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Developing a Standard Update Process for the Army’s Annual MOS Availability Factors (AMAFs)

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Summary

The number and specialties of personnel distributed among U.S. Army units can have a significant impact on Army operations. An insufficient number of personnel, or a mismatch between the military occupational specialties (MOSs) of personnel and unit task requirements, could affect units’ readiness and overall performance. As the frequency and variety of Army operations increase, careful allocation of manpower becomes particularly critical. Thus, the U.S. Army Force Management Support Agency (USAFMSA), the organization largely responsible for calculating and documenting Army manpower requirements and authorizations, is striving to continuously improve that process to meet Army needs.

To determine the manpower requirements for a particular mission, the Army matches the estimated number of man-hours required by the mission (demand) to the estimated number of productive man-hours available to perform these tasks (supply). Currently, USAFMSA integrates data from multiple sources to measure Manpower Requirements Criteria (MARC), the set of factors used to calculate combat support (CS) and combat service support (CSS) manpower requirements. MARC components include the number of labor-hours required per task or activity, the required number of tasks or activities, and the productive time that a soldier has available to perform those tasks.

A key element in the manpower requirements calculation is the annual MOS availability factor (AMAF), which refers to the amount of direct and indirect productive time (over the course of a year) that a soldier has available to perform MOS duties. Traditionally, the Army has calculated AMAFs by measuring soldiers’ non-available hours per day, i.e., the time that a soldier does not have available for MOS-related tasks. The remainder of the 24 hours is then treated as available time, which the Army measures on an annual basis. The AMAF is based, in large part, on field data collection that identifies specific “non-availability factors” and measures how much time soldiers allocate to each of those activities. The Army conducted AMAF studies in 1983 and 1992; however, updates are rare because of the investments of time and dollars required to carry them out.
Over the past decade, however, there have been important changes in the Army’s force structure, operational concepts, and planning scenarios. Recognizing that these and other developments (e.g., new technology) could affect soldiers’ available time, USAFMSA asked RAND to help assess and improve the AMAF update process. The goals of the research were to identify lessons learned from other services and commercial organizations and to develop an approach to AMAF estimation that offers the Army a more adaptive, lower-cost update process.

**Lessons Learned from the Other Services and Commercial Organizations**

Methods for determining non-available time can be broadly described as either “directive” or “calculation” approaches. The directive approach involves establishing a fixed amount of time per day for function/MOS duties, while the remainder of the day, i.e., the time left over after spending the required hours on function/MOS duties, is designated as non-available time. In contrast, the calculation approach involves examining how personnel actually spend their non-available time—that is, identifying specific activities within the category of “non-available time” and then measuring the time spent on each activity. This approach computes how much time personnel need for personal and unit-related activities, and then treats the remaining time in the day as available time for function/MOS duties. Traditionally, the Army has used the calculation approach, but an important question to consider is whether the directive approach might be more appropriate.

A review of other military services’ treatments of non-available time suggests that their approaches are more directive than that of the Army. For example, the Navy samples productive work-hours to generate an approved standard measure of a productive workweek, which is the basis for its work-hour availability factor (WAF), the “average number of work-hours per month an assigned individual is available to perform primary duties” (Navy Manpower Analysis Center, 2000: M-22). The Air Force uses a detailed simulation model of demand to estimate the monthly labor-hours and number of personnel from each Air Force Specialty Code (AFSC) required to accomplish tasks. An implicit assumption of the model is that the requirements will leave personnel with sufficient time for activities that are not related to their functional duties,
so that detailed non-availability calculations are unnecessary. In the Marine Corps approach, neither task demands nor personnel available/non-available time is calculated. Instead, the organization relies on rules of thumb as well as input from subject matter expert (SME) groups to determine the number and types of personnel needed for a particular work area.

In the commercial sector, we found examples of both the calculation and directive approaches to non-available time. A common calculation approach, particularly in the healthcare and manufacturing sectors, is activity analysis, which entails identifying the tasks performed in an organization or organizational unit, examining the relationships among those tasks, and distinguishing between those that are primary versus secondary, value-added versus non-value-added, or productive versus nonproductive. In commercial firms that, like the Army, have “deployed” personnel who frequently reside at a worksite away from their families and homes, the directive approach to non-available time is prevalent. For example, while deployed, oil rig workers typically spend 12 hours on-duty and 12 hours off-duty per day.

