

Technical Report 1431

**Army-Wide Job Analysis for Warrant Officers:
Identifying Knowledge, Skill, and Behavior
Requirements from the Army Talent Attribute
Framework Volume I: Main Report**

**Ryan P. Royston
Naiqing Lin
U.S. Army Research Institute**



July 2023

**United States Army Research Institute
for the Behavioral and Social Sciences**

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**U.S. Army Research Institute
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**Department of the Army
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Authorized and approved:

**GERALD F. GOODWIN, Ph.D.
Acting Director**

Technical Review by:

Dr. Jamie Striler, Army Research Institute
Dr. David Glerum, Army Research Institute

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| 14. ABSTRACT The Army-wide Job Analysis for Warrant Officers identifies Knowledge, Skill, and Behavior (KSB) requirements for active-duty Warrant Officer (WO) Military Occupational Specialty (MOS) and ranks using the newly developed Army Talent Attribute Framework (ATAF). Data was collected via an online survey system. WOs rated the importance of all 198 ATAF KSBs for successful performance in their position. This research serves as a baseline for future talent management research, such as investigating new job analytic techniques, tracking Army modernization efforts, and analyzing force restructuring demands for particular attributes. This research also serves as a critical baseline for informing numerous current and future Army talent management efforts outlined in the Army People Strategy (2019) – a) Acquire, b) Develop, c) Employ, and d) Retain. Army stakeholders, workforce analysts, talent managers and strength managers (i.e., those responsible for tracking incoming and outgoing Soldiers) may use these findings to determine position attribute requirements, and better match individuals to open positions, identify talent gaps, and provide individual developmental opportunities. WOs have specific skill requirements due to the high degree of specialization within their jobs, consequently, collecting information on current WO perceptions of KSB importance will help advise future talent alignment efforts in the Army talent marketplace. | | | | | |
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**Predictive Analytics and Modeling Research Unit
Charles T. Keil, Chief**

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ARMY-WIDE JOB ANALYSIS FOR WARRANT OFFICERS: IDENTIFYING KNOWLEDGE, SKILL, AND BEHAVIOR REQUIREMENTS USING THE ARMY TALENT ATTRIBUTE FRAMEWORK VOLUME I: MAIN REPORT

EXECUTIVE SUMMARY

Research Requirement:

The Army has focused on developing a talent management system that effectively recognizes and uses an individual's knowledge, skills, and behaviors (KSBs). The Army People Strategy (2019) outlines the Army's approach to a strategic talent management-based personnel system through: 1) Acquiring, 2) Developing, 3) Employing, and 4) Retaining Talent. Implementing a modernized, data-driven talent management system for the Army will enable strategic workforce development, reduce talent gaps, and increase overall Army readiness. An essential component to modernizing the Army's talent management system is to identify the attributes that are necessary for Soldier performance. To meet this critical Army's need, the primary objective of the current research was to conduct a large-scale job analysis to identify the attributes critical to success in positions across each Army warrant officer (WO) Military Occupational Specialty (MOS) and rank using the newly developed ATAF.

Procedure:

Data was collected via an online survey system. A total of 10,783 WOs were invited via email to participate in the survey. Additionally, an open-internet link to the same survey was approved to increase survey access. Participants responded to position and service questions (e.g., time in position, time in rank, MOS), then were presented with the complete Army Talent Attribute Framework (ATAF) KSB list and asked to rate the importance of each for performance in their position. The survey was open from 4 November 2021 to 31 March 2022. After data cleaning, the dataset consisted of 1,065 WOs across numerous MOS.

Findings:

This report summarizes overall WO KSB importance ratings, along with KSBs that emerge according to one's rank. The results of this study provide insight into the unique skills requirements for WO duty requirements based on the recently developed ATAF. Several sets of descriptive analyses were performed to identify the most important KSBs for overall WOs, as well as by rank and MOS. Warrant officers tend to have very specific skill requirements due to the high degree of specialization within their jobs, consequently collecting descriptive information on WO ratings of KSB importance will help advise future talent alignment efforts in the Army talent marketplace and provide strength managers with information on position requirements, which can be used to match individuals to positions based on KSB alignment.

Utilization and dissemination of findings:

The results of this job analysis will be used by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) to guide numerous talent management research efforts. For example, this data will allow researchers to explore new approaches to job analysis (e.g., by extracting job requirements from text responses using natural language processing) and identify where and how assessments may most be needed (and, where necessary, develop such assessments). This job analysis also served as an important baseline for supporting Army talent management efforts based on the Army People Strategy (2019) of acquiring, developing, employing, and retaining critical talent. Results from this job analysis survey will be used to improve the Assignment Interactive Module Version 2 (AIM2) Marketplace process for individuals applying to positions, as well as for Army talent management and strength managers (i.e., individuals responsible for tracking incoming and outgoing Soldiers). For individual WOs, understanding how KSBs are used in the Marketplace enables them to communicate their strengths to units of interest, and allow them to identify areas in which they need further development in preparation for a desired position. For strength managers, data from this study allows them to better match candidates to available job positions based on alignment between the candidate's strengths and position requirements using effective selection and assessment strategies. Understanding the critical knowledge, skills, and abilities needed for specific positions will allow the identification of reliable and valid assessments for selection, assignment, and evaluating performance. Further, regarding the Army's focus on employing talent, individuals can identify developmental areas to facilitate their career trajectory and engage in relevant trainings or experiences and be matched to positions for which they are good matches. In support of the Army's focus on retaining talent, the position requirements outlined by this study will allow Army talent management to identify individuals with in-demand talents and find opportunities for career counseling and permeability (i.e., moving between different workforce positions for which they may be suited).

