the end of the year, the *CE Metrics End of Year Review*, will be used as the source of data for actual performance measures. This briefing differs from the Annual Report in its format and structure. The Annual Report is structured around the CE core competencies and their process action teams, while the *CE Metrics End of Year Review* is

structured around the three CE goals and the eight associated mission essential tasks (METs).

It is important to clarify the terminology used throughout this chapter as well as the remainder of the research. Performance Measures (PMs), as previously defined, are designed to assess how an organization intends to measure its progress toward its defined goals and objectives. Performance metrics, also referred to as simply metrics, are the tools used to represent a performance measure. They are usually presented as either a table or a graph. For example, Table 3 provides an example of two goals, METs (objectives) and the notional PMs as they are described in the CESP. It also contains the PMs as they appear in the *Civil Engineer Metrics End of Year Review* and a description of the metrics used to provide illustration of those PMs. It is also important to note that the CESP clearly states that its PMs are in fact "notional," or example measures, and the MAJCOMs and bases are encouraged to develop additional PMs specific to their needs. However, those measures were included in the analysis detailed in Chapter 4 because several have been adapted for practical application.

| Goal | MET | Notional PM | Actual PM | Metric |
|---|---|---|---|---|
| Quality Engineering | MET 1.A: Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace | PM 1.A.1: Condition of bases, infrastructure and facilities | 1.A.1: Health of Air Force Physical Plant | Installation Readiness Report (IRR) mission ready rating system (C-1, C-2, C-3, C-4) |
| Focused Engineering | MET 3.B: Maximize housing opportunities and efficiency through balance of construction, revitalization, maintenance and privatization | PM 3.B.1: Funding allocated versus requirement for housing and dormitories | 3.B.1: MFH MILCON execution | MFH Design Cost vs. Programmed Amount (by year and MAJCOM), MFH Design Completion Status, MFH MILCON Award Status, MFH scope reduction |

**Table 3. Performance Measure and Metric Comparison**

As Table 3 shows, a distinction exists between the PMs and metrics used to represent them. The PM is written in general terms and emphasizes the key strategic elements of the MET while the metric is the actual tool used (such as the IRR) to display that PM. In much of the performance measurement literature, the terms performance measure and metric are often used interchangeably, which can cause considerable confusion. To avoid that confusion, this research will maintain their distinction and provide separate evaluations of each. Throughout the remainder of this thesis, the PMs described in the CESP will continue to be referred to as ”notional” performance measures, or NPMs and those extracted from the *Civil Engineer Metrics End of Year Review* will be referred to as “actual” performance measures, or APMs.

The *CE Metrics End of Year Review* presents each of the eight METs along with their actual performance measures (APMs). An example of one of these MET slides as it appears in the briefing is shown in Figure 9.

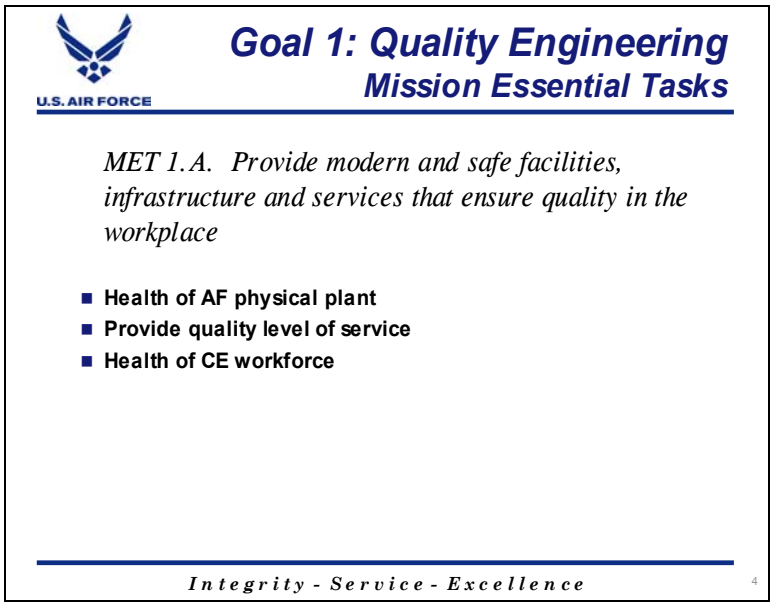


**Figure 9. Sample MET and APMs of the CE Metric Review**

The statements: health of AF physical plant, provide quality level of service, and health of CE workforce, represent the APMs associated with MET 1.A from the *CE Metrics End of Year Review*. The complete list of these APMs is contained in Table 4 and they are presented exactly as they appear on the briefing slides. This information differs from the measures contained in the CESP (Table 2). This is due to the fact that the CESP intended the PMs in Table 2 to be examples while the measures in Table 4 represent those that are actually reported to the Civil Engineer. Several of these "bullet statements" are vague and do not provide a clear definition of what exactly is being measured. Therefore, the third column of Table 4 provides an explanation of the APM and what its intent is.

| Mission Essential Task | Actual Performance Measure (APM) | Explanation of APM |
|---|---|---|
| MET 1.A: Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace | APM 1.A.1. Health of AF physical plant | "Health" defined by a mission capable rating system |
| | APM 1.A.2. Provide quality level of service | Addresses the "services" portion of the MET but does not define "quality level." |

| | | |
|---|---|---|
| | APM 1.A.3. Health of CE workforce | "Health" is defined by rate of mishaps within CE |
| MET 1.B: Provide adequate, quality housing and dormitories that preserve our sense of community for Air Force members | APM 1.B.1. Number of adequate houses vs. inadequate | "Adequate" refers to housing that meets AF standards for size and quality. |
| | APM 1.B.2. # of adequate, private dorm rooms vs. inadequate/deficit | Definition of "adequate" same as 1.B.1. "Private" refers to 1+1 construction standard (1 airman per bedroom with a shared kitchen and bath) |
| | APM 1.B.3. Response times or occupancy rates | Definition of response times not available. Occupancy rate refers to percentage of units occupied. |
| MET 1.C: Improve quality of life and protect Air Force people through conscientious and rigorous management of our pollutants and wastes | APM 1.C.1. Number of open enforcement actions | Enforcement action is defined by a written notice from a Federal, state, or local regulatory authority citing violations of environmental statutes or regulations and requires corrective action (AFPD 32-70, 1994: 9) |
| MET 2.A: Provide well-trained and fully capable forces to support military operations anywhere in the world | APM 2.A.1. Mission Ready | Mission capable rating system for all deployable CE personnel. |
| | APM 2.A.2. Military passive defense ops | "Passive Defense Ops" refers to Nuclear, Chemical and Biological Warfare defensive measures |
| | APM 2.A.3. Ops Tempo by AFSC | Deployment rates by Air Force Specialty Code (AFSC) |
| MET 2.B: Provide robust and well-trained forces and equipment to respond to the full spectrum of emergencies | APM 2.B.1. Exercise program | CE progress in the Air Force personal fitness program |
| | APM 2.B.2. Equipment Status | Mission ready status of deployable equipment |
| | APM 2.B.3. Number of trained personnel | In-residence training and education quotas |
| | APM 2.B.4. Equipment/ vehicle MC rates | Equipment and vehicle mission capable (MC) rates; much like APM 2.B.2 |
| MET 3.A: Optimize Air Force resources through proper planning, programming and execution of our facility and infrastructure programs | APM 3.A.1. Investment profiles | CE investment predictions for the various funding categories |
| | APM 3.A.2. Base Capacity | No reported data on "base capacity" |
| | APM 3.A.3. MILCON execution | Military Construction (MILCON) program accomplishments |
| | APM 3.A.4. FIM execution | Facility Investment Metric (FIM) used to define and advocate for funding for facility restoration and modernization requirements |
| | APM 3.A.5. Actual scope vs. programmed scope | Actual dollars spent vs. budgeted amounts |

| | | |
|---|---|---|
| | APM 3.A.6. Energy conservation | Facility and Industrial energy reduction |
| | APM 3.A.7. Competitive Sourcing (CS) | CS studies announced and studies committed but not yet announced |
| MET 3.B: Maximize housing opportunities and efficiency through balance of construction, revitalization, maintenance and privatization | APM 3.B.1. MFH MILCON execution | Military Family Housing (MFH) MILCON program accomplishments and status |
| | APM 3.B.2. MFH privatization execution | Military Family Housing (MFH) privatization program accomplishments |
| MET 3.C: Effectively manage our environmental programs, ranges and airspace to maximize operations and training of Air Force weapons and units well into the future | APM 3.C.1. Cleanup DPG goals | Refers to Defense Environmental Restoration Program (DERP) goal: have sites cleaned up to lower relative risk category (high, medium, or low) or have remedial systems in place NLT 2014 |

**Table 4. Actual Performance Measures from the CE Metrics Review**

Most of the APMs are associated with one or more metrics in the presentation. These metrics are designed to provide visual clarification of the performance measures. Some of the APMs described in Table 4 had several metrics associated with them to give the CE leadership a clear picture of the organizations progress toward the objective. However, there are others that did not have any metrics directly associated with them at all. For example, APM 1.B.3: "Response times or occupancy rates" was included as a measure of MET 1.B, but there is no metric associated with it to explain what it means or if it is actually measures. An example of one of the metrics as it appeared in the presentation is shown in Figure 10.

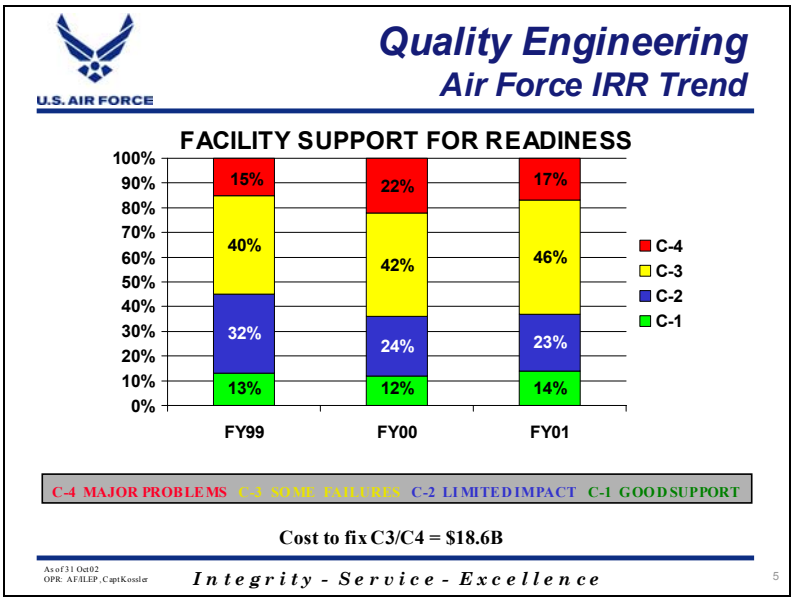


**Figure 10. Sample Metric from the CE Metric Review**

The data used to prepare this metric was complied from all MAJCOMs and represents an Air Force-wide summary of the mission ready status of all Air Force facilities and infrastructure. The metric represents the yearly trend of these mission ready ratings as they appear in the annual Installation Readiness Report (IRR). The IRR is a tool to provide objective and timely information to Congress, DoD, and the Air Force on the capability of its facilities and infrastructure to support forces in the conduct of their missions (FIP, 2003: 3.1). This metric was used to represent the "health of the AF physical plant." The IRR utilizes four categories of ratings to classify facilities and infrastructure. These "C-Ratings" are summarized as:

- C-1 – Only minor deficiencies with negligible impact on ability to perform required mission
- C-2 – Some minor deficiencies with limited impact on ability to perform required mission
- C-3 – Significant deficiencies that prevent performance of some missions
- C-4 – Major deficiencies that preclude satisfactory mission accomplishment

The IRR is just one example of an existing metric already in use by the Air Force. The goal of this research is to ensure that this and other reporting tools, such as the Status of Resources and Training System (SORTS) used by the CE Readiness community, are providing information that is appropriately linked to the goals and objectives of the CESP.

## Performance Measurement

The following section of this chapter will explore two performance measurement systems specifically designed to create measures that are strategically linked to the goals and objectives of the organization. These systems prescribe to an approach to measurement design that views the organization from a variety of perspectives. This balanced approach is applicable in both the public and private sectors and allows planners to design measures that evaluate both financial and non-financial aspects of their organization. The systems discussed here provide the foundation for the performance measurement evaluation methodology used in this research.

As indicated by its presence in every strategic planning model discussed in this chapter, performance measurement is an essential element of any strategic planning process. The immediate role of a performance measurement system is to monitor progress toward established goals (Kanji, 2002: 715). Its intent is to identify shortcomings in achieving those goals in order to design effective and efficient improvement strategies (Kanji, 2002: 716) and is therefore an integral part of the management process (Kaplan & Norton, 1993: 134).

A successful performance measurement system will establish a relationship between the organization's strategy and the objectives designed to achieve that strategy (Oliveira, 2001: 42). The Balanced Scorecard (BSC), a performance measurement system created by Robert S. Kaplan and David P. Norton (1992), is designed to establish performance indicators that can be directly influenced by managers in an effort to attain the organization's strategy and vision. The BSC designs performance measures around four unique perspectives: *financial, customer, internal, and innovation and learning* (Kaplan & Norton, 1996: 76). It seeks to answer four corresponding questions: 1) How do we look to our stakeholders? 2) How well do we meet our customers' needs? 3) What do we need to excel at? 4) Can we continue to improve and create value? (Kaplan & Norton, 1992). These perspectives and their associated questions are a departure from traditional performance measurement systems that focused solely on financial measures. Many managers find that retrospective financial indicators often lead to a narrow, short-term focus that blocks adoption of strategic opportunities (Voelker, 2001: 13). The BSC is not intended to replace an organization's day-to-day measurement system, but it seeks to describe the organization's strategy in operational terms.

A perspective on performance measurement systems similar to Kaplan and Norton's BSC is Kanji's Business Scorecard (KBS). It is based on critical success factors (CSFs), which are principles that have been proven over time as universally valid and if properly implemented, will potentially lead to organizational success (Kanji, 2002: 717). The KBS expands upon the understanding of the BSC perspectives with four perspectives of its own: delight the stakeholder, stakeholder value, process excellence, and organizational learning. The first of these ideas, *delight the stakeholder*, builds upon

the BSC concept of building performance measures from the customer's perspective. However, the KBS takes into account the needs and expectations of all those groups or individuals who are directly or indirectly affected by an organization's pursuit of its goals (i.e. investors, community, employees, suppliers, etc.) (Kanji & Moura, 2002: 20). The next principle is *stakeholder value*, expanding the BSC financial perspective. This concept basically implies that business excellence can be measured by more than just traditional financial indicators such as cash flow, profit and ROI. These types of measures only serve the shareholders, not the rest of the organization's stakeholders. Business excellence must also consider factors such as customer demand, ability to recruit and maintain outstanding personnel, and goal achievement (Kanji & Moura, 2002: 21). The third perspective of the BSC, internal business perspective, is extended by the KBS principle of *process excellence*. Kanji (2002) explains that an organization should view itself as an interrelated net of processes and it is vital for these organizations to identify which processes and competencies they must excel at and specify measures for each. The fourth principle of the KBS is *organizational learning*. Due to the constantly changing business environment, organizations must invest in improvements and innovations for products (or services) and processes. Therefore, education and training are essential at all levels of the organization (Kanji & Moura, 2002: 22). The principles and concepts incorporated in both Kaplan and Norton's Balanced Scorecard and Kanji's Business Scorecard will form the foundation for criteria used to develop the proposed performance measures described in Chapter 3, *Methodology*. Proving that the scorecard approach to performance measurement is not only for profit-seeking businesses, the

United States Army has also adopted it as part of its Strategic Readiness System (Frigo, 2002: 1).

In its guidance for implementing the principles of the Government Performance and Results Act of 1993 (GPRA), the U.S. General Accounting Office (GAO) published its perspective on effective performance measurement criteria. It described four characteristics that should be considered when designing performance measures: demonstrate results, limited to the vital few, respond to multiple priorities, and link to responsible programs. These characteristics are explained in Table 5.

| Characteristic | Description |
|---|---|
| Demonstrate Results | "Performance measures should tell each organizational level how well it is achieving its goals." |
| Limited to the Vital Few | "The number of measures for each goal at a given organizational level should be limited to the vital few. Those vital few measures should cover the key performance dimensions that will enable an organization to assess accomplishments, make decisions, realign processes, and assign accountability." |
| Respond to Multiple Priorities | "Performance measurements should account for all competing demands (i.e. quality, cost, customer satisfaction, stakeholder concerns, and other factors." |
| Link to Responsible Programs | "Performance measures should be linked directly to the offices that have responsibility for making programs work." |

**Table 5. GAO Performance Measure Criteria (GAO/GGD-96-118, 1996: 25)**

In an effort to assist government agencies in developing performance measurement systems, as required by the GPRA, the U.S. Department of Energy (DoE) published, *How to Measure Performance, a Handbook of Tools and Techniques* (1995). Table 6 summarizes a nine-step approach to creating a performance measurement system as it was presented in that text.

| Steps | Process |
|---|---|
| 1. Involve all affected organizations in the development of performance metrics | Ensure that all affected organizations will accept the results of the effort |
| 2. Flow chart the applicable process<br>3. Determine what is important to the customer | Identify critical activities (i.e. "control points") to measure, and the results which are worthy of being measured |
| 4. Establish the performance measurements (i.e. unit of measure, sensor, and frequency)<br>5. Establish goals or standards<br>6. Identify responsible parties for data collection, analysis, and reporting | Collect the data, and ensure that the data collection process functions properly |
| 7. Analyze and report the actual performance<br>8. Compare actual performance with standard or goal<br>9. Evaluate causes of variances, and potential corrective actions | Determine what actions should be taken in response to a variance. It may be appropriate to:<br>• Ignore it (if the variance is not statistically significant)<br>• Fix it (if it is significant, or indicates an unfavorable trend)<br>• Challenge the goal (if achieving the goal would be counter-productive to more important corporate objectives)<br>• Challenge the metric (if the metric is providing useless or hard-to-interpret information) |

**Table 6. Creating a Performance Measurement System (Buchheim, 2000: 311)**

The criteria outlined in step 4 (unit of measure, sensor, and frequency) of this 9-step process are actually criteria for developing performance metrics. This is one example where the terms "performance measure" and "metric" have been used interchangeably. However, the criteria refer to the specific requirements of performance data that is necessary to develop appropriate metrics. In addition to the DoE criteria, Edberg (1997) suggests that metrics also need to be understandable, quantifiable, cost-effective, proven (or validated), and high impact. These criteria, coupled with those presented by Buchheim set the foundation for the metrics proposed in Chapter 4, *Analysis and Results*.

## Summary

This chapter discussed background information about corporate strategic planning and how it is useful to military planners. It also presented several strategic planning models to establish the foundation for the suggested models and analysis presented in Chapter 4, *Results and Analysis*. An overview of the content and processes contained in the Air Force Strategic Plan and the Civil Engineering Strategic Plan were also presented. Finally, a brief overview of performance measurement literature was presented at the end of this chapter in order to establish the foundation for the performance measure evaluation method described in Chapter 3, *Methodology*. Chapter 3 provides the steps taken to design a theoretical strategic planning model designed to evaluate the CE strategic planning process. It also describes the steps taken to gauge the effectiveness of the CESP at meeting the goals and objectives of the Civil Engineer through a thorough analysis of its performance measures and metrics.

# 3. Methodology

## Overview

This chapter describes in detail the methodology used to accomplish the objectives of this research. The research was divided into two distinct phases: 1) process modeling and evaluation, and 2) performance measure development and evaluation. This chapter provides a framework for strategic planning evaluation and explains the method used to develop strategic performance measures and metrics as well as evaluate those currently in use by the Civil Engineer. The methodology used in conducting this research can be summarized in six steps. They are: 1) fully understand strategic planning processes and the current Civil Engineering (CE) process, 2) develop a theoretical planning model to be used as evaluation criteria for the CE process, 3) evaluate the CE process to identify gaps or overlaps, 4) describe the CESP METs and categorize them into strategic perspectives, 5) develop proposed performance measures (PPMs), compare them against existing measures, and suggest the optimal choice for CESP, and 6) develop proposed metrics to represent the PPMs, compare them to existing metrics, and suggest the optimal choice for the CESP.

## Phase 1 – Process Modeling and Evaluation

### Step 1 – Understanding Strategic Planning

The first of the research was to develop a full understanding of strategic planning and the Civil Engineering (CE) process. This was accomplished through an extensive literature review detailed in Chapter 2. A thorough understanding of the various elements

of strategic planning was necessary to establish the foundation of a theoretical planning model that was used as a baseline for evaluation of the CE process.

