How *Naval Aviation Uses the* **Balanced Scorecard**

The mission of the Navy is to maintain, train and equip combat-ready Naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas.

—Mission statement of the United States Navy

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A house fire. A crime in progress. Recovery from a natural disaster. You hope none of these ever happens to you. But should it, wouldn't you want a rapid response from highly skilled professionals who could help you get through the ordeal? Whether it's a fire and rescue squad, a police force, or employees of the Federal Emergency Management Agency (FEMA), the people in these and other primary responder positions must have a high degree of situational or operational readiness, even if they are never asked to actually do the jobs for which they were hired and trained.

Now think about disaster recovery for your company's computer network and data. The company might contract with an outside facility to provide a backup site and hope they never actually have to use it. But they must be confident that if they needed the site it would be ready to perform the intended task.

One commonality among all these responder organizations is that their deliverable is readiness to perform, which makes for some interesting challenges with respect to monitoring and evaluating performance. The goal of performance measurement is to help an organization achieve its objectives. Just as objectives need to be specific for someone to know whether they have been attained, performance measures must be specific to ensure reliable feedback on progress toward reaching the objectives. The balanced scorecard (BSC) is well suited to helping managers in these situations meet this challenge.

Scorecard Design

The BSC has been studied in a variety of for-profit environments where a balanced set of measures is tied to different points of focus within an organization that are most commonly categorized as: learning and growth capabilities, the efficiency of internal processes, customer value, and financial success. Our experience with scorecard implementations leads us to believe these perspectives should serve as a guide to helping managers develop a linked set of metrics tied to strategy rather than serving as a limitation to the scorecard design. There's no reason an organization must use these four perspectives—each entity can develop its own dimensions of importance. We often find that important metrics don't fit easily within one (or more) of these four perspectives or that all four perspectives aren't relevant to an organization's operating environment. For example, one of the common characteristics of the response by a fire department, police force, or an organization like FEMA is that the person receiving the benefits from the service isn't billed for that service.

Another segment that's charged with readiness for which the beneficiaries aren't billed for the service is the U.S. military, and we can learn many lessons from how the U.S. military manages performance.

To help you understand the application of scorecard principles to an organization not driven by financial returns, this article examines a U.S. Navy strike fighter squadron. Our goal is to get you to think beyond the familiar for-profit organizations and obtain a fresh perspective on familiar scorecard design issues and metrics. Thus we identify the structure and logic to support the development of a BSC for a U.S. Navy F/A-18 strike fighter squadron. Although we're using a military organization to develop the nontraditional application of a BSC, we could easily substitute police or fire operations and achieve the same level of understanding.

Managers are challenged to implement organizational strategy, primarily through efforts to link operational performance to strategy, but it isn't always clear how to proceed. Whether public or private, profit-oriented or not-for-profit, all organizations must invest in "learning and growth" metrics in order to improve their "internal processes." But we assert that the traditional four-perspective scorecard breaks down at the "customer value" and "financial success" perspectives for organizations such as the U.S. Navy where the deliverable is "readiness." In this case, the customers are the commanders in charge of exercising and training their personnel resources to respond to whatever the situation or operation requires of them. We offer a new application of the BSC by aligning the strategic goal of operational readiness with a set of cascading scorecard performance measures.