Our review of military and commercial approaches to non-available time resulted in some lessons for the Army:

- The calculation approach tends to be costly and time-consuming because of the data collection required. Additionally, it is difficult to capture accurate data on some non-availability factors.
- The directive approach has the advantage of lower cost, although the resulting personnel requirements may be difficult to defend unless the organization has very well defined and substantiated task requirements, such as the Air Force and offshore drilling firms. Without clear task requirements, the risk is that personnel requirements will be subject to challenge.

A More Adaptive, Lower-Cost AMAF Estimation Method for the Army

Assuming that the Army decides to continue using a calculation approach, a key challenge of AMAF estimation is finding an update process that can be done regularly—but without each update necessarily requiring the substantial investment that prior updates required. At times, a quick, rough assessment of
one or more non-availability factors may be sufficient, while at other times, potential changes will most likely require more rigorous assessment of non-availability factors. Rather than using a single data-collection approach for all updates, the Army may find it more cost-effective to match the approach to the scope of the update. Below we list three common data-collection approaches that, together, offer a range of options.

**SME judgments.** This approach, used by the Marine Corps, is fast and relatively inexpensive. It involves soliciting the opinions of a small group of experts on the topic of interest, either by meeting with them in person or remotely (by email or phone). While the method typically does not yield data for a statistical analysis, it can offer reasonable answers to a small set of questions that are limited in scope, and it can take as little as a week or two to complete.

**Web survey.** This method involves posting a questionnaire at a website and emailing a target population to solicit their participation. The process of developing and implementing a web survey (including questionnaire design, creation of a sampling plan, tracking of responses, and analyzing results) can take as long as 2 to 4 months. Labor-hours and software requirements make this approach costlier than SME judgment, but the resulting data are generally of reasonable quality and suitable for statistical analysis. However, this method is susceptible to survey errors, including self-selection bias. Web surveys also tend to have low response rates.

**Structured observation.** More time-consuming and expensive is the structured observation approach, which involves direct observation and systematic recording of events, behaviors, and conditions in a setting of interest. Data obtained through this method tend to have fewer biases and thus higher quality than the self-report data captured by surveys. Structured observation can also offer a statistical sample, if enough observations are made. This approach is less susceptible to response biases than self-report methods, and allows researchers to capture context more effectively than web surveys.

**AMAF Estimation Could Incorporate a “Three-Gate” Approach to Data Collection**

All three data-collection methods might be used by the Army to inform AMAF updates, as described below.
Quick Reaction Method. If a rapid, rough assessment of non-available times is required, then a data-collection approach that is fast, low-cost, and low in statistical rigor may be sufficient. The Quick Reaction Method primarily calls for SMEs but may involve limited use of the internet for gathering data from those SMEs or conducting a small-scale web survey. This method would be appropriate when reports from the field or an automated flag from a data system suggests that personnel may not have enough time to perform maintenance or other tasks and a quick assessment is needed to determine the magnitude and source of the problem.

Hasty Method. If somewhat more time is available and a broader assessment of non-availability factors is required, then a moderately costly data-collection approach involving a larger sample (and more statistical rigor) may be appropriate. This method primarily involves administering a web survey to a large sample, but it may also include supplementary, on-the-ground observations and data collection to use as a comparison to check for potential sampling biases or other sources of error. The Hasty Method may be necessary when the Quick Reaction Method indicates that a problem may be systemic (affecting more than a few units) and that more extensive data collection is required for verification and statistical analysis.

Deliberate Method. If the quality of an estimate is particularly important but speed is less critical (e.g., if results of the update will be used for long-term planning and documentation rather than for temporary adjustments to manpower), then a slower, highly rigorous, and more expensive approach may be warranted. Additionally, a substantial change in Mission, Enemy, Terrain, Troops available, Time, and Civilian considerations (METT-TC) may warrant a more thorough review of non-availability factors to ensure their relevance and accuracy; thus, METT-TC constitutes a potential trigger for use of the Deliberate Method.

Figure S.1 summarizes some of the features of each of these data-collection approaches in terms of time required, quality (both in terms of confidence in the data quality and statistical rigor), and cost.
The Quick Reaction, Hasty, and Deliberate approaches to AMAF estimation, and the data-collection methods each incorporates, need not be mutually exclusive. Rather, they may feed into one another, as shown in Figure S.2. For example, if reports from the field suggest that organic personnel at CSS units do not have enough time to provide unit security, MARC planners could begin investigating the issue via the Quick Reaction approach, sending a set of questions by email to a group of SMEs. If responses to the questions suggest that the problem is minor, then AMAF adjustments may be unnecessary, and planners should simply continue to monitor the situation. But if SMEs indicate that the problem is significant and widespread, then planners can begin the Hasty Method for updating AMAFs, distributing a web survey to a larger sample, with supplementary spot checks on the ground. If the web survey yields high-quality data (e.g., reasonable response rate, representative sample, low measurement error, minimal response bias), then those data may serve as a basis for AMAF revision. If not, the Deliberate Method is warranted.
The Army May Also Want to Further Refine the Update Process

Additional decisions to be made about the AMAF update process include the extent to which AMAF tailoring is needed, which non-availability factors should be examined, and how frequently updates should be performed.

AMAF Tailoring. Historically, the Army tailored calculations of non-availability factors to the type of unit (i.e., Combat, CS, or CSS); the unit’s location on the battlefield (i.e., Division/Brigade Combat Team, Corps/Support Brigade, or Echelons Above Corps); and the amount of unit movement. However, non-availability factors have not been tailored on the basis of other dimensions, even though such dimensions could cause non-available times to differ. While tailoring the AMAF according to numerous dimensions may be impractical, some dimensions are particularly relevant to soldier non-available time and, thus, may be natural candidates for further AMAF tailoring. These areas include different MOSs, deployment conditions and the type of contingency/mission, OPTEMPO, basing conditions, and other factors.
Inclusion of Non-Availability Factors. Another important decision for MARC planners is which non-availability factors to include in the AMAF updates. Several potentially significant factors did not appear in the 1983 and 1992 studies, including rest and recuperation, physical training, and personal digital communications. To determine which non-availability factors to exclude or include in a future data-collection process, the Army might want to adopt a threshold such as the “2 percent rule”: If a factor is likely to consume more than 2 percent of a soldier’s waking hours, it is probably worth measuring.

Frequency of Updates. An update process that permits more frequent data collection will help ensure that non-availability factors reflect technological or socioeconomic changes. But how frequently should the Army conduct updates? The answer is likely a function of Army preferences, the triggers being monitored, and the TOE modification process. If the Army were to implement the three-pronged approach to AMAF estimation described earlier, it would be important to define and monitor possible triggers for each method. For example, some triggers might initiate the Quick Reaction method, while others may initiate the Hasty or Deliberate method. Then, depending on the information revealed by these estimation methods, either short-term or long-term staffing adjustments may be needed.

Metrics Can Be Used to Assess the Fit of AMAFs to Units and Tasks

The Army can also use various techniques to assess the fit of AMAFs to the units and the tasks they encounter. A direct method of assessing whether there is enough time to accomplish all the duties and personal requirements in a soldier’s day is to “ask the customer,” e.g., use web-based surveys of soldiers to assess the fit of workload to available productive time. A second, more indirect method is to carry out exit interviews/surveys and re-enlistment surveys with soldiers. If the results from such surveys showed, for example, that the top reasons cited for not re-enlisting include responses like “excessive workload” or “burnout from too much work,” this may be an indicator that there is a possible mismatch of manpower to workload.

The Army might also consider ways of formalizing estimation methods. AMAF calculations vary across factors, and the underlying logic and specific algorithms are spread across a number of publications. Having a single place
that gathers and makes accessible all the supporting information for AMAF calculations has a number of advantages. Supplying formally defined AMAF factor calculations in a locked spreadsheet, publicly available for download, provides some advantages over the current, paper-based formalization. This approach allows any interested party to inspect the calculations, assumptions, and underlying data, and allows changes to the calculations to be documented.

**Conclusion**

With the Army transitioning from conventional, sporadic warfare to less conventional, persistent conflict, it has become essential to create a more flexible and responsive structure. The ability to move personnel and/or reorganize units quickly, whether to manage new threats or adapt to new technology, requires a MARC process with regular reviews and adjustments. The three-pronged approach proposed in this study can give the Army a process that is adaptable to the full range of missions that the Army must be prepared to fulfill.