Step 2 – Planning Models Development

Step two of the research created two strategic planning models. The first was theoretical and based on the critical planning elements extracted from the literature discussed in Chapter 2. The second model created was of the existing CE process. The CE model is helpful because a formal representation of the CE process does not currently exist. The models were constructed with similar structures to those found in Chapter 2. They outline a sequential strategic planning process from start to finish and contain elements that are easily interpreted by the reader. Simplicity is very important in creating these types of models. Therefore, only the most important and basic steps of the process were included in the models. Also, every effort was made to describe the steps of either process as simply as possible. Including terminology that is uncommon or difficult to understand for those outside the strategic planning team defeats the purpose of a simplistic model. Using boxes and arrows to indicate the process flow was a common modeling technique used in the literary models and thus was used in the construction of the two models intended for this research.

Step 3 – Model Evaluation

Evaluation is a systematic means of finding out how well an organization is accomplishing those tasks it set out to accomplish and the probable reasons for their success or failure (Koteen, 1991, 209). It is designed to rationally examine practices of the past or present in order to establish a basis for better decision making for the future.

The Air Force Civil Engineer has completed multiple rounds of strategic planning without a formal evaluation of the process. For this reason, step three of the research provided a step-by-step comparison of the theoretical and CE strategic planning models. Using the elements of the theoretical model as the evaluation criteria, shortcomings or similarities that existed in the CE process were identified and discussed. These findings are presented in Chapter 4, *Analysis and Results*. The purpose of this analysis is to facilitate future planning cycles and revisions of the Civil Engineer Strategic Plan (CESP). Since the evaluation criteria used was actually conceived as a result of this research, it too is presented in Chapter 4. These three steps make up the first phase of the research, process modeling and evaluation.

**Phase 2 – Performance Measure Development and Evaluation**

The second phase of the research developed, tested and validated performance measures and metrics suitable to effectively represent the strategic goals and objectives of the CESP. The research defined proposed performance measures (PPMs) based on the strategic emphasis of its associated goals and objectives and then compared them to the NPMs suggested in Volume II of the CESP. In this case, the "objectives" of the CESP are represented by the CE mission essential tasks (CEMETs) presented in Table 2. The PPMs were also compared to the APMs extracted from the *Civil Engineer Metrics End of Year Review, December 2002*. As it was described in Chapter 2 of this thesis, this briefing reports the progress toward the goals and objectives of the CESP as reported by the bases and MAJCOMs. It is an important aspect of this research because it contains the actual PMs used by the Civil Engineer as opposed to the notional ones contained in

the CESP. Following a thorough comparison of these various performance measures, a final recommendation was made for implementation into the CESP. Lastly, metrics were proposed to accompany the final set of recommended performance measures. For those recommended PMs that did not have an existing metric suitable to represent it, a new metric was created. These recommended metrics are also presented and discussed in Chapter 4 of this thesis.

Step 4 – Strategic Perspective Categorization and MET Descriptions

Step four of the research first classified the METs into *strategic perspective* categories. These categories were adapted from the perspectives presented in Kaplan and Norton's Balanced Scorecard (1992) and Kanji's Business Scorecard (2000) discussed in Chapter 2. The strategic perspective classification was based on the researcher's interpretation of the strategic nature and intent of the MET as well as the definition of each perspective. The strategic perspective categories encompass a holistic approach to performance measurement design and helped ensure each proposed performance measure (PPM) was appropriately tied to its associated strategic objective, or MET. Figure 11 represents the process flow from MET to PPM, using the strategic perspectives to establish an underlying "strategic theme" upon which the PPMs are based.

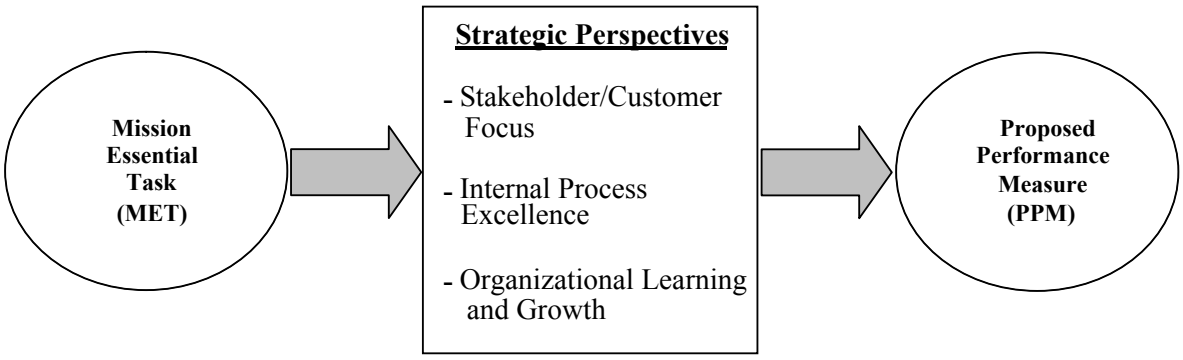


**Figure 11. Development of Proposed Performance Measures (PPMs)**

The first strategic perspective is *stakeholder/customer focus.* This perspective is intended to ensure the PM is written with either the internal or external customer in mind. Some of the traditional business measures constructed from the customer perspective are: customer satisfaction, customer retention, and market share in targeted segments (Kaplan & Norton, 1996: 26). However, it is also important, especially in non-profit organizations such as the DoD and the Air Force, to consider measures that indicate what the customers or stakeholders value. Incorporating a customer/stakeholder-centric focus into performance measures will ensure the organization is meeting the needs of its constituency while staying on track with its overarching mission and strategy.

The second strategic perspective is *internal process excellence.* This perspective focuses on the organization's internal processes and the actual work being done. It is intended to force organizations to take a close, hard look at themselves and develop measures that evaluate the processes they currently use to meet the needs of their customers and achieve their strategic goals. Some examples of performance measures designed from this perspective for CE may include: work order processing times, project design and execution reports, and customer service satisfaction. However, strategically orientated organizations will also seek to design and measure new processes at which

they must excel in order to meet their organization's strategic objectives (Kaplan & Norton, 1996: 27). Most for-profit organizations that implement the Balanced Scorecard or Kanji's Business Scorecard include performance measures from a separate financial perspective as well. These measures include traditional business indicators such as profit, return-on-investment (ROI), increasing revenue and improvement on cost and productivity (Kaplan & Norton, 1996: 47). These measures are often designed to measure short-term performance. Since the Air Force is a not-for-profit organization, traditional financial measures are not typically tracked as they are in the business world. However, efforts dedicated to responsible funds management and budget allocation are a priority in all military organizations. Therefore, METs that include financial aspects will also be classified under the *internal business excellence* category.

The third perspective is *organizational learning and growth.* This category stresses the importance of developing performance measures that evaluate how well the organization is striving toward continuous process improvement, education and training of its personnel, and technology innovation and integration. Those organizations that proactively pursue process improvement and invest in innovative technologies are traditionally more successful than those that do not. Therefore, PMs should be designed to track education and training at all levels of the organization (Kanji, 2002: 22).

The strategic perspective categorization was based on the researcher's interpretation of the METs as well as his personal experience in Civil Engineering and familiarity with the CESP. They were then validated by Civil Engineering officers enrolled in the Air Force Institute of Technology's Graduate of Engineering Management program. For example, MET 1.A, "Provide modern and safe facilities, infrastructure and

services that ensure quality in the workplace," was classified under the strategic perspectives, *stakeholder/customer focus* and *internal process excellence.* This MET is tied directly to the CE Core Competency of *Installation Engineering* and emphasizes the internal processes of providing quality engineering services while remaining focused on the customer's needs. By understanding the strategic thrust behind this MET, proposed performance measures that are customer-centric and focused on the internal processes that ensure "quality in the workplace" were more easily developed. To simplify the categorization process, an Excel spreadsheet was used to compile the data. The complete list of METs and their associated classifications and justifications are contained in Table 8, which can be found in Chapter 4, *Analysis and Results*.

Following the strategic perspective categorization, each MET was analyzed and described in detail as it relates to the CE mission. These MET descriptions, coupled with the strategic perspectives established a solid foundation for the development of proposed performance measures. In summary, step four of the research categorized the METs of the CESP into strategic perspectives, indicating the strategic intent of each MET. This category, combined with a detailed description of each MET as it relates to the CE mission, established a focused theme from which the proposed performance measures were developed.

Step 5 – Proposed Performance Measure Development

Step five of the research developed strategically appropriate, or proposed, performance measures (PPMs) for each MET based on the strategic perspective categories established in step four and the performance measure criteria developed by the

GAO and presented in Table 5. Those criteria are summarized as: demonstrate results, limited to the vital few, respond to multiple priorities, and link to responsible programs. However, only three of the four criteria apply directly to individual performance measures. "Limited to the vital few" refers to developing only those measures necessary to adequately assess goal attainment and facilitate strategic decision making. This criterion should be applied to the PMs as a group to ensure the organization stays focused on the strategy and not excessive measures. The purpose of creating these PPMs was to establish a benchmark that was used to evaluate the NPMs of the CESP and the APMs of the *Civil Engineer Metrics End of Year Review*. The procedure for designing the PPMs followed a "top-down" approach, from goals to objectives to performance measures and metrics, as suggested by most of the strategic planning models presented in Chapter 2 of this thesis.

The first step in development the PPMs was to use the strategic perspectives as a guide to establish the strategic intent of the MET. The next step was to use the MET analysis from step 4 and determine the key elements it contained that should be measured. Once those key elements were identified, proposed performance measures were developed that adequately represented those elements of the objective. The last step was to verify the validity of the PPM by evaluating it against the GAO criteria (which was detailed in the justification of each PPM). Table 7 contains a framework for conducting this portion of the research.

| MET | Strategic Perspective | Key Elements | Justification | Proposed Performance Measure (PPM) |
|---|---|---|---|---|
| | | | | |

**Table 7. Proposed Performance Measure Development and Evaluation Framework**

After the PPMs were created, they were compared to the NPMs of the CESP and the APMs of the *Civil Engineer Metrics End of Year Review.* Any differences or similarities that existed were highlighted and suggestions for improvement were made. These evaluations produced a set of recommended performance measures for implementation by the Air Force Civil Engineer.

Step 6 – Proposed Metric Development

The sixth and final step of this research developed proposed metrics to accompany the recommended PMs developed in step five. If it was determined that an existing metric was suitable to represent one of the recommended PMs, that metric was also included and discussed in the recommendation made by this research. As noted in Table 6, the U.S. Department of Energy (DoE) suggests performance metrics should consist of three critical elements: a defined unit of measure, a sensor which gathers and records the raw data, and a frequency with which measurements and reports are to be made (Buchheim, 2000: 311). These criteria were used to validate each proposed metric.

## Testing and Validation

There are multiple ways to test and validate the proposed performance measures and metrics developed in this research. In theory, both the PPMs and suggested metrics should be valid by virtue of the criteria that were used in their development. Each performance measure and metric created meets the appropriate design criteria suggested by the literature. However, that does not necessarily make them valid to the Civil Engineer if the data is too expensive to gather or it does not even exist. Therefore, the first step in validating both the PPMs and metrics was to access the CE database, ACES

(Automated Civil Engineer System), and compile the information necessary to create the metric. ACES is a relatively new database system designed to provide project management data to all levels of the Civil Engineering organization. For those measures with data not currently contained in ACES, the office of the core competency champion most closely associated with that measure was asked to provide the necessary data. If the information was readily available and cost effective to compile, more credence would be given to the validity of those measures and metrics.

Following the data validation, the next step was to assess the usefulness of the new measures and metrics with the MAJCOM staffs. Since these PMs and metrics were developed to evaluate the strategy of the Civil Engineer, they were not tested at the base level. They were written at an aggregate level and are not suited to measure progress at individual bases. Each recommended performance measure and metric was forwarded to the plans and programs divisions (CEP) of each MAJCOM Civil Engineer. The planners were asked to assess the feasibility of implementing the recommended PMs and metrics based on their expert knowledge of the data reporting systems and the measures and metrics currently in use. They were also asked to suggest improvements to any areas, in their opinion, that did not accurately represent the MET. Adoption of these measures and metrics by mid-level management, such as the MAJCOM staffs, is an effective form of validation because ultimately they are the ones who will use these tools to assess their progress toward the overall strategy of the Civil Engineer.

Finally, the recommended PMs and metrics were submitted to the Core Competency Champions and their staff for coordination and acceptance. This coordination also included the Programs Division of the Office of the Civil Engineer

(AF/ILEP), sponsors of this research. They are responsible for drafting the CESP and their acceptance of these measures and metrics represents acceptance from "field experts" and confirms their validity and overall value to the Air Force and Civil Engineering.

## Conclusion

This chapter covered the methodology that was used in evaluating the Air Force Civil Engineering Strategic Plan and its planning process. It described six steps that were used to accomplish this research, which was broken down into two distinct phases: process modeling and evaluation, and performance measure evaluation. Step one was to fully understand strategic planning and the CE planning process. Step two modeled the current CE process as well as developed a theoretical model that was used as evaluation criteria. Step three evaluated the model of the CE process and identified areas for improvement. Step four described the eight METs of the CESP and then classified them into strategic perspectives that highlight the overarching driving force behind each objective. With those strategic perspectives serving as the baseline, step five developed "proposed" PMs designed to accurately reflect the goals and objectives of the CESP. Step five also examined the current performance measures of the CESP and the *Civil Engineer Metrics End of Year Review* and highlighted any differences and similarities from the proposed PMs and recommended a set of optimal measures for implementation. Finally, step six conducted an evaluation that provided recommendations for metrics to accompany the recommended PMs using existing CE metrics or ones developed in this research.

# 4. Analysis and Results

## Overview

This chapter presents the results of the process modeling and evaluation, as well as the performance measure evaluation phases. First, the process modeling and evaluation phase produced two strategic planning models. These models are presented along with detailed descriptions of each step. Following the model descriptions, a step-by-step comparison of the two models was conducted. Phase two of the research developed proposed performance measures and metrics for the Civil Engineer Strategic Plan (CESP). These proposed measures and metrics were then compared to the notional measures and metrics described in the CESP and the actual measures and metrics extracted from the *Civil Engineer Metrics End of Year Review, December 2002.* The results of these analyses are also contained in this chapter.

## Phase One – Process Modeling and Evaluation

### Theoretical Strategic Planning Model

One of the primary objectives of this research was to evaluate the existing strategic planning process of the Air Force Civil Engineer. In order to accomplish this evaluation, two strategic planning models were developed. The first, presented in Figure 12, represents a theoretical model designed to provide evaluation criteria to be used in evaluating the Air Force Civil Engineering planning process. The researcher chose to create a new planning model in an effort to incorporate the most common and effective elements of strategic planning as described in the literature review.

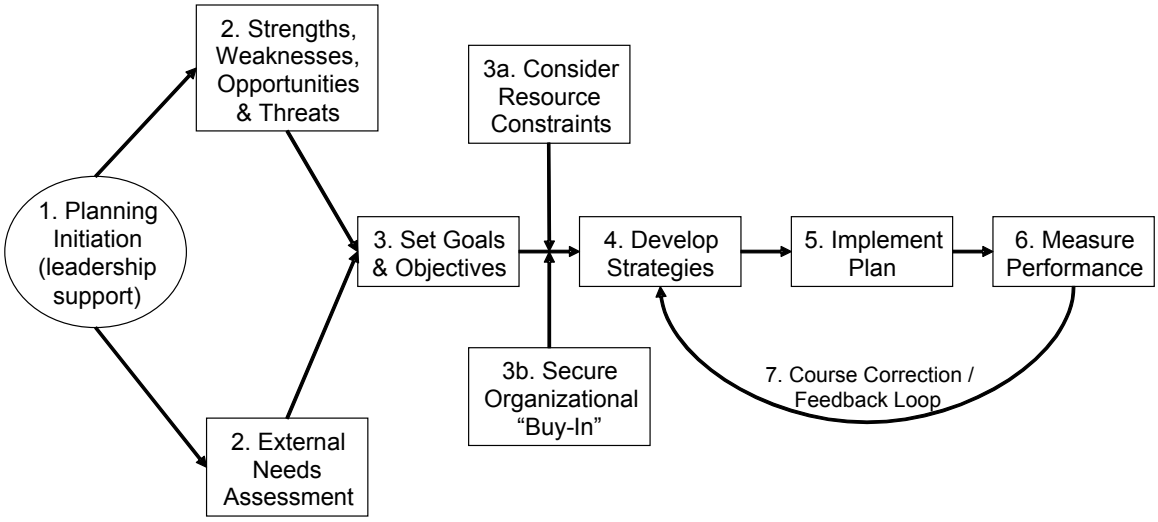


**Figure 12. Theoretical Strategic Planning Model**

The step one in the process begins with public support of the strategic planning process from the organization's senior leadership (e.g. Blackerby, 1994; Steiner, 1979). This support can come in the form of a statement from the CEO stressing the importance of the strategic plan to the organization, or from a hierarchy of approved planning guidance and foundational documents as is the case with many governmental agencies. Once the organization's leadership has initiated the planning process, step two includes two elements that can occur simultaneously. These two elements are the *Strengths, Weaknesses, Opportunities, and Threats (S.W.O.T.) analysis and the external needs assessment* (e.g. Blackerby, 1994; Dyson, 1990; Steiner, 1979). The S.W.O.T. analysis looks inward at the organization's strengths and weaknesses, and then outward for threats and opportunities that will determine the best course of action for the future. This type of analysis identifies the organization's ability to reach its vision or accomplish its mission as well as those internal and external inhibitors that prevent that from happening. In

addition to this scan of the organization's operating environment, an external (or customer) needs assessment must be accomplished (e.g. Blackerby, 1994; Dyson, 1990). The customer defines the organization's existence by requiring some product or service. However, whether it is a for-profit corporation or a non-profit service agency, the needs of the customer change regularly, thus making this a necessary step in any organization's strategic planning process.

Once a thorough analysis of the internal and external environments is complete, step three is to *define the goals and objectives* of the organization (e.g. Armstrong, 1983; Blackerby, 1994; Dyson, 1990; Steiner, 1990). This is one of the most important steps in the strategic planning process because it not only defines what the organization hopes to achieve in the near-term and sets the foundation for the strategic plan. It also identifies where the organization wants to be in five, ten, and in some cases, twenty years. Following the setting of goals and objectives, step four in this process is to *develop strategies* (e.g. Armstrong, 1983; Blackerby, 1994; Dyson, 1990; Steiner, 1979). These strategies will characterize how the organization plans to achieve its goals and objectives and are based on the capabilities defined by the S.W.O.T. analysis as well as the external needs assessment. However, before the organization can fully formulate its strategies, step four is moderated by two other significant elements: *consideration of resource constraints and securing organizational "buy-in"* (steps 3a and 3b) (e.g. Armstrong, 1983; Dyson, 1990).

Every organization is bound by certain resource constraints. The most common resource considered in strategic planning is money; however, there are other resources of equal importance that must be factored into any strategic plan. One such critical resource

is personnel. For example, a firm's objective may be to become the market leader of a particular product line. Its strategy is to increase production by sixty percent over the next five years. Such a dramatic increase in productivity may require a significant increase in the number of employees needed. The firm could also invest in technology that could increase production, but at what cost? These are constraints the planners must consider before including such a strategy in the strategic plan. Another resource constraint to factor into the strategic planning process is the organizational infrastructure. Does the firm have adequate manufacturing capacity? Do they have sufficient storage space for the increase in production? These are only a few of the questions that must be addressed before finalizing an organization's strategy.

The other moderator of developing strategies in this model is securing organizational buy-in. This step is vital to ensure the middle and lower levels of management have accepted the goals and objectives set by the planning team and that they are committed to achieving those goals. Armstrong (1983) reports self-set goals are more likely to be achieved than goals set by others. Additionally, if there is organizational buy-in to the goals and objectives, members outside the planning team may be able to offer better and more efficient ways of achieving those goals. In other words, strategy development as well as implementation of the plan may be enhanced if members of the organization are committed to the goals and objectives prior to the plan being implemented.

Steps five and six in the theoretical planning model are *implement the plan and measure performance*. Implementation (e.g. Dyson, 1990; Steiner, 1979) happens on the "front lines" of the organization. It takes the principles outlined in the strategic plan and

puts them into practical application. Following implementation, the degree to which the goals and objectives were met must be measured (e.g., Armstrong, 1983; Blackerby, 1994; Dyson, 1990; Steiner, 1979). These performance measures should be tied to the organizational strategy and supported by statistical data that clearly demonstrate how the objectives were or were not met. Referring to the previous example, if an organization's strategy for becoming a market leader was to increase production by sixty percent over the next five years, a simple performance measure could be monthly production rates. These measures can then be used to justify adjustment in the strategy. Thus, step seven of this model is the *course correction/feedback loop*. This process is essential because strategic planning is meant to be a dynamic process. This correction/feedback loop traces back to the *develop strategies* step because it is more likely that an organization will adjust its methods for achieving its goals before it changed the goals themselves. As organizations review their performance measures, it may be obvious that a particular strategy is not working and needs to be changed. This course correction loop will help keep an organization on track with the right strategy to achieve its goals and objectives. It can also serve as a tool for the organization to evaluate its strategic planning process. By reevaluating the organizations strategies, areas for improvement in the planning process may become apparent in order to avoid future shortfalls in performance.

## Civil Engineering Strategic Planning Process

Using information derived from the Civil Engineer Strategic Plan (CESP), Air Force Policy Directive (AFPD) 32-XX, (pending approval) *Civil Engineer Strategic Planning*, and the Civil Engineer Annual Report, it is proposed that the model depicted in

Figure 13 represents the current strategic planning process used by the Air Force Civil Engineer. The solid arrows represent a sequential process flow with each step dependent on its predecessor. The dotted box depicts the realm of responsibility of the Core Competency Champions and their Process Action Teams (PATs) described in Chapter 2 and the dashed arrows indicate which steps in the process influence the CESP.

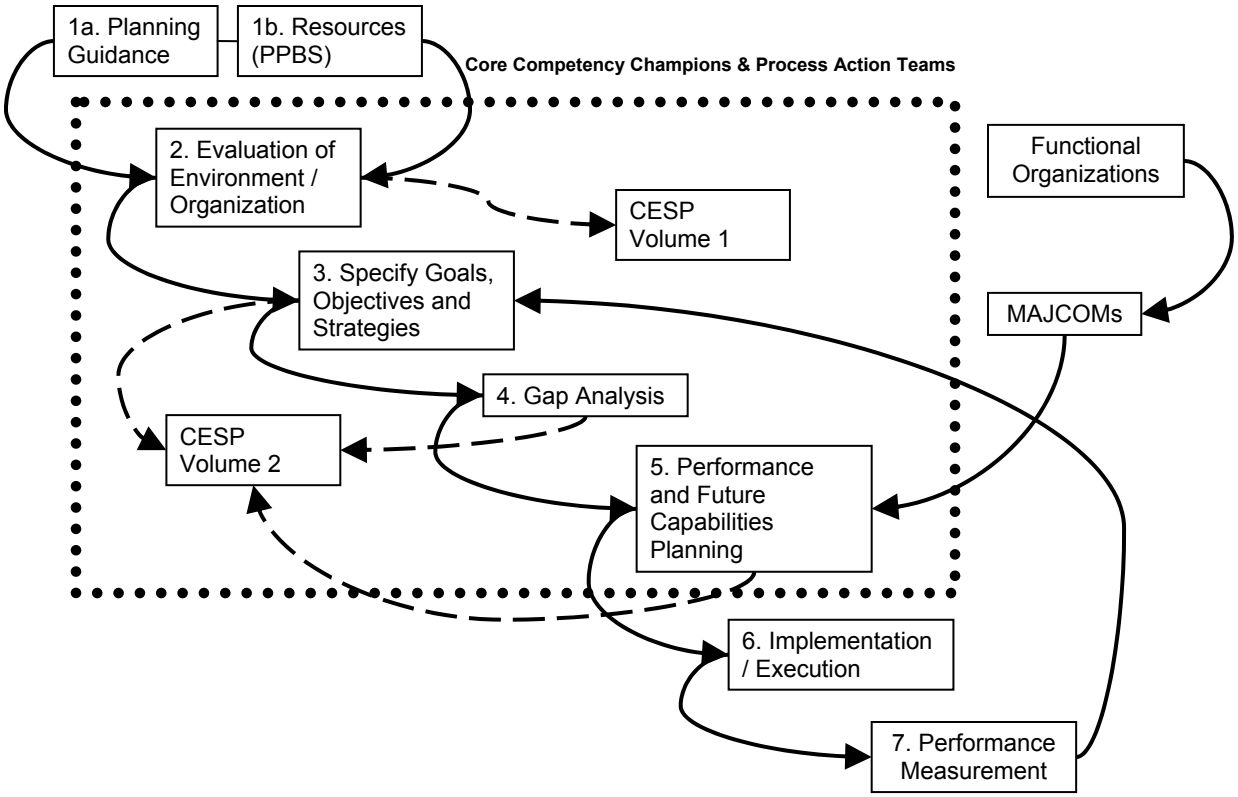


**Figure 13. Civil Engineer Strategic Planning Process**

Steps 1a and 1b in the model are *consideration of planning guidance and available resources*. The planning guidance comes from formal, published documents used by several DoD agencies as well as those specific to Air Force organizations. Examples of non-Air Force specific documents are: the National Security Strategy, National Military Strategy, the Government Performance and Results Act (1993), Joint

Vision 2020, Annual Planning and Programming Guidance (APPG), and the 1997 Quadrennial Defense Review. The planning documents used that apply specifically to Air Force operations are Air Force Vision 2020, Air Force Doctrine documents, the Air Force Strategic Plan, Blueprint 2000: The Air Force Civil Engineer Modernization Plan, Civil Engineer Strategic Plan (CESP) and the final draft of AFPD 32-XX, *Civil Engineer Strategic Planning*. These documents represent the position of Air Force and DoD senior leaders and are considered valid sources for strategic planning guidance. Civil Engineering planners also receive formal planning guidance from their boss, the Civil Engineer. According to sources on the AF/ILEP staff, the Civil Engineer is the approval authority for all plans and programs within Civil Engineering (Kossler, 2003). His or her vision for the future of the organization is imparted to the staff, who in turn converts that vision into tangible goals and objectives.

The resources considered in the strategic planning process come from the Federal government's Planning, Programming, and Budgeting System (PPBS). This system directs the annual allocation of congressional funding to all federal agencies, which in turn, plays a significant role in the development and execution of the CESP. A full explanation of the scale of this budget system is beyond the scope of this research, but it is incorporated in the CE planning model to demonstrate its significant impact on the development of the goals, objectives and strategies of the Civil Engineer.

Building upon the principles described in these various planning documents while operating under the constraints of the PPBS and its annual budget, step two in the Civil Engineer process is to *evaluate the environment and the organization*. This step of the strategic planning process produced Volume I of the CESP, depicted by the dashed arrow

in the model. Contained in this volume are future security environments and challenges that both the Air Force and the Civil Engineer are likely to face. Volume I also defines the CE Core Competencies of: *Installation Engineering, Expeditionary Engineering, Housing Excellence, Environmental Leadership, and Emergency Services.* These core competencies define the inherent capabilities of Civil Engineers and the services they provide to the Air Force.

Step three in the CE process is to *define the organization's goals, objectives, and strategies*. The CE goals: Quality Engineering, Agile Engineering, and Focused Engineering were developed to directly support the Air Force goals: Quality People, Operational Performance, and Modernization as well as the goals of DoD: Shape the International Environment, and Prepare Now for an Uncertain Future (CESP Vol. II, 2000: 5). The CE goals are further elaborated in Volume II of the CESP in the discussion of the CE Mission Essential Tasks (METs) and their associated Performance Measures (PMs). This task list was built in conjunction with the Air Force Task List (AFDD 1-1) and the CE core competencies to best characterize the goals and objectives of the Civil Engineer.

Following the definition of goals, objectives and strategies, step four of the CE process is to conduct a *gap analysis.* This analysis is also described in Volume II and explores the gaps existing between the present environment and the desired endstates of the Civil Engineer. To properly plan for such desired endstates, assumptions about the future were made in order to provide a foundation to identify and address organizational weaknesses. This gap analysis is meant to highlight possible tradeoffs between current systems, force readiness, and modernization planning (CESP Vol. II, 2000: 17).

Step five of the CE model is to *develop future capabilities and performance planning* which is described in detail in Chapter 2 of this thesis. This is a key element in the process that requires input from all levels of the organization as well as organizations outside of CE. This outside influence can come from the major commands (MAJCOMs) as well as Air Force functional organizations such as Security Forces, Logistics, or Communications. These plans detail how the CE community will operate in the future as well as outline plans for modernization. Process action teams (PATs) are charged with developing these plans and are lead by a member of the headquarters civil engineer staff known as the core competency "champion." The dotted box in the model represents the realm of responsibility of these champions and their PATs. The output from steps three, four, and five can be found in Volume II of the CESP, which is represented by the three dashed arrows in the model.

Step six is *implementation and execution.* This occurs primarily at the lower organizational levels such as the MAJCOMs and the base civil engineering squadrons. As with any organization, strategy implementation is governed by laws and regulations as well as resource constraints. Air Force doctrine promotes the concept of "centralized control, decentralized execution" in the application of aerospace power (AFDD 1, 1997: 23). This idea is also applicable to civil engineering strategy. The policy is written at the headquarters staff level, and the MAJCOMs and bases are given the flexibility to implement that policy to best serve their organizations and the Air Force.

The seventh step of the Civil Engineering strategic planning process is *performance measurement*. This step is designed to track the progress of civil engineers toward the goals and objectives described in the CESP. These performance measures

(PMs) are represented by various performance metrics and are reported primarily in the *Civil Engineer Metrics End of Year Review* and the CE Annual Report. Each core competency team reports PM data as well as any significant accomplishments they may have achieved over the past year which is also published in the Annual Report. The CE process model also includes a loop back to Step 3. This feedback loop links back to the goals, objectives and strategies step of the planning process and occurs within the core competency PATs. These groups meet at various times throughout the year and may also double as another entity (i.e. the Expeditionary Engineering PAT also serves as the CE Readiness Board). Some of the actions taken by these PATs include: validation of mission essential tasks, revision of gap analysis with respect to goals, and changes made in the strategy when appropriate (CE Annual Report, 2002: 2).

**Model Comparison Results**

As described in Chapter 3, *Methodology,* the first phase of this research is defined as process modeling and evaluation. This section will discuss the gaps and overlaps of each step of the CE process as it compared to the evaluation criteria established in the theoretical model. It is important to recognize that the CE process model represents specific elements contained in the CESP. Therefore, as the models were compared and discussed, considerable insight into the contents and structure of the CESP was gained and is also contained in this analysis. Table 8 contains a summary of the planning steps found in both models. The first column of the table provides the planning steps as they appear in the Theoretical model and the second contains the steps found in the CE model.

| Theoretical Model | | CE Model | |
|---|---|---|---|
| Step 1) Planning Initiation (leadership support) | | Step 1a) Planning Guidance | Step 1b) Resources (PPBS) |
| Step 2a) SWOT Analysis | Step 2b) External Needs Assessment | Step 2) Evaluation of Environment / Organization | |
| Step 3) Set Goals & Objectives (moderated by: "Resource Constraints" and "Organizational Buy-in" | | Step 3) Specify Goals, Objectives and Strategies (CE process delays buy-in until CE Step 5; Resources constrain CE process from Step 1.) | |
| Step 4) Develop Strategies | | Step 4) Gap Analysis | |
| Step 5) Implement Plan | | Step 5) Performance and Future Capabilities Planning ("Buy-in" solicited from MAJCOMs and Functional units) | |
| Step 6) Measure Performance | | Step 6) Implementation/Execution | |
| Step 7) Course Correction / Feedback Loop | | Step 7) Measure Performance / Feedback Loop | |

**Table 8. Summary of Theoretical and CE Strategic Planning Models**

**Step 1 – Planning Initiation**

Step one of the CE process, *planning guidance/resources (PPBS)* is very similar to step one of the theoretical model. Strategic planning begins in both models with some type of formal guidance. The Civil Engineering process is guided by several foundational planning documents that express the formal goals and desires of the DoD and Air Force leadership. However, this planning process can also be influenced by the focus and direction of CE senior leadership. As prescribed by the theoretical model, this leadership support is essential to initiate the planning process.

The CE model also differs from step one of the theoretical model because it considers organizational resources at the beginning of the planning process. According to the theoretical model, resource constraints should not be considered until step 3a, an additional consideration after the organization's goals and objectives have been set. Civil Engineering strategic planners are immediately constrained by the PPBS before they even begin the task of setting goals or developing strategies. Unfortunately, this is the case for all federal agencies. Instead of setting goals and objectives following a thorough S.W.O.T analysis, the CE planners must develop their goals, objectives and strategies under the constraints of the funding allocated to them each year by Congress. The theoretical model is designed to not limit the creativity of planners in developing goals and objectives for their organization's future. Once those goals and objectives are set, resource constraints should be considered in the development of strategies, because a strategy is meant to be a central, integrated, and externally orientated concept of how an organization will achieve its objectives (Hambrick, 2001: 49).

**Step 2 – S.W.O.T Analysis and External Needs Assessment**

The second step of the CE process is somewhat similar to step two of the theoretical model, but there are significant differences as well. For example, Volume I of the CESP contains a very detailed description of various future environments that discuss *threats* at the national level, but not threats specific to the CE organization, such as a decreased workforce due to competitive sourcing efforts and Base Realignment and Closures (BRAC). Organizational *strengths* could also be inferred from the description of the CE Core Competencies. This section of Volume I highlights CE's distinctive

capabilities and how those capabilities support the goals of the Civil Engineer and the Air Force. There is little discussion of organizational weaknesses and opportunities in the CE process until step four, *gap analysis*.

Part of the mission of the Civil Engineer is to provide bases, infrastructure and facilities to all Air Force personnel. For that reason, CE customers span the entire Air Force organization. Volume II of the CESP discusses how the goals of the Civil Engineer flow down from the goals of the Air Force and the DoD. Therefore, it can be inferred that by building upon the goals of the Air Force, CE had considered the needs of the external customer, but that is a very liberal interpretation of the *external needs assessment* of the theoretical model. The needs of lateral organizations such as, communications, aircraft maintenance, medical, etc, should also be considered before the goals and objectives are set because these organizations are representative of the customers CE personnel interact with on a daily basis.

The "gap analysis" section of Volume II is intended to identify and address organizational *weaknesses*, or gaps, when constrained by some predetermined constraints that were developed from the material contained in Volume I. The gap analysis also provides organizational *opportunities* when it discusses how the CE community should address the gaps and weaknesses. However, as previously noted, this type of analysis is most suitable earlier in the strategic planning process in order to assist planners in developing more accurate goals and objectives.

### Step 3 – Set Goals and Objectives and Step 4 – Develop Strategies

Step three of the CE model is nearly identical to the third and fourth steps of the theoretical model. Both models require the development of goals, objectives and strategies to establish the heart of the organization's strategic plan. However, the theoretical model suggests considering resource constraints and securing organizational "buy-in" at this point before moving onto development to specific strategies. The consideration of resources has previously been discussed in step one, but organizational buy-in is also included in order to facilitate strategy development. The goal of "buy-in" is to get all levels of the organization to accept and perhaps contribute to the organization's strategy. Even though the CESP encourages MAJCOM and base level contribution, a formal process for securing buy-in at all levels of the Civil Engineering organization does not exist. The CE process allows for both internal and external organizational input, but only in the development of the performance and future capabilities plans.

### Step 5 – Implement Plan and Step 6 – Measure Performance

Both planning models include steps to implement the strategic plan as well as measure performance toward the goals and objectives of that plan. These are steps six and seven, respectively, in the CE model. There is little difference in the CE approach to these two steps as compared to the theoretical model. Performance measurement is critical in assessing the overall effectiveness of the plan. The measures and metrics must be properly designed and accurately tracked. Phase two of this research will discuss this step of the strategic planning process in much greater detail.

### Step 7 – Course Correction / Feedback Loop

Step 7 of the CE model also has a feedback loop that traces back to step 3 of the process. This feedback loop is executed by the core competency PATs. The PATs evaluate the performance measurement data and make necessary corrections to the strategies and perhaps even the mission essential tasks. Adjustment to the goals would require input from all core competency champions and approval of the Civil Engineer. This loop is virtually identical to the one described in the theoretical model. However, there is no defined or required timeline to accomplish this process review. For example, one PAT met four times over the course of 2002, while others only met once.

## Process Evaluation Findings and Recommendations

Overall, the strategic planning process of the Air Force Civil Engineer is relatively similar to the theoretical model developed. However, this first phase of this analysis also provided several insights into CE's strategic planning process. These insights, or conclusions, will be discussed in the following section. There are some differences between the theoretical and CE models, but those are primarily in the way the process flows within the CE staff. All the main elements of the theoretical model are present in some form, including the course correction / feedback loop. This is a critical element of strategic planning that not only allows organizations to reevaluate the strategies used to achieve their goals, but it also facilitates a strategic planning process review. This affords organizations the opportunity to reassess the way they approach strategy development and ensure they remain on course to achieve their goals and objectives.

The first conclusion drawn from the process analysis was that evidence of the evaluation of the external environment and internal organization was difficult to find. The various elements of this evaluation were spread throughout Volumes I and II of the CESP and had to be inferred by the researcher. Step 2 of the theoretical model describes the need for a clear definition of the organization's strengths, weaknesses, opportunities, and threats. The "gap analysis" contained in Volume II of the CESP does an adequate job of identifying areas that need attention (weaknesses), but it is not presented until chapter 3, after the goals and objectives have been established. It should be included in Volume I in order to set the stage for the goals, objectives and strategies that are presented in Volume II. This would provide users of the plan a more logical flow of strategy development.

The organization's strengths should be described in terms more specific than the definition of the core competencies, and the threats need to be described in terms that are more specific to civil engineering. They need to go beyond a description of various future national security scenarios (alternate futures) and describe those threats that can hinder the CE mission. Therefore, it is recommended that a more distinctive procedure for evaluating and defining the organization's strengths, weaknesses, opportunities and threats needs to be implemented into the planning process and incorporated into the CESP, preferably in Volume I. This will provide more consolidated look at those factors controlling the future of Civil Engineering and its ability to accomplish its mission as well as set the tone for the goals, objectives and strategies described in Volume II.

Another conclusion drawn from this research is that the CESP does not provide a clear definition of the actual achievement strategies for each MET. There is a gap

between objective and performance measure that does not address the actions necessary to achieve that defined objective. The modernization plans contained in Volume II outline capabilities needed to achieve future goals and endstates within each core competency, but no where does it describe exactly how they plan to get there. Therefore, the CESP would be a more valuable tool to the lower levels of the organization if, in addition to suggesting performance measures, it also included achievement strategies for each MET. These strategies would outline specific actions to be executed by the bases and MAJCOMs to achieve the goals and objectives of the plan.

The CE process does not solicit organizational buy-in from the lower levels of the organization until the performance and future capabilities planning step of the process. A formal procedure for including representatives from various bases and MAJCOMs should be instituted as early in the strategic planning process as possible in order to achieve buy-in and greater input in the development of the goals, objectives and strategies.

Lastly, step seven of the CE strategic planning process is to measure performance which then ties back to the "specify goals, objectives, and strategies" step of the process. This feedback loop allows the core competency process action teams (PATs) to reevaluate the MAJCOMs' progress toward the goals and objectives described in the CESP. However, there is no defined timeline for this process review to occur. Some core competency PATs meet on multiple occasions throughout the year, while others meet only once. A formal review timeline should be established and implemented to standardize the process throughout the organization and therefore provide the CE leadership a more accurate assessment of the effectiveness of the CESP. This review

schedule should be presented in the Air Force Policy Directive (AFPD 32-XX), *CE Strategic Planning* and the results detailed yearly in the in the Annual Report.

### Phase 2 – Performance Measure Evaluation

The CESP was produced as a result of the planning process evaluated in this research. This process is also used to make modifications to that plan. The tools used to assess how well CE is achieving the goals and objectives of the CESP are the performance measures and metrics contained in the plan. Therefore, the second phase of this research effort focused on these measures and metrics in order to assess the overall effectiveness of the CESP and the CE strategic planning process.

#### Strategic Perspective Categorization and MET Descriptions

Step four of the research methodology was to establish a framework to be used in developing proposed performance measures for the Civil Engineer Strategic Plan (CESP). The purpose of developing new performance measures was to complete the process from an objective and independent perspective. To begin this process, each MET was assigned one or more *strategic perspective*. These perspectives were formulated using the literature of the "Balanced Scorecard" and "Kanji's Business Scorecard" discussed in the literature review. The three strategic perspectives were: stakeholder/customer focus, internal process excellence, and organizational learning and growth. Each MET was then examined and defined as it relates to the CE mission. The key elements of these MET definitions along with the strategic perspective categories are summarized Table 9.

**Table 9. Step 4 - Strategic Perspective Categorization and MET Key Elements**

| Goal | Mission Essential Task (MET) | Strategic Perspective | Justification | MET Key Elements |
|---|---|---|---|---|
| **Goal 1: QUALITY ENGINEERING** - Provide well-trained and equipped civil engineer (CE) forces to construct, operate and maintain facilities, housing, infrastructure and utilities that preserve sense of community and uphold quality of life. | MET 1.A: Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace | Stakeholder/Customer Focus, Internal Process Excellence | This MET is tied directly to the Core Competency of *Installation Engineering.* It emphasizes the internal processes of providing quality engineering services while remaining focused on the customer's needs. | Modern and safe facilities infrastructure and services; quality in the workplace |
| | MET 1.B: Provide adequate, quality housing and dormitories that preserve our sense of community for Air Force members | Stakeholder/Customer Focus | This MET has direct correlation to Quality of Life issues, which is a high priority of the CE customer. | Adequate, Quality Housing (MFH or Dorms); Sense of Community |
| | MET 1.C: Improve quality of life and protect Air Force people through conscientious and rigorous management of our pollutants and wastes | Stakeholder/Customer Focus, Internal Process Excellence | This MET focuses on the internal process of managing environmental pollutants and wastes in order to protect AF personnel (stakeholders/customers). | Improve Quality of Life & Protect People; Environmental stewardship |

| Goal | Mission Essential Task (MET) | Strategic Perspective | Justification | MET Key Elements |
|---|---|---|---|---|
| **Goal 2: AGILE ENGINEERING** - Develop and modernize CE forces and equipment that are light and lean to provide support across the full range of military operations | MET 2.A: Provide well-trained and fully capable forces to support military operations anywhere in the world | Internal Process Excellence, Organizational Learning and Growth | This MET focuses on the internal process of world-wide force projection and stresses the importance of training CE personnel. | Well-trained & Fully Capable; Operations Anywhere in the World |
| | MET 2.B: Provide robust and well-trained forces and equipment to respond to the full spectrum of emergencies | Internal Process Excellence, Organizational Learning and Growth | Providing emergency service (Fire, EOD, and Readiness) is an internal process unique to CE. This MET also stresses the importance of training and equipping those mission critical personnel. | Training & Equipping Forces; Full Spectrum of Emergencies |
| **Goal 3: FOCUSED ENGINEERING** - Provide strategic direction to modernize Air Force installations that efficiently and effectively support Air Force missions and people | MET 3.A: Optimize Air Force resources through proper planning, programming and execution of our facility and infrastructure programs | Internal Process Excellence | This MET is focused purely inward. It focuses on programs and processes unique and internal to CE in order to optimize AF resources. | Optimize Resources; Planning Programming, and Execution |
| | MET 3.B: Maximize housing opportunities and efficiency through balance of construction, revitalization, maintenance and privatization | Stakeholder/Customer Focus, Internal Process Excellence | This MET focuses on CE customers (MFH and dormitory residents) as well as its internal processes for balancing housing funds allocation. | Maximize Housing Opportunities |
| | MET 3.C: Effectively manage our environmental programs, ranges and airspace to maximize operations and training of Air Force weapons and units well into the future | Stakeholder/Customer Focus, Internal Process Excellence | The MET focuses on environmental program management (internal process) in order to maximize training opportunities and operational success for all AF personnel. | Environmental, Range & Airspace Management / Maximize Operations and Training |

The strategic perspectives were validated by ten Civil Engineering officers currently enrolled in the Air Force Institute of Technology's Graduate of Engineering Management Program. A summary of this validation is contained in Table 10.

| MET | Researcher Categories (Percent agreement of validation sample) |
|---|---|
| MET 1.A: Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace | Customer/Stakeholder Focus (90%)<br><br>Internal Process Excellence (30%) |
| MET 1.B: Provide adequate, quality housing and dormitories that preserve our sense of community for Air Force members | Customer/Stakeholder Focus (90%) |
| MET 1.C: Improve quality of life and protect Air Force people through conscientious and rigorous management of our pollutants and wastes | Customer/Stakeholder Focus (90%)<br><br>Internal Process Excellence (20%) |
| MET 2.A: Provide well-trained and fully capable forces to support military operations anywhere in the world | Internal Process Excellence (50%)<br><br>Organizational Learning and Growth (50%) |
| MET 2.B: Provide robust and well-trained forces and equipment to respond to the full spectrum of emergencies | Internal Process Excellence (60%)<br><br>Organizational Learning and Growth (50%) |
| MET 3.A: Optimize Air Force resources through proper planning, programming and execution of our facility and infrastructure programs | Internal Process Excellence (90%) |
| MET 3.B: Maximize housing opportunities and efficiency through balance of construction, revitalization, maintenance and privatization | Customer/Stakeholder Focus (50%)<br><br>Internal Process Excellence (50%) |
| MET 3.C: Effectively manage our environmental programs, ranges and airspace to maximize operations and training of Air Force weapons and units well into the future | Customer/Stakeholder Focus (30%)<br><br>Internal Process Excellence (60%) |

**Table 10. Summary of Strategic Perspective Validation**

For the METs associated with CE Goal 1, "Quality Engineering" (1.A, 1.B, and 1.C), ninety percent of the officers chose "stakeholder/customer focus" as an appropriate strategic perspective. However, only thirty percent of the officers polled agreed that "internal process excellence" was also appropriate for MET 1.A and twenty percent agreed with it for MET 1.C. These are the two categories chosen by the researcher for

METs 1.A and 1.C. The researcher chose only "stakeholder/customer focus" for MET 1.B, which was validated by ninety percent of the officer polled. These results indicate the majority of the participants believe the METs associated with "Quality Engineering" are stakeholder/customer centric. This information is valuable in developing strategically appropriate performance measures.

Both METs associated with CE Goal 2, "Agile Engineering" (2.A and 2.B), were evenly split among the participating officers. For MET 2.A, "internal process excellence" and "organizational learning and growth" were each agreed upon by fifty percent of the participants. MET 2.B, sixty percent agreed with "internal process excellence" and fifty percent agreed with "organizational learning and growth." This indicates that separate performance measures may be appropriate for each strategic perspective when measuring these METs.

The METs associated with CE Goal 3, "Focused Engineering" (3.A, 3.B, and 3.C), "internal process excellence" was the predominate choice of the participating officers. It was chosen by ninety percent for MET 3.A, by fifty percent for MET 3.B, and by sixty percent for MET 3.C. "Stakeholder/customer focus" was also chosen by fifty percent of the officers polled for MET 3.B. The researcher chose "internal process excellence" for MET 3.A, and "stakeholder/customer focus" and "internal process excellence" for METs 3.B and 3.C. This information stresses the importance of CE's internal processes to the participants and should be a primary focus of the performance measures associated with these METs.

Although six of the eight METs had two strategic perspectives, the information in Table 10 shows unique trends for each group of METs. The METs associated with Goal

1 (1.A, 1.B, and 1.C) are all predominately focused on customer and stakeholder interests. The second group of METs (2.A and 2.B) is equally focused on "internal process excellence" and "organizational learning and growth." Finally, the third group of METs (3.A, 3.B and 3.C) is predominately focused on "internal process excellence." These perspectives emphasize the strategic intent of the METs and provided a foundation for the development of the proposed performance measures in step five of this research.

To determine the key elements of the METs, each was examined in order to establish its true strategic intent as it relates to the mission of the Civil Engineer. For example, the key element of MET 1.A is to "provide modern and safe facilities, infrastructure and services." That main focus guided the search for official documentation to support that idea. These official documents were found on the Air Force electronic publications web-site: http://www.e-publishing.af.mil (May 2003). The documents specific to Civil Engineering were found under the main heading of "HQ US Air Force" and then under the "32-Series" of publications. This site contains 132 publications that describe, in detail, the various missions of the Civil Engineer and how those missions should be accomplished. Several of these documents were used by the researcher to define each MET and establish a link between the strategic perspectives, the METs and the CE mission. The descriptions of the METs are explained in the following section.

***MET 1.A: Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace***

This MET has two distinct elements. The first focuses on providing modern and safe facilities and infrastructure. The term infrastructure includes, but is not limited to, the installation support structure such as the airfields, roadways, utilities, and communications equipment. According to Nelson F. Gibbs, Assistant Secretary of the Air Force (Installations, Environment & Logistics), "…by providing people with safe, efficient, and modern places to live and work we directly enhance readiness and combat capability" (*Air Force Facilities Investment Plan*, 2003: 1). Air Force Policy Directive (AFPD) 32-10, *Installations and Facilities,* states: "The Air Force will provide, operate, maintain, and protect facilities, infrastructure, and installations required for effective mission support worldwide at their lowest life-cycle cost." Air Force Handbook, AFH 32-1084, *Facility Requirements,* provides "technical criteria to serve as guidance in the design and construction of high quality facilities that are durable, functional, economical, safe, aesthetically pleasing, and have reasonable operating and maintenance costs." By offering "modern and safe facilities, infrastructure and services," to its personnel, the Air Force is seeking to improve quality of life by providing quality living and working environments and still maintain all mission requirements. With an average facility age of 40 years and 25% of the total physical plant inventory over 50 years old, the Air Force recognizes the importance of facility modernization (*Air Force Facilities Investment Plan*, 2003: 3.2). Deteriorating facilities and infrastructure weaken mission readiness and have a negative impact on the efficiency of the workforce due to the often unsafe conditions associated with them.

The second element of MET 1.A refers to providing "facilities, infrastructure and services that ensure quality in the workplace." Customer service is an essential component of all aspects of the civil engineering mission. In addition to the multitude of facility maintenance and infrastructure repair services the CE Operations flights provide (i.e. plumbing, power production, snow removal, electrical services, etc.), civil engineers also provide services such as: project management, real property management, fire protection, and housing referral just to mention a few. These are all services that have ties to facilities and infrastructure. When they are conducted properly and professionally, civil engineers help foster a quality working environment for all Air Force personnel. Therefore, it is important to also consider the "service" portion of this MET when developing performance measures that are designed to ensure the MET is being achieved.

***MET 1.B: Provide adequate, quality housing and dormitories that preserve our sense of community for Air Force members***

The Air Force has recognized the importance of providing adequate and high quality living space for its personnel because productivity and retention greatly depend on it (AFPD 32-60, 1994: 1). The Air Force has committed to meeting the goal set by the Office of the Secretary of Defense (OSD) in 1999 to "revitalize, divest through privatization or demolish inadequate housing by or before Fiscal Year (FY) 2010" (Air Force Family Housing Master Plan, 2002: 2). This commitment will provide Air Force families with adequate and quality housing that meets up-to-date construction standards and retains a viable sense of community on and around its installations (Air Force Family Housing Master Plan, 2002: 2).

In the 1993, the National Defense Authorization Act directed the DoD "to give similar priority to unaccompanied housing as is currently given to family housing" (Air Force Dormitory Master Plan, 2000: 4). In 1995, the Air Force committed to address the number one quality of life concern of unaccompanied enlisted members as identified in the 1995 Air Force Chief of Staff Quality of Life Survey; privacy. Therefore, all newly constructed or upgraded dormitory rooms will be configured in the "1+1" style. This construction standard allows individual members to have their own sleeping quarters and a shared bathroom and kitchenette with just one other Airman (Air Force Dormitory Master Plan, 2000: 5).

Issues such as "adequacy and quality," as well as investment strategies for future development of family housing and dormitories, are contained in the Air Force Family Housing Master Plan and the Air Force Dormitory Master Plan. These documents, in conjunction with several AFIs, provide the necessary guidance for Air Force planners to properly execute the housing program of the Air Force.

***MET 1.C: Improve quality of life and protect Air Force people through conscientious and rigorous management of our pollutants and wastes***

According to AFPD 32-70, *Environmental Quality,* "all Air Force employees, including military, civilian, and contractor personnel, are accountable for the environmental consequences of their actions." MET 1.C encourages environmental responsibility through "conscientious and rigorous management of our pollutants and wastes." The words conscientious and rigorous are strong adjectives that stress the significance of proper environmental management. Improper management of pollutants and wastes can produce effects that negatively impact quality of life and the safety of Air

Force personnel and communities on and around its installations. To prevent that from happening, the Air Force has established its Environmental Quality program as a means to achieve this MET. This program is built upon four main pillars described below.

**Compliance -** The USAF is committed to ensuring current operations comply with applicable Federal, state, and local environmental requirements. This program covers air, water, solid and hazardous waste, hazardous materials, and storage tanks, the community right-to-know, and toxic substances.

**Conservation -** The USAF is committed to conserving natural and cultural resources through effective environmental planning. This program addresses the environmental impact analysis process and development of base comprehensive plans.

**Pollution Prevention -** The USAF is committed to preventing future pollution by reducing the use of hazardous material and releases of pollutants into the environment to as near zero as feasible through source reduction, recycling, or treatment methods.

**Cleanup -** The USAF is committed to cleaning up past contamination to reduce health and environmental risks at each US installation. At overseas locations, the USAF performs cleanup to protect health and safety and to sustain current operations. (AFH 10-222, Vol. 4, 1997: 11)

***MET 2.A: Provide well-trained and fully capable forces to support military operations anywhere in the world***

This MET is tied to the CE goal of Expeditionary Engineering and relates directly to the war-fighting mission of Air Force civil engineers. Civil Engineers provide three very distinct capabilities to support military commanders, at both CONUS and forward deployed locations. These capabilities are: fire protection and prevention, explosive ordinance disposal (EOD), and Readiness (which includes combat engineering and contingency response capabilities).

The first element of this MET states that CE will "provide well-trained and fully capable forces…" Further dissection of this statement reveals two key concepts: well-trained forces and fully capable forces. The training required of CE forces is outlined in

AFPDs 32-20, *Fire Protection*; 32-30, *Explosive Ordinance Disposal*; and 32-40, *Disaster Preparedness.* AFI 10-210, *Prime Base Engineer Emergency Force (Prime BEEF) program,* describes the Readiness training required for the Air Force Specialty Codes (AFSCs) specific to Civil Engineering. Examples of some of the skills required to meet CE mission requirements include: rapid runway repair, "tent-city" layout and construction, power production, and Nuclear, Biological, and Chemical Warfare. This MET also states the forces will be "fully capable." By making this statement, the CE leadership has committed to provide their forces all that is necessary to conduct their mission. Fully trained, fully manned, and fully equipped are the attributes needed to successfully define CE forces as "fully capable." Therefore, the performance measures associate with this MET must focus on measuring training status as well as the CE force's ability to conduct its mission.

The second element of this MET states CE forces will "support military operations anywhere in the world." To meet that requirement, civil engineers have been integrated into Air Force-wide force deployment "packages" known as Aerospace Expeditionary Forces (AEFs). These AEFs fit into a structure called the Expeditionary Aerospace Force (EAF). The EAF is a force deployment construct based on an expeditionary model that has a global mission focus and is capable of rapid employment worldwide (CESP, Vol. I: 21). Civil Engineers are a critical link in the EAF construct. Making forces and equipment available to support the EAF concept provides vital combat engineering expertise to deployed air commanders and meets the CESP objective of having CE forces available to support military operations anywhere in the world. Therefore, a PM should address CE ability to support their AEF requirements.

***MET 2.B: Provide robust and well-trained forces and equipment to respond to the full spectrum of emergencies***

According to the Merriam-Webster Dictionary (2003), the word *robust* is an adjective used to describe something that is "strongly formed or constructed; sturdy." Using that definition to describe CE's emergency response forces emphasizes the importance of that mission not only to CE, but to the Air Force as well. The "full spectrum of emergencies" includes fire protection, explosive ordnance disposal (EOD), disaster preparedness, and readiness support. Readiness support consists of Nuclear, Biological, and Chemical (NBC) protective operations, weapons of mass destruction (WMD) protective operations, and consequence management of natural and manmade disasters (CESP Vol. II, 2000: 12). Planning guidance for emergency operations can be found in AFI 10-211, *Civil Engineer Contingency Response Planning.*

This MET reiterates the importance of providing CE forces that are "well-trained." However, it also emphasizes "equipment." Viable equipment is a critical element of emergency response capability. Without it, CE forces would not be able to support contingency operations. Even though "fully equipped" was assumed in the definition of "fully capable forces" in MET 2.A, it is deliberately specified in this MET. Therefore, performance measures designed for this MET should not only focus on emergency operations training but equipment status as well.

***MET 3.A: Optimize Air Force resources through proper planning, programming and execution of our facility and infrastructure programs***

The objective of facility and infrastructure project planning and programming is to provide facilities and infrastructure needed to perform the Air Force mission. These projects must meet validated requirements, comply with all applicable standards, and be

programmed at the lowest life cycle cost (AFI 32-1021, 2003: 4). The main thrust of this MET is to "optimize Air Force resources." This statement implies it is the responsibility of CE to optimize the usage of existing facilities and infrastructure systems as well as utilize budget resources to achieve maximum output from the facilities and infrastructure programs. This is made possible through proper conduct of the facility and infrastructure program elements: planning, programming, and execution.

AFI 32-1021, *Planning and Programming Military Construction (MILCON) Projects* (2003) defines planning as "establishing facility requirements critical for mission accomplishment and proposing the most effective and economical means of satisfying those requirements." Planning is broken down into three separate actions: determine requirements, evaluate alternative solutions, and initiate programming actions (AFI 32-1021, 2003: 6). These actions are applicable to individual projects, but they can also be applied on a broader scale. The Air Force and CE actively participate in comprehensive base planning. Comprehensive planning establishes a systematic framework for decision-making with regard to the development of Air Force installations. Through this process, goals and objectives are defined, issues are identified, information is gathered, alternative solutions are developed, and a sound decision-making process is employed to select a preferred alternative for implementation (AFI 32-7062, 1997: 4).

Programming is described as the process of acquiring approval and funding necessary to execute a planned project (AFI 32-1021, 2003: 21). This approval and authorization process begins with project requirement identification and justification (DD Form 1391 for MILCON and AF Form 332 or 327 for minor construction). The next step in programming is to allocate Congressional or MAJCOM funding and then the process

ends with project execution authority. Project execution is the actual project management process of constructing a facility or infrastructure system from start to finish.

***MET 3.B: Maximize housing opportunities and efficiency through balance of construction, revitalization, maintenance and privatization***

The goal of this MET is two-fold. The first is to "maximize housing opportunities" and the second is to "maximize housing efficiency." The word "housing," as it is used in this MET, is a generic term referring to both military family housing (MFH) and unaccompanied enlisted housing (dormitories) (AFPD 32-60, 1994: 1). To achieve the first element of the MET, "maximize housing opportunities," the Air Force conducts assessments of the housing markets around each installation and provides suitable housing whenever the local civilian community cannot meet military needs (AFPD 32-60, 1994: 1). "Maximizing housing efficiency" refers to the effective execution of the housing program. Acting on guidance provided by Congress and OSD, the Air Force has chosen to meet these goals through a balance of construction, revitalization, maintenance and privatization. This balance is achieved through building new MFH units and dormitories, "whole-house" remodeling projects to achieve revitalization, continual maintenance and repair of existing units, and divesture through privatization when it is economically viable (FHMP, 2002: 2). What is unclear in this MET and its supporting documents is what exactly constitutes "balance." There are no defined percentages to use as standards for performance measurement. The balance needed to achieve this objective depends on individual installations and economic

feasibility. Each of these methods has associated costs and outputs which could be used to adequately measures performance for this MET.

***MET 3.C: Effectively manage our environmental programs, ranges and airspace to maximize operations and training of Air Force weapons and units well into the future***

This MET is focuses on effective management of three distinct areas of concern: environmental programs, weapon ranges, and airspace. The first area of concern calls for effective management of CE's environmental programs. These programs fall under the four pillars of Environmental Quality: compliance, conservation, pollution prevention and cleanup (AFPD 32-70, 1994: 2). These pillars each have specific programs such as: air and water compliance, solid and hazardous waste management, underground storage tank compliance, pollution prevention and recycling, natural resource management, and comprehensive planning. This portion of this MET is very similar to MET 1.C. That MET calls for "conscientious and rigorous management of our pollutants and wastes," a concept that is inherent in "effective management of Air Force environmental programs." The concept of the fourth pillar, cleanup, is expanded in AFI 32 -7020, *The Environmental Restoration Program* (ERP). The goal of the Air Force ERP is to reduce risks to human health and the environment due to contamination from past Air Force activities in a cost effective manner and in a manner that fosters community support (AFI 32-7020, 2001: 4). Proper management of these environmental programs allows Air Force personnel to train and operate in a safe and risk free environment.

The other elements of this MET, range and airspace management, can also have positive effects on operations and training when managed properly. According to AFI 13-212v1, *Range Planning and Operations,* the goal of the Air Force range program is to

balance the need to accomplish realistic testing and training with the need to minimize potential impacts of such activities on the environment and the surrounding communities. "Impacts on the environment" is where civil engineers can have to most impact on this program. This AFI also states that preserving the long-term environmental vitality of Air Force range assets contributes significantly to readiness. Therefore, environmental planning and stewardship are an essential component of effective range management.

Air Force civil engineers also play an important role in effective airspace management. According to AFI 13-201, *Air Force Airspace Management,* the objective of airspace management is to provide airspace in which USAF testing and training missions can be conducted as realistically as possible while minimizing midair collision potential and the impact on other users, surface activities, and the environment. The "minimize impact on the environment" portion of this objective requires planning coordination and management oversight from CE. AFI 13-201, Section 3.6 requires operations personnel to assist CE in establishing and maintaining (where applicable) an active AICUZ program. Air Installation Compatibility Use Zone (AICUZ) is a DoD planning program designed to develop compatible land use policies and procedures around military airfields. The AICUZ program addresses issues such as noise control, incompatible land use (encroachment), accident potential zones and height of obstructions (AFI 32-7063, 2002: 10).

**MET Analysis**

After completion of this portion of the research, it was apparent that CE Goals 1 and 3 had similar themes, although "Quality Engineering" is orientated more toward the

near future while "Focused Engineering" is more strategic, or long-term in nature. It was also apparent that the METs associated with those goals also shared similar themes: METs 1.A and 3.A, facilities and infrastructure; METs 1.B and 3.B, housing; and METs 1.C and 3.C, environmental management and protection. It is suggested that Goals 1 and 3 could be consolidated to read, "Quality and Focused Engineering - Provide fully trained and equipped CE forces to build, operate and maintain safe and modern installations and their support systems to effectively sustain aerospace operations and promote quality of life for all Air Force personnel." Using this consolidated goal as a guide, this research suggests that the associated METs may be consolidated as well. The consolidated METs would read:

> Ensure quality in the workplace by optimizing Air Force resources to provide safe and modern facilities, infrastructure, and services through proper planning, programming and execution of those programs.
>
> Maximize the opportunity for all Air Force members to have access to quality and suitable housing that promotes a sense of community through a balance of construction, revitalization, maintenance, and privatization.
>
> Effectively and conscientiously manage our environmental programs, ranges and airspace to improve quality of life, promote the health and safety of our people, and maximize operations and training for all Air Force units and personnel.

Each of these proposed METs combine the key elements of the existing METs while maintaining a focused and strategic link back to the proposed consolidated goal. Additionally, it is suggested that METs 2.A and 2.B should also be consolidated to eliminate overlap. The new MET would read:

> Provide fully trained and ready Civil Engineer forces with modern equipment and the capability to support and respond to the full spectrum of military and emergency operations anywhere in the world.

This fully supports Goal 2 – Agile Engineering and encompasses all the aspects of the existing METs. This new MET could be measured with minor adjustments to the current Status of Resources and Training System (SORTS) and AEF readiness reporting tools. One example would be to combine the results of the two reports so that all CE deployable units are tracked and reported under one system which would effectively measure this consolidated MET. This concept will be expanded upon in the following section.

**Proposed Performance Measure and Metric Development**

The first task in developing the proposed performance measures (PPMs) for the CESP was to identify the key elements, or main points of each MET. These key elements were derived from the MET descriptions completed in step 4. These key elements, combined with the strategic perspectives also established in step four, created a strategic foundation from which the PPMs were written. Each PPM was also written according to the criteria established by the GAO: demonstrates results, limited to the vital few, Respond to multiple priorities, and link to responsible programs. These criteria are detailed in Table 5 of the literature review. A suggested office of primary responsibility (OPR) was designated to record and report the measure at the MAJCOM level. These proposed OPRs were based upon how closely the responsibilities of individual elements of civil engineering (housing, environmental, readiness, etc.) matched with the nature of the PPM. The next step was to compare the newly created PPMs to the NPMs as they appear in Volume II of the CESP and the APMs of the *Civil Engineer Metrics End of Year Review, December 2002*. Following this comparison of the various performance measures, a final recommendation was made as to which PMs should be incorporated

into the CESP. Finally, suggestions were made as to the most appropriate metrics to represent the recommended performance measures.

**MET 1.A: Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace**

The key elements of this MET are: "modern and safe facilities infrastructure, and services," and "quality in the workplace" and the selected strategic perspectives are: stakeholder/customer focus and internal process excellence. A summary of the performance measures and metrics analyzed for this MET are contained in Table 11. The first column contains the Mission Essential Task (MET), followed by the evaluated Performance Measures in the second column (NPMs from the CESP, APMs from the *End of Year Review,* and PPMs suggested by this research). The third column represents the current and recommended metrics for the corresponding PMs, and the last column provides the information source used to describe or develop each measure and metric. A similar summary table will be provided for each subsequent MET discussed in this chapter. The format and structure of Tables 12 through 19 will be the same as Table 11.

The first proposed performance measure (PPM) for MET 1.A is PPM 1.A.1: "Progress toward all AF facilities and infrastructure being fully mission ready" This PPM will assess CE's progress toward providing facilities and infrastructure that are fully capable of supporting their installations' missions as directed by AFPD 32-10. The "mission ready status" is a proposed rating determined by the installation commander based on user inputs. The installation commander assesses the ability of the installation's facilities and infrastructure to meet mission requirements as well as provide a modern and safe place to work. The suggested office of primary responsibility (OPR) for collecting

**Table 11. Notional, Actual, and Proposed PMs and Metrics for MET 1.A**

| Mission Essential Task (MET) | Performance Measures (PMs) | Metrics | Data Source |
|---|---|---|---|
| MET 1.A: Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace | Notional PM:<br>1.A.1: Condition of bases, infrastructure and facilities | Notional Metric:<br>NM 1.A.1 Facility Investment Metric (FIM) *Frequency: Yearly*<br><br>NM 1.A.2 Facility Readiness Indicators *Frequency: Yearly* | CESP, Volume II, 2000 |
| | Actual PMs:<br>APM 1.A.1. Health of AF physical plant<br><br>APM 1.A.2. Provide quality level of service<br><br>APM 1.A.3. Health of CE workforce | Actual Metrics:<br>AM 1.A.1 FIM Data & Annual Recap Rate<br><br>AM 1.A.2 Installations Readiness Report (IRR)<br><br>AM 1.A.3 Reportable Mishap Rate vs. AF | CE Metrics End of Year Review, December 2002 |
| | Proposed PMs:<br>PM 1.A.1: Progress toward all AF facilities and infrastructure being "fully mission ready." **OPR: CEC** | Proposed Metrics:<br>PM 1.A.1: Combination of the Installations Readiness Report (IRR) and Facility Investment Metric (FIM) | 2003 Facility Investment Plan, FY 2001 AF Installations' Readiness Reporting Instructions, AF Facility Investment Metric Directive |
| | PPM 1.A.2: AF facilities and infrastructure that meet current AF standards (per AFH 32-1084) **OPR: CEC** | PM 1.A.2: percentage of projects funded based on the annual investment projections produced by the FIM, Facilities Recapitalization Metric (FRM), and the MILCON Integrated Priority List (IPL) versus those that were not funded | AFH 32-1084, *Facility Requirements* |
| | PPM 1.A.3: Workplace satisfaction. **OPR: CEC** | PM 1.A.3: Likert-style scale representing workplace satisfaction | "Workplace environment" data from CSAF Quality of Life Survey |

and compiling this information is the Engineering division (CEC) because of their close association with the programs dedicated to facility and infrastructure construction, revitalization and modernization, and demolition.

The second PPM for MET 1.A is PPM 1.A.2: "AF facilities and infrastructure that meet current AF standards (per AFH 32-1084)." This PPM ties directly back to the "modern and safe facilities and infrastructure" portion of the MET. In addition to the military construction (MILCON) program that provides entirely new facilities or infrastructure, the Air Force has also committed to a program of Sustainment, Restoration, and Modernization (SRM) to revitalize and maintain existing structures in an effort to provide facilities and infrastructure that are modern and safe. SRM is an essential concept to maintain an aging inventory of infrastructure and facilities. AF standards for facilities and infrastructure are explained in AFH 32-1084 and it is CE's responsibility to implement that guidance. Providing facilities and infrastructure that meet these standards demonstrates the Air Force's commitment to improve Quality of Life for its personnel and sustain mission capability of its facilities and infrastructure. MAJCOM CECs are the suggested OPR for this PPM because they are the division of Civil Engineering that manages the MILCON and SRM programs.

The third proposed measure is PPM 1.A.3: "Workplace satisfaction." This PPM is intended to measure the degree to which the facilities, infrastructure and services provided by CE actually produce a sense of "quality in the workplace." It measures the degree to which AF personnel as satisfied with their overall working environment (facility conditions, workspace adequacy, maintenance service response, etc) and if the facilities, infrastructure and services provided by CE are meeting their needs.

Maximizing this performance measure demonstrates CE's progress toward meeting the objective of this MET to "[ensure] quality in the workplace." MAJCOM CECs are also the recommended OPR for this measure because of their intimate knowledge of the facilities and infrastructure program.

The next step in presenting recommended PMs for the CESP is to evaluate and compare the notional and actual performance measures (NPMs and APMs). The notional performance measure (NPM) suggested in the CESP for this MET is NPM 1.A.1: "Condition of bases, infrastructure and facilities." This NPM is designed to report the current condition of bases, facilities and infrastructure in order to help determine where facility and infrastructure funding should be spent (CESP Vol. II, 2000:52). It does not provide results that are indicative of CE performance toward the objective stated in the MET. It also does not specify what "condition" means. Condition could be translated to mean facility aesthetics, structural integrity, workspace capacity, or mission capable status. This measure is not clearly defined and only represents current conditions, not performance of something accomplished by CE.

There are three actual performance measures (APMs) reported in the CE Metrics End of Year Review that are dedicated to MET 1.A. The first is APM 1.A.1: "Health of AF physical plant." According to *CE Metrics End of Year Review,* this measure is similar to NPM 1.A.1 in that it only reports the current status or condition of the AF Physical Plant (facilities and infrastructure). It does not represent any actual performance accomplished by Civil Engineering. It fails the "demonstrates results" criteria required of proper performance measurement design described in Table 5. The second actual measure is APM 1.A.2: "Provide quality level of service." This APM is very vague and

also fails to demonstrate actual results. There are no criteria defined for "quality level of service" and the type of service to be provided is not specified either. In fact, there is no evidence that it is even being measured because there is no supporting data for this APM in the *CE Metric End of Year Review*.

The third APM, 1.A.3: "Health of CE workforce," is intended to assess the "safe" criterion for facilities, infrastructure, and services provided by CE based on the supporting metric contained in the *End of Year Review*. "Health" of the workforce is measured by rate of reportable mishaps, which can be attributed to the overall safety of the facility or workplace. The desired trend is an inverse relationship, lower rate of mishaps equates to safer facilities. However, this measure only reports the "health" of the CE workforce, excluding all other AF organizations. This may be important information for CE commanders to have, but it does not provide the strategic link necessary to assess the overall safety of the facilities, infrastructure and services provided by CE. It only shows how CE's average mishap rate compares to the AF average. Therefore, it is recommended that this APM should not be associated with this MET.

Based on the comparison of these seven performance measures (PPMs, APM, and NPM), it is recommended that CE incorporate the three PPMs into the CESP. These measures are strategically linked to the MET and satisfy the GAO criteria. They address the key elements of the MET and are written from the same strategic perspectives as the MET. It is also recommended that APM 1.A.3 is a more appropriate measure of an adequately trained workforce and thus should be moved under MET 2.A. This recommendation will be explained in further detail in the discussion of MET 2.A.

There are several tools currently in use by CE that produce information to support the facilities and infrastructure program. Some of that existing information can be used to produce metrics that support the recommended performance measures for MET 1.A. For example, PPM 1.A.1 can adequately be represented with the existing Installation Readiness Report (IRR) and Facility Investment Metric (FIM). The IRR is a tool to provide objective and timely information to Congress, DoD, and the Air Force on the capability of its facilities and infrastructure to support forces in the conduct of their missions (FIP, 2003: 3.1) and is currently used in the *CE Metric End of Year Review* (see Figure 10). The rating system used in the IRR assigns a score (C-1 – C-4) to the represent the installation commander's assessment of the mission ready status of an installation's facilities and infrastructure. The FIM is a tool designed to categorize facility and infrastructure requirements based on their impact to four mission areas: primary mission, mission support, base support, and community support. The facilities and infrastructure requirements in each mission area are categorized into one of three mission impact ratings: Critical, Degraded, or Enhancement. These mission impact ratings are intended to identify and prioritize Operations and Maintenance funding for restoration and modernization (FIP, 2003: 4.8). Combining the rating attributes of both of these existing systems can produce an objective rating of the "mission ready status" of AF facilities and infrastructure called for in PPM 1.A.1

PPM 1.A.2 requires tracking the number of Air Force facilities and infrastructure that meet current standards required by AFH 32-1084, *Facility Requirements.* The Air Force uses multiple investment models to plan facility and infrastructure sustainment, restoration, and modernization. These models are designed to predict funding amounts

necessary to help Civil Engineers meet the "modern and safe" objective of MET 1.A. Some of these investment models include: the Facility Investment Metric (FIM), which represents facility restoration and modernization (R&M) requirements funded through the Operations and Maintenance (O&M) budget appropriation; the Facilities Recapitalization Metric (FRM), which relates planned facilities and infrastructure investments to expected service life; and the MILCON Integrated Priorities List (IPL), which involves large R&M facility and infrastructure projects funded through the MILCON budget appropriation (FIP, 2003: 4.5-9). A more detailed description of each of these models can be found in the 2003 Air Force Facilities Investment Plan. Each of these models produce a total dollar amount required to invest in Air Force facility and infrastructure sustainment, restoration, and modernization. The standards required for that restoration and modernization are described in AFH 32-1084. Therefore, an appropriate metric for PPM 1.A.2 would be the percentage of projects funded based on the investment projections produced by the FIM, FRM, and the IPL versus that were not funded.

The Air Force Chief of Staff (CSAF) Quality of Life Survey contains information relating to workplace environment, however, an adequate metric has not been developed to fully represent "workplace satisfaction". Therefore, it is recommended that further research be conducted into using the data from the CSAF Quality of Life survey to design a workplace satisfaction survey that can be implemented annually to fully assess issues such as facility conditions, workspace adequacy, and maintenance service satisfaction. The survey data would demonstrate CE's success or failure at "ensuring quality in the workplace."

**MET 1.B: Provide adequate, quality housing and dormitories that preserve our sense of community for Air Force members**

The key elements of this MET are: "adequate, quality housing," and "sense of community" and the strategic perspective selected for it was: "stakeholder/customer focus." A summary of the performance measures and metrics analyzed for this MET are contained in Table 12.

The first PPM for this MET is PPM 1.B.1: "Total available living quarters (MFH and dorms) meeting Air Force standards." By focusing this PPM on measuring only those living quarters that meet standards and are currently available, it provides an accurate picture of CE's progress toward the MET. "Available" refers to only those units that are currently occupied or available for occupancy. It eliminates those units currently under construction (new construction or renovation) or scheduled for demolition to provide a more accurate number of total housing inventory to compare to those units meeting standards. It is CE's responsibility to provide housing that meets DoD and AF standards for space, privacy, and quality. Therefore, this PPM demonstrates the results of that effort for both Military Family Housing (MFH) and unaccompanied enlisted dormitories.

Housing adequacy and quality are vital elements in establishing a sense of community among Air Force members. According to this MET, by providing Air Force people adequate and quality living conditions, they are more likely to preserve a sense of community than those that live in inadequate quarters. Therefore, PPM 1.B.2: "Housing resident satisfaction," is designed to assess how well AF housing (MFH and dorms) is meeting the needs its current residents. "Sense of community" is a difficult concept to

**Table 12. Notional, Actual, and Proposed PMs and Metrics for MET 1.B**

| Mission Essential Task (MET) | Performance Measures (PMs) | Metrics | Data Source |
|---|---|---|---|
| MET 1.B: Provide adequate, quality housing and dormitories that preserve our sense of community for Air Force members | Notional PM:<br>NPM 1.B.1: Number and percentage of housing units meeting Air Force standards | Notional Metric:<br>NM 1.B.1 Number of Inadequate Housing Units *Frequency: Yearly*<br><br>NM 1.B.2 Number of Inadequate Dormitory Rooms *Frequency: Yearly* | CESP, Volume II, 2000 |
| | Actual PMs:<br>APM 1.B.1. Number of adequate houses vs. inadequate<br><br>APM 1.B.2. # of adequate, private dorm rooms vs. inadequate/deficit<br><br>APM 1.B.3. Response times or occupancy rates | Actual Metrics:<br>AM 1.B.1 Percent Housing Units Adequate<br><br>AM 1.B.2 Percent Dorms Rooms Adequate<br><br>No metric reported for APM 1.B.3 | CE Metrics End of Year Review, December 2002 |
| | Proposed PMs:<br>PPM 1.B.1: Total available living quarters (MFH and dorms) meeting AF standards. **OPR: CEH** | PM 1.B.1: Modify AMs 1.B.1 and 1.B.2 to reflect total units available meeting AF standards vs. Master Plan goals | AFPD 32-60, *Housing*; AF Military Family Housing Master Plan, AF Dormitory Master Plan |
| | PPM 1.B.2: AF Housing resident satisfaction **OPR: CEH** | PM 1.B.2: AF Housing resident satisfaction presented on a Likert-style scale | Housing satisfaction data from CSAF Quality of Life Survey |

objectively measure, but it is closely associated with "quality of life," a concept Air Force senior leaders take very seriously (AFPN, 2002). Based on the results of the 1999 Chief of Staff Quality of Life Survey, the Air Force allocated $544 million to improve or replace more than 13,000 MFH units and $156 million to construct over 1,600 new dormitory rooms in FY 02. Therefore, it is suggested that housing residents who are satisfied with their living quarters will foster a greater sense of community than those who are dissatisfied with their quarters. Therefore, positive evidence of this performance measure would be represented by an increasing trend in housing resident satisfaction. The Housing divisions of the MAJCOM CE staffs (CEH) are the recommended OPR for these PPMs. The issues represented by these performance measures are part of the primary responsibilities of the Housing division which make them the most logical choice.

According to Volume II of the CESP, the NPM suggested for this MET is: "Number and percentage of housing units meeting Air Force standards." This measure is nearly identical to PPM 1.B.1, but it does not specify what will be used as the baseline for the total housing inventory. The percentage of units meeting standards compared to the total housing inventory may be considerably lower than the percentage of units meeting standards compared to only the units that are available (as suggested by PPM 1.B.1). Therefore, this NPM is not recommended because it is not thoroughly defined.

There are three APMs associated with this MET. The first is APM 1.B.1: "Number of adequate houses vs. inadequate." The second is very similar, but it is focused on dormitories; APM 1.B.2: "Number of adequate, private dorm rooms vs. inadequate/deficit." Both of these measures are directly linked to the main focus of the MET, providing adequate

and quality housing. According to the associated metrics in the *End of Year Review,* these APMs are designed to measure progress toward providing adequate housing against the existing inadequate housing.

The third APM is: "Response times or occupancy rates." This measure is meant to represent the percentage of housing units currently occupied. However, this measure does not strategically link to the MET because it does not measure anything to do with "providing adequate and quality housing and dormitories." Additionally, there was no supporting data associated with this measure contained in the *CE Metric End of Year Review*.

Therefore, it is recommended that CE implement both of the PPMs suggested for this MET. As noted above, PPM 1.B.1 and NPM 1.B.1 are similar, but the PPM is slightly more specific because it focuses attention on the housing units "available." This is a more strategically appropriate measure because it demonstrates results that are customer focused which is the perspective from which the MET was written. The current metrics reported in the *CE Metric End of Year Review* show, on two separate graphs, the percentage of MFH units and dormitories that are adequate as compared to the goal set by the 2002 Family Housing Master Plan and the 2000 Dormitory Plan. These metrics should be modified to represent PPM 1.B.1 by simply modifying the data to represent the percentage of "available" units that are meeting AF standards. Also, using the phrase "meeting AF standards" provides a clearer definition of what exactly is being measured. It is more descriptive than "adequate" and it implies adherence to some defined level of quality.

**MET 1.C: Improve quality of life and protect Air Force people through conscientious and rigorous management of our pollutants and wastes**

The key elements of this MET are: "improve quality of life and protect Air Force people," and "management of pollutants and wastes." The strategic perspectives selected were: "stakeholder / customer focus," and "internal process excellence." A summary of the performance measures and metrics analyzed for this MET are contained in Table 13.

There are two proposed performance measures suggested that reflect the intentions MET 1.C. The first of these proposed measures is PPM 1.C.1: "Progress toward zero "negative" ESOHCAMP findings" was designed to meet the requirements of AFPD 90-8, *Environmental, Safety, and Occupational Health,* AFPD 32-70, *Environmental Quality*, and AFI 32-7045, *Environmental Compliance Assessment and Management Program (ECAMP)*. ESOHCAMP is the Air Force Environmental, Safety and Occupational Health Compliance Assessment and Management Program. According to an internet-based newsletter published by Kunsan Air Base, Republic of Korea, the ESOHCAMP program is designed to assess conditions that pose potential threats to human health and safety or the environment. ESOHCAMP inspections cover the full range of environmental, safety, and occupational health issues, and categorize each finding into one of five levels: significant (worst), major, minor, management practice and positive (best). The goal of the program is to progress toward zero "negative" (significant, major, minor) findings. Reducing these negative findings to as close to zero as possible demonstrates the Air Force's proactive approach to "improve quality of life and protect Air Force people" through management of a comprehensive environmental inspection program.

**Table 13. Notional, Actual, and Proposed PMs and Metrics for MET 1.C**

| Mission Essential Task (MET) | Performance Measures (PMs) | Metrics | Data Source |
|---|---|---|---|
| MET 1.C: Improve quality of life and protect Air Force people through conscientious and rigorous management of our pollutants and wastes | Notional PM:<br>NPM 1.C.1: Number of open enforcement actions | Notional Metric:<br>NM 1.C.1 Compliance Performance (number of open Enforcement Actions)<br>*Frequency: Cumulative Results Reported Yearly* | CESP, Volume II, 2000 |
| | Actual PM:<br>APM 1.C.1. Number of open enforcement actions | Actual Metric:<br>AM 1.C.1 same as NM 1.C.1 | CE Metrics End of Year Review, December 2002 |
| | Proposed PM:<br>PPM 1.C.1: Progress toward zero "negative" ESOHCAMP findings<br>**OPR : CEV** | Proposed Metrics:<br>PM 1.C.1: Percentage of negative findings (significant, major, minor) closed out per MAJCOM | AFPD 32-70, *Environmental* Quality; AFPD 90-8, *Environmental, Safety and Occupational Health*; AFI 32-7045, *Environmental Compliance Assessment and Management Program (ECAMP)* |
| | PPM 1.C.2: Reduce total amount of pollutants released into the environment to as close to zero as possible<br>**OPR : CEV** | PM 1.C.2a: Total tonnage hazardous and solid waste disposed annually over ten years<br>PM 1.C.2b: Total annual tonnage of wastes processed through AF recycling program<br>PM 1.C.2c: Total amount of pollutants reported annually to the AF Toxics Release Inventory (TRI) program per MAJCOM | AFI 32-7080, *Pollution Prevention Program*; AFH 10-222v4, *Environmental Guide for Contingency Operations* |

The second PPM focuses on the effective management of the Air Force Pollution Prevention program. According to AFI 32-7080, *Pollution Prevention Program,* preventing pollution requires a proactive and dynamic management approach because prevention achieves environmental standards through source reduction rather than "end-of-pipe" treatment. The second proposed measure for MET 1.C is indicative of this proactive approach because it demonstrates CE's progress in achieving the standards required by this program. The proposed measure is PPM 1.C.2: "Reduce total amount of pollutants released into the environment to as close to zero as possible." The phrase "conscientious and rigorous management of our pollutants" represents a proactive approach to managing pollution. The goal of the Air Force pollution prevention program is to reduce the amount of pollutants released in environment to as close to zero as possible (AFI 32-7080, 1994: 5). This proposed performance measure will demonstrate progress toward that goal and the objective of the MET. Since these METs focus solely on environmental issues, the Environmental division of the MAJCOM CE staffs (CEV) is the most appropriate OPR to collect and compile the data for these PPMs.

The measures suggested in the CESP and the *CE Metrics End of Year Review* are identical. Both NPM and APM 1.C.1 state: "Number of open enforcement actions." This measure is also the same measure suggested for environmental compliance in AFPD 32-70. It is designed to report to the total number of enforcement actions identified throughout the year. According to AFPD 32-70, an enforcement action is defined as a written notice from a Federal, state or local regulatory authority citing violations of environmental statutes or regulations. This is the only PM currently in use by Civil Engineering to measure MET 1.C.

and does not accurately measure "management of pollutants and wastes" because an enforcement action can represent a variety of different environmental violations.

It is recommended that CE adopt both proposed performance measures suggested in this research. The recommended metric for PPM 1.C.1 is the percentage of negative findings (significant, major, minor) that were closed out per MAJCOM. This information can be extracted from installation ESOHCAMP inspection reports. These reports show all five levels of findings. The total number of negative findings can be isolated and compared to those that have been closed out to produce a percentage. This metric would represent how CE is addressing those issues and progressing toward the goal of "zero negative findings."

PPMs 1.C.2 could be represented by metrics built on several different sources of data. One proposed metric for PPM 1.C.2 could be a comparison of the total tonnage of hazardous and solid waste disposed of each year for the past ten years. Accurate accounting of hazardous and solid waste disposal is required by law. Therefore, comparing the total disposed of each year will produce a trend that could be analyzed. If that trend shows a continual decrease in the amount of hazardous and solid wastes disposed, it would indicate the amount of wastes Air Force personnel are exposed to have also decreased. This metric would provide a direct link back to the key element of this MET: "improve quality of life and protect Air Force people." Another suggested metric would be the total annual tonnage of wastes processed through AF recycling program. This data is also linked to the METs objective of "conscientious management of wastes." Finally, the third suggested metric for this PPM is the total amount of pollutants reported annually to the AF Toxics Release Inventory (TRI) program per MAJCOM. The AF TRI stems from the US Environmental

Protection Agency TRI. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990 (Sullivan, 2001: 660). The TRI is a database that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities (Sullivan, 2001: 678). The Air Force has adopted this program and CE could demonstrate its progress toward reducing the total amount of pollutants released to as close to zero by a continual decrease in the pollutants reported to the TRI.

It is important to note some inherent flaws in the proposed measures and metrics discussed in this section. The first is the difficulty establishing the "as close to zero as possible" standard described in PPM 1.C.2. Although AFI 32-7080 includes criteria to establish a measurement baseline, this baseline differs with each MAJCOM and progress toward zero can differ greatly between MAJCOMs due to unique mission requirements. Also, the proposed metrics may produce trends that show overall progress, but those trends may not reflect changes in mission requirements that produced unusually high amounts of pollution at a particular installation. It is the responsibility of unit commanders to achieve the delicate balance between mission and environmental requirements. Sometimes the choices that must be made to achieve such a balance are not obvious from a simple trend analysis of total pollutants reported to the TRI or the total tonnage processed through AF recycling facilities.

**MET 2.A: Provide well-trained and fully capable forces to support military operations anywhere in the world**

The key elements of MET 2.A are: "well-trained and fully capable forces" and "military operations anywhere in the world." The strategic perspectives chosen were "internal process excellence" and "organizational learning and growth." A summary of the performance measures and metrics analyzed for this MET are contained in Table 14.

There is one proposed measure suggested for this MET, PPM 2.A.1: "Mission ready status of all CE deployable personnel and equipment." The results of this measure are mission ready ratings of all CE deployable personnel and equipment. It is suggested that commanders should assess the mission ready status of their squadrons and assign an overall rating to their ability to support their assigned mission. This rating system would be similar to the one suggested for PPM 1.A.1, but based on training and equipment status of deployable personnel. Reporting a mission ready rating based on training and equipment status addresses the "well-trained and fully capable" elements of the MET. This PPM also measures CE ability to "support military operations anywhere in the world." It is also proposed that APM 1.A.3, "Health of CE Workforce" is more appropriately associated with this MET. This APM is represented by a metric that reports CE Mishap Rates compared to the AF average. A link can be made between the effectiveness of CE training and total CE mishaps if it is assumed that personnel with proper training will be involved in fewer mishaps. Therefore, using this APM to link to the "well-trained and fully capable" portion of this MET is appropriate. The suggested OPR for these PPMs is the MAJCOM Readiness

**Table 14. Notional, Actual, and Proposed PMs and Metrics for MET 2.A**

| Mission Essential Task (MET) | Performance Measures (PMs) | Metrics | Data Source |
|---|---|---|---|
| MET 2.A: Provide well-trained and fully capable forces to support military operations anywhere in the world | Notional PM:<br>NPM 2.A.1: Percentage of CE Forces fully mission ready (SORTS) | Notional Metric:<br>NM 2.A.1 Percentage of Units Fully Mission Ready *Frequency: Quarterly* | CESP, Volume II, 2000 |
| | Actual PMs:<br>APM 2.A.1. Mission Ready<br><br>APM 2.A.2. Military passive defense ops<br><br>APM 2.A.3. Ops Tempo by AFSC | Actual Metric:<br>AM 2.A.1 Status of Resources and Training System (SORTS) ***(Classified: "SECRET")***<br><br>No metric reported for APM 2.A.2<br><br>AM 2.A.3 Cumulative Dollar Goals for Required EOD UTCs | CE Metrics End of Year Review, December 2002 |
| | Proposed PM:<br>PPM 2.A.1: Mission ready status of all CE deployable personnel & equipment<br>**OPR : CEX** | Proposed Metric:<br>PM 2.A.1 Monthly report of deployable personnel and equipment Mission Ready Ratings by MAJCOM | |
| | APM 1.A.3: Health of CE Workforce<br>**OPR : CEX** | AM 1.A.3: Reportable Mishap Rate vs. AF Average | CE Metrics End of Year Review, December 2002 |

division (CEX) because for they are responsible for ensuring CE forces are trained and prepared to meet their mission requirements.

The CESP suggests a notional measure very similar to the one proposed in this research. NPM 2.A.1: "Percentage of CE Forces fully mission ready (SORTS)" is designed to track the readiness of Prime BEEF, RED HORSE and other CE special deployable teams to execute their wartime requirements (CESP, Vol. II, 2000: 57). SORTS refers to the Status of Resources and Training System. SORTS is the single automated reporting system within the Department of Defense that functions as the central registry of all operational units of the US Armed Forces and certain foreign organizations. The purpose of SORTS is threefold: it provides data critical to crisis planning; it provides data for the deliberate planning process; and is to be used by the CSAF and subordinate commanders in assessing their effectiveness in meeting their Title 10, United States Code responsibility (AFI 10-201, 2003: 8). This system assigns overall ratings to operational units based on inputs from four separate measured areas: 1) personnel (SORTS-P), 2) training (SORTS-T), 3) equipment and supplies on hand (SORTS-S), and 4) equipment condition (SORTS-R). The overall C-level is assigned by the unit commander.

The overall category-levels (C - 1 through 4) are summarized below:

- C-1: The unit possesses the required resources and is trained to undertake the *full wartime mission(s)* for which it is organized or designed.
- C-2: The unit possesses the required resources and is trained to undertake *most of the wartime mission(s)* for which it is organized or designed.
- C-3: The unit possesses the required resources and is trained to undertake *many, but not all, portions of the wartime mission(s)* for which it is organized or designed.

- C-4: The unit *requires additional resources or training to undertake its wartime mission(s),* but it may be directed to undertake portions of its wartime mission(s) with resources on hand. (AFI 10-201, 2003: 14)

There are three APMs reported in the *End of Year Review.* The first is APM 2.A.1: "Mission Ready." This measure refers to the mission ready ratings of the SORTS report. It is the same measurement data that is suggested in the NPM. The second reported measure is APM 2.A.2: "Military passive defensive ops." According to the CESP, this measure refers to nuclear, biological, and chemical (NBC) passive defensive measures. However, there are no metrics contained in the *End of Year Review* to represent this measure. Therefore, it is not clear if this information has even been measured. APM 2.A.3, "Ops tempo by AFSC" is Air Force jargon for operational deployment rates reported by Air Force Specialty Code. This measure links to the "support military operations anywhere in the world" portion of the MET, but it too has no supporting metric reported in the *End of Year Review* to demonstrate if it is actually being measured and if CE is meeting its deployment requirements.

**MET 2.B: Provide robust and well-trained forces and equipment to respond to the full spectrum of emergencies**

The key elements of MET 2.B are: "robust and well-trained forces" and "full spectrum of emergencies." The strategic perspectives selected for both METs were: "internal process excellence" and "organizational learning and growth." A summary of the performance measures and metrics analyzed for this MET are contained in Table 15.

There are three proposed performance measures for this MET. The first is PPM 2.B.1: "Percentage of CE emergency response forces fully mission ready." The intent of this PPM is to measure the mission ready status of all CE emergency response personnel (Fire,

**Table 15. Notional, Actual, and Proposed PMs and Metrics for MET 2.B**

| Mission Essential Task (MET) | Performance Measures (PMs) | Metrics | Data Source |
|---|---|---|---|
| MET 2.B: Provide robust and well-trained forces and equipment to respond to the full spectrum of emergencies | Notional PMs:<br>NPM 2.B.1: In-service rates for mission essential equipment<br><br>NPM 2.B.2: Status of CE training and certification | Notional Metrics:<br>NM 2.B.1 Mission Critical Equipment In Service Rates (for Fire, EOD, and Readiness) *Frequency: Quarterly*<br><br>NM 2.B.2 Percentage of Training Requirements Accomplished *Frequency: Quarterly* | CESP, Volume II, 2000 |
| | Actual PMs:<br>APM 2.B.1. Exercise program<br><br>APM 2.B.2. Equipment status<br><br>APM 2.B.3. Number of trained personnel<br><br>APM 2.B.4. Equipment / vehicle MC rates | Actual Metrics:<br>AM 2.B.1 Continuing Education in Resident Quotas<br><br>AM 2.B.2 AAD Quotas<br><br>AM 2.B.3a CE Officer Manning<br>AM 2.B.3b CE Enlisted Manning<br><br>AM 2.B.4a Officer Retention<br>2.B.4b Enlisted Retention<br><br>AM 2.B.5 Fire Fighting Vehicle Accidents<br><br>AM 2.B.6 Fire Vehicle Modernization Funding Requirement | CE Metrics End of Year Review, December 2002 |
| | Proposed PMs:<br>PPM 2.B.1: Mission ready status of all CE emergency response personnel | Proposed Metrics:<br>PM 2.B.1 Monthly report of emergency personnel Mission Ready Ratings by MAJCOM | |
| | PPM 2.B.2: Mission ready status of all emergency response equipment | PM 2.B.2 Monthly report of emergency response equipment Mission Ready Ratings by MAJCOM | |
| | PPM 2.B.3: Training status of emergency response personnel | PM 2.B.3 Annual report of emergency response training completion | |

EOD, and Readiness). It is intended to measure mission ready ratings similar to those described in PPM 2.A.1, but specific to emergency response personnel to assess their ability to support their peace and wartime missions. This PPM would be a sub-set of PPM 2.A.1, because emergency response personnel are deployable too. Because this MET specifically mentions equipment, the second proposed measure is PPM 2.B.2: "Mission ready status of all emergency response equipment." Again, focusing only on Fire, EOD and Readiness equipment, this measure would track how well CE is providing equipment that can support the "full spectrum of emergencies." Lastly, PPM 2.B.3 requires "training status of emergency response personnel." This PPM separates training of emergency personnel into its own measure. Emergency response personnel must meet strict training requirements for their specific specialty (Fire, EOD, and Readiness) to meet certification standards. This PPM measures CE's progress toward all its emergency response forces meeting those training requirements. The recommended OPR for this PPM is the Readiness division (CEX) of the MAJCOM CE staff. Tracking training and equipment status is also their responsibility.

The two notional measures described in the CESP are very similar to PPMs 2.B.2 and 2.B.3. NPM 2.B.1: "In service rates for mission essential equipment," is designed to measure the in-service rates for critical equipment along with the investment process to replace that equipment (CESP, Vol. II, 2000: 58). In-service rates refer to the usable service life of a piece of equipment. NPM 2.B.2: "Status of CE training and certification," is designed to measure status of training and certification within the Fire Protection, EOD, and Readiness Flights. The training and certification intended to be measured include: fire fighter

certification, hazardous material response, military skill training and compliance with national certification programs (CESP, Vol. II, 2000: 59).

There are four actual performance measures contained in the *End of Year Review.* The first of these APMs is APM 2.B.1: "Exercise program." This measure is very vague as it is currently written. It does not describe what is being measured or how it ties to the MET. It is assumed that this APM was intended to report CE's participation in base and Air Force level military training exercises, but there is no associated metric or data to support that assumption. This measure could provide valuable strategic information because it would demonstrate CE's progress toward providing "well-trained forces," but it is not effectively used in the *End of Year Review.* APMs 2.B.2: "Equipment status" and 2.B.4: "Equipment/vehicle mission capable rates" are both intended to represent the current status of emergency response equipment. However, the only equipment information provided in the *End of Year Review* deals with fire fighting vehicle accident rates and fleet modernization. There is nothing in that report that describes the status of any other emergency response equipment. Lastly, APM 2.B.3: "Number of trained personnel" should represent information pertaining to this MET. However, the only data reported in the *End of Year Review* refers to CE officer and enlisted retention and education information. This information would be more effective in supporting MET 2.A since the definition of "fully capable" used in that MET included being "fully manned." It is recommended that this information be rolled into the data collected for PPM 2.A.1.

Consolidation of METs 2.A and 2.B

After a thorough examination of METs 2.A and 2.B, it was apparent that they contained a great deal of overlap in their concepts as well as their associated performance measures. The concepts of "military operations" and "full spectrum of emergencies" have little distinction in regard to the forces necessary to support them. Military operations require the full compliment of Readiness, EOD, and Fire Protection forces. Volume II of the CESP states the "full spectrum of emergencies" also requires support from those same forces. Additionally, the required training is the same. For example, a firefighter must be fully trained and proficient in the skills necessary for fighting fires. He must know how to extinguish a blaze caused by enemy artillery during wartime operations or one caused from an aircraft emergency during routine peacetime operations. Regardless of the circumstances, he still has to fight a fire. The same applies to EOD and Readiness personnel. Whether responding to an emergency situation or actively engaged in military operations, the required knowledge and skills are the same. Therefore, it is recommended that METs 2.A and 2.B be consolidated and the associated PPMs be implemented into the CESP. The consolidated MET would read:

> "Provide fully trained and ready CE forces with viable equipment and the capability to support and respond to the full spectrum of military and emergency operations anywhere in the world."

This consolidation allows for the main concepts of both METs to be measured by one set of PMs and it uses the phrase "CE forces" to represent the fully range Civil Engineer skill categories. A summary of the performance measures and metrics suggested for this consolidated MET are contained in Table 16.

**Table 16. Proposed PMs and Metrics for Consolidated METs 2.A and 2.B**

| Mission Essential Task (MET) | Performance Measures (PMs) | Metrics | Data Source |
|---|---|---|---|
| Consolidation of METs 2.A & 2.B: Provide fully trained and ready CE forces with viable equipment and the capability to support and respond to the full spectrum of military and emergency operations anywhere in the world | Proposed PMs:<br>PPM 2.A.1: Percentage of CE forces fully mission qualified | Proposed Metrics:<br>PM 2.A.1: Modify existing SORTS-T rating to reflect CE training requirements met for all CE UTCs; demonstrates qualification and proficiency | AFI 10-201, *Status of Resources and Training System (SORTS)*; AFI 10-244, *Reporting Status of Aerospace Expeditionary Forces*; AFI 10-210, *Prime Base Engineer Emergency Force (BEEF) Program*; AFI 32-2001, *Fire Protection Operations and Fire Prevention Program*; AFMAN 32-2003, *Fire Fighter Certification Program*; AFI 32-3001, *Explosive Ordinance Disposal Program* and AFMAN 32-4004, *Emergency Response Operations* |
| | PPM 2.A.2: Percentage of CE forces supporting all deployment requirements | PM 2.A.2: Modify existing SORTS-P rating to reflect CE personnel currently assigned to meet all CE UTC manning requirements | |
| | PPM 2.A.3: Percentage of CE equipment and vehicles fully capable of supporting all deployment requirements | PM 2.A.3: Modify existing SORTS-R rating to reflect mission ready status (condition) of required equipment and vehicles for all CE UTCs | |

The first proposed performance measure for this newly consolidated MET is PPM 2.A.1: "Percentage of CE forces fully mission qualified." This PPM is designed to measure the how well CE forces are meeting the requirement of the MET to be "full trained." The definition of "fully mission qualified" indicates an individual has successfully completed his or her training and or certification program as required by program guidance. These documents (AFI 10-210, AFI 32-2001, AFMAN 32-2003, AFI 32-3001 and AFMAN 32-4004) provide training and certification requirements as well as operating procedures for the Prime BEEF, Fire Protection and Prevention, EOD, and Disaster Preparedness programs.

A suggested metric that could effectively represent this PPM is an enhanced version the existing SORTS-T rating. According to AFI 10-201, the existing SORTS "T" rating reflects the total number of personnel trained who are assigned to a unit task code (UTC) that is tasked by a designed operational capability (DOC) statement. A DOC statement defines a unit's primary wartime mission. A T-1 rating is given to units that report 85 – 100 percent of personnel trained, T-2 for 70-84 %, T-3 for 55-69%, and T-4 for 0-54%. However, there are some CE units not tasked by a DOC statement and therefore are not measured under the SORTS system. It is recommended that the SORTS T-rating system be modified for account for all CE UTCs. However, since SORTS is a mandatory DoD reporting system, this modified metric should only be used internally to represent this CESP PPM. The same applies to the recommended metrics for the following PPMs.

The second proposed measure is PPM 2.A.2: "Percentage of CE forces supporting all deployment requirements." This PPM is designed to demonstrate CE's full support of Air and Space Expeditionary Force (AEF) deployment requirements as well as those units tasked

by a SORTS DOC statement. As the Air Force has transitioned into an expeditionary fighting force, new methods of tracking personnel deployment support have been needed. For CE forces to be able to "support and respond to the full spectrum of military and emergency operations," they must have adequate personnel manning. The existing SORTS-P system assigns a "P" rating to represent the total percentage of personnel assigned to a DOC tasked unit {P-1, 90-100%; P-2, 80-89%, P-3, 70-79%, and P-4, 0-69% personnel assigned} (AFI 10-201, 2003: 50). It is recommended that this P-rating system be used to assign a rating to the percentage of CE personnel assigned to support all deployable billets. This information can be consolidated from the exiting SORTS data and AEF reporting data as required by AFI 10-244, *Reporting Status of Aerospace Expeditionary Forces*. If the consolidated P-ratings are consistently low, that demonstrates CE can not fully support its deployment requirements due to manning constraints.

The third proposed measure for the consolidated MET is PPM 2.A.3: "Percentage of CE equipment and vehicles fully capable of supporting all deployment requirements." This PPM ties directly into the portion of the MET that states CE will provide "ready CE forces with viable equipment…" For the purpose of this PPM, vehicles are included in the definition of equipment. Equipment is an essential element to the success of any CE deployed unit. For that reason, the purpose of this PPM is to demonstrate CE's ability to provide its UTCs with the equipment necessary to support their deployment requirements. The existing SORTS–R rating assigns an "R" rating to the percentage of deployable equipment that is mission ready and available {R-1, 90-100%; R-2, 70-89%; R-3 60-69%; R-4, 0-59% equipment mission ready and available}(AFI 10-201, 2003: 118). As with the

SORTS-T rating, the SORTS-R rating could be modified to create a metric suitable to represent this PPM. It would have to be modified to include all CE UTCs, including those tasked only with AEF requirements. This will produce an accurate picture of the percentage of CE equipment that is mission capable and available to support AEF and SORTS requirements. The suggested OPR for these consolidated PPMs is the Readiness division (CEX) of the MAJCOM CE staffs because tracking mission capabilities and ensuring units have the necessary training to complete their mission is their main responsibility.

**MET 3.A: Optimize Air Force resources through proper planning, programming and execution of our facility and infrastructure programs**

The key elements of this MET are: "optimize resources," and "planning programming, and execution." The selected strategic perspective is "internal process excellence." A summary of the performance measures and metrics analyzed for this MET are contained in Table 17.

There were two proposed performance measures developed for this MET. The first is PPM 3.A.1: "Ensure active participation in Air Force Comprehensive Planning Program at all installations." As previously discussed in this chapter, CE actively manages the installation comprehensive planning program. The goal of this program is to establish a systematic framework for decision-making with regard to the development of Air Force installations (AFI 32-7062, 1997: 4). This systematic framework helps Air Force commanders incorporate programs such as environmental, operational and urban planning when making decisions about future development of their installations. It identifies and

**Table 17. Notional, Actual, and PMs Measures and Metrics for MET 3.A**

| Mission Essential Task (MET) | Performance Measures (PMs) | Metrics | Data Source |
|---|---|---|---|
| MET 3.A: Optimize Air Force resources through proper planning, programming and execution of our facility and infrastructure programs | Notional PM:<br>NPM 3.A.1: Funding allocated versus requirement by major funding (i.e. program) category | Notional Metric:<br>NM 3.A.1 MILCON Funding History<br><br>NM 3.A.2 Real Property Maintenance Funding<br><br>NM 3.A.3 Real Property Services Requirement vs. Funding | CESP, Volume II, 2000 |
| | Actual PMs:<br>APM 3.A.1. Investment profiles<br><br>APM 3.A.2. Base Capacity<br><br>APM 3.A.3. MILCON execution<br><br>APM 3.A.4. FIM execution<br><br>APM 3.A.5. Actual scope vs. programmed scope<br><br>APM 3.A.6. Energy conservation<br><br>APM 3.A.7. Competitive Sourcing | Actual Metrics:<br>AM 3.A.1a ACES Implementation<br>AM 3.A.1b Installation Data Warehouse Implementation<br><br>No reported metric for APM 3.A.2<br><br>AM 3.A.3a MILCON Program History (by Project and $)<br>AM 3.A.3b MILCON Award History,<br>AM 3.A.3c MILCON Design History,<br>AM 3.A.3d MILCON Schedule Growth,<br>AM 3.A.3e MILCON Cost Growth<br><br>AM 3.A.4a FY 04 R&M (O&M) Backlog (Total Force),<br>AM 3.A.4b SRM Obligations (Total Force)<br><br>AM 3.A.5a FY04 PBR Real Property Services (RPS),<br>AM 3.A.5b RPS Obligation<br><br>AM 3.A.6a Facility Energy Reduction,<br>AM 3.A.6b Industrial Energy Reduction<br><br>AM 3.A.7 Competitive Sourcing Commitments | CE Metrics End of Year Review, December 2002<br><br>AFI 32-1021, *Planning and Programming Military Construction (MILCON) Projects*; AFI 32-1022, *Planning and Programming Nonappropriated Fund Facility Construction Projects*; AFI 32-1032, *Planning and Programming Appropriated Funded Maintenance, Repair, and Construction Projects* |
| | Proposed PMs:<br>PPM 3.A.1:Ensure active participation in AF Comprehensive Planning Program at all installations, **OPR : CEV** | Proposed Metrics:<br>PM 3.A.1: Percentage of installations actively participating in comprehensive planning | AFI 32-7062, *Air Force Comprehensive Planning* |
| | PPM 3.A.2: Progress toward 100% award of programmed projects, OPR : CEC | PM 3.A.2: Program execution metrics such as: MILCON Award History, funding allocated to R&M (O&M) backlog, annual Recapitalization Rate | AFI 32-1021, AFI 32-1022, AFI 32-1032 (see titles above) |

assesses development alternatives and ensures compliance with applicable federal, state and local laws, regulations, and policies. It is this comprehensive decision making process that allows commanders to optimize resources by planning the most appropriate development strategies for their installations. Therefore, ensuring each installation is actively implementing and managing a comprehensive planning program demonstrates CE's input toward "optimizing Air Force resources through proper planning…" Because the current Comprehensive Planning Program is the responsibility of the Environmental division (CEV) of the MAJCOM CE staffs, it is the recommended OPR for this PPM.

To this point in the research, performance measures have been proposed for each key element of the METs. However, it is important to note the second element of this MET, programming, does have a PPM associated with it. Project programming is defined as the process of developing and obtaining approval and funding necessary to accomplish planned work (AFI 32-1032, 2002: 8). Although programming is a crucial step in project execution, this research failed to successfully develop an appropriate measure to determine how well it has been done. Since programming is required by law before a project can be executed, it is assumed that every project CE has executed has been properly programmed. There is no measure of performance to adequately represent how well a project was programmed. However, it is suggested that measuring project execution rates established an adequate link to programming because without proper programming, those projects could not have been executed in the first place. Therefore, the second PPM developed for MET 3.A is PPM 3.A.2: "Progress toward 100% award of programmed projects." This performance measure is designed to address both programming and exection elements of the facilities and

infrastructure program. Project execution begins at the time of contract award and ends with final close-out of the construction effort. Therefore, CE can demonstrate how it optimizes its available resources by measuring what percentage of its total programmed projects was awarded. The goal of this performance measurement is to achieve as close to 100% awarded (or executed) as possible. This measure would also represent a percentage of projects that were properly programmed, because again, without proper programming, that percentage of projects could never have been executed. The OPR for this PPM should be the Engineering division (CEC) because it is the primary division responsible for project programming and execution.

The notional PM suggested in the CESP, NPM 3.A.1: "Funding allocated vs. requirement by major funding category," is very similar to PPM 3.A.2. According to its description in the CESP, this NPM is designed to measure funding requested (requirement) for Real Property Maintenance and Service Activities as well as MILCON as it compares to actual funding allocated (programmed) for these programs. Although this may be a strategically sound performance measure, it only addresses the programming portion of the MET. The CESP does not offer any suggested measures for the planning and execution aspects of this strategic objective.

The opposite is true of the APMs presented in the *End of Year Review.* There are several measures and even more metrics associated with this MET that are contained in the presentation. The first is APM 3.A.1: "Investment Profiles." This refers to the various investment models used by CE to properly plan the facilities and infrastructure program. Some of these models include the Facilities Investment Metric (FIM), the Facility

Sustainment Model (FSM) and the Facilities Recapitalization Metric (FRM) (FIP, 2003). However, these models are not adequately represented by the metrics in this section on the presentation. There are six metrics dedicated to the MILCON program. These metrics are associated with APM 3.A.3: "MILCON execution," but as written, this APM does not make a good performance measure because it does not describe actual performance, only the type of metrics included in the presentation. APM 3.A.2: "Base capacity," is equally vague. In fact, there is no supporting data or metric related to this APM to determine whether it is actually being measured. APM 3.A.4, "FIM execution," is represented by several metrics that describe execution of programs dedicated to investing in the requirements identified by the FIM. This APM, like APM 3.A.3, does not describe a measure of performance to be tracked and therefore is not an effective performance measure as it is written. APM 3.A.5: "Actual scope vs. programmed scope," is also poorly written as a performance measure. There is no clear target to measure performance against and it is difficult to establish a strategic link to the MET. The next APM, 3.A.6: "Energy conservation," does in fact imply resource optimization because conserving energy saves money and allows those resources to be allocated elsewhere. This measure links to the MET because it represents execution of a critical infrastructure program. It is represented in the *End of Year Review* by two metrics demonstrating facility and industrial energy reduction. Both of these metrics show positive trends toward an established goal and are easily understood. The final APM in this section is APM 3.A.7: "Competitive Sourcing." According to the information contained in the *End of Year Review*, this performance measure refers to the process of contracting Base Operating Support services that had previously been accomplished "in-house" by CE personnel. The

competitive sourcing process involves acquiring that service for the lowest possible cost, thus optimizing resources. Measuring how well CE is accomplishing this process is a strategically appropriate performance measure because it demonstrates results that are tied to resource optimization and execution of a vital facility and infrastructure program.

Therefore, based on this evaluation of each PPM and the existing NPM and APMs, it is recommended that CE continue to use APMs 3.A.6 and 3.A.7 and their associated metrics as well as implement both PPMs. These measures are well defined and have definite links to the MET. They also fulfill the GAO criterion of "limit to the vital few." This section of the *End of Year Review* contains seven performance measures and seventeen different metrics. The "vital few" requires measuring only those key performance dimensions that will enable an organization to assess accomplishments, make decisions, realign processes, and assign accountability (GAO/GGD-96-118, 1996: 25). It is suggested that two PPMs and two APMs recommended for this MET satisfy that criterion.

The recommended metric for PPM 3.A.1 is the "total number of installations that have an active comprehensive planning program IAW AFI 32-7062." This metric requires all MAJCOMs to ensure their installations are actively participating in the comprehensive planning program. It will require inspection of comprehensive plans to ensure the currency of the plans and the timeliness of their revisions. This metric will as well as input from the installation commanders to determine the vitality of the program. This may not be a very "results-orientated" metric, but it does demonstrate how civil engineers are optimizing resources through proper planning by encouraging active participation in the comprehensive planning program. PPM 3.A.2 can be represented with existing program execution metrics

such as the MILCOM Award history, funding allocated to R&M (O&M) backlog, and the annual Recapitalization Rate.

**MET 3.B: Maximize housing opportunities and efficiency through balance of construction, revitalization, maintenance and privatization**

The key element identified for this MET is "maximize housing opportunities," and the strategic perspectives were: "stakeholder/customer focus" and "internal process excellence." A summary of the performance measures and metrics analyzed for this MET are contained in Table 18.

There were two proposed performance measures developed for this MET. The first is PPM 3.B.1: "Reduce the Air Force Military Family Housing (MFH) and dormitory deficits to as close to zero as possible." This performance measure was developed based on information gathered from the Housing and Dorm Master plans. Each of the documents contains information on the existing deficits in the total number of available units in their respective programs. These deficits drive housing and dorm investment and revitalization strategies. Therefore, it is suggested that CE can effectively measure its progress toward "maximizing housing opportunities" by measuring how close it comes to lowering those housing deficits to as close to zero as possible.

The second PPM is 3.B.2: "Total AF MFH units revitalized through MILCON or privatization." The focus of this PPM is more narrow than PPM 3.B.1 because it only considers MFH. According to the 2000, Dorm Master Plan, studies are underway to incorporate dorms into the privatization process. When dorm privatization becomes a more common practice, it can be easily included in this PPM. Again, the main focus of this MET

**Table 18. Notional, Actual, and Proposed PMs and Metrics for MET 3.B**

| Mission Essential Task (MET) | Performance Measures (PMs) | Metrics | Data Source |
|---|---|---|---|
| MET 3.B: Maximize housing opportunities and efficiency through balance of construction, revitalization, maintenance and privatization | Notional PM:<br>NPM 3.B.1: Funding allocated versus requirement for housing and dormitories | NM 3.B.1 Military Family Housing (MFH) Requirements vs. Funding<br>*Frequency: Yearly* | CESP, Volume II, 2000 |
| | | NM 3.B.2 Dormitory Requirements vs. Funding<br>*Frequency: Yearly* | |
| | Actual PMs:<br>APM 3.B.1. MFH MILCON execution<br><br>APM 3.B.2. MFH privatization execution | Actual Metrics:<br>AM 3.B.1a MFH Design Cost vs. Programmed Amount (by year and MAJCOM)<br>AM 3.B.1b MFH Design Completion Status<br>AM 3.B.1c MFH MILCON Award Status<br>AM 3.B.1d MFH scope reduction<br>AM 3.B.2 Housing Privatization Metric | CE Metrics End of Year Review, December 2002 |
| | Proposed PMs:<br>PPM 3.B.1: Reduce the Air Force MFH and dormitory deficits to as close to zero as possible | Proposed Metrics:<br>PM 3.B.1: MFH and dormitory deficit data to show annual housing deficit trends over 10 year period | 2002 Air Force Family Housing Master Plan; 2000 Air Force Dormitory Master Plan |
| | PPM 3.B.2: Total AF MFH units revitalized through MILCON or privatization | PM 3.B.2: Combination of annual MFH MILCON execution data with existing privatization data to represent total units revitalized and available; potential to combine with metric for PPM 1.B.1 | AFI 32-6002, *Family Housing Planning, Programming, Design, and Construction*; 2002 Air Force Family Housing Master Plan |

to maximize housing opportunity. Therefore, measuring the total number of housing units revitalized through MILCON or privatization ties back to the "construction, revitalization and privatization" elements of this MET as well as PPM 1.B.1by reporting units now available through MILCON or privatization. The recommended OPR for these PPMs is the Housing division (CEH) because both measures deal with housing issues.

The notional measure described in the CESP is similar to PPM 3.B.1. It reads, "NPM 3.B.1: Funding allocated vs. requirement for housing and dormitories." The idea of this NPM is to combine all the funding requirements requested for MILCON and O&M of MFH and dorms and compare it against the actual funding allocated (CESP, 2000: 62). This PM seeks to measure how close CE has come to meeting the housing requirements from a financial perspective. This NPM is linked to the main element to the MET, "maximize housing opportunities," but it does not address how that requirement was met through any of the four execution methods described in the MET (i.e. construction, revitalization, maintenance, or privatization).

The APMs described in the *End of Year Review* are similar to APMs 3.A.3 and 3.A.4. They only describe the type of metrics (program execution) that are contained in the briefing with no real indicators of what is being measured or how it ties to the MET. APM 3.B.1: "MFH MILCON execution," does not fully address the "housing" as described in AFPD 32-60. Housing is defined as both MFH and dormitories. This APM only reports progress on the MFH program. Also, it is interesting to note that there are fourteen different metrics reported in the *End of Year Review* for this APM. Reporting that many metrics for one performance measure can easily distort what exactly is being measured or if it is being achieved. The second reported APM is 3.B.2: "MFH

privatization execution." As previously described in PPM 3.B.2, only MFH is measured in regard to privatization because the dorm privatization program is still undergoing investigation. This APM as written does not describe what actually constitutes performance. However, the metric reported in the *End of Year Review* does in fact include a goal to privatize 37,000 units by 2010. It is suggested that a more descriptive PM to reflect CE's progress in MFH privatization would be, "Total MFH units privatized." This new PM establishes a firmer link with the MET and can be represented by the existing metric showing the actual number of units privatized as they compare to the goal and projected units to be privatized over a ten year period.

Therefore, it is recommended that the two suggested PPM be implemented by CE to accurately describe what constitutes performance in regard to MET 3.B. It is recommended that the existing deficit data contained in the MFH and Dorm Master Plans should be displayed over a ten year period to create a metric to effectively represent PPM 3.B.1. Trends in this deficit data will help illustrate CE's progress toward reducing the housing deficit to as close to zero as possible. It is also recommended that existing MFH MILCON execution and privatization data be combined to create a metric that illustrates the total housing made available through construction, revitalization, maintenance and privatization. This metric also presents an opportunity to consolidate information with the metric suggested for MFH for PPM 1.B.1.

**MET 3.C: Effectively manage our environmental programs, ranges and airspace to maximize operations and training of Air Force weapons and units well into the future**

The key elements of this MET are "environmental, range & airspace management" and "maximize operations and training." The strategic perspectives are "internal process excellence" and "organizational learning and growth." A summary of the performance measures and metrics analyzed for this MET are contained in Table 19.

There were three proposed performance measures suggested for this MET. Two are newly developed for ranges and airspace management, but the first is the same as PPM 1.C.1: "Progress toward zero "negative" ESOHCAMP findings." As it was described in the discussion of MET 1.C, this PPM is designed to measure CE's progress toward zero negative findings from ESOHCAMP inspections. ESOHCAMP is a program designed to assess conditions that pose potential threats to human health and safety or the environment. This self inspection program covers every aspect of proper environmental management as prescribed in AFPD 32-70, *Environmental Quality* and AFI 32-7045, *Environmental Compliance Assessment and Management Program (ECAMP).* The ESOHCAMP program includes all the aspects of the ECAMP program as well as aspects of safety and occupational health. Using PPM 1.C.1 is an effective measure to represent the "environmental management" portion of MET 3.C because it represents a comprehensive, objective measure of all environmental programs CE is responsible for. It would eliminate the cost and effort of creating an additional measure and reduce the redundancy in the performance measurement process.

The second proposed measure for MET 3.C is PPM 3.C.2: "Progress toward zero negative ESOHCAMP findings on Air Force ranges." As previously discussed,

**Table 19. Notional, Actual, and Proposed PMs and Metrics for MET 3.C**

| Mission Essential Task (MET) | Performance Measures (PMs) | Metrics | Data Source |
|---|---|---|---|
| MET 3.C: Effectively manage our environmental programs, ranges and airspace to maximize operations and training of Air Force weapons and units well into the future | Notional PM:<br>NPM 3.C.1: Funding allocated versus requirement for environmental requirements | Notional Metric:<br>NM 3.C.1 Requirements vs. Funding for all Environmental Programs *Frequency: Yearly* | CESP, Volume II, 2000 |
| | Actual PM:<br>APM 3.C.1: Cleanup DPG goals | Actual Metric:<br>AM 3.C.1 Cleanup Defense Planning Guidance (DPG) goals | CE Metrics End of Year Review, December 2002 |
| | Proposed PMs:<br>**PPM 3.C.1 (Same as PPM 1.C.1)**: Progress toward zero "negative" ESOHCAMP findings | Proposed Metrics:<br>PM 3.C.1 (Same as PM 1.C.1): Total number of negative findings (significant, major, minor) closed out per MAJCOM | AFPD 32-70, *Environmental* Quality; AFPD 90-8, *Environmental, Safety and Occupational Health*; AFI 32-7045, *Environmental Compliance Assessment and Management Program (ECAMP)* |
| | PPM 3.C.2: Progress toward zero negative ESOHCAMP findings on all Air Force ranges | PM 3.C.2: Total number of negative findings (significant, major, minor) closed out on each range | AFPD 13-2, *Air Traffic Control, Airspace, Airfield, and Range Management*; AFI 13-212v1, *Range Planning and Operations* |
| | PPM 3.C.3: Progress toward 100% eligible installations with active AICUZ programs | PM 3.C.3: Percentage of installation AICUZ plans that reflect current flying mission | AFI 32-7063, *Air Installation Compatible Use Zone (AICUZ) Program*; AFH 32-7084, *AICUZ Program Manager's Guide* |

ESOHCAMP assesses every aspect of environmental compliance and cleanup required by Air Force regulation in accordance with local, State and Federal law. According to AFI 13-212v1, *Range Planning and Operations*, the Air Force has a responsibility to ensure it operates in an environmentally responsible manner while sustaining the highest levels of readiness to meet its mission requirements. This can be achieved through proper planning and coordination between range and CE personnel. Environmental planning guidance can be found in AFI 32-7061, *Environmental Impact Analysis Process*; AFI 32-7064, *Integrated Natural Resources Management*; and AFI 32-7065, *Cultural Resources Management.* Range planners use these documents to establish operating parameters that minimize negative impacts on the environment and the public safety. It is CE's responsibility to ensure these parameters comply with all Federal, State and local environmental regulations and statutes. Non-compliance with these environmental policies could result in decreased range operations. Therefore, measuring ESOHCAMP findings specific to Air Force ranges will identify environmental conditions that could possibly hinder range operations. By minimizing negative findings, CE demonstrates its contribution toward "maximizing operations and training for Air Force weapons and units."

The third proposed measure is PPM 3.C.3: "Progress toward 100% eligible installations with active AICUZ programs." As previously discussed in this chapter, AFI 13-201, *Air Force Airspace Management,* requires an active Air Installation Compatible Use Zone (AICUZ) at all installations with active flying missions. Implementation guidance for the AICUZ program is outlined in AFI 32-7063. This instruction also states that the Air Force AICUZ program execution is the responsibility of the Air Force Civil

Engineer. Therefore, an appropriate measure of how CE ensures airspace is being managed to optimize training and operations is to ensure each eligible installation has an active AICUZ program. This measure is specific to the "airspace management" portion of the MET and it demonstrates results that can easily be understood. Since each of the proposed performance measures are associated with environmental management and stewardship, the recommended OPR for all three PPMs is CEV.

The notional performance measure described in the CESP for this MET is, NPM 3.C.1: "Funding allocated versus requirement for environmental requirements." The CESP defines this measure as the total funding requested for all environmental programs as compared to the total amount of funding that was allocated. This is the only suggested measure for this MET and it does not accurately demonstrate results that indicate how CE is contributing to "maximizing operations and training." This NPM also neglects the range and airspace management elements of this MET.

The actual performance measure reported in the *End of year Review* is even more narrowly focused than the NPM. APM 3.C.1: "Cleanup DPG Goals" focuses on only one aspect of environmental management (cleanup) and also disregards the range and airspace management elements of the MET. The measure reports CE's progress toward the DoD goal for reducing the relative risk categories (high, medium, low) at those sites identified by the Defense Environmental Restoration Program (DERP). This may be important information to gather and track, but it fails to effectively measure the broad scope of this MET. This APM does not provide sufficient evidence that the strategic intent of this MET is being met.

Therefore, it is recommended the all three PPMs be incorporated into the CESP. The metric recommended for PPM 1.C.1 could be used to effectively represent MET 3.C as well. The close-out rate of negative ESOHCAMP findings is an accurate representation of effective environmental program management as well as rigorous management of pollutants and wastes. This overlap of performance measures indicates an overlap in the METs as well. It was evident following the MET analysis discussed in this chapter that METs 1.C and 3.C were both focused on effective and pro-active environmental management. Using the same PPM and metric to represent these METs eliminates the cost and time necessary to collect additional data and presents the opportunity to continue to reduce the overall number of reported measures to the "vital few."

The recommended metric for PPM 3.C.2 can also be built from existing information. It requires sorting and consolidating the ESOHCAMP data that is specifically associated with AF ranges. This data is part of the overall findings summary for each installation responsible for managing and maintaining a range. Just as it is presented for PPM 1.C.1, the close-out rate of negative findings will show how effective CE is at reducing environmental conditions that hinder operations and training on Air Force ranges.

Finally, the recommended metric for PPM 3.C.3 is: "percentage of installation AICUZ plans that reflect current flying mission." By reporting the total number of installation AICUZ plans that reflect current flying missions, CE can demonstrate how many eligible installations are actively participating in the AICUZ program. As flying mission requirements change, so do the AICUZ requirements. Therefore, those plans that

do not accurately reflect the current flying mission of that installation prove that the installation does not have an active AICUZ manager or program.

# 5. Conclusions and Recommendation

This chapter will present a review of the steps taken throughout this research effort as well as a summary of its results. It will also present some conclusions and recommendations based on the results of the strategic planning process and performance measure analysis of the Civil Engineering Strategic Plan. Finally, this chapter will close with a brief discussion of some of the limitations of the methodology and suggest possible areas for future research.

## Summary of Research Effort

The objective of this research was to analyze the strategic planning process of the Air Force Civil Engineer as well as the effectiveness of the Civil Engineer Strategic Plan (CESP). The methodology used to complete this analysis was conducted in two distinct phases. The first phase analyzed the strategic planning process used by the Office of the Civil Engineer (CE). Following an extensive literature review of strategic planning models and foundational planning documents published by the Department of Defense (DoD), the Air Force and CE, two strategic planning models were developed. The first was a theoretical model based on the critical planning elements derived from the literature review. This model was then used as the evaluation criteria, or baseline, to evaluate the CE strategic planning process. However, since an actual model of the CE process did not exist, the researcher developed one to in order to provide a visual representation of the existing process. Once these models were developed, a step-by-step comparison of each planning element was conducted and the results were presented in

Chapter 4 of this thesis, *Analysis and Results*. This concluded the first phase of the research.

The second phase analyzed the effectiveness of the CESP by examining the Mission Essential Tasks (METs), Performance Measures (PMs) and metrics outlined in the CESP. These elements of the strategic plan are designed to provide guidance to the lower levels of the Air Force organization (MAJCOMs and bases) on how best to achieve the goals and objectives of the CESP. In addition to examining the notional, or example, PMs and metrics contained in the CESP, the researcher included those reported in the *Civil Engineer Metrics End of Year Review, December 2002.* The contents of this briefing were included in the analysis because they represent the actual measures and metrics used by the MAJCOMs and reported to the Air Force Civil Engineer on a biannual basis.

The first step in this portion of the research was to examine the METs and determine a strategic perspective from which they were written. To accomplish this, the researcher first developed strategic perspective categories based on performance measurement systems known as the Balanced Scorecard and Kanji's Business Scorecard. The researcher categorized the METs into their respective strategic perspectives and then analyzed and defined each MET as it related to the CE mission. Using the strategic perspectives and the key elements derived from the definitions of the METs as a guide, the researcher developed "proposed" performance measures designed to capture all the aspects and the strategic intent of each MET. These proposed performance measures (PPMs) were then compared to the notional and actual PMs contained in the CESP and the *End of Year Review.* This comparison highlighted some gaps and overlaps between

the existing measures and those proposed by the research and recommendations were made as to the most appropriate measures for implementation.

The final step in the research was to recommend metrics that could be used to represent the recommended PMs. The research discusses how existing metrics could be modified to represent these measures. In the cases where existing metrics were not appropriate, newly developed metrics were suggested.

## Summary of Results, Conclusions and Recommendations

### Phase 1 – Process Modeling and Evaluation

The first phase of the research produced two strategic planning models. The first was a theoretical model based on common planning elements discussed in the literature review. It consisted of seven sequential steps, beginning with leadership support and progressing through a thorough analysis of the organizational environment, the setting of goals, objectives and strategies, and finishing with plan implementation and performance measurement feedback. This model served as the criteria used to analyze the strategic planning process used by the Air Force Civil Engineer.

The second model was developed based on the planning guidance used by CE and various elements of the CE Strategic Plan (CESP). This model also includes an analysis of the organizational environment and the setting of goals, objectives and strategies. The CE process incorporates an analysis of the gaps that exist between the current and desired future environments as well as a discussion of the capabilities needed to close those gaps. The CE model finishes with steps to execute the plan and conduct performance measurement feedback. The evaluation and comparison of these two planning models

produced four specific recommendations. Two of these recommendations specifically address reorganization and content of the CESP while two more address strategic planning process improvements.

The first recommendation is to reorganize the CESP to present a "Strengths, Weaknesses, Opportunities and Threats (SWOT)" analysis and an external needed assessment in a consolidated section of Volume I. As currently written, several elements of the SWOT analysis are spread throughout both volumes of the CESP. A SWOT analysis is intended to establish the foundation for the goals and objectives of the organization. Therefore, consolidating the information contained in the core competency and gap analyses (strengths and weaknesses) with a discussion of organizational opportunities and threats would present a more thorough analysis for CE of its internal environment. An external needs assessment is intended to analyze the needs of the organization's customers. These external needs define the organization's purpose and are equally important in establishing strategic goals and objectives. The organizational strengths and weaknesses are internal inputs that must be consolidated from the lower levels of the organization. They are based on past performance and future capabilities. Combining that information with the external inputs of organizational threats, opportunities for success, and the customer's needs provides the solid foundation needed to develop appropriate goals and objectives for Civil Engineering.

The second recommendation is to incorporate achievement strategies for each MET in to the CESP. Strategies define exactly how the organization intends to achieve its strategic goals and objectives and should bridge the gap between objectives and performance measures. These strategies should outline specific actions each MAJCOM

and base should take to achieve the METs and they should be clearly defined in the CESP.

The third recommendation addresses how CE solicits "buy-in" from the lower levels of the organization. This "buy-in" is formally solicited in the modernization and future capabilities planning step of the CE strategic planning process. It is gained through the inputs of the core competency process action teams (PATs). It is suggested that this input should be solicited earlier in the planning process to allow those lower organizational levels to contribute to the initial setting of goals and objectives. This recommendation may lengthen the strategic planning process, but as this research has shown, input from the lower levels of the organization can produce more attainable goals and objectives and more accurate strategies on how to achieve those goals.

The last recommendation from this phase of the research is to formally define a timeline to conduct the "course correction/feedback loop" described in the strategic planning models. Currently, this step is not well defined in the CE planning guidance or the CESP and the process is inconsistent among (PATs). However, this research is not suggesting that this inconsistency equates to ineffectiveness. Formalizing this review process is only suggested as a way to ensure the METs and PMs receive adequate and equitable review on a reoccurring basis. With the sometimes rapid turn-over of military personnel, this formal review will help keep the organization focused on its strategic goals and objectives.

Phase 2 – Performance Measure Evaluation

The second phase of the research analyzed the notional and actual performance measures and metrics designed to evaluate the CESP. This phase of the research also developed several "proposed" PMs to establish a more formal link between the strategic objectives (METs) and the performance measures. Sixteen of these proposed performance measures (PPMs) and three actual performance measures (APMs) were recommended for implementation in to the CESP. The following portion of this chapter will summarize the conclusions and recommendations drawn from phase two of the research.

From the outset of this research effort, there was some confusion as to which set of performance measures should be evaluated. There are two distinct sets of performance measures in Volume II of the CESP. A third set of performance measures was also extracted from *Civil Engineer Metrics End of Year Review*. Understanding that the measures presented in the CESP were intended to be notional, it is recommended that in future versions of the CESP, the measures presented should be the actual measures used by the MAJCOMs. The METs are broad enough that they are applicable to all MAJCOMs and therefore would allow the CESP to present definitive measures, not notional ones. Not providing clear guidance on performance measurement opens the door for the lower echelons of management to simply continue measuring those things that they have always measured in the past, regardless of if those measures actually tie to the organization's goals, objectives and strategies. Therefore, to eliminate any confusion and present a clear picture to the MAJCOMs on what they should focus their efforts on, it is recommended that the CESP present actual, not notional, PMs to be used by all

MAJCOMs. It is further suggested that these PMs address every key element of the MET to ensure the whole objective is being measured. As it is suggested by AFPD 32-XX, *Civil Engineering Strategic Planning,* these PMs should be reviewed annually by the Core Competency PATs to ensure only those vital measures necessary to assess goal attainment and mission accomplishment are being tracked.

A second recommendation is to readdress how the METs are written. Several METs contain very broad and unclear terminology such as: "ensure quality in the workplace," "preserve our sense of community," "rigorous management," "robust forces," "optimize resources" and "maximize operations and training." It is difficult to devise achievement strategies for these objectives because they are not clearly defined. Rewriting the METs using the principles and strategic perspectives developed in this research would require input from all levels of the organization, but the effort would produce objectives and performance measures that are more focused and strategically linked to the goals of the Civil Engineer. An example for MET 1.A might be: "Design, build, and maintain Air Force facilities and infrastructure that provide a safe and modern workplace for all personnel." The language in this MET is more specific than the current version (Provide modern and safe facilities, infrastructure and services that ensure quality in the workplace) and it does not include a concept such as "quality in the workplace" that is difficult to define and measure.

In addition to the recommendations presented as result of this research, one additional suggestion is presented for consideration in future versions of the CESP. In a memorandum to all Air Force personnel dated 15 January 2003, the Chief of Staff of the Air Force, General John P. Jumper, issued a statement that redefined the existing Air

Force core competencies as "distinctive capabilities" (CSAF Sight Picture, 2003). The memo introduced three new Air and Space Core Competencies – *Developing Airmen, Technology-to-Warfighting,* and *Integrating Operations.* Since the CESP is modeled after the AFSP, the following are suggested new core competencies for Civil Engineering that more accurately reflect the format and intent of the new Air and Space Core Competencies. They also correlate respectively with the spirit and intent of the three CE Goals: 1) Quality Engineering, 2) Agile Engineering, and 3) Focused Engineering.

***1) Quality of Life Champions –***

> We all know that people are our most cherished resource. Therefore, it makes sense that enhancement of our airmen and civil servant's quality of life would be at the forefront of the Civil Engineering agenda. Civil Engineers have led the way in environmental stewardship for decades and we will continue to promote a culture of environmental consciousness that will last for generations. We provide state-of-the-art facilities that support mission requirements as well as modern, safe living quarters for our military troops. In today's expeditionary Air Force, civil engineers make even the most austere conditions livable and workable for all Air Force personnel.

***2) Operational Preparedness –***

> Today's world has changed a great deal since the Cold War. As global war on terrorism continues, Civil Engineers will continue to train Air Force and DoD personnel in nuclear, biological, and chemical warfare detection and protection tactics to combat this threat. We are prepared with our RED HORSE and Prime BEEF teams to respond at a moments notice to the full spectrum of emergencies anywhere in the world. We'll be there to support disaster relief efforts in the most remote corners of the globe, or simply restore power to the base command post during a snow storm. Whatever the need, CE troops have the skill and know-how to get the job done…always have, always will!

***3) Engineering Expertise –***

> Air Force Civil Engineers have built a global reputation for being superior performers, both at home and abroad. We provide expert engineering services in a variety of disciplines. From power production to sanitary engineering; from minor construction to tent-city assembly, civil engineers provide unit commanders with vital services that ensure mission accomplishment. Whether it is repairing a

> runway at a remote location in southwest Asia or building a playground for military family housing in the heartland of America, Air Force civil engineers are paving the way for future airmen to follow.

By redefining the core competencies in this manner, the Civil Engineering community can establish a more clearly defined link between its goals, objectives (METs) and performance measures and the capabilities and competencies they provide to the Air Force.

## Research Limitations

There were a few limitations to this research that are worth noting. The first of these limitations is that neither the recommended PPMs nor the nor the recommended metrics have been formally tested and validated by the MAJCOMs. Although the researcher received input to the development of the PPMs, they have not been formally "field tested." As Edberg (1997) suggests, a good performance measure and metric should be proven, or validated. The first step in validating a performance measure is to determine the availability of the suggested data and then analyze and interpret it. Once the data is interpreted, the PM should be evaluated to ensure it is measuring the right attribute of the objective and if that attribute is being measured correctly (Edberg, 1997: 7). This validation effort should be conducted at the MAJCOM level since they are responsible for consolidating the PM data before it is forwarded to the HQ AF/ILE staff. The metrics should also be evaluated at the MAJCOMs to ensure they meet the design criteria suggested by Buchheim (2000) (unit of measure, sensor, and frequency) and Edberg (understandable, quantifiable, cost-effective, proven, and high impact) in the literature review.

The second limitation is the scope of the research. The Air Force Civil Engineer Strategic Plan was the only strategic plan included in the analysis. Although that was the main focus of the research objective, perhaps strategic plans from other functional organizations within the Air Force could have been included. These documents would have provided and perspective on the planning processes and procedures used throughout the Air Force. They may have also provided additional insight in the development of proposed PM and metrics. Understanding how other Air Force organizations link their performance measures with the objectives and goals of the organization may have helped produce more accurate and refined measures and metrics.

Additionally, only a small population of Civil Engineering officers was used to validate the strategic perspective categorization accomplished in step four of the research. A population size of thirty or more would have provided greater statistical significance to the validation effort. The officers polled were all company grade officers (Lieutenants and Captains) and currently enrolled in the Air Force Institute of Technology's Graduate of Engineering Management Program. Although the students who completed this validation all have varied backgrounds in civil engineering and are representative of "middle-management" at base level squadrons, including more senior officers as well as senior enlisted personnel would have provided greater breadth of experience to the research and would have strengthened the validation results.

Finally, the greatly subjective nature of qualitative research opens the door for criticism from those that favor the objectivity and rigor of statistical analyses. The definitions of the METs were based on the researcher's interpretation of current CE guidance. The same can be said about the proposed performance measures and metric

development. Although the foundation for them was set through a thorough understanding of strategic planning and performance measurement literature, and they were coordinated with some of the MAJCOMs and Air Staff, they are still somewhat subjective and based on the researcher's interpretation of the METs and Air Force Instructions (AFIs). However, although subjective, this research represents the first in-depth analysis of the CE Strategic Plan and the performance measures and metrics associated with it. The researcher followed a methodology based on valid strategic planning and performance measurement literature which produced results that will benefit future revisions of the CESP.

## Areas for Future Research

The next step in analyzing Air Force Civil Engineering strategic planning is to pick up where this research left off. As suggested by both Edberg (1997) and Buchheim (2000), testing and validation is an important step in producing a viable set of performance measures. It is suggested that an appropriate area for future research would be to test and validate the performance measures and metrics presented in this thesis. This future research effort would require input from each MAJCOM to collect the data needed for each PPM and consolidate that information to produce the recommended metrics. In many cases, the data already exists in ACES, but the new PPMs may require it to be formatted differently than it had in the past. If it is determined at the MAJCOMs that the data for a particular PPM is not cost-effective to collect, that would present an opportunity to redesign that PPM to make it more effective for the MAJCOMs and incorporate it into the next revision of the CESP.

As the Air Force prepares to enter the second decade of the 21st Century, proper strategic planning is going to play an increasingly important role in shaping the future of Civil Engineering. Therefore, continued analysis of strategic plans and the processes used to develop them will be equally important. Thus, an additional area for future research might examine the strategic planning processes of dynamic industries such as information technology, pharmaceuticals or automotives. Proper planning is vital to the long-term success of these ever-changing industries. Additionally, the strategic plans and planning processes of other functional units within the Air Force could also be included in this research. Studying how these organizations conduct strategic planning and measure their performance would provide valuable insight that could be benchmarked and incorporated into the CE process.

Another area for possible future research would be a comparison of the CE strategic planning process to other DoD civil engineering organizations' strategic planning processes (U.S. Army Corps of Engineers (USACE) and the Naval Facilities Engineering Command (NAVFAC)). The theoretical model developed in this research could be used to evaluate each planning process and then conduct a comparison of all three to highlight similarities and differences. Each service must plan accordingly to handle similar issues, (i.e. facility and infrastructure construction and maintenance, housing, environmental stewardship, and deployable combat engineering forces). Therefore, understanding how each service conducts its strategic planning and measures its performance could provide Air Force Civil Engineers valuable insight for future planning cycles. This type of research could be used to benchmark best practices in strategic planning and applied across DoD.

## Summary

This research provided the first formal evaluation of the Air Force Civil Engineering Strategic Plan and the planning process used by civil engineers to develop that plan. It has provided several findings and provided suggestions on ways to improve on a process that is already well established and quite effective. The fact that the office responsible for drafting the CESP has sponsored this research demonstrates CE's proactive approach toward strategic planning and the desire to continually improve their process. Specifically, recommendations were made on ways to consolidate and clarify portions of the CESP and the planning process to develop performance measures that are strategically linked to the CE goals and objectives.

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## Vita

Captain Francis J. Mondo, Jr. graduated from Connetquot High School in Bohemia, New York in 1990. He then entered undergraduate studies at Virginia Polytechnic Institute and State University (Virginia Tech) in Blacksburg, Virginia where he earned his Bachelor of Science degree in Civil Engineering in May of 1995. He was commissioned through Detachment 875 of AFROTC at Virginia Tech and began active duty at Offutt AFB, NE in June of 1995.

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The objective of this research was to analyze the strategic planning process of the Air Force Civil Engineer (CE) and the effectiveness of the Civil Engineer Strategic Plan (CESP). This analysis was conducted in two phases: process modeling/evaluation and performance measure evaluation. The first phase compared the CE strategic planning process to a theoretical planning model. This evaluation showed the CE process does not provide a thorough analysis of the organization's strengths, weaknesses, opportunities, and threats and lacks defined achievement strategies for the goals and objectives of the CESP. It also noted the need for a defined timeline and schedule for Civil Engineers to conduct a strategic planning process review in order to analyze performance measurement data and make necessary corrections to their strategy. The second phase developed proposed performance measures (PMs) and metrics that are strategically linked to the Mission Essential Tasks (METs) of the CESP. The researcher also analyzed the PMs and metrics currently in use by CE to assess their effectiveness. This analysis showed several measures and metrics that were not strategically linked to the goals and objectives established in the CESP. The analysis also highlighted some redundancy in the METs and provided suggestions for improvement.

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