Figure 1: Carrier Strike Group Organization
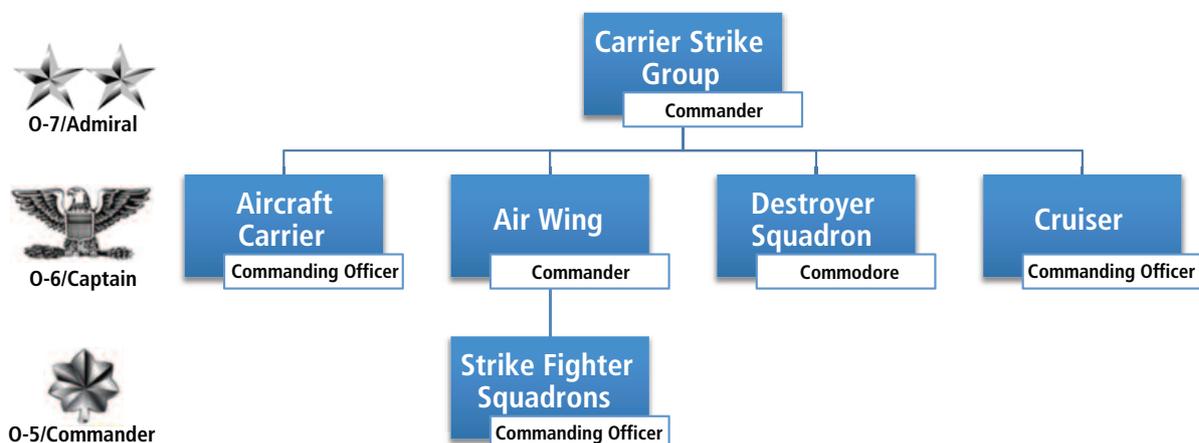
Organizational Structure

To better understand the organizational context of the U.S. Naval forces, think of a U.S. Naval carrier strike group (CSG) as one of several highly autonomous, decentralized divisions in a large multinational corporation. Just as a division has a vice president responsible for the performance of his or her respective area of responsibility, so, too, does a CSG commander. A typical CSG is composed of approximately 7,500 personnel, an aircraft carrier, one cruiser, a squadron of six to 10 destroyers and frigates, an attack submarine, a supply ship, and a carrier air wing of 65 to 70 aircraft (see Figure 1). The dynamic nature of a CSG is such that one can be formed and disestablished as the operational environment requires. In all cases, however, a CSG consists of an embarked air wing to provide its striking capability. Therefore, we consider the strategic objectives of the CSG (corporate division) to drive scorecard development and the performance measurement system.

As shown in Figure 1, the CSG commander, a one- or two-star admiral, is the immediate superior in command of the aircraft carrier, air wing, destroyer squadron, and attached cruiser. The air wing component consists of eight or nine squadrons, four of which are F/A-18 strike fighter squadrons. This article illustrates a balanced scorecard for a single F/A-18 squadron delivering readiness to the air wing and CSG commander. Therefore, the relevant organizational structure is the chain of command from the F/A-18 squadron commanding officer through the air wing commander to the strike group commander.

The BSC from an F/A-18 Strike Fighter Squadron Perspective

To apply a balanced scorecard to an organization that isn't directly motivated by cost-wise measures, we must modify the traditional, for-profit scorecard to address the breakdown in the customer and financial perspectives. (All organizations have fiscal responsibility for financial resources, but the primary objective of organizations such as the Navy isn't to produce a financial return for shareholders.) Figure 2 provides a concrete example of what a scorecard might look like for the leadership of an F/A-18 strike fighter squadron. This scorecard is similar to a traditional scorecard but has the following notable exceptions:

◆ The first change removes the customer and financial perspectives. These categories are replaced with organizational levels responsible for providing services through readiness. As discussed previously, the ultimate deliver-able for the CSG is operational readiness in order to provide a service as opposed to customer satisfaction or financial success.