ARMY-WIDE JOB ANALYSIS FOR WARRANT OFFICERS: IDENTIFYING
KNOWLEDGE, SKILL, AND BEHAVIOR REQUIREMENTS FROM THE ARMY TALENT
ATTRIBUTE FRAMEWORK VOLUME I: MAIN REPORT

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Army-Wide Job Analysis for Warrant Officers: Identifying Knowledge, Skill, and Behavior Requirements Using the Army Talent Attribute Framework

Volume I: Main Report

The Army People Strategy (2019) outlines the Army's goal of moving from talent management processes that rely heavily on filling empty billets to data-driven processes that strategically and actively manage the talents of Army personnel. The Army's approach to a strategic talent management-based personnel system includes four lines of effort: 1) Acquire, 2) Develop, 3) Employ, and 4) Retain Talent. The Army has focused on developing a talent management system that should effectively recognize and then utilize individual's knowledge, skills, and behaviors (KSBs) and places individuals in roles that align with their KSBs. Implementing a modernized, data-driven talent management system for the Army can also enable strategic workforce development, reduces talent gaps, and increases overall Army readiness. With the recent development of the Army Talent Attribute Framework (ATAF), the Army now has an extensive taxonomy of the various attributes relevant to individual Soldier success. An essential component to modernizing the Army's talent management system is to identify the attributes that are necessary to perform successfully in each position.

In order to support the Army's focus on acquiring, developing, employing, and retaining talent, the purpose of this research was to conduct a large-scale job analysis to identify KSB requirements for warrant officers (WOs), both by rank and by Military Operation Specialty (MOS). The results of this study provide a complete summary across the entire Army and identifies critical attributes to successful performance and position requirements for WOs.

Specifically, in support of the Army's focus on acquiring talent, this job analysis provides Army talent management and strength managers (i.e., individuals responsible for tracking incoming and outgoing Soldiers) with an understanding of attribute requirements for each position. This understanding allows them to communicate position requirements to the talent pool and better match candidates to available job positions by aligning the candidate's strengths and position requirements using a valid and reliable assessment strategy. In support of the Army's effort to develop talent, the results of this study facilitate the identification of talent gaps and opportunities to develop individuals through appropriate training, education, and credentialing. In support of the Army's emphasis on employing talent, this job analysis supports the Army's emphasis on retaining talent by emphasizing alignment between individual strengths and job requirements, as well as informing talent-based individual career pathing. The Army has recognized the importance of person-job alignment and is actively engaged in modernizing Army talent management by better aligning individuals to jobs and career opportunities based on their attributes. Further, this study supports the Army's focus on retaining talent by providing an understanding of position attribute requirements, as well as workforce positions with similar attribute requirements. This understanding allows Army talent management to identify individuals with in-demand talents and engage these individuals with opportunities for career counseling and permeability (i.e., moving between different workforce positions for which they may be suited). Emphasizing alignment between individual attributes and position requirements has been shown to increase worker job satisfaction, motivation, and retention (e.g., Barrick & Mount, 2005; Barrick & Parks-Leduc, 2019). This large-scale job analysis was approved by Army senior leadership to support this critically important modernization effort.

Further, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) researchers can use the results of this job analysis as a critical baseline for informing and guiding a number of talent management research initiatives. For instance, analysis of individual text data collected during job analyses can be time-consuming and cumbersome (Putka et al., 2022); however, new approaches such as natural language processing (NLP) and machine learning (ML) can facilitate more efficient ways of extracting attribute requirements from job incumbents. This data will also help researchers and planners better understand where particular types of assessments may be most needed in the future.

The Army Talent Attribute Framework

The Army Talent Attribute Framework (ATAF) was a joint effort between ARI and Army Talent Management Task Force (ATMTF) to develop and adopt a common framework for describing the capabilities of Army personnel and the requirements of positions throughout the Army (Royston et al., 2022). It consolidates the attributes contained within the “21 Talents” of the Office of Economic and Manpower Analysis (OEMA), ADP 6-22’s leadership competency model, and the Army Talent Alignment Process (ATAP) KSB-P list. It also contains attributes identified as being important to Army personnel from the Department of Labor’s Occupational Information Network (O*NET) and from an extensive review of academic sources.

The ATAF’s structure and each attribute’s label and definition was agreed upon by the ATMTF, OEMA, U.S. Army Training Doctrine and Command – Operations, Plans, and Training (TRADOC G-3/5/7), and three organizations from the Combined Arms Center, including Army University, Center for Army Professional Leadership, and Mission Command Center of Excellence (Royston et al., 2022). The ATAF also received approval by the Assistant Secretary of the Army (Manpower & Reserve Affairs) to be the standard framework for attribute data in the Military Implementation Plan (Army People Strategy, 2020). Currently, the ATAF is being implemented within the Integrated Personnel and Pay System-Army (IPPS-A) to assess, report, develop, and track talent attributes of military personnel and is being piloted in Army talent management systems such as Assignment Interactive Module 2.0 (AIM 2.0). The standardized framework provides commonality among talent management initiatives allowing data linkage across different talent applications. Additionally, