PREFACE

In the context of developing a high-level, overarching system for managing the military readiness of the United States Air Force (USAF), Project AIR FORCE's Resource Management Program has undertaken an in-depth review of readiness problems in an active component operational fighter wing. The broad context stems from ongoing allegations of problems with readiness in the current environment of constrained resources and demanding contingency requirements. Our aim is to characterize the effects of this environment on a representative operational unit and to capture the generalizable features in a readiness management system designed for senior decisionmakers. At the time of writing, we were in the process of developing an architecture for an encompassing USAF readiness management system.

At the generous invitation of its commanding officer, Col Mike Hostage, we focused on the 388th Fighter Wing (FW) at Hill Air Force Base, Utah. When we collected our data, the 388th was operating a primary mission authorized inventory (PMAI) of 54 F-16 Block 40 jets in three squadrons: the 4th, the 34th, and the 421st. These aircraft are equipped with Low-Altitude Navigation and Targeting Infrared–Night (LANTIRN) systems that render them among the most lethal ground attack systems in the world; the aircraft also have powerful air-to-air capability. As such, they are in high demand for contingency operations. The 388th Maintenance Squadron (MXS) provides intermediate-level maintenance support. Behind the flying and maintenance squadrons are a range of supporting squadrons and groups, as well as the wing command.

This documented briefing reports and analyzes the simultaneous, competing pressures facing the wing on almost a daily basis: (1) strenuous contingency requirements, (2) demanding requirements to maintain current and future readiness, and (3) severe resource and retention problems. We have endeavored to quantify as much of this as possible in order to move beyond anecdotal evidence. Our data are, however, consistent with well-known but often insufficiently documented allegations of problems in fighter units. Based on conversations with many experts throughout the Air Force, we believe that our findings on the 388th are indicative of pressures facing operational fighter wings throughout the USAF, especially those in the continental United States (CONUS). We have not attempted to assess the differences that may exist between CONUS units and those that are permanently stationed abroad in Europe and the Pacific.

This study should be of interest to analysts and decisionmakers at the wing, Major Command (MAJCOM), and Air Staff levels with responsibility for allocating resources to readiness-related activities.

Project AIR FORCE

Project AIR FORCE, a division of RAND, is the Air Force federally funded research and development center (FFRDC) for studies and analyses. It provides the Air Force with independent analyses of policy alternatives affecting the development, employment, combat readiness, and support of current and future aerospace forces. Research is performed in four programs: Aerospace Force Development; Manpower, Personnel, and Training; Resource Management; and Strategy and Doctrine.

ACKNOWLEDGMENTS

The command and staff of the 388th FW were exceptionally gracious and forthcoming in their assistance to our effort. We are grateful for their support and information, as well as the precious time they took answering our many questions. They work very hard to provide security to the nation, and we can only hope that our research will contribute in some way to the betterment of their lives.

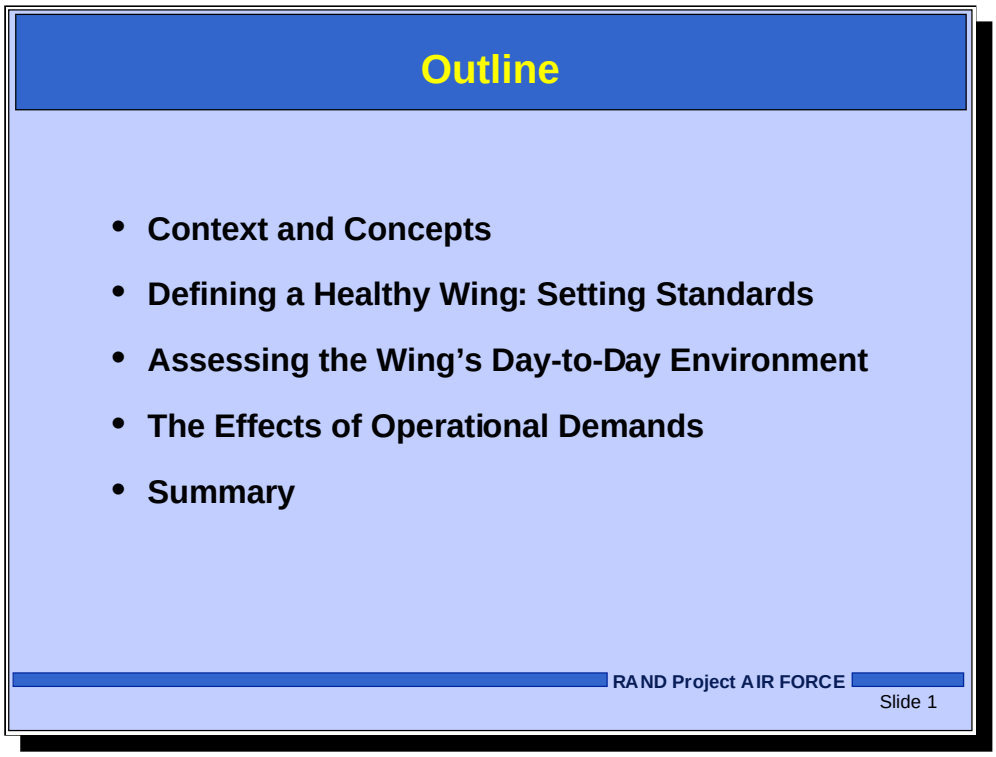
First and foremost, we would like to thank Col Mike Hostage, the 388th FW commander (388 FW/CC), and Col Ron Oholendt, the vice commander (388 FW/CV), for opening their organization to us. In addition, we greatly appreciate the efforts of Ms. Judy Lemmons, 388th protocol (388 FW/PA), for setting up many meetings at Hill and making every visit smooth and easy. Many, many others at the 388th dedicated time and energy to our effort. Thanks to Col Kurt Dittmer, Lt Col Cecil Culbreth, Lt Col Vic Wager, Lt Col Russell Walden, Lt Col Paul Lis, Lt Col Paul Smith, Maj Frank Lara, Maj Mark Fluker, Maj Mike Moore, Capt Hessam Wessal, Capt Rob Gilcrist, Capt Adam Hobson, 1Lt Darren Paladino, CMSgt Brenda Rose, CMSgt George Nicholau, CMSgt Vincent Townsend, CMSgt Sheila Lafferty-Dickerson, SMSgt Steve Rogers, MSgt Jeffry Kascsak, MSgt Joe Cardea, MSgt David Davis, MSgt John Weimer, MSgt Domenic Fazzo, SSgt Kathleen McNeil, and SSgt Tina Santos. We are indebted to the many 5-level and 7-level maintainers in the fighter and maintenance squadrons who spoke with us and helped us evaluate our test questionnaire.

Others in the Air Force provided valuable information. Thanks to Mr Don White (ACC/XRYL), Mr Reese Lang (AF/DPRS), Maj John Wright (ACC/DOTBB), Maj J. D. Henson (ACC/DP), CMSgt Brian Bastow (AETC/DOOI), and SMSgt Rick Gagnon (ACC/DOTBB) for their patience in passing to us a wealth of data.

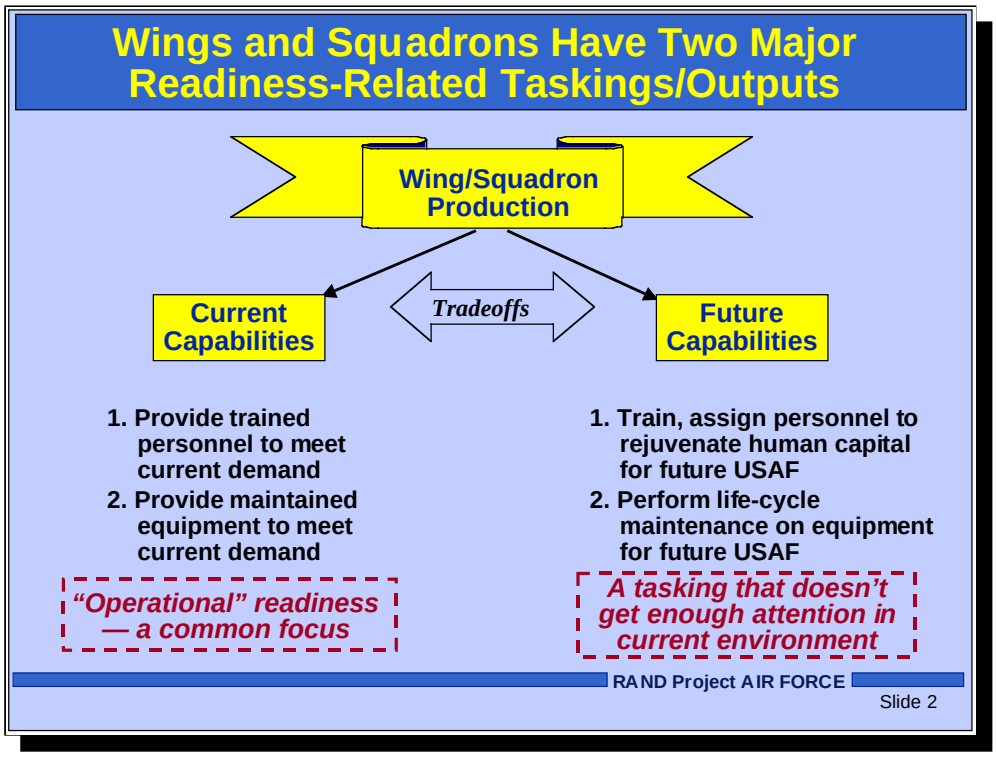
We appreciate the support and advice we have received from our Air Staff sponsor, Col Greg Flierl (AF/XOOA). Our numerous discussions over the past two years have been invaluable. We received support and encouragement from Bob Roll, Director of PAF's Resource Management Program. We also benefited enormously from interactions with him and with RAND colleagues Bill Taylor, Hy Shulman, Gary Massey, Craig Moore, John Stillion, and Frank Camm.

A number of people commented on the draft document. Jerry Ball of RAND provided a formal review that greatly improved its flow and clarity. We also received thoughtful comments from Col Hostage, Col Dittmer, Col Ken Lewandowski (OO-ALC/YP), Col Bill Coutts (AF/XOOA), Mr White, Maj Geoffrey Parkhurst (ACC/XOMM), and CMSgt Larry Funk (AF/ILMM).

Finally, many thanks to Dionne Sanders, formerly of RAND, for the hours she spent carefully and patiently tabulating the responses to the test questionnaire. Also, thanks to Jeanne Heller for her editorial review of this document, and to Joanna Alberdeston for her editorial comments on an earlier version.



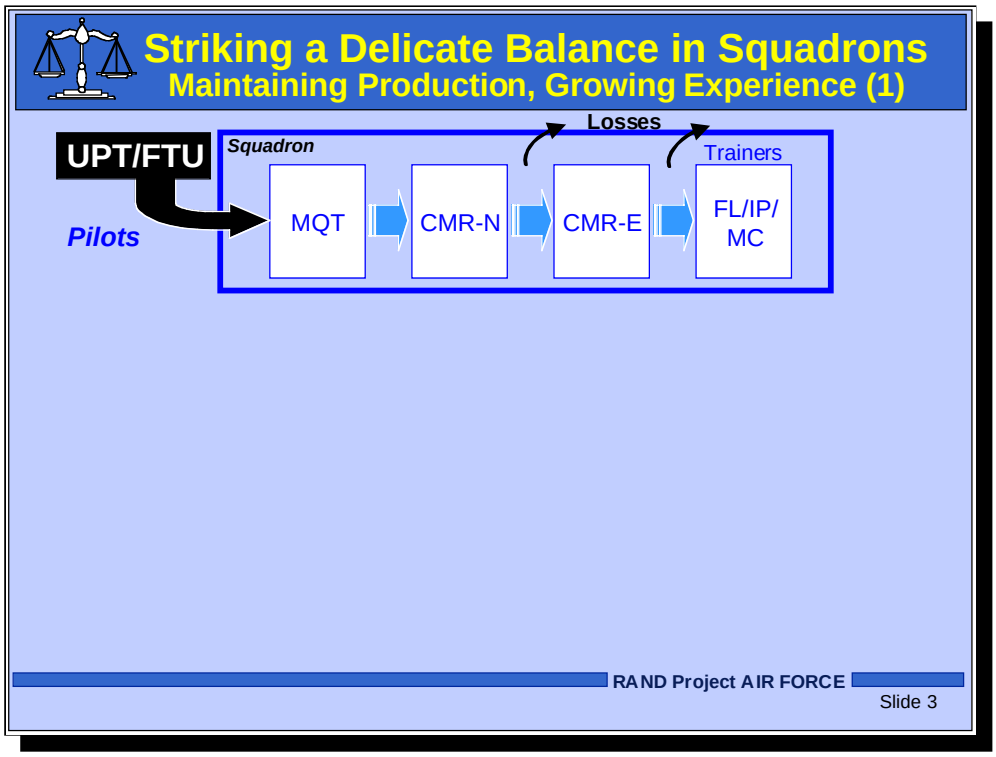
The structure of this document closely parallels our broad recipe for assessing readiness: Define what is "healthy," evaluate the current and future status, and identify where that status deviates from what is "healthy." Initially, we provide a context for the assessment that advocates a more complete view of readiness. We then suggest how better to characterize the health of an F-16 wing, particularly as it relates to the inventory of pilots and maintainers over time. Given this background, we assess the wing's normal, home-station environment, followed by an evaluation of how operational demands (contingencies, exercises, and operational readiness inspections) perturb this environment. The study closes with a summary.



The official Department of Defense (DoD) dictionary defines operational readiness as "the capability of a unit/formation, ship, weapon system or equipment to perform the missions or functions for which it is organized or designed." A distinguishing feature of our approach is that we apply this concept to both peacetime and wartime taskings.

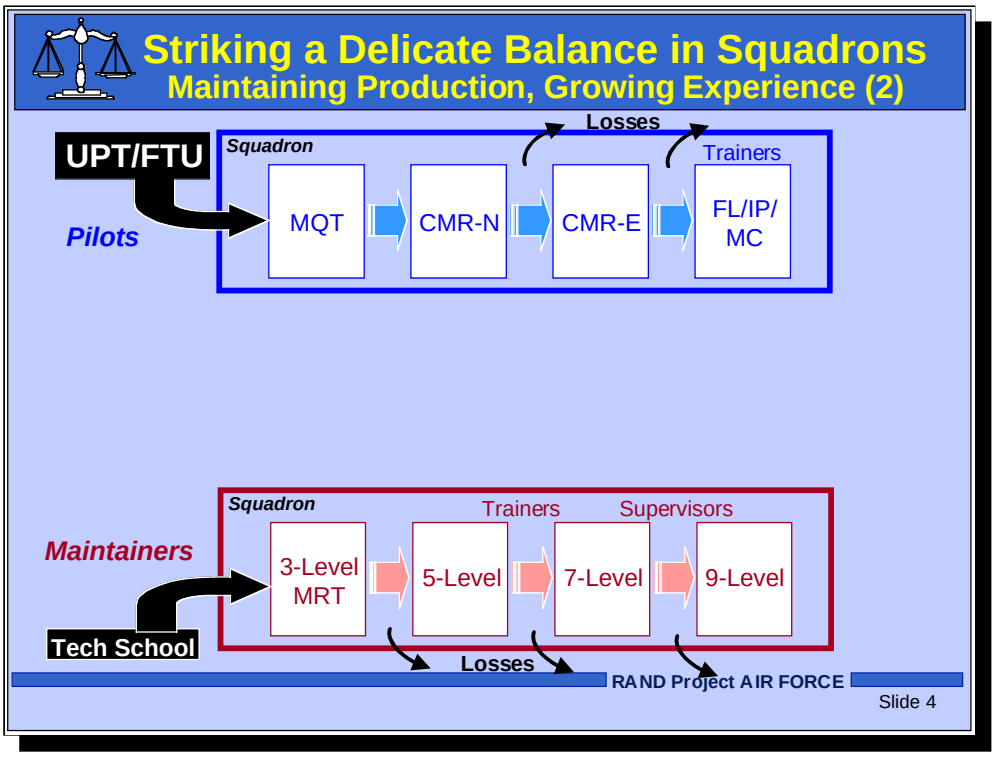
On the most basic level, United States Air Force (USAF) wings and squadrons are designed to produce two overarching and intimately connected outputs related to readiness. The first is the ability to provide current military capabilities, i.e., the activities universally associated with operational readiness. If the wing had to go to war now, how well would its capabilities match up with the demands levied by the combatant commanders-in-chief (CINCs)? Are the right number of personnel trained appropriately? Is the equipment in good working condition with an adequate level of supplies? Can the requisite number of effective sorties be generated?