◆ The second design point relates to the classification of pilot training as an "internal business process" rather than "learning and growth" as is typical of most for-profit corporations. Training is the day-to-day internal business for many governmental agencies such as police, fire, and military personnel. An F/A-18 pilot must fly regularly to maintain proficiency in a variety of missions involving tasks such as night carrier landings, in-flight refueling, and the releasing of ordnance. Daily squadron activities ensure air wing readiness at the CSG level.
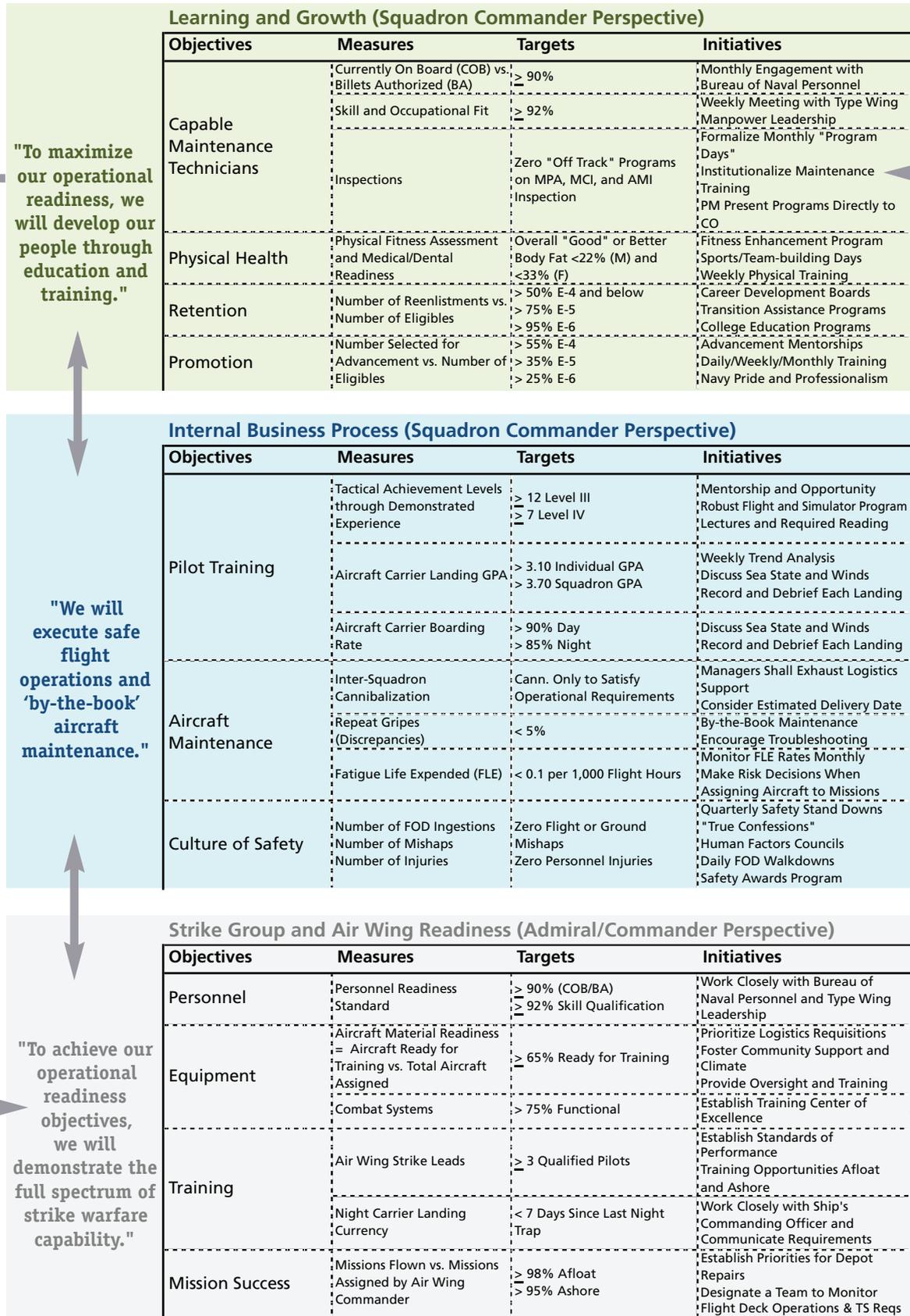
◆ The third point involves classifying various maintenance crew inspections as "learning and growth" rather than as outcomes of internal business processes. These inspections include a significant teaching element and present opportunities for growth through real-time feedback and instruction for improvement when required.

As Figure 2 illustrates, readiness can be viewed from the perspective of the squadron commander, air wing commander, or admiral. Similar to how a manufacturing plant manager delivers high-quality products to the sales division, the squadron commander delivers operational capability and readiness to the air wing commander. The air wing commander is responsible for delivering the readiness of eight or nine subordinate squadrons to the CSG commander. Therefore, the commander is less interested in the squadron's internal processes than with providing combat pilots and full mission-capable aircraft ready to execute when called on. Figure 2 also depicts a traditional scorecard linkage between objectives and key performance measures in order to achieve the strategic objective of delivering operational readiness.

Learning and Growth: Squadron CO's Perspective

The commanding officer (CO) has a tremendous influence over the daily lives of the men and women in a squadron. When channeled correctly, the organization of more than 200 personnel can prosper through enhanced productivity, dedication to duty, professionalism, and adherence to tradition and heritage. The CO in every Naval organization is responsible for creating a positive culture and establishing a climate of mutual respect and trust. The "learning and growth" element of the BSC captures this unique responsibility and shares this view throughout the chain of command. A squadron's personnel readiness is maximized via leveraging technical expertise, common developmental goals, and increased

Figure 2: Sample Strike Fighter Squadron Balanced Scorecard

Learning and Growth (Squadron Commander Perspective)

"To maximize our operational readiness, we will develop our people through education and training."

Objectives	Measures	Targets	Initiatives
Capable Maintenance Technicians	Currently On Board (COB) vs. Billets Authorized (BA)	> 90%	Monthly Engagement with Bureau of Naval Personnel
	Skill and Occupational Fit	> 92%	Weekly Meeting with Type Wing Manpower Leadership
	Inspections	Zero "Off Track" Programs on MPA, MCI, and AMI Inspection	Formalize Monthly "Program Days" / Institutionalize Maintenance Training / PM Present Programs Directly to CO
Physical Health	Physical Fitness Assessment and Medical/Dental Readiness	Overall "Good" or Better Body Fat <22% (M) and <33% (F)	Fitness Enhancement Program / Sports/Team-building Days / Weekly Physical Training
Retention	Number of Reenlistments vs. Number of Eligibles	> 50% E-4 and below / > 75% E-5 / > 95% E-6	Career Development Boards / Transition Assistance Programs / College Education Programs
Promotion	Number Selected for Advancement vs. Number of Eligibles	> 55% E-4 / > 35% E-5 / > 25% E-6	Advancement Mentorships / Daily/Weekly/Monthly Training / Navy Pride and Professionalism

Internal Business Process (Squadron Commander Perspective)

"We will execute safe flight operations and 'by-the-book' aircraft maintenance."

Objectives	Measures	Targets	Initiatives
Pilot Training	Tactical Achievement Levels through Demonstrated Experience	> 12 Level III / > 7 Level IV	Mentorship and Opportunity / Robust Flight and Simulator Program / Lectures and Required Reading
	Aircraft Carrier Landing GPA	> 3.10 Individual GPA / > 3.70 Squadron GPA	Weekly Trend Analysis / Discuss Sea State and Winds / Record and Debrief Each Landing
	Aircraft Carrier Boarding Rate	> 90% Day / > 85% Night	Discuss Sea State and Winds / Record and Debrief Each Landing
Aircraft Maintenance	Inter-Squadron Cannibalization	Cann. Only to Satisfy Operational Requirements	Managers Shall Exhaust Logistics Support / Consider Estimated Delivery Date
	Repeat Gripes (Discrepancies)	< 5%	By-the-Book Maintenance / Encourage Troubleshooting
	Fatigue Life Expended (FLE)	< 0.1 per 1,000 Flight Hours	Monitor FLE Rates Monthly / Make Risk Decisions When Assigning Aircraft to Missions
Culture of Safety	Number of FOD Ingestions / Number of Mishaps / Number of Injuries	Zero Flight or Ground Mishaps / Zero Personnel Injuries	Quarterly Safety Stand Downs / "True Confessions" / Human Factors Councils / Daily FOD Walkdowns / Safety Awards Program

Strike Group and Air Wing Readiness (Admiral/Commander Perspective)

"To achieve our operational readiness objectives, we will demonstrate the full spectrum of strike warfare capability."