The current production of future capabilities, while usually receiving less attention, is equally important. We focus on these activities in this document because they tend to be addressed less directly in planning and programming. DoD and USAF guidance on and management of readiness traditionally emphasize operational readiness, and the requirements for maintaining this readiness are explicit. The production of future capabilities through the rejuvenation of human capital by on-the-job training (OJT), however, is not normally recognized as a separate and equally important tasking that is embedded in units. As units are deployed to support contingency operations, they must trade off building future capabilities for providing current ones. The longer this continues, the more units must postpone or scale back upgrade training and life-cycle maintenance of aircraft. Future commanders then have a less experienced, less capable force from which to draw.



To illustrate some of the complexities of resourcing and managing the two intimately connected tasks assigned to operational units, let's look first at pilots. It is clear that operational capabilities are produced through training sorties. The embedded task is represented by the requirement to flow pilots through the personnel inventory—from low to high skill levels. Beginning from the time the inexperienced pilot reports to the unit after undergraduate pilot training (UPT), and possibly after some time with a field training unit (FTU), the operational unit must expand the required skills of each individual. After completing a brief period of mission qualification training (MQT), the new assignee becomes an inexperienced combat mission ready (CMR-N) pilot.

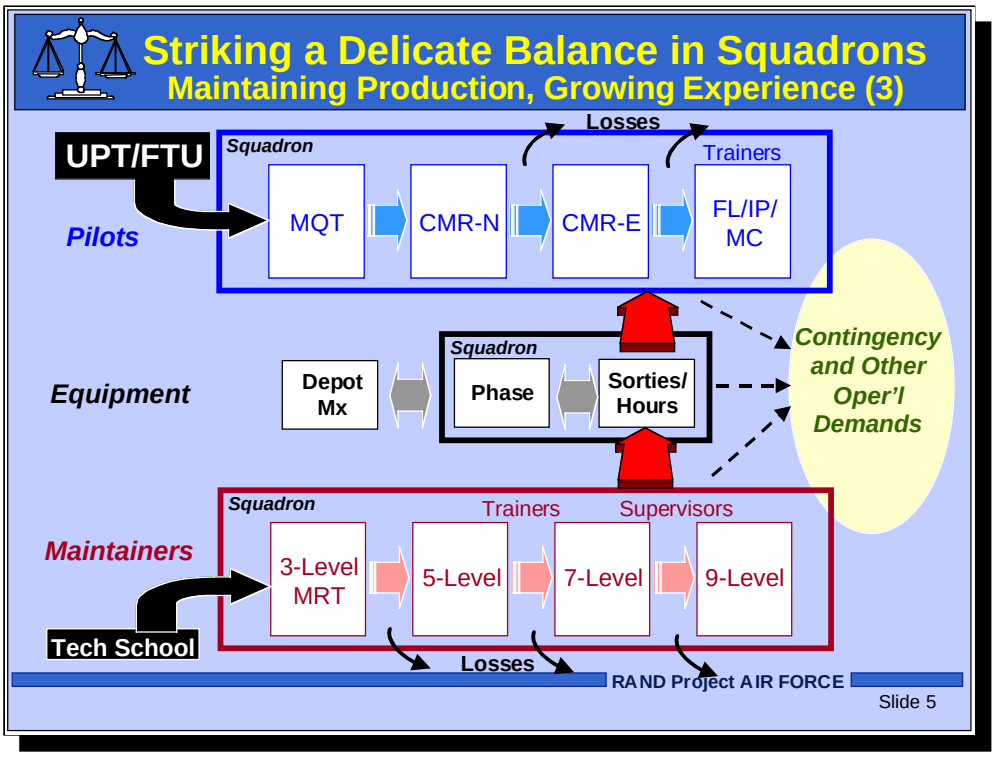
The inexperienced pilot becomes experienced (CMR-E) by stepping through specific training events and flying hour combinations. At certain points in his flying career, the pilot may also become an instructor pilot (IP), flight lead (FL), and/or mission commander (MC). As an IP or FL, a pilot is qualified to teach CMR-N pilots. Throughout this time, a squadron may lose its pilots (both experienced and inexperienced) through reassignment or separation from the Service.



A similar picture can be shown for the enlisted maintainers. The requirement to flow people through the personnel inventory—from low to high skill levels—exists for pilots and maintainers alike. New maintainers are assigned to squadrons out of technical schools as mission ready technicians (MRT) and designated as 3-levels, or apprentices. Through a combination of OJT, formal study, and promotion, 3-level apprentices attain 5-level journeyman status and go on to become 7-level craftsmen and 9-level supervisors. The 5- and 7-level maintainers serve as teachers for the more junior 3-levels. Thus, there is a strong parallel between pilot training and maintainer training within the squadron.

The necessity to continuously recreate skilled assets that are lost from people leaving the squadron or the USAF *drives a requirement to have people at all skill levels*. It is not sufficient to have only the most senior, most skilled people flying the sorties and maintaining the aircraft, for when they leave—as they all do sooner or later—a quality replacement must be available. Thus, a healthy unit—and a healthy force—is one that is composed of an adequate number of people at all skill levels, from entry level to the highest possible level.

When this fundamental condition is not recognized, resources allocated to units are underestimated and very difficult trade-offs have to be made at the wing and squadron levels. When resources are limited, there is a tension between the two unit tasks that pits sortie production for pilot training and contingency operations against maintainer training and maintenance of aircraft. The challenge of wing and squadron leadership is to forge a delicate balance between these activities.



Operational capabilities are produced through training sorties for the pilots and maintenance activities that keep the planes mission-ready. Wings perform day-to-day maintenance as well as intermittent-phase inspections to extend the life of equipment and ensure its availability for both continuation/upgrade training of pilots and potential deployments. For major maintenance and repairs, wings send aircraft to depots.

The chart above summarizes the key interrelationships between pilots, maintainers, and equipment. Wings continuously act to keep both the human and the physical capital healthy through properly managed recycling of skills and properly maintained equipment. Newly assigned pilots and maintainers attain skills and proficiency through OJT in the unit under the tutelage and supervision of experienced personnel. USAF squadrons manage and produce the entire inventory of skills that make up a crucial element of the USAF's "human capital."

Squadrons must maintain and rejuvenate their human and physical capital concurrent with their requirement to meet operational demands. These demands include exercises, inspections, and contingency deployments. Squadrons face a serious challenge maintaining a stable training and maintenance schedule in the presence of these demands. Contingency deployments in particular may spring up with little notice, thereby hampering the ability of the unit to strike a balance between current and future requirements.

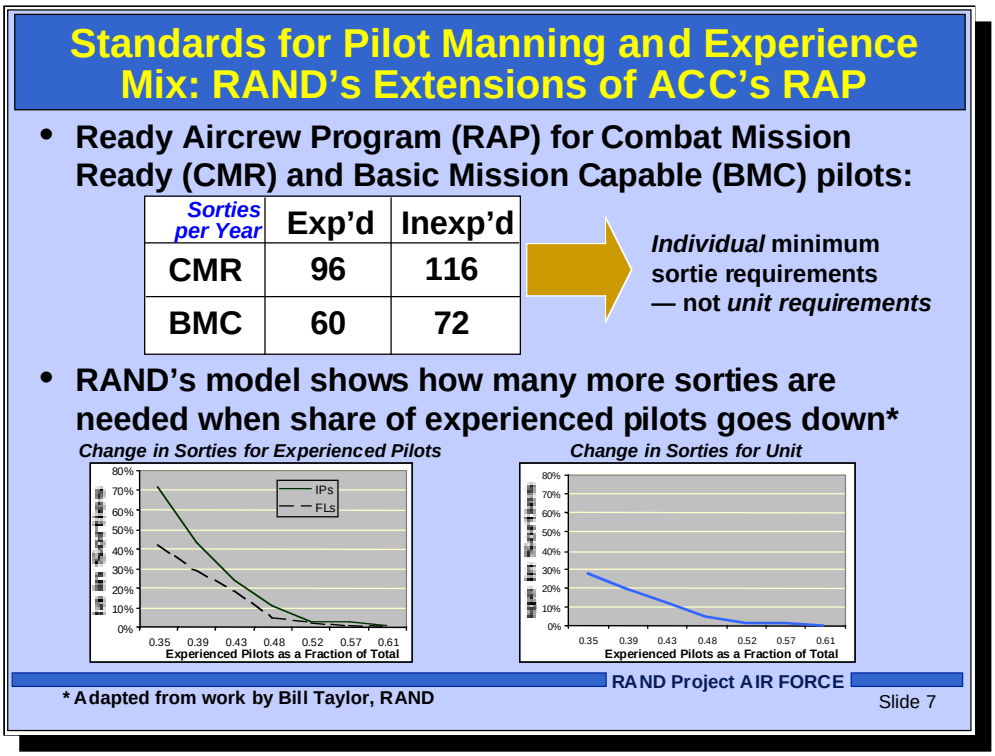
With our discussion of a unit's production of future capability as background, we turn to the task of defining what characterizes a "healthy" wing—i.e., one that can maintain a sufficiently high number of training sorties to sustain a healthy experience mix of pilots, while *simultaneously* providing adequate training to sustain an appropriate maintainer experience mix *and* performing life-cycle maintenance on its aircraft. A healthy wing is also one that can meet its major theater war and contingency requirements, but our focus in this document is on characterizing "health" as it relates to the second readiness tasking described previously.

Characterizing a healthy wing means setting standards that the wing and its components must meet. Without the right standards, it is impossible to define the metrics that will signal when readiness has fallen enough to drive management actions. When it comes to what we regard as a critical unit tasking—the requirement to produce future capabilities through the rejuvenation of lost skills—this is quite challenging. Often, standards and metrics for training and manning in particular are stated but incomplete, or they are lacking because the attendant activities are difficult to quantify.

In defining a healthy wing, we concentrate on the flying and maintenance squadrons. At this point, our analysis does not attempt to set standards for manning or training of personnel in other wing components (with the exception of pilots in the wing staffs). For the purposes of the present analysis, we also have left aside the standards that must be set for the material processes relating to equipment, maintenance, and supply.

With regard to the personnel inventory, we suggest standards along the following lines:

- sorties required to maintain a healthy pilot experience mix;
- sortie utilization (UTE) and aircraft availability rates required to sustain these sortie levels;
- maintenance manning needed to generate the sorties over the long term; and
- maintainer experience mix to provide adequate OJT over time.



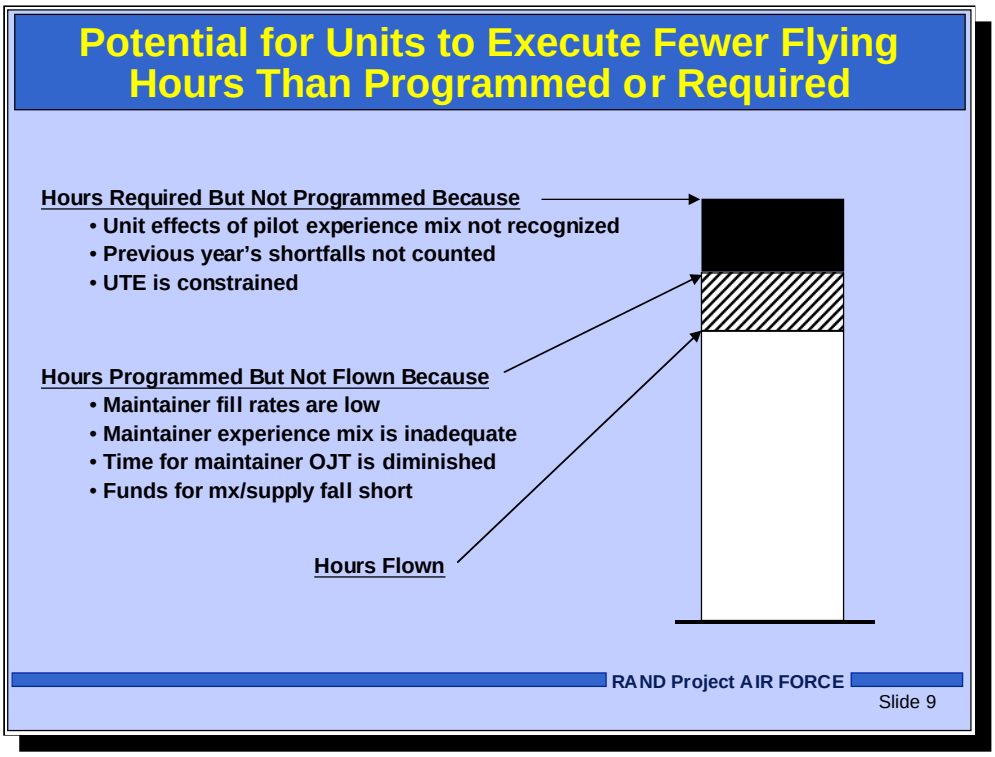
The Air Combat Command (ACC) programs flying hours for air combat units through a recently developed methodology called the Ready Aircrew Program (RAP). Based on clearly articulated individual training standards appropriate for each level of fighter pilot skills, RAP defines the minimum number of sorties per year per pilot for four classes of pilots: experienced and inexperienced combat mission ready (CMR) and basic mission capable (BMC) pilots. Although RAP is significantly advanced over older methods for computing associated flying hours, recent PAF research in this area concludes that RAP falls short in at least two respects.[1]

First, the program does not account for the phenomenon whereby *individual and unit sortie requirements change when the experience mix in the unit changes*. To gain skills in the cockpit, inexperienced pilots newly assigned to the unit must fly with FLs or IPs—and in a single-seat jet like the F-16C, this means each flies his own aircraft. The higher the proportion of inexperienced pilots, the more these FLs and IPs must fly. So, individual FL and IP sorties and total unit sorties must increase just to maintain the initial experience mix. If the extra sorties are not made available when experience levels fall, the FLs and the IPs must increase their sortie rate to train junior pilots, leaving inadequate sorties for the younger pilots to fly to meet their training requirements.

[1] Unpublished research by RAND colleagues William Taylor and S. C. Moore.

Thus, the experience mix continues to drop over time, with FLs and IPs flying more than they require to meet their own currency and upgrade needs, and with rising numbers of inexperienced pilots vying for a smaller pool of available sorties. Consequently, it must take longer for the inexperienced pilots (e.g., with 100 hours of flying) to become experienced wingmen, FLs, and IPs (e.g., 500 hours plus specialized training).

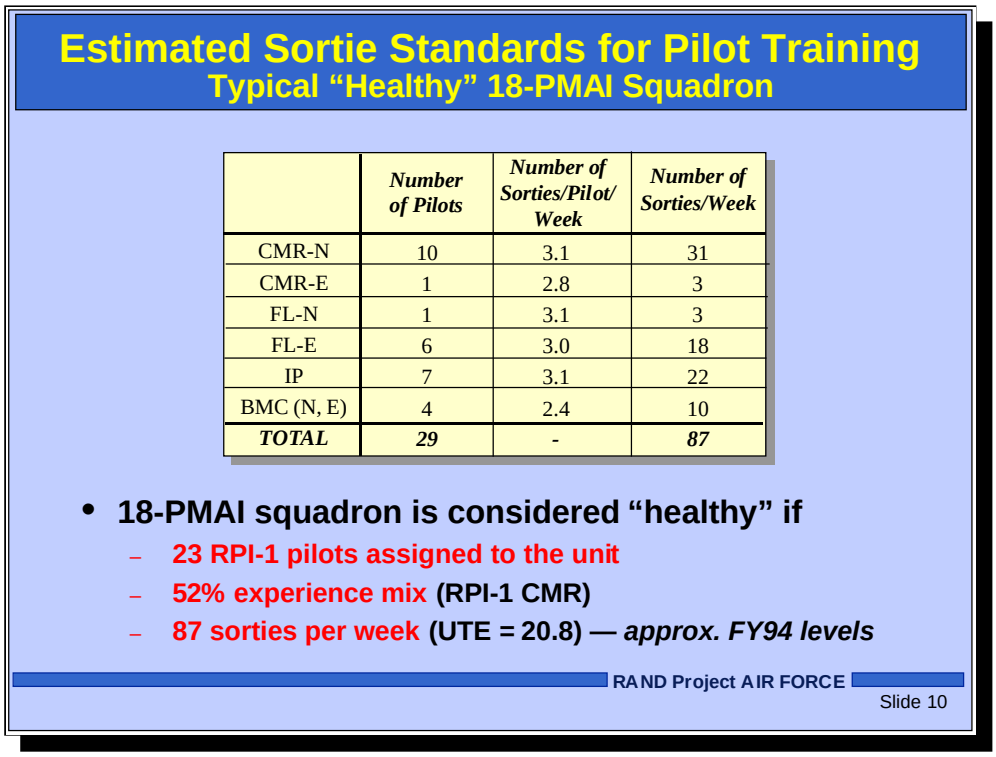
Second, RAP is constrained by UTE limits. UTE rate refers to the average number of sorties per primary mission authorized inventory (PMAI) per month. By determining a flying hour program that is UTE-constrained, RAP does not provide an actual sortie standard that is based on what the pilots need to attain and maintain flying skills and combat proficiency. It provides only what available resources dictate. However, if we are to measure a shortfall, we must determine what pilots need, not what is possible in the current budgetary climate.



The importance of this analysis can be illustrated in the following way: Unless correct attention is paid to the relationship between individual and unit training standards on the one hand, and the fundamental connection between pilot flying hours and the implied demands on UTE rate and maintenance resources on the other, the following—seemingly paradoxical—situation can easily emerge: As shown above, the flying hour program that is funded in the budget *may be too low* to meet unit training standards and yet units may be *unable to fly out all the funded flying hours.* These units may then be forced to give these hours to other units that are able to fly them or simply turn them back in at the end of the fiscal year to their Major Command (MAJCOM) as unexecutable. The analysis above immediately suggests three potential reasons for this:

- The number of pilots assigned to units may be fewer than manning documents prescribe (overall pilot shortfall);
- There may not be sufficient numbers of FLs and IPs to train younger pilots who need supervision (inadequate experience mix);
- The maintenance side of the unit cannot produce a sufficiently high level of aircraft availability to support the UTE rate required by the pilots—which in turn may be caused by a variety of problems related to inadequate maintenance manning or experience mix. Shortfalls in materiel can also constrain UTE rates.

Thus, a fully funded flying hour program is one that not only meets training standards for the pilots but also provides all the accompanying resources—sorties and their implied personnel, maintenance, and supply demands—that are needed to execute a proper pilot training program.



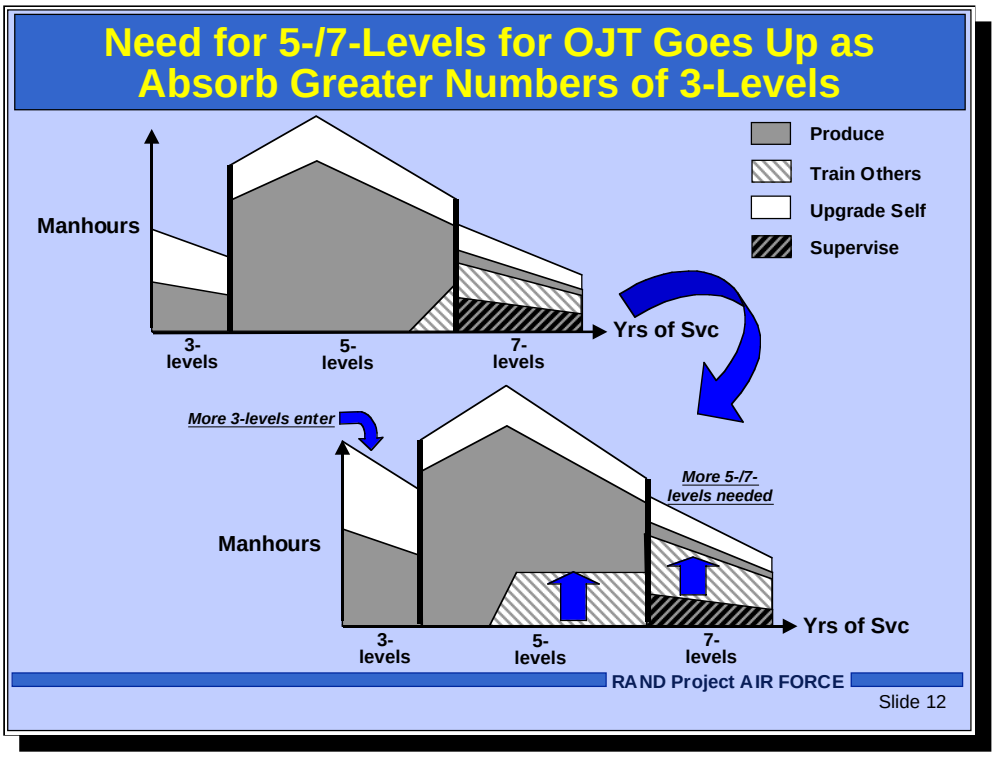
To suggest standards for pilot manning levels, training, and attendant sorties, we employ analysis recently conducted at RAND by Bill Taylor and Craig Moore. Their research and supporting model seek to define minimum individual and squadron sorties based on experience mix and events required at all levels of pilot qualification. Unlike RAP, sorties are not UTE-constrained in the RAND model. The research results in sortie numbers that are somewhat higher than those defined in RAP because the analysis accounts for the need to fly experienced pilots more frequently when the proportion of inexperienced pilots in the unit rises. It also shows the degradation in experience over time when a unit fails to meet these sortie standards.

The table above portrays typical pilot assignments to an 18-PMAI F-16 Block 40 squadron in which the experience mix is 52 percent; this unit includes two experienced Rated Position Indicator (RPI)-6 pilots (the squadron commander and operations officer) and supports four BMC RPI-6 pilots in the wing staff.[2] RPI-6 BMC pilots are critical because they are used during war to increase crew ratios to allow higher sortie rates. We choose 52 percent because it appears as a break point—it becomes increasingly difficult to sustain or improve unit status when the experience mix is less than this. The table also shows the minimum average sorties per week for each pilot and for all pilots in each category.

[2]Two categories of pilots we discuss in this document are RPI-1 and RPI-6. RPI-1 pilots are the front-line pilots assigned to fighter squadrons. With the exception of the squadron commanders and operations officers, RPI-6 pilots work in the wing staff. They have flying duties as well and are normally attached to one of the flying squadrons for this purpose.

We calculate experience mix by dividing the number of experienced RPI-1 CMR pilots by the total number of RPI-1 CMR pilots, less those newly assigned pilots who are in mission qualification training. This differs somewhat from the way ACC determines experience mix—by dividing the total number of experienced pilots assigned to the wing, less the number of authorized RPI-6 pilots, by the number of authorized RPI-1 pilots. The ACC calculation is used to standardize experience mix across many wings, each of which makes its own decisions—for valid, operational reasons—on actual placement of assigned pilots within the wing. We use our calculation to more accurately reflect the situation in a wing and its flying squadrons.

Given the manning levels and qualifications of pilots, the wing can maintain a healthy experience mix if it flies 87 sorties per week. This yields a UTE rate of 87 x 4.3 ÷ 18, or 20.8, where 4.3 is the average number of weeks in a month. This UTE approximates the average rate that the 388th Fighter Wing (FW) achieved in FY94 (but, as we will see, has not been reached since).



Maintainers—in both the flying squadrons and the maintenance squadron—face a similar phenomenon. Just as inexperienced pilots need time in the cockpit supervised by an FL or IP to gain experience and proficiency, new maintainers (3-level apprentices) require OJT and schoolhouse courses with the guidance and supervision of experienced maintainers (senior 5-level journeymen and 7-level craftsmen) in order to become productive 5-levels. With higher 3-level manning come increasing requirements for 5- and 7-level trainer time. The maintainers must accomplish OJT tasks while producing sorties for pilot training as well.

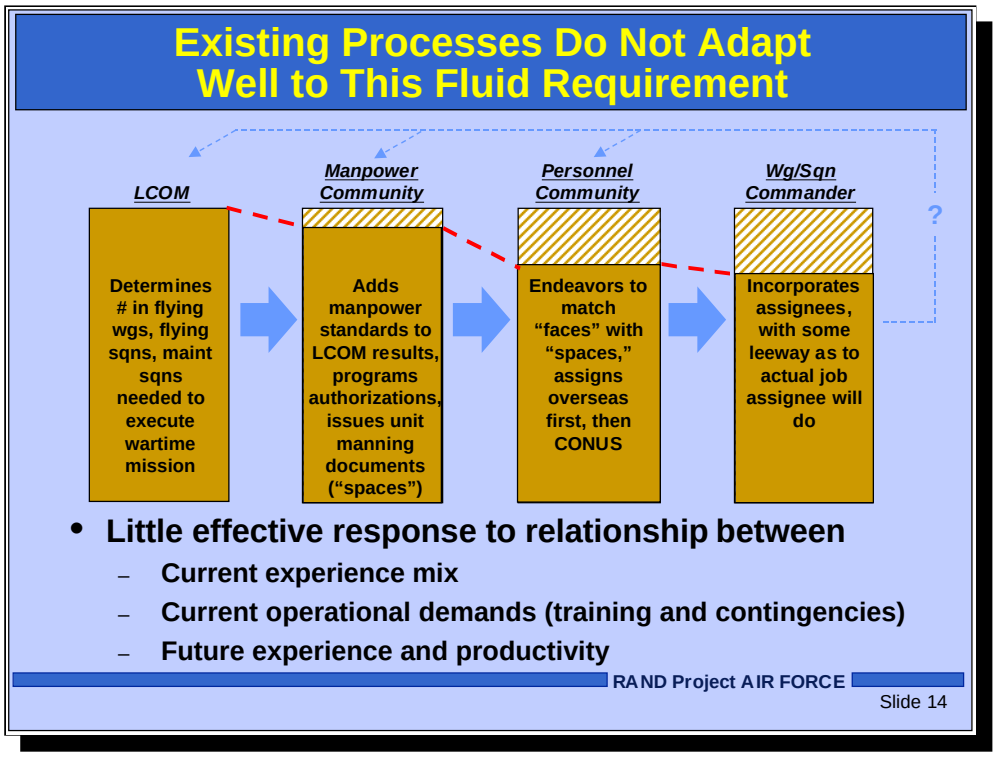
What constitutes a healthy maintenance manpower inventory (for rejuvenation of skills) is by no means a fixed quantity. Since unit manning fluctuates constantly through reassignments and separations, the proportion of senior-to-junior personnel sometimes changes dramatically over only a few years. When senior people leave and are replaced by junior personnel, the need for supervision and training increases, and total manpower needed to sustain "health" may grow as a result. Unless this is recognized at the resource allocation and programming stages, shortfalls will inevitably creep into the system.

Whether the need for manpower grows and how great the growth will depend on several critical factors. First, alternative concepts for utilization of manpower and for training may lessen the need for additional manpower. For example, experienced maintainers theoretically could spend more hours on training and fewer on some other activities, thereby alleviating the need for additional manpower. A second factor is the rate of turnover of personnel—the more

rapidly people leave the unit, the greater will be the need for replacement with junior personnel and hence for trainers and supervisors. A third factor relates to the complexity of the task to be taught—the more technical and training-intensive the occupational specialty, the more trainers will be required and the greater the increase in total manpower needed as seniority declines.

The dilemma emerges when experienced personnel leave at a faster rate than junior personnel can be adequately trained and promoted. In the civilian sector, a company that loses experienced employees can probably hire new personnel who are equally experienced. Not so in the USAF. It cannot hire experienced 7-levels but must grow them from within. The USAF's response to diminishing retention rates largely has been to push more new personnel into critical career fields that are losing experienced personnel. This presents the wing with a "Catch-22"—it is losing experienced, productive maintainers/trainers and gaining inexperienced 3-level trainees, who require *more* of the experienced maintainers/trainers, whom it can generally gain only by training 3-levels. In the extreme, the additional workload can exacerbate the exodus of experienced personnel from the force, further compounding the problem.

At this time, the USAF does not adequately articulate how the requirement for trainers changes when experience mix and sortie demands change. Therefore, it is very difficult to estimate just how much total manpower must change when there are unexpected separations of senior personnel. We have not yet been able to quantify the impact of falling experience mix among maintainers, as RAND has been able to do for pilots. The community at ACC that runs the Logistics Composite Model (LCOM)—a system that helps the USAF determine maintenance manpower requirements (see discussion below)—has been field testing a concept for capturing the effects of variable skill level manning on sortie production. Precise quantification of the total impact will be impossible without further detailed work on the empirical issues of what drives retention rates of experienced personnel, how long train-up times are for various Air Force specialties, and what the productivity differential is between junior and senior personnel.



It does not appear that the USAF responds effectively to this fluid requirement for trainers, trainees, and producers. A cursory review of the processes by which the USAF sets maintenance manpower requirements, funds authorizations, and assigns personnel to units is instructive in this regard.

The LCOM employed by ACC serves as the basis for determining maintenance manpower numbers for flying and maintenance squadrons within each aircraft type in the Combat Air Forces (CAF). The model takes as inputs such factors as wartime sortie rates and durations, break rates, and manhours required to accomplish detailed maintenance and repair tasks. It combines these inputs with a "manpower factor" that ostensibly accounts for lunch breaks, sick leave, training, and other activities to derive manning required for each work center and Air Force Specialty Code (AFSC). LCOM analysts validate their assessments with audits at actual units where they ask maintainers about average times to accomplish repair tasks.

Several factors lead us to consider whether LCOM might be employed in different ways. First, LCOM runs are based on a "peacetime/wartime" dichotomy, which seems less applicable to the current day-to-day tempo of operations. LCOM uses scenarios for major theater war (MTW) that are driven by classified War Mobilization Plan (WMP-5) sortie rates and durations. LCOM determines this to

be the most stressing scenario for fighters—and this is probably a correct assessment when compared with the peacetime steady-state seen during the Cold War. Yet the current day-to-day scenario of frequent contingency deployments, exercises, and inspections may be *more* stressing than MTWs in terms of sortie production *in conjunction with* embedded training.

This is an analytical issue that must be resolved. We do not believe that LCOM adequately reflects "peacetime" requirements as they exist today, and thus determination of which scenario is most stressing needs further analysis. However, the LCOM community has provided some initial assessments indicating that split operations—the common practice whereby part of a squadron deploys overseas while the remainder continues normal operations at home station—significantly increase maintenance manpower requirements under relatively stressing operational assumptions. We contend that much more analysis is needed to better define the "peacetime" scenario and assess its effects on units.

Second, the model at this time only prescribes total manning; it does not distinguish skill levels (although it could, if required, model skill levels parametrically—if the data were available, which is not the case). LCOM audits of units reflect only the *average* skill level of maintainers in the unit at the time of the audit. As we have stated, however, skill mix can deteriorate quickly, and in the last few years highly skilled people have left and been replaced by less skilled junior personnel. The auditing process associated with the model is not sensitive to these fast-developing fluctuations, but it should be if the model is to capture the requirements of the second, future-oriented readiness tasking.

The LCOM results go to the manpower community, which applies its standards to these results and to those maintenance AFSCs that LCOM does not assess (e.g., aerospace ground equipment). The manpower community then determines what is affordable in the context of a corporate programming process. The USAF's corporate structure programs and funds the authorizations—the authorized "spaces"—for maintenance (and other) manpower. Authorizations are based on constrained budget levels, and often authorizations are below LCOM-produced manning levels. Because authorizations are driven by the two MTW scenarios, they do not vary much from year to year, and it thus becomes hard to make a convincing argument for increased manpower authorizations. In light of this, combined with a tendency in the corporate process to build the program from a baseline, one year's authorizations become one of the most important determinants of the following year's authorizations. Changes in *actual* manning and experience do not influence authorization levels to the extent that they should.

An additional complexity arises from a difference between deliberate plans and actual deployment practices of USAF units. For essential and very easily

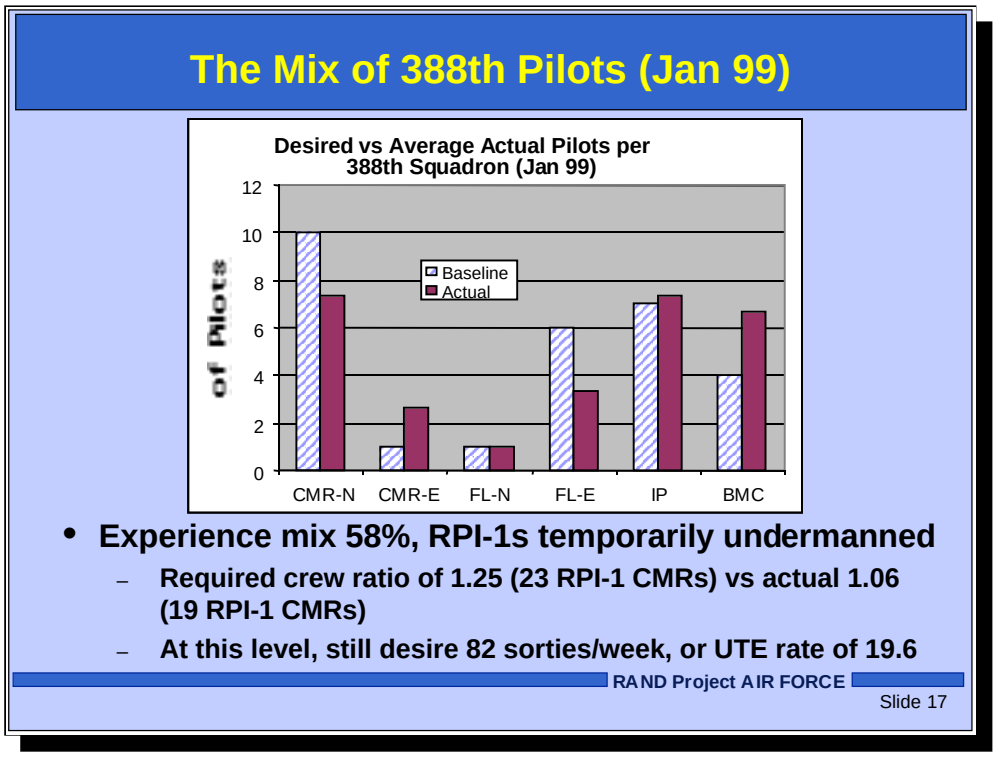
understood reasons, no one wants to send units to a contingency without adequate support in personnel and materiel. There is anecdotal evidence that units sometimes deploy to contingencies in a "robusted" state, I.e., with assigned resources that meet or even exceed 100 percent of their estimated wartime requirements—what in readiness-reporting language is called high C-1 status. The difficulty arises from the Air Force's practice of regularly programming for personnel, training, and materiel for all units at *low* C-1 readiness status, i.e., at around 90 percent of wartime requirements. Thus, in order to fill deploying units at high C-1, home-station units that supply the additional resources to deploying units may fall below C-1 readiness status. More research is needed in this area to determine the frequency and scope of the practice of robusting.

The personnel community endeavors to assign "faces," or available personnel, to the "spaces" authorized. More often than not, the number of faces is not adequate to fill the spaces. In some cases, assigned personnel make up only 60–80 percent of authorizations. While serious attempts are made to fill holes in certain occupations through cross-training from others, it is not easy to replace lost experience in this manner. The result of actions by the personnel community is the manning and experience mix we see in the wings and squadrons themselves.

Finally, the wing and squadron commanders have some leeway regarding which jobs people are actually performing on a day-to-day basis. Some personnel may fill positions to which they are not assigned because the jobs are operationally necessary. These may be critical positions for which there are no authorizations—i.e., they are unfunded.

Naturally, MAJCOM and Air Staff programmers are aware of and sympathetic to the personnel and skill-mix problems in wings and squadrons. However, given topline budget guidance and the current emergence of unforeseen retention and recruiting problems, they are left with diminishing availability of personnel to assign, constrained dollars for authorizations, and an impaired ability to respond to changes in manpower requirements. Given that only difficult choices exist between many desirable goals, the USAF is hard-pressed to address manning and experience problems in the units. This problem has, in our judgment, been severely exacerbated by the difficulty in articulating the similarity between manpower and personnel issues on the maintainer side of unit taskings, in the same way that the Air Force over the last few years has been able to do for the pilots.

Later in this report, we will show results from a test of a survey instrument that we shared with maintainers at the 388th FW to determine whether it is possible to quantify the relationships between current experience, current productivity, and future maintainer inventory health. First, we assess the circumstances of the pilots at the 388th in relation to standards of "health" set forth above.



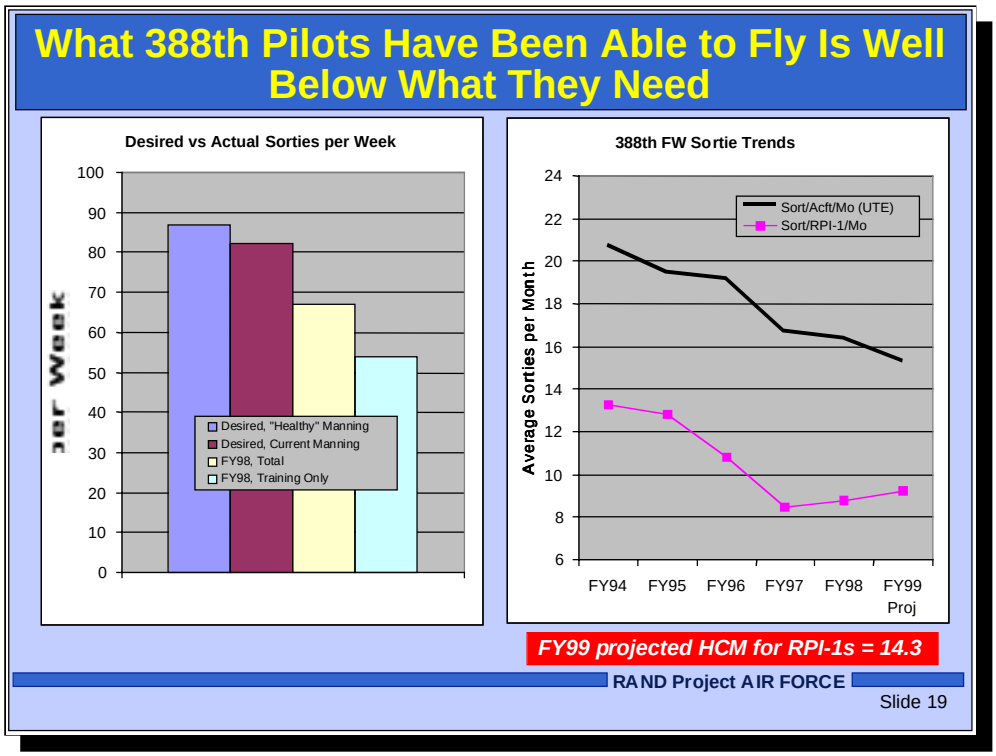
In January 1999, average pilot experience mix was higher than the basic standard of 52 percent discussed above, reaching 58 percent.[3] However, the fighter squadrons were undermanned in RPI-1 CMR pilots by about 17 percent. This is a product of the timing of our data collection, and the squadrons later reached healthier manning levels. In calculations below, we show the effects of both the January levels and healthy levels.

The shortfall of RPI-1s does not necessarily indicate a reduced *current* warfighting capability if, as in the case of the 388th at this time, there are staff pilots (RPI-6s) who can fill cockpits during contingencies. Though the data show lower manning in inexperienced CMR pilots, the greatest concern is the shortage of experienced flight leads. This signifies a reduced ability to absorb inexperienced pilots—meaning that any effort to increase the crew ratio by increasing the assignments of junior pilots would not only cause the experience mix to diminish

[3]The pilot data displayed in this slide represent January 1999, when our data collection was initially completed. Pilots in the 388th were somewhat undermanned at this time; in subsequent months, the wing was manned at over 100 percent of its authorized levels. There is always flux in manning levels throughout the year. By ACC's method of calculation, the experience mix in January was 64 percent.

but also make it difficult for the wing to fly these pilots at an adequate UTE rate. Additionally, the flight lead shortage could reduce combat capability, although many of the IPs are flight leads as well. Finally, higher levels of BMC (RPI-6) pilots attached to the squadrons could create greater competition with RPI-1 pilots for sorties. This is not a great concern as long as the shortfall of RPI-1s makes flying hours available for the staff pilots to fly, but it could be a significant problem if squadron manning levels were healthy and flying hours were not added.

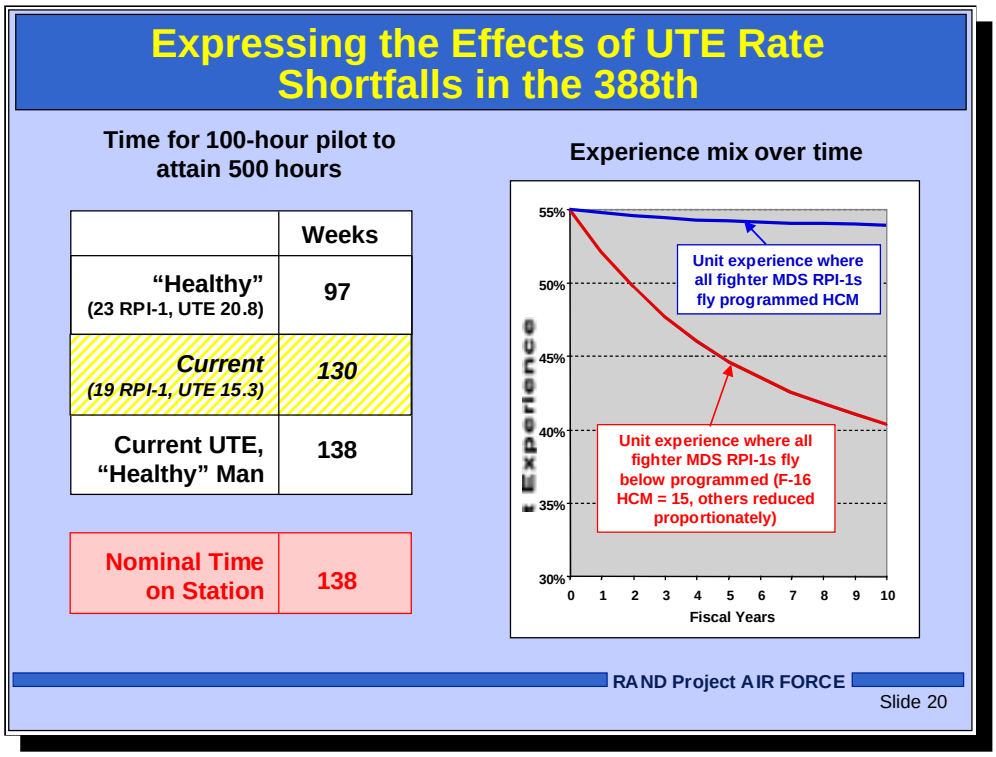
Despite the undermanning, the squadrons still should average 82 sorties per week, or a UTE rate of 19.6, to maintain an experience mix of 58 percent.



At the time of our data collection, the pilots of the 388th FW were flying only about 54 sorties per week—67 if we include sorties flown during contingency operations overseas. Although we include contingency sorties in our calculations, pilots often do not receive adequate sequences of training events during deployments. Training adequacy during deployments is highly situation-dependent. On one deployment, sorties might be limited to "drilling holes in the sky" during repetitive combat air patrols; on another, pilots could be involved in operations against real enemy targets. Because we include contingency sorties, the results of our calculations can be viewed as optimistic.

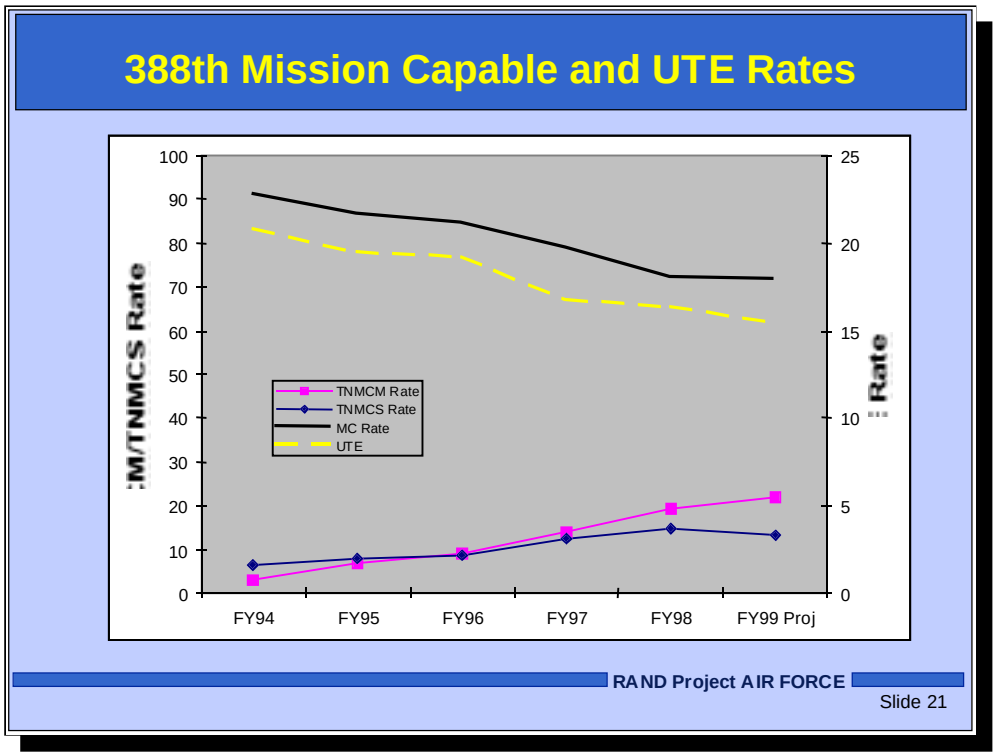
UTE rates at the 388th have diminished rapidly since FY94, the last year the wing achieved healthy rates with regard to the second readiness tasking. As of this writing in August 1999, we project FY99 UTE rates to fall to 15.3—about 22 percent below the healthy 19.6. Sorties per RPI-1 per month have come down by a greater amount—over 30 percent—indicating some competition for scarce sorties between RPI-1s and RPI-6s. The projected FY99 average for hours per crew per month (HCM) for RPI-1s is 14.3, compared with the ACC-programmed level of 17.1 HCM.[4]

[4]We mention hours here because it is the metric by which the USAF measures pilot experience and allocates resources to its flying program. However, there are many drawbacks to using hours to judge the true experience of a pilot. An hour spent in the cockpit flying across the Atlantic is by no means equivalent to an hour spent on a training range. We believe that sorties and the UTE rate derived from them provide a better metric for pilot experience.



With this diminished UTE rate, we calculate that it takes about 130 weeks for an inexperienced, 100-hour pilot to achieve the 500 hours of cockpit time he needs to be considered experienced. It should take the same pilot in a healthy unit only 97 weeks to become experienced; i.e., it is taking 34 percent longer to train a pilot to a certain standard than it should take. Moreover, that pilot is reassigned after a two-year eight-month tour (138 weeks), so the unit benefits from only two months of experience from that pilot. He then goes to his next assignment (often another flying assignment), but that follow-on unit must take time to provide further training as a 4-ship flight lead or instructor pilot—training for which there was no time at the first unit. The training that did not occur in the first unit then creates a follow-on training burden for the next flying unit to which the pilot is assigned. Thus, training shortfalls in a pilot's career will be extended throughout the operational Air Force. Today's shortfalls in training create lingering effects that can last for several years.

According to RAND's pilot-training model, at these reduced hours and sorties the 388th cannot sustain a desirable experience mix. Were all fighter MDSs (mission design series) to fly programmed hours, the mix could be expected to reach a steady-state at a level only slightly below the current experience mix (illustrated by the upper line of the right-hand panel in the slide above). However, if we assume the more realistic case where all fighter aircraft units were experiencing similar flying hour shortfalls, experience in the 388th (and other active F-16 wings) would fall more rapidly. Experience would dip below 50 percent in about two years and, according to the RAND model, reach its steady-state at a catastrophic experience mix of less than 35 percent. This is caused by the snowballing effects of training shortfalls discussed in the preceding paragraph.



Clearly, the 388th's pilots are not receiving enough sorties. At the same time that UTE rates have fallen, Total Non-Mission Capable Maintenance (TNMCM) rates have soared over the past six years from about 3.0 to 21.4 percent. TNMCS (supply) rates also have increased, though not as dramatically—a problem that can add to a maintainer's workload.[5] Clearly, resources available to the maintenance side of the wing have been inadequate. No single reason can be found to explain the resource problems—they have affected both materiel and personnel. Though one is hard-pressed to directly link rising TNMCM and TNMCS rates to falling UTE rates—they seem to be independent variables—our discussions throughout the USAF suggest that maintenance manning levels and realized experience mix are key factors in diminishing sorties available for pilot training.

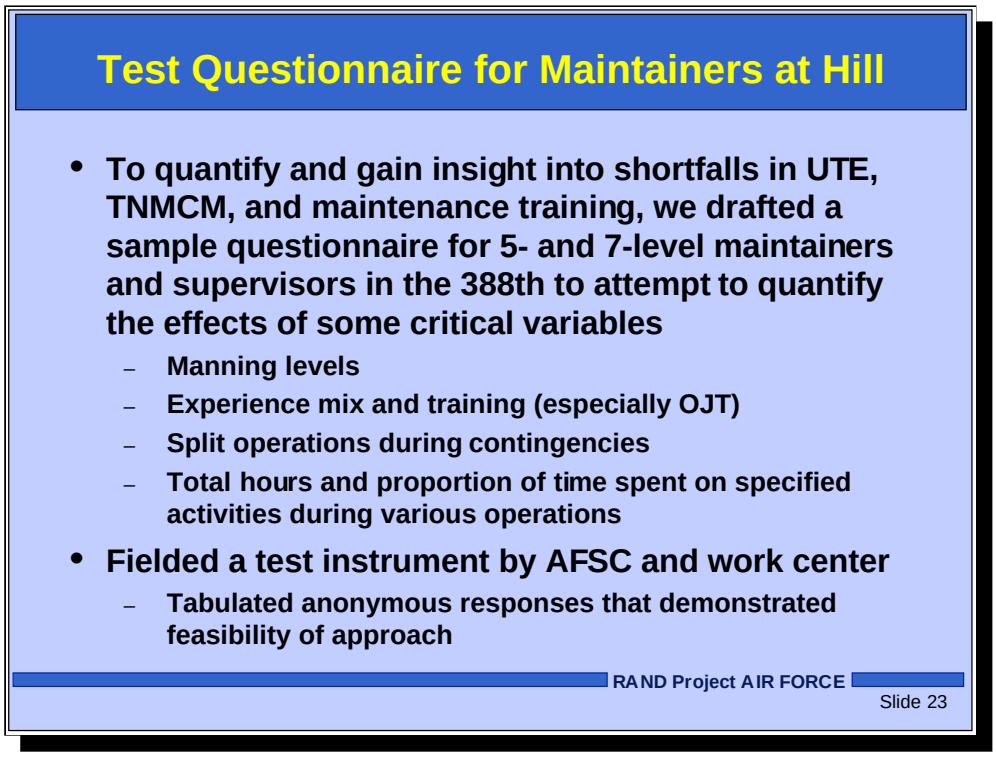
As noted above, maintenance manpower authorizations currently are driven mainly by LCOM and the previous year's authorization levels—based on the determination that MTW sortie rates should be the main factor in setting manpower standards. However, as we have just seen in our discussion of pilot training, there is an immediate connection between pilot-training curricula, pilot seniority mix, and the sorties demanded—and how much maintenance is required to sustain those levels of training. In other words, it is not always sufficient to build a process for determining maintenance manpower solely around estimated MTW sortie requirements. It is possible, as appears to be the case at the present

[5]MC rate refers to the percentage of possessed aircraft that can meet at least one of their assigned wartime missions. TNMCM rates refer to aircraft down awaiting maintenance actions, while TNMCS rates refer to aircraft down awaiting parts.

time throughout the Combat Air Forces, that the force may be capable of executing current wartime plans, while, at the same, the flying hour program is not sufficient to meet the training standards of the present inventory of pilots. As the experience mix falls, it may be necessary to raise programmed hours in order to produce the pilots that must be trained to meet tomorrow's MTW requirements. This intertemporal relationship is an essential element of readiness, as we have endeavored to point out in this briefing. When the flying hour program does not meet the training standards for the pilots, the pressure builds on the maintenance side to produce sortie-capable aircraft, and this explains much of the tension currently so real in fighter units.

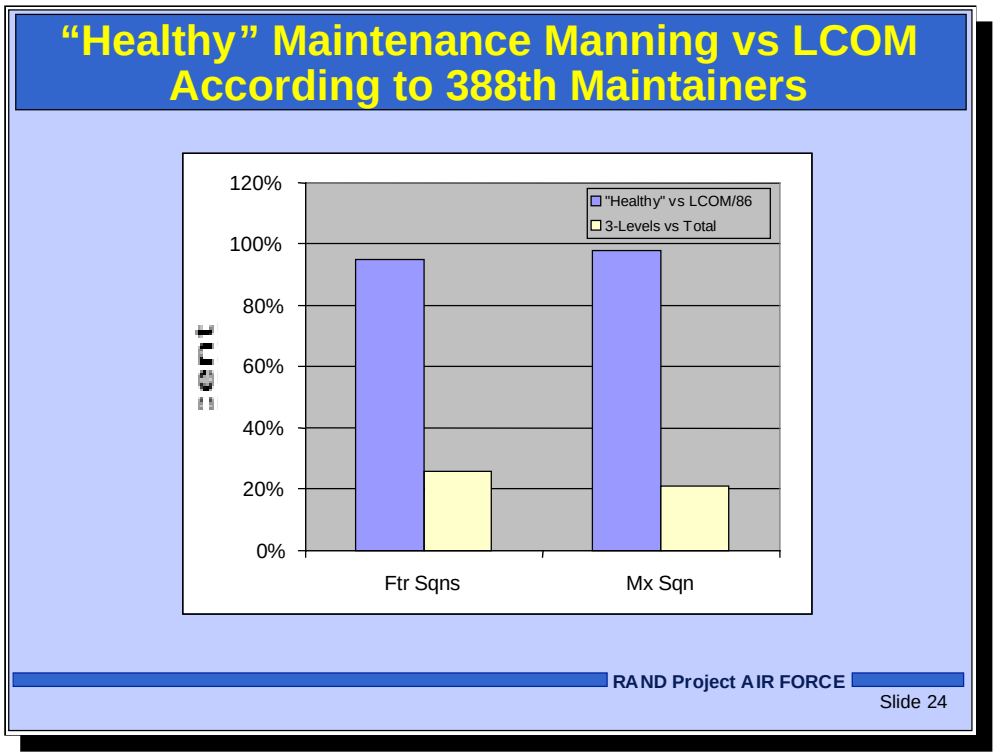
For these reasons, we focus our attention on manpower/personnel issues in our analysis. It is our judgment that this is a key source of falling MC and UTE rates and has been underemphasized in recent discussions and decisions on readiness. This is not to say that the materiel-related sources of declining aircraft availability are completely understood. We know much about the *collection* of causes relating to materiel processes in fighter wings—aging aircraft, unforeseen engine problems, unexpected wear and tear due to frequent deployments, policy implementation difficulties (e.g., two-level maintenance, supply funding shortfalls), to name but a few of the most commonly highlighted issues. However, there is not yet a sufficient level of understanding of the relative contributions of all these sources of problems in maintenance. We are confident, however, that there is a great deal of attention paid to these issues at the moment, so we have chosen to focus our analysis on the manpower/personnel side.

Next, we explore the problems that hamper the 388th's maintainers' ability to produce sorties and fuel their absorption difficulties.



Without the right standards for the personnel inventory, we are hard-pressed to understand the relationships between experience mix, absorption capacity, and the production of sorties that drive these rates both now and into the future. Thus, to help characterize and quantify these relationships, we developed a preliminary questionnaire intended to test whether it is feasible, through a survey methodology, to solicit quantifiable data on the issues in which we are interested. We shared this draft questionnaire with a number of the more experienced maintainers at the 388th—5-levels, 7-levels, and supervisors. Since we are interested in whether this can be done for a number of varied career fields and work centers, we have tabulated the responses to our test instrument. As will be shown in the ensuing pages, we believe that we have demonstrated that it is both possible and useful to solicit the relevant data from a questionnaire. Thus, should the Air Force leadership decide that such information is of further use, a real survey instrument can be developed, tested, and fielded relatively quickly .

The results from this questionnaire may be used to suggest additional metrics that the USAF needs to measure its ability to accomplish the second readiness tasking. The questionnaire was designed to gain insight into the development of future capabilities and not to define the manning needed to conduct operations in an MTW context.



The graph above shows the results we obtained relating to total manning desired and suggested capacity to absorb junior personnel in the fighter and maintenance squadrons. We asked experienced maintainers and supervisors what they believed would be healthy levels of manning in their career fields compared with results from LCOM.[6] We also asked them to recommend the number of 3-levels they could absorb to be considered healthily manned. The sample included 18 maintainers in the fighter squadrons and 30 in the maintenance squadron, for a sample size of 48.

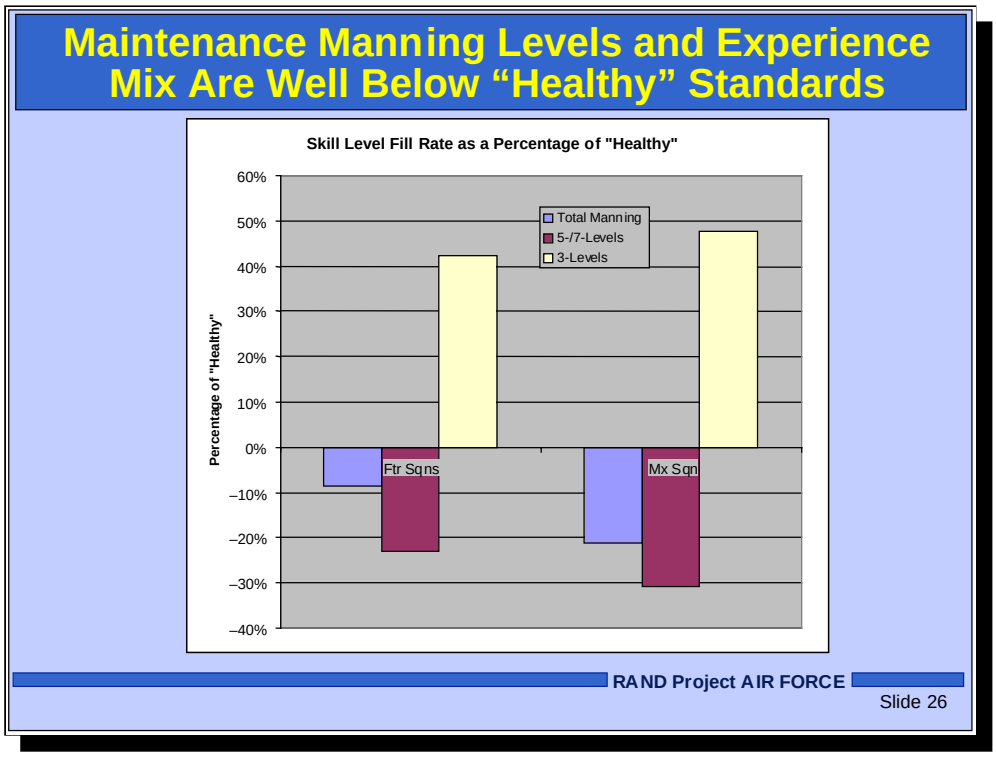
On average, maintainers in the fighter squadrons suggested that "health" could be sustained at 95 percent of LCOM levels with an experience mix that does not exceed 26 percent 3-levels. Respondents in avionics, engines, and electric/environmental career fields preferred higher manning levels than are provided by LCOM. Crew chief, engine, and phase-related technicians suggested a lower than average absorption capacity for 3-levels.

Personnel in the maintenance squadron responded that their unit could remain healthy at 98 percent of LCOM with 21 percent 3-levels. Egress, metals, and

[6]We used LCOM results for the 1986 WMP-5, the current baseline as of the time of writing. The LCOM community has conducted numerous analyses of manpower requirements using more recent WMPs. These have indicated that maintenance manpower should increase, but such increases have not been funded. Efforts were under way at the time of writing to correct this problem by ensuring that authorizations reflect the results of the updated LCOM analyses.

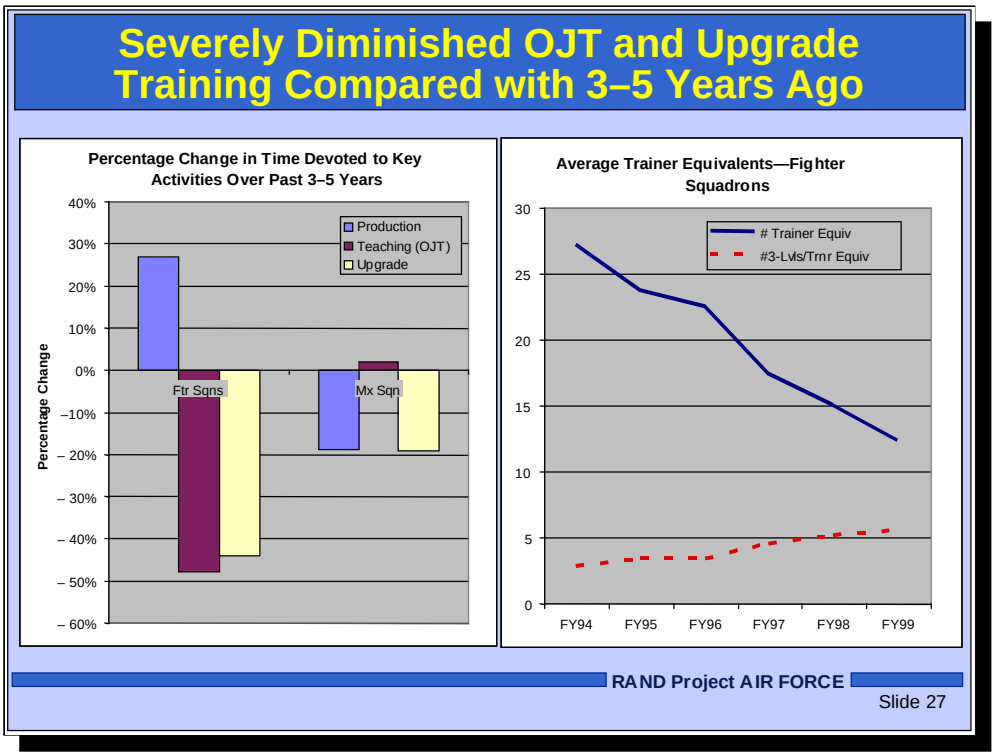
armament technicians desired higher manning levels. Absorption capacity was lower than average in fuels, survival, engine, Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN), and AGE career fields.

We use the questionnaire results as a surrogate for a set of maintenance manning and absorption standards for healthy F-16 fighter and maintenance squadrons (in relation to the second future-oriented readiness tasking). Qualitatively, these standards may be appropriate for other F-16 wings, but we do not explore that here. Next, we evaluate levels of manning, experience, and training in the 388th FW.



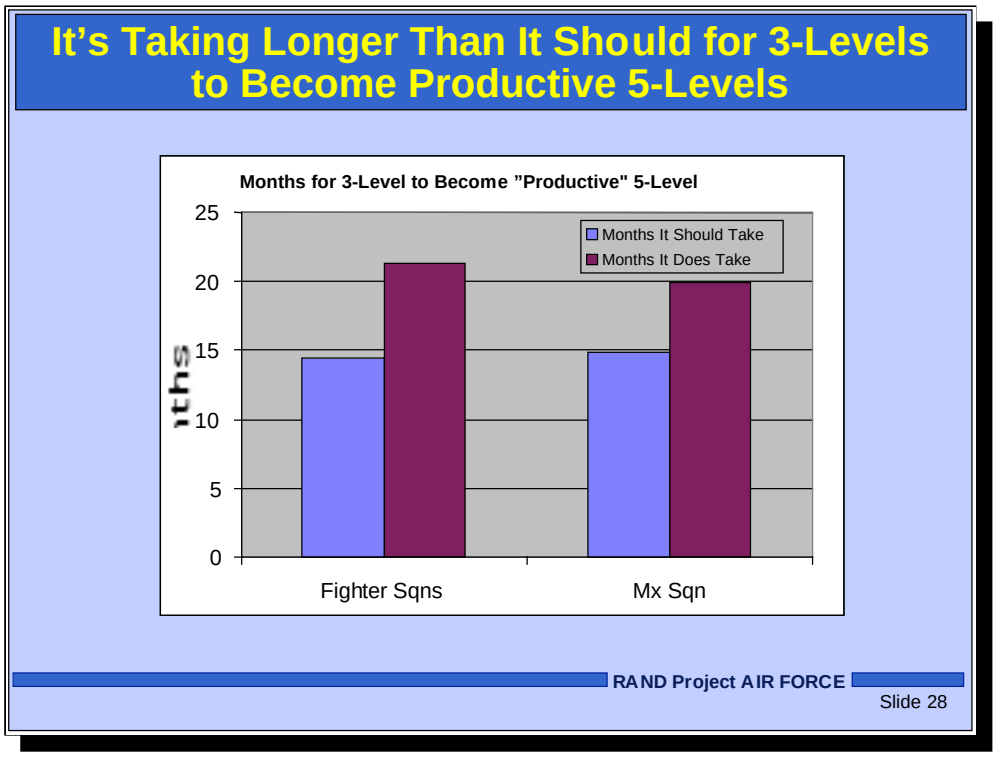
Compared with healthy manning defined previously (the 0 percent line on the y-axis), the 388th's fighter and maintenance squadrons are undermanned. Moreover, experience mix is highly skewed toward junior personnel. The fighter and maintenance squadrons' manning in 5-/7-level maintainers is 23 and 31 percent (respectively) *below* what respondents told us they needed to be healthy. Even worse, the 3-level fill rate is too high by 42 and 48 percent, respectively. Undermanning and lack of experience are particularly acute in avionics, crew chiefs, and engines in the fighter squadrons, and in avionics test, LANTIRN, structures, electrical/environmental, and a number of other fields in the maintenance squadron.

It appears that the undermanning and lack of experience are having severely detrimental effects on the ability of maintainers to produce (generate sorties), conduct OJT, and do upgrade training. This may be a key reason for rising TNMCM rates and falling UTE rates.

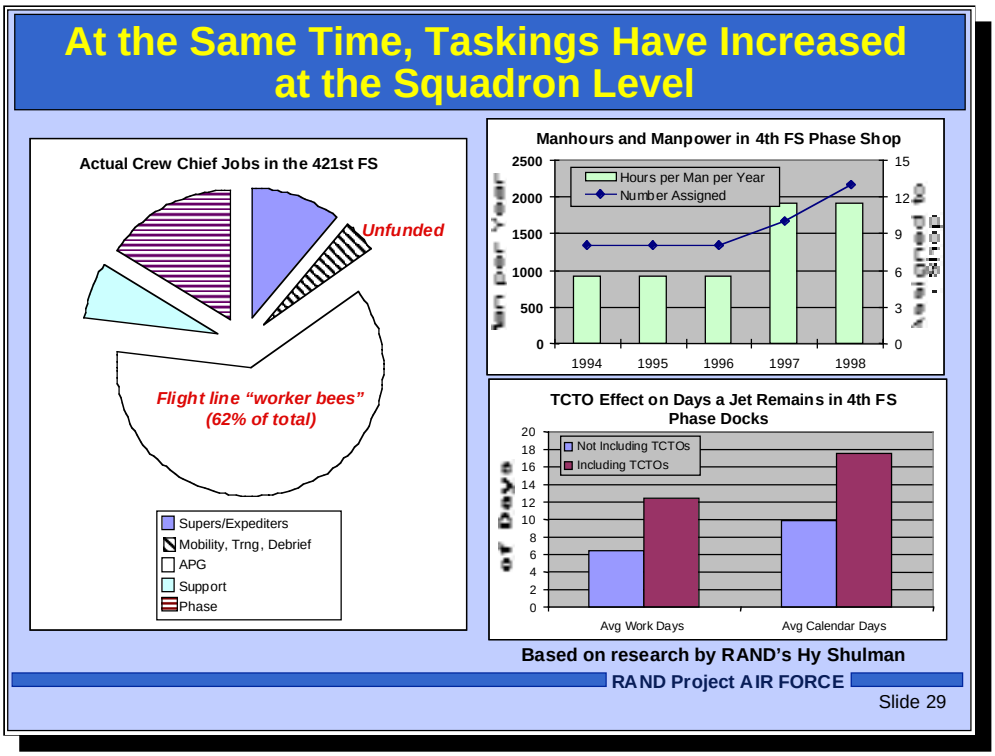


Clearly, 5-/7-level maintainers in the fighter squadrons are spending more time than they did 3–5 years ago on sortie production and have greatly curtailed the time they spend teaching 3-levels and upgrading themselves. Not surprisingly, the competing pressures seem to favor generating sorties to the extent possible. With less immediate production pressure in the maintenance squadron, the 388th Maintenance Squadron (MXS) has attempted to maintain OJT, but those maintainers are overwhelmed by even greater manning and skill shortages than in the fighter squadrons.

One measure of the OJT capacity in the fighter squadrons is the number of trainer equivalents—a product of the number of 5-/7-levels and the percentage of time they spend teaching. The number of trainer equivalents today is less than half of what it was in FY94. Furthermore, the number of 3-levels per trainer equivalent has doubled from about three per trainer to about six. This means that a 3-level spends a great deal of time waiting for a 5-/7-level to explain a maintenance action and check his work, while the 5-/7-levels are running from 3-level to 3-level and from jet to jet trying to keep up with the calls for help. *This closely parallels the problem we identified on the pilot side*—too few FLs and IPs flying too many sorties, and too many young pilots vying for a smaller pool of sorties.



One metric for expressing the effects of reductions in OJT is months for a 3-level to become a productive 5-level. We asked experienced maintainers how long it should take a 3-level in his career field to become a productive 5-level and how long it actually takes under current circumstances. On average, it is taking 3-level maintainers in the fighter squadrons 50 percent more time than it should to become a 5-level. In the maintenance squadron, it takes a third more time than it should. This delays the replenishment of 5-levels in the unit as they move up to 7-level, separate from military service, or are reassigned.



These manning and experience problems are occurring at the same time the task load has increased. This increase may come in one of at least two forms: (1) overall manning diminishes while the need to fill supervisory and "overhead" slots remains constant, and (2) actual workload rises.

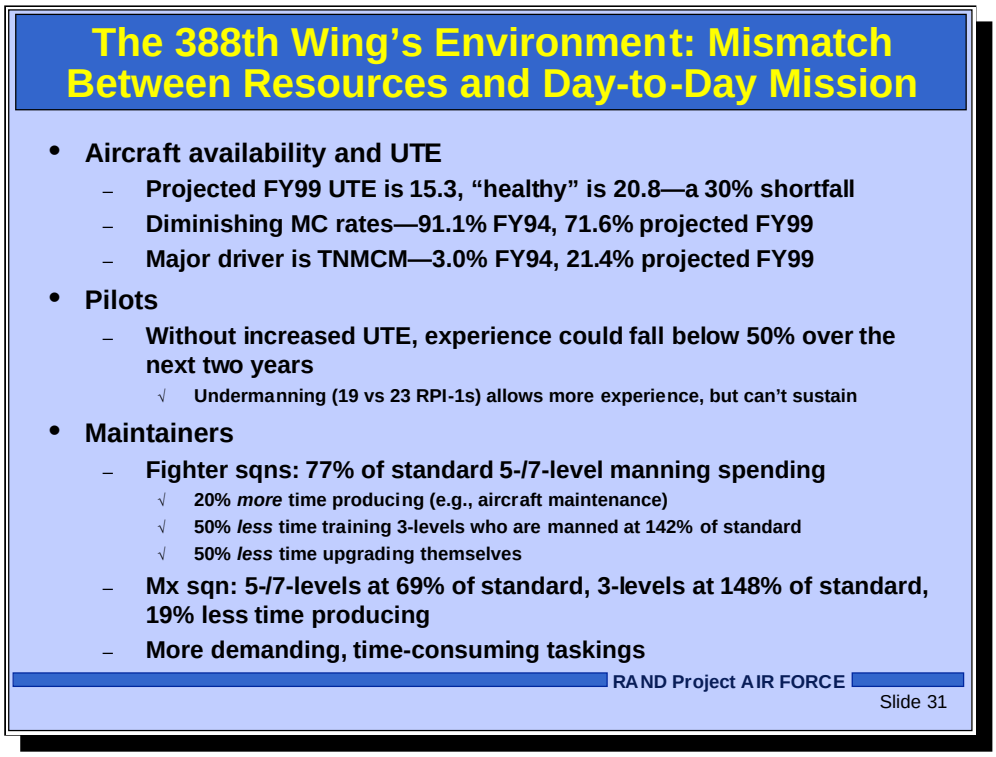
The first form relates in part to the difference between the jobs to which personnel are assigned and the jobs that they actually perform. For example, there are certain positions in the fighter squadrons—mobility, debrief, ancillary training, resource adviser, and small computers—for which there are no authorizations (and no funding), *but which must be filled*, often by experienced personnel "out of hide." In the 421st Fighter Squadron (FS), crew chiefs fill the first three of these positions. When we add crew chiefs assigned to the phase shop, support positions, and production supervision, the result is that only 62 percent of assigned crew chiefs actually work on jets on the flight line.

In the second case, the workload seen at squadron phase shops—manned primarily by the more experienced crew chiefs—has risen manyfold over the past several years.[7] This is due in large part to increasing Time Compliance Technical Orders (TCTOs), which direct system modifications and one-time inspections. Many of these TCTOs are assigned to the depots, but some become the responsibility of the squadron phase shops (and even the flight line itself). As the tables above show, manning in the 4th FS phase shop has increased, but at a rate much smaller than

[7]Unpublished analysis by RAND colleague Hy Shulman.

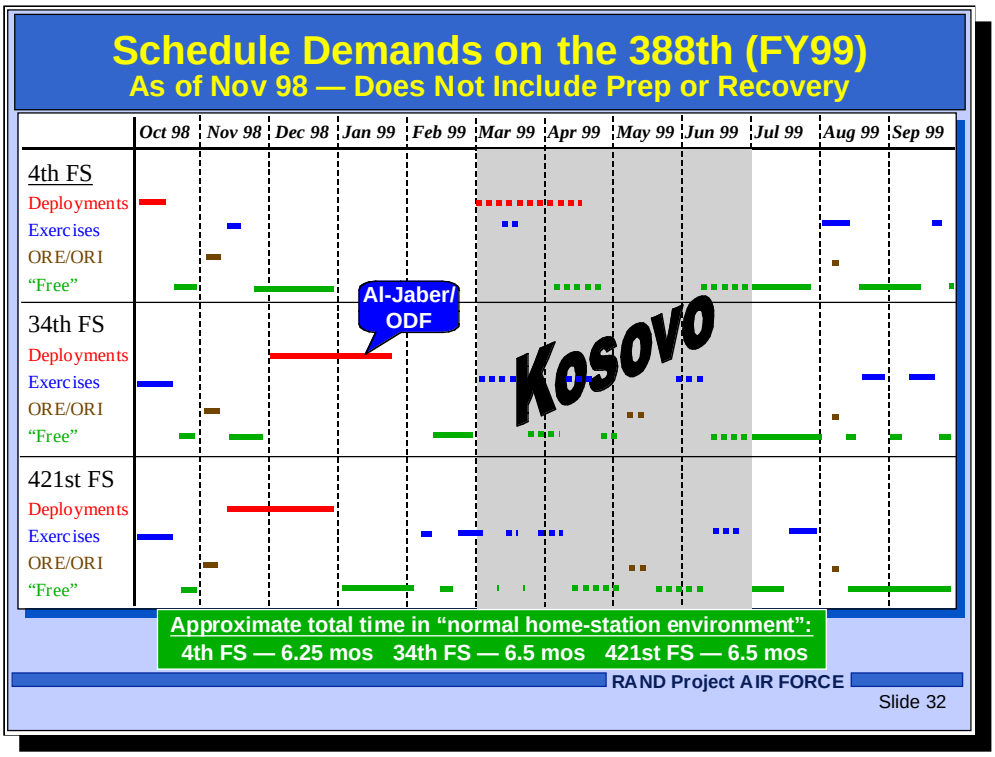
the increase in manhours. In fact, 1998 hours per man per year were equivalent to 100 percent of available working hours, leaving nothing for other tasks without increasing overtime.

In addition, TCTOs almost double the average number of work days that a jet spends in phase, thereby reducing the number of aircraft available for training sorties. It should be noted that much of this has happened in spite of existing policy guidance. USAF guidance states that TCTOs requiring more than 25 working hours to complete should be transferred to the depot—precisely in order to avoid the "creep" in unit workload that we observe here. Unfortunately, this limit is not infrequently exceeded, and since there is no additional manning to accompany the increased workload, the result is lower aircraft availability.



In sum, our analysis indicates a rather severe mismatch between resources available to the 388th FW and the day-to-day missions it is tasked to accomplish—namely, the requirement to rejuvenate human capital. The UTE rates are not high enough to maintain a healthy pilot inventory. At the same time as UTE rates have come down, TNMCM and TNMCS rates have skyrocketed. Maintenance manning is becoming less experienced as junior personnel are pushed into the wing to replace a declining force of 5- and 7-levels. Although declining in number, experienced maintainers are spending more time producing sorties, overwhelming their ability to properly teach the 3-levels and to upgrade themselves, thereby threatening the long-term health of the maintainer inventory.

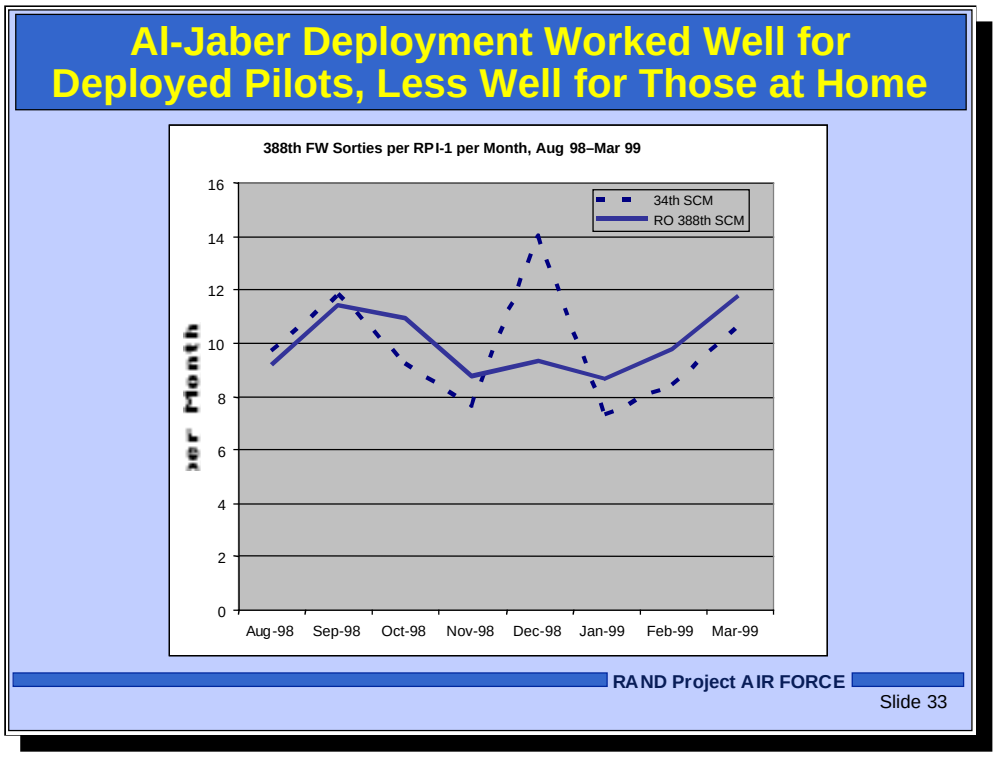
The circumstances we have laid out to this point reflect only the wing's normal home-station environment. We show that the wing is not in a healthy state, yet we have not even addressed the additional demands that contingencies, exercises, and operational readiness inspections (ORIs) embody. It is to these demands that we now turn.



The schedule above shows the demands on the 388th's fighter squadrons during FY99. The schedule identifies about 5.5–6 months during which each squadron would be engaged in deployments, exercises (USAF- and CINC-sponsored operational readiness exercises [OREs]), and ORIs. Thus, the squadrons would have only 6–6.5 months during which a "normal home-station environment" would prevail. This overstates the normal environment because it does not account for the additional time and effort squadrons spend preparing for and recovering from these activities. It also hides the instability that flows from the erratic training and maintenance schedules that ensue. Thus, the 5.5–6 months associated with meeting steady-state "operational demands" should be taken as a highly conservative estimate.

We focus on two events. The Al-Jaber, Kuwait, deployment of the 34th FS in December and January—during which it conducted strikes on Iraq in support of Operation Desert Fox (ODF)—provides a vehicle for exploring split operations, or "split ops." The squadron deployed 10 of its best jets, 16 pilots, and experienced maintainers. It left 9 less robust aircraft and an undermanned, less experienced maintenance crew, and 13 pilots who still needed sorties for training. In order to strengthen the deploying part of the squadron, the part at home station was "broken," a perennial problem with split ops. We describe the circumstances at home station.

During the Kosovo operation (Operation Allied Force, or OAF), the 388th was tagged for possible deployment to the conflict. While none of the squadrons did, in fact, deploy, the operations at home station were affected during this time. We briefly describe these effects.



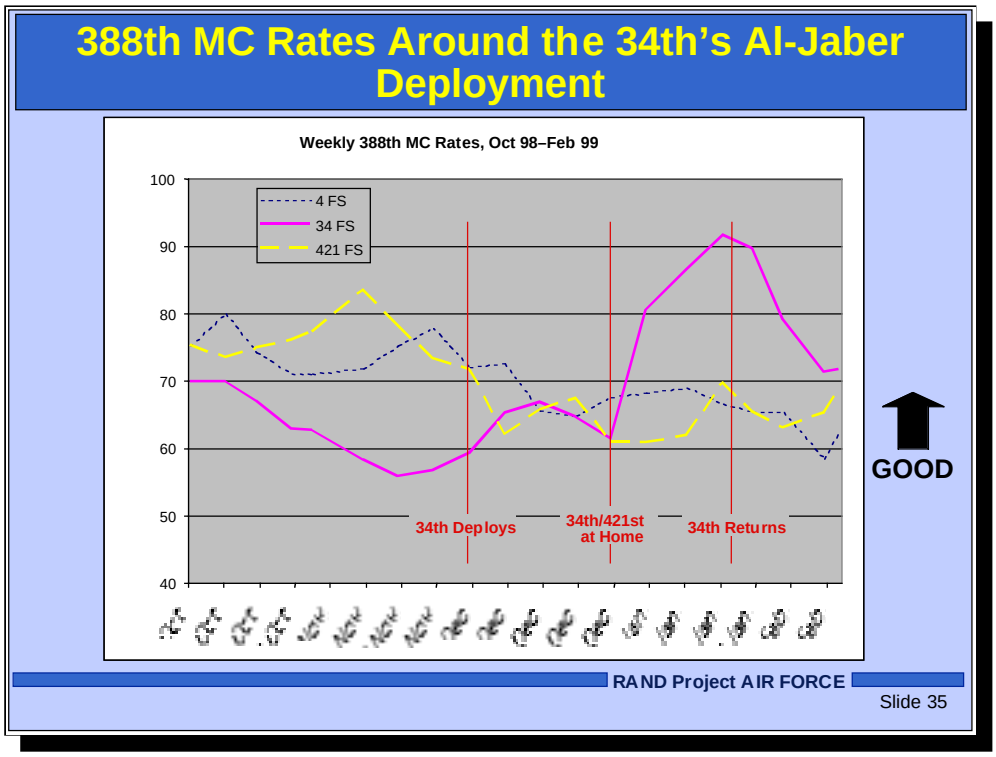
The 10 jets of the 34th FS left Hill on November 27. In the months leading up to departure, sorties per RPI-1 crew per month (SCM) in all squadrons declined steadily. Some of this decline was related to two factors: (1) a wing decision to "front-load" training for maintainers, whereby training increases (and sortie production decreases) to make up for the expected loss in training opportunities surrounding the deployment to Al-Jaber, and (2) preparation of deploying jets in the weeks leading up to the departure date, which can result in flying these jets less frequently while cannibalizing other jets to keep the deploying jets in good condition.

At Al-Jaber during December, 34th pilots were free to conduct effective training prior to ODF. Training included dissimilar aircraft training, close air support training with the Army, tactical intercepts, and many other events. In addition, 34th pilots flew 23 sorties in support of ODF. The squadron commander and operations officer reported that training opportunities at Al-Jaber were much better than previous rotations. Sorties per RPI-1 were relatively high, and, despite a drop in training in January, deployed pilots maintained currency, flew flight lead upgrade sorties, and required little recovery upon their return home.

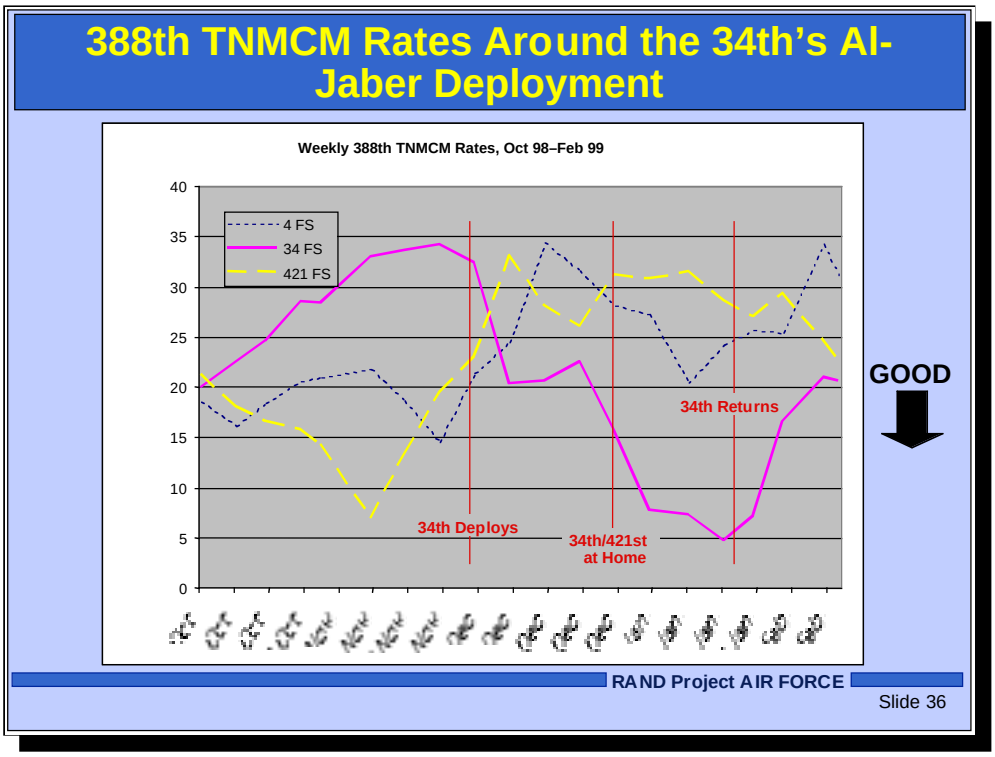
In contrast, 34th pilots at home flew less than half (17 of 36) of planned sorties in the first half of December and none between December 15–20. The reasons have already been mentioned above; weather was not a factor at this time. The best planes went to the desert, and the deploying detachment of the unit was assigned a disproportionate share of the more experienced maintenance personnel. In

addition, the deployed detachment, for natural and understandable reasons, was given clear priority for local parts, as well as in requisitions submitted through the supply system. In effect, the stay-at-home part of the 34th would have reported C-4 for equipment, personnel, and training (a very "unready" status in existing readiness-reporting parlance) had it been reporting as a separate unit—a reflection of the actual deployment practices of the Air Force.

Toward the end of December, the remaining pilots, maintainers, and jets of the 34th merged with those of the 421st. This worked well for both squadrons, especially for the pilots, since now they benefited from economies of scale associated with having one large squadron of 26 aircraft. The 34th pilots at home received more training sorties than they would have as a separate squadron. The leadership of the two squadrons reported to us that they found it easy and advantageous to both units to undertake the integration. Sorties for the squadrons at home dipped slightly in January, having already dropped nearly 25 percent since September. The 388th recovered in February and March to September levels.

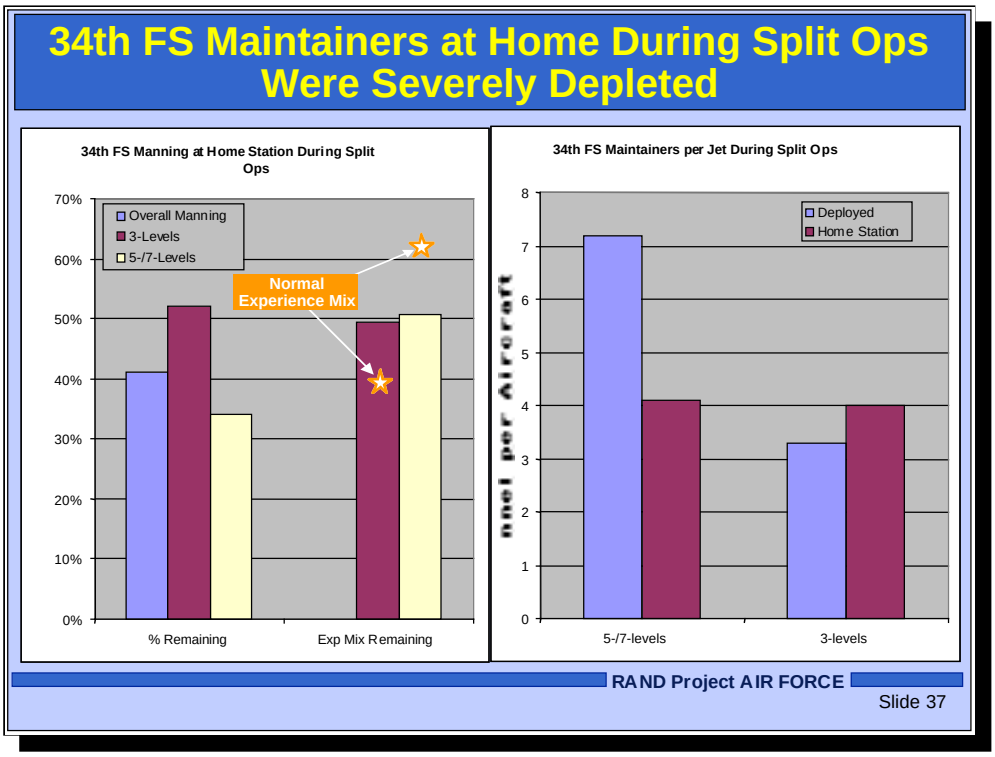


The mission capable rates tell a similar story. Rates began to diminish in the weeks leading up to the November 27 departure and continued at the lower level for the 4th and 421st throughout the deployment and even after the 34th's return. In December, the 34th's MC rates reflect the entire squadron—deployed and at home station. The strong rise in the 34th's MC rates during January captures the deployed rates only, while the 421st's rates during this month *include* the 34th's jets remaining at home station.



TNMCM rates mirror the MC rates to a large extent. Notably, the 34th's TNMCM rates rise strongly in the weeks before the deployment, signaling that the squadron was focusing on getting the deploying jets ready at the expense of the jets being left at home station. And, during the final week or two, the rates for the other two squadrons jump because their maintainers are helping the 34th ready the deploying jets while the 34th's maintainers prepare themselves to deploy.

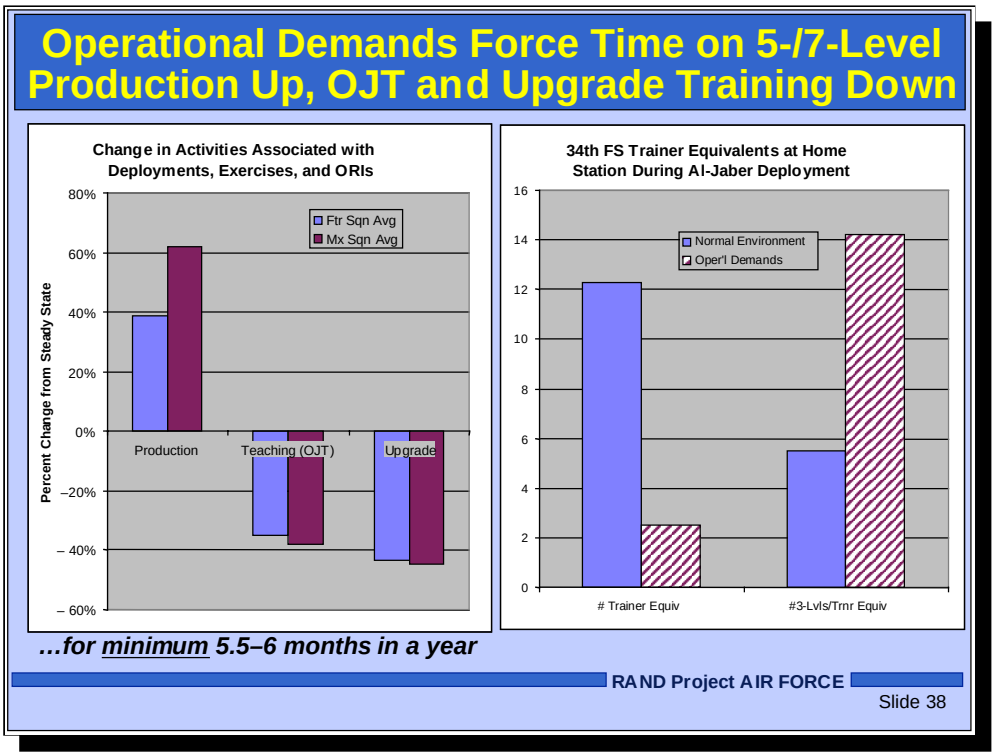
The 34th's TNMCM rates improve enormously once deployed. As with its MC rates, the squadron's TNMCM rates in December reflect an average of very low (good) rates for the deployed portion and very high rates for the home-station portion. In January, after the merge with the 421st, the 34th's rate refers only to the deployed portion, while the 421st's includes the 34th's home-station portion.



The problems associated with split ops become clearer when we look at the 34th's maintenance manning and experience mix at home station.[8] The 34th FS designated nearly 60 percent of its maintenance personnel to accompany the 10 jets. Most of these were more experienced 5-/7-levels, leaving only about 34 percent of experienced personnel at home station. Some 3-levels deployed as well, mainly crew chiefs and armaments personnel, but over 50 percent of those assigned remained. This worsened the experience mix problem at home station. The squadron went from over 60 percent experienced to about 50 percent. Thus, the squadron was less able to conduct OJT with the reduced experience mix.

The number of maintainers per aircraft provides some insight into the sortie-generation problems the 34th had at home station—and why the wing command decided to merge 34th and 421st operations. The number of experienced maintainers per aircraft at home station was just over four, compared with more than seven at Al-Jaber. The number of 3-levels per aircraft was slightly more at home station than at the deployed location. In this situation, many of the 34th's maintainers, particularly those in the crew chief, propulsion, and electrical/environmental fields, worked 11-hour days at home station. This was also to maintain more problematic aircraft and to support the flying schedule—and to do so with fewer experienced maintainers.

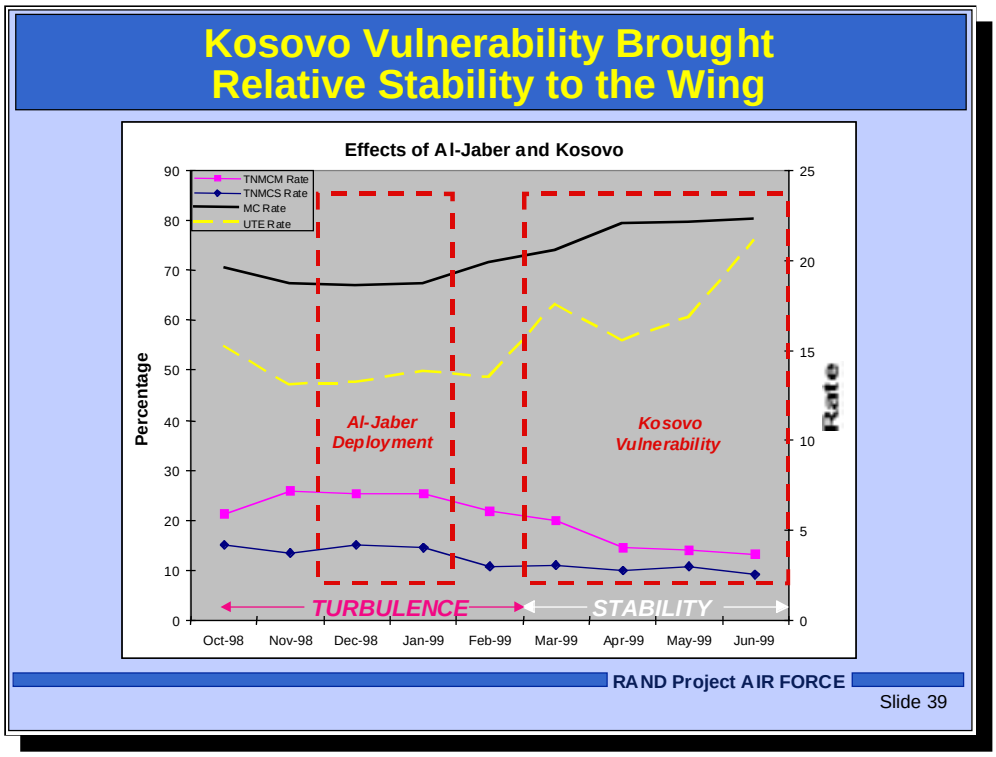
[8]Manning is based on the 388th's Deployment Requirement Manning Document from November 1998. This may not reflect numbers of personnel actually deployed.



Contingency deployments, exercises, and ORIs exacerbate the problems maintainers already face. Generally, and not surprisingly, we found strong increases in 5-/7-level sortie production during these activities. Time spent teaching others and upgrading oneself was low during normal home-station operations and became almost nonexistent when preparing for, meeting, and recovering from operational demands. Major drivers seem to be preparation and recovery during contingencies, exercises, and ORIs.

Thus, during more than half the year (when we include preparation and recovery), production time spent by 5-/7-levels rises at the expense of training others and upgrading themselves.

The deployment of the 34th FS reinforces this point. OJT and upgrade training ceased at home station during the deployment. The number of trainer equivalents plummeted to about 20 percent of their already depleted levels, while the number of 3-levels per trainer equivalent more than doubled.



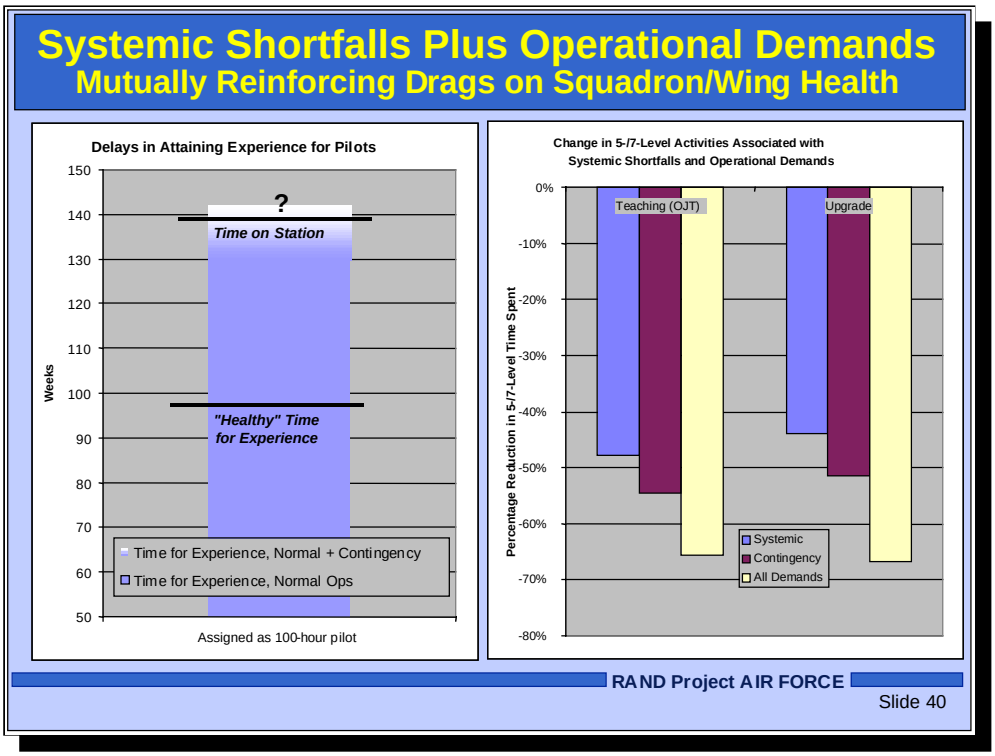
We have focused on how operational demands at home station can create turbulence that exacerbates the problems the wing already experiences under normal circumstances. This chart provides some insight into the positive effect that stability has on the wing.

During the months that the wing was vulnerable to deployment, exercises and ORIs were canceled, as was a scheduled deployment of the 4th FS to Southwest Asia. Furthermore, the USAF instituted a forcewide "stop-loss" program that postponed planned separations in critical careers until the conflict was terminated.

The changes in the indicators tell a compelling story. All of the 388th's fighter squadrons gained high priority for supply.[9] This, combined with the absence of other operational demands, enabled the maintainers to bring up the MC rate and to produce more training sorties. By June, the UTE rate had reached a healthy 22.

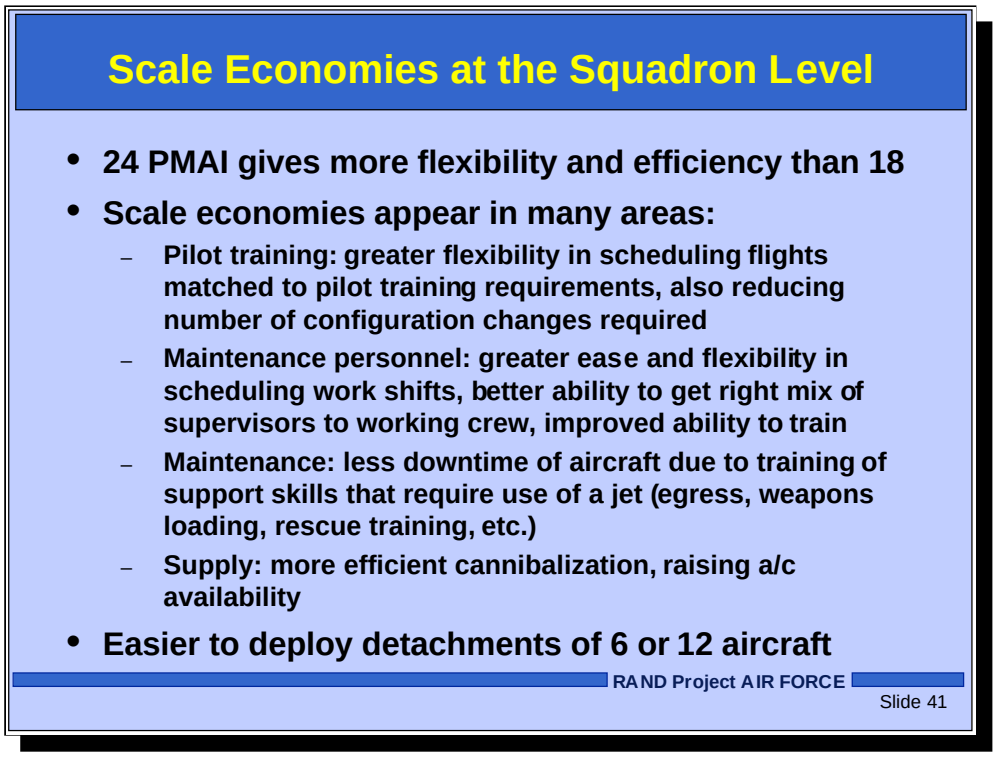
Neither the pilots nor the maintainers at the 388th have much confidence that the stability during the Kosovo vulnerability was anything more than an aberration. They believe that the return to "normalcy" after Kosovo will bring the same health problems the wing has faced for some time.

[9]We understand that improving the availability of supplies for units tagged for Kosovo had the effect of reducing availability for other units—this despite an earnest effort by the depots to surge.



These health problems are summarized above. We have shown that the pilots are not able to fly enough sorties to sustain a healthy experience mix. On average during normal home-station operations, new pilots are taking 8–10 months longer than they should to become experienced. This bumps them up against the time when they are eligible for reassignment. Additionally, while the recent deployment to Al-Jaber did provide good pilot training, this often is not the case. If hours flown on deployment are less relevant to gaining proficiency and skill, a pilot may reach 500 hours but with less real experience. This is represented by the question mark at the top of the bar in the left panel.

On the maintainer side, diminishing OJT and upgrade training has become a severe problem that will inhibit the ability of the wing to rejuvenate its maintainer inventory for the foreseeable future. Compared with 3–5 years ago, 5-/7-level maintainers are spending nearly 50 percent less time on these activities—even under normal circumstances, without considering operational demands. If we add these operational demands, the reduction increases to over 65 percent. Given that there are fewer 5-/7-levels and more 3-levels, this does not bode well for the future health of the wing. Considering that other wings face similar problems, this also does not bode well for the USAF as a whole.



We have noted that when the 34th FS deployed to Kuwait, the remaining segments of the squadron had great difficulty producing sorties because of difficulties in maintenance. We have also indicated how this improved when the 34th and the 421st were merged and managed as one squadron. In effect, the 421st was able to reap the benefits of operating at a somewhat larger scale by functioning as a squadron of 26 PMAI rather than 18. As noted, the reports we received indicated that the transition was easy to accomplish for pilot training but was more difficult for the maintainers, although after the transition had been worked out they, too, found that increased size gave greater flexibility and efficiency. The slide above summarizes some of the most important benefits of a larger squadron.

Under the Ready Aircrew Program (RAP), pilot training requirements are established by experience and skill. The reason for this is that the content of a training mission should be tailored to an individual pilot's particular requirements. However, a training flight usually involves a flight of four ships, sometimes more, and it then becomes necessary to design a training schedule that satisfies the requirements of pilots of several different skill and experience levels. The greater the pool of pilots from which the flight schedule is made up, the easier it becomes to match the training syllabus to an appropriate set of pilots for each flight. This achieves training efficiencies that in the long run potentially could save sorties. Another benefit is that the larger pool of pilots makes it possible to retain an air-to-air or an air-to-ground configuration of a dual-mode aircraft like the F-16; every time configuration has to be altered, it costs time, creates more work for maintenance personnel, and always involves the risk of something on the aircraft breaking—which costs sorties.

There are additional benefits on the maintenance side. An increase in the number of aircraft in a wing will require more people in maintenance and support, both in the flying squadrons and in the maintenance squadron. LCOM estimates that these additional manpower requirements would add at least 201 spaces to the wing.[10] This would give each flying squadron an additional 42 spaces, and the maintenance squadron would gain an additional 75 spaces. The larger manpower pool would allow much greater flexibility in matching supervisors to production personnel over the two to three shifts maintainers work. This would also help with providing better supervision of on-the-job training.

Larger squadron size would also enable efficiencies in both maintenance and supply, contributing to higher sortie rates. Larger squadrons increase the likelihood of having a backup aircraft ready if one has to be aborted prior to takeoff. They also allow greater efficiencies in cannibalization, which leads to higher mission capable rates. It also becomes less of a problem to take an aircraft out of the sortie rotation to make it available for various kinds of support training (e.g., weapons loading, egress training, etc.).

In addition, larger squadrons lead to overall savings in manpower. The Air Staff has calculated a net savings for the Air Force of 128 pilot positions if all 18-PMAI squadrons were turned into 24-PMAI units. The savings come from overhead slots, i.e., RPI-6s who serve in staff positions in the wing. The number of overhead positions is the same in small as in large wings, so there is a net savings from reducing the number of wings and increasing the size of the squadrons in the remaining wings. There are also savings in maintenance manpower. In going from 18 to 24 PMAI, LCOM estimates show a reduction of maintainers per aircraft of about 10 percent, reflecting greater efficiencies in maintenance operations.

Lastly, one significant advantage of larger squadrons is that they make it much easier to support contingency operations with detachments of 6 to 12 jets. It is a much greater imposition on the scheduling of pilot training and of maintenance when one- to two-thirds of a squadron deploys, rather than a fourth to a half. Increased size provides somewhat of a buffer in times of turbulence caused by repeated deployments.

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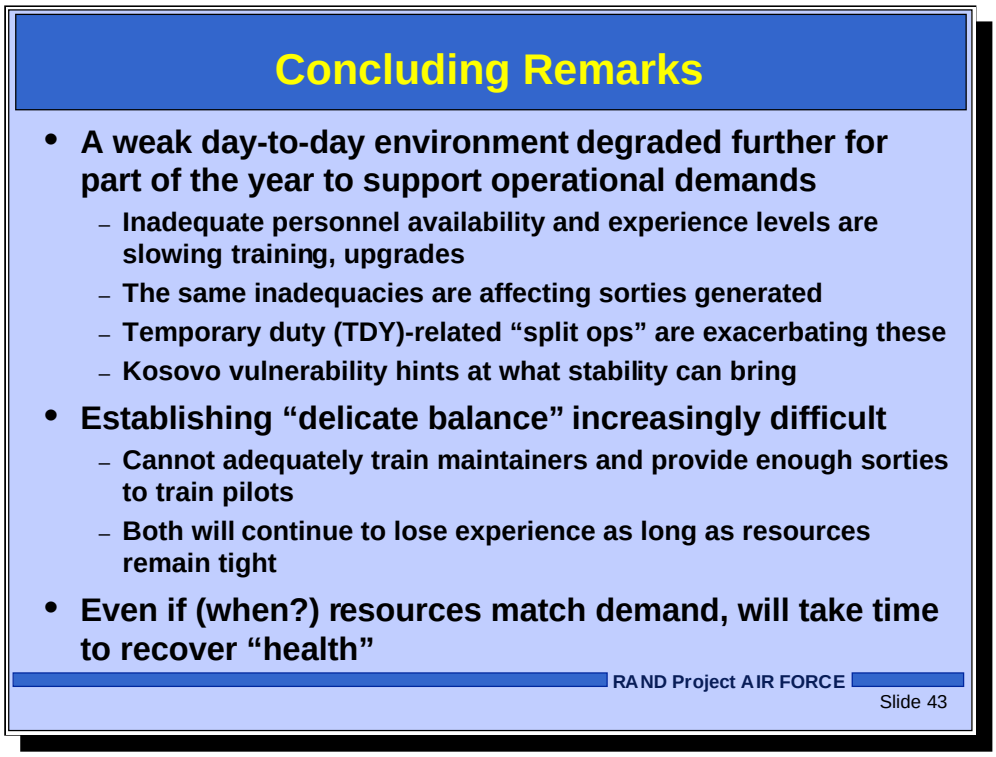
[10]Using the 1986 WMP-5, the number rises from 1,197 to 1,398.



To summarize, the 388th FW faces a mismatch between the tasks it must accomplish and the resources at its disposal. The turbulence that accompanies systemic shortfalls and operational demands in the form of split ops has continued unabated. A stable environment is necessary to help alleviate these problems. Even with such an environment and the resources to support it, one should not expect a rapid return to health. It would likely take several years to reestablish a pilot and maintainer inventory—and a healthy balance—that is sustainable.

The recipe we follow in this study begins with establishing what a healthy wing should comprise. Our focus on setting the right standards is critical to assessing the readiness of the force. Without the proper standards and the right metrics for tracking how units are capable of meeting those standards on a day-to-day basis in executing their program, senior management will never be able to identify and assess adequately what shortfalls in readiness exist throughout the force.

In this study, we choose not to address options for resolving many of the problems we identify. Clearly, there is much that could be done at the MAJCOM, Air Staff, Office of the Secretary of Defense (OSD), and congressional levels to increase the resources at the wing level to match *all* assigned taskings—especially with a long-term view in mind. Any related decisions certainly would require difficult, painful trade-offs that go beyond the research in this document. We do believe, however, that the causes of these problems are manifold, and that "throwing" money at them is not the sole remedy. Increasing resources—dollars, manpower, equipment—would not likely bring the wings back to "health" without a clear understanding of how USAF and DoD policies affect this health and how changes in specific policies might improve it.