Objectives	Measures	Targets	Initiatives
Personnel	Personnel Readiness Standard	> 90% (COB/BA) / > 92% Skill Qualification	Work Closely with Bureau of Naval Personnel and Type Wing Leadership
Equipment	Aircraft Material Readiness = Aircraft Ready for Training vs. Total Aircraft Assigned	> 65% Ready for Training	Prioritize Logistics Requisitions / Foster Community Support and Climate / Provide Oversight and Training
	Combat Systems	> 75% Functional	Establish Training Center of Excellence
Training	Air Wing Strike Leads	> 3 Qualified Pilots	Establish Standards of Performance / Training Opportunities Afloat and Ashore
	Night Carrier Landing Currency	< 7 Days Since Last Night Trap	Work Closely with Ship's Commanding Officer and Communicate Requirements
Mission Success	Missions Flown vs. Missions Assigned by Air Wing Commander	> 98% Afloat / > 95% Ashore	Establish Priorities for Depot Repairs / Designate a Team to Monitor Flight Deck Operations & TS Reqs

responsibility through qualification. Both the individual and command-wide mechanisms outlined in this section are vital to the growth and development of a squadron's aircraft maintenance capability.

Here are some key performance measures that motivate the necessary technical skill to fuel a squadron's internal business processes.

Capable Maintenance Technicians

◆ **Fill and Fit.** It's just as important to have the right number of people as it is to have the right technical skills. "Fill" refers to the relationship between the number of personnel currently on board (COB) vs. the number of billets, or positions, authorized (BA) by Congress. "Fit," on the other hand, addresses occupational specialty, experience, and technical skill. Close liaison with a squadron's aircraft type wing (e.g., Commander, Strike Fighter Wing, U.S. Pacific Fleet) manpower authorities and the Bureau of Naval Personnel ensures these metrics are achieved.

◆ **Inspections.** There are several opportunities for learning and growth by way of formal inspections that contribute directly to internal business process and readiness objectives. The most significant inspections by higher echelons include the Maintenance Program Assist (MPA), Material Condition Inspection (MCI), and Aviation Maintenance Inspection (AMI). Because teaching is a significant component of these inspections, we don't consider inspections as outcomes of the internal process perspective. Naval Aviation Maintenance consists of more than 40 unique programs that address hazardous material, occupational safety, and tool control, to name a few. Although a score of "Off Track" on any one program is considered a failure for that program, it isn't uncommon for a squadron to have two to three "Off Track" programs. What's good about the Navy's inspection process is that after an inspector gives an "Off Track" score, help arrives from virtually every direction to lend the necessary training and materials required to get programs and program managers (PM) back on track for future success.

Physical Health

◆ **Physical Fitness Assessments and Medical/Dental Physicals.** Performance on the job can be attributed directly to an individual's overall health. Every member of the armed forces undergoes periodic fitness assessments and receives an annual comprehensive physical and dental examination. The combined emphasis on fitness, physical health, and dental health is captured in this performance measurement.
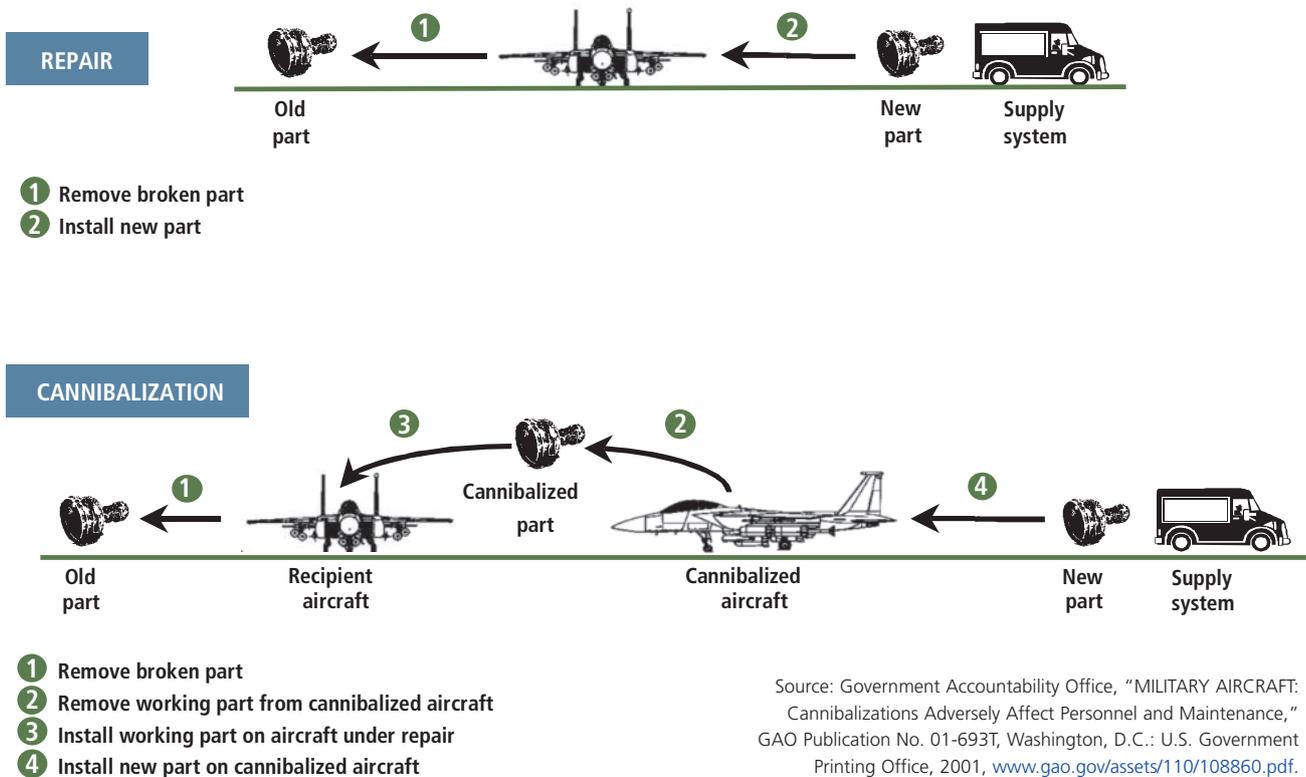
Retention and Promotion

◆ **Retention.** Retaining highly skilled individuals is vitally important in order to maximize "fit" through experience and technical skill. The retention rate is simply the number of personnel who reenlisted divided by the number eligible in a given period of time. The same factors that affect commercial enterprises impact the Navy's ability to retain good people: culture, climate, economy, education, and social influences. All affect a person's decision to stay in the Navy.

◆ **Promotion.** In contrast to most organizations, the military requires its personnel to advance because it's their duty to do so. This metric simply reflects the percentage of individuals eligible for advancement who were selected for the enlisted pay grades (ranks) of E-4, E-5, and E-6. The Navy leverages promotion from within to ensure the right people with the right skills are available to meet strategic objectives, which may be a desirable condition for any organization.

Internal Business Process:
Squadron CO's Perspective

The commanding officer is responsible for safe and effi-

Figure 3: Aircraft Repair vs. Cannibalization

REPAIR

Old part   New part   Supply system

1 Remove broken part
2 Install new part

CANNIBALIZATION

3   2

Cannibalized part   4

Old part   Recipient aircraft   Cannibalized aircraft   New part   Supply system

1 Remove broken part
2 Remove working part from cannibalized aircraft
3 Install working part on aircraft under repair
4 Install new part on cannibalized aircraft

Source: Government Accountability Office, "MILITARY AIRCRAFT: Cannibalizations Adversely Affect Personnel and Maintenance," GAO Publication No. 01-693T, Washington, D.C.: U.S. Government Printing Office, 2001, www.gao.gov/assets/110/108860.pdf.

cient flight operations by maximizing readiness through the management of scarce material and personnel resources. The CO's ultimate deliverable may be readiness, but the ways in which readiness is achieved may vary significantly from one squadron to the next. Most organizations, whether for-profit or not, depend on people (not machines) to get things done. Each internal business process must be continually evaluated to ensure the highest-quality work is delivered to the full extent of the process capabilities. To capitalize on learning and growth, the squadron focuses on pilot training, aircraft maintenance practices, and fostering a culture of safety.

Pilot Training

◆ **Experience Achievement Level.** All pilots enter their first operational squadron at Level I. Think of a Level I as a college freshman. Although qualified to operate an F/A-18 aircraft in benign environments, new pilots (Level I) have a great deal of professional growth ahead of them as they progress through Levels II, III, and IV in the next three years. It would be inconceivable for a college freshman to develop a credible SWOT (strengths, weaknesses, opportunities, and threats) analysis of an emerging high-tech firm. But perhaps a senior preparing to graduate

(i.e., Level IV) is well positioned to do just that and much more. A strike fighter squadron wants more than 12 Level III and seven Level IV pilots.

◆ **Aircraft Carrier Landing Grade Point Average (GPA).** Every pilot at the controls of an aircraft landing on an aircraft carrier receives a grade on his or her individual performance. The grading scale is much like an academic grade using a scale of 1 to 4. A grade of 4 is reserved for landing attempts with small deviations in glideslope and lineup. The majority of landings are evaluated as a 3, which means they are simply safe and expeditious—not perfect, but not unsafe either. The scores 2 and 1 are reserved for unsafe actions by the pilot and will attract unfavorable attention from squadron and air wing leaders. Senior pilots spend a significant amount of time mentoring and coaching junior pilots to improve their landing performance because landing GPA is evaluated from both an individual and squadron perspective.

◆ **Aircraft Carrier Boarding Rate.** The boarding rate is an average of a squadron's landings during the day or night divided by the number of attempts. Rates around 90% aren't uncommon. Landing safely onboard an aircraft carrier on every attempt is important because the flight deck typically is open only for a brief period of

time to recover aircraft. If an aircraft fails to "trap" the ship, then hundreds (sometimes thousands) of personnel are impacted because a second approach is necessary. It's possible that extra time required to retrieve the aircraft could place its aircraft carrier in a compromised position.

Aircraft Maintenance

◆ **Inter-squadron Cannibalization.** With few exceptions, cannibalization is a manifestation of a logistic or maintenance management system failure. Because of funding constraints, there is a scarcity of parts, which ultimately leads to nonflyable aircraft as a result of supply shortfalls. Cannibalization is the removal of serviceable parts from one aircraft for installation on another. As Figure 3 shows, a simple repair involves just two steps while a cannibalization involves four. This additional effort has a tendency to impact morale adversely and worsen the logistical (parts supply) situation it was intended to overcome. Poor job satisfaction generally leads to reduced work center productivity.

◆ **Repeat Gripes.** Working on complex machinery such as the F/A-18 Super Hornet is difficult, even with highly trained and experienced maintenance technicians. Although the expectation is that a particular discrepancy is repaired correctly the first time, this isn't always possible given the nature of some failures. For example, a pilot may inform a maintenance technician of a cockpit instrument cycling on and off in flight. But when the technician investigates the instrument, no discrepancy may be noted since the aircraft is on the ground and not subject to vibrations present only when airborne. The next pilot to fly the aircraft would then have the same (repeat) gripe as the last pilot. The rate of rework that results from repeat gripes (discrepancies) is an important factor because it suggests the knowledge, skills, and troubleshooting abilities of the technician are insufficient. Therefore, repeat gripes have a direct impact on aircraft readiness.

◆ **Fatigue Life Expended (FLE).** Heavy machinery, whether located on a manufacturing plant floor or on a flight deck, is subject to design limitations. Throughout the year or following a unique production run, equipment must be sidelined for preventative maintenance, overhaul, or repair. Naval aircraft are equipped with strain gauges that measure stress on the airframe (mechanical structure) over time. The data from these gauges is reported monthly for maintenance and command leaders to review. To ensure the F/A-18 survives to 10,000 flight hours, the desired consumption is at a linear rate of 0.1 per 1,000 flight hours. Whenever an aircraft's FLE exceeds this rate, decisions are made to manage the airframe strain back to an acceptable level.

Culture of Safety

◆ **Foreign Object Debris (FOD).** FOD occurrences typically are attributed to an object ingested down the intake of an operating engine. Think of an FOD incident as something resulting from poor housekeeping. For example, if a tool or rag is left somewhere on the aircraft and damage to the aircraft or injury to personnel results from this misstep, the squadron is held accountable. On the other hand, striking objects such as birds during takeoff and landing or rocks kicked up by the tires forward of the intakes can't be easily avoided, so the squadron isn't penalized. For scorecard purposes, the target is zero FOD ingestions.

◆ **Mishaps and Injuries.** Damage to aircraft and/or personnel is very serious as each has an immediate impact on the mission. For scorecard purposes, the target is zero damage to aircraft as a result of maintenance malpractice and/or injury to personnel.

Strike Group and Air Wing Readiness: Admiral/Commander Perspective

The final perspective shown in Figure 2 is the combined view of the admiral and the air wing commander. Here the traditional "customer value" and "financial success" perspectives merge under our proposed balanced scorecard. It's also where the ultimate objective of *operational readiness* is delivered because all scorecard objectives and performance measures exist to support this objective. From this perspective, the strike warfare capability of the CSG is summed up using three pillars of readiness: Personnel, Equipment, and Training (PET).

In its simplest form, the commander can understand each capability (PET) through a standard stoplight chart:

• **Green (80%-100%)** = The squadron can perform the assigned capability.
• **Yellow (60%-79%)** = The squadron hasn't demonstrated performance but is expected to do so.
• **Red (≤ 59%)** = The squadron can't perform its mission or capability.

The air wing commander is most interested in the demonstrated war-fighting capability and status of readiness across each PET pillar. After major training exercises are completed, the air wing commander submits an updated assessment of all subordinate squadrons to the strike group commander. Objectives that are important

to the air wing commander include metrics supporting personnel, equipment, training, and mission success rates across all squadrons under his or her charge. If the air wing commander notes a particular squadron reporting "Yellow" in the Personnel pillar, he or she can easily use the Navy's automated systems to drill down for additional detail.

◆ **Personnel.** Although the squadron CO is entrusted with managing personnel by way of fit and fill, the air wing commander uses the stoplight chart to verify that the minimums are met.

◆ **Equipment.** Aircraft material readiness is a large part of the air wing commander's oversight responsibility. His or her staff sets priorities for repair parts as well as for various planning and estimating services. Since the air wing commander is interested in the war-fighting capability of the *entire* air wing, decisions may be made that are detrimental to a single squadron's readiness if these decisions enhance the air wing's readiness as a whole.

◆ **Training.** The pinnacle of a strike fighter pilot's continued education culminates in the Air Wing Strike Lead qualification. This qualification level is available only to the squadron department heads, executive officer, and CO because of their vast flying experience and skill. Since the air wing commander personally observes and designates pilots as Air Wing Strike Leads, this measure is an important part of any scorecard.

◆ **Mission Success.** A squadron's learning and growth functions feed its internal pilot training and aircraft maintenance processes in order to deliver high-quality aircraft and training resources. The air wing commander and CSG admiral are most interested in the fruits of that labor: Is the mission a success or not? This key performance measure crowns the readiness achievement through a simple success rate by dividing missions flown by missions scheduled. All squadrons designate a small team of top-notch sailors known for their technical expertise to troubleshoot (TS) minor aircraft discrepancies after engine start for a mission. The innate ability of troubleshooters to repair and launch an aircraft from the flight deck in short order makes them particularly impactful on mission success rates.

Lessons Learned

In this article we have compared traditional balanced scorecard applications to one developed for an F/A-18 strike fighter squadron. It's important to note that our Navy example also could apply to not-for-profit governmental organizations such as police or fire operations. As we have shown, some key changes to the traditional structure of a balanced scorecard are necessary to satisfy such an organization's strategic objectives. Three important conclusions emerge:

◆ The financial and customer perspectives aren't always relevant. In lieu of the financial and customer perspectives, our scorecard uses the organizational levels to which the nonfinancial deliverable is made. In this case, the carrier strike group and air wing receive a fully capable combat F/A-18 squadron.

◆ The deliverables dictate what an organization considers an internal process. In our setting, readiness is the deliverable. Training is the day-to-day internal business process and, unlike traditional views, isn't classified in the learning and growth perspective.

◆ Inspections can be value-added, and, in our scenario, inspection results are considered learning and growth activities because of the significant teaching and mentoring that occur as part of the inspection process.

By examining the organizational structure and operations of a single F/A-18 squadron, as well as its system of cascading measures, we hope we have stimulated some balanced scorecard design ideas other types of nonbusiness units can use. While process details will differ, basic scorecard structural issues should seem similar to those found in businesses and other entities. **SF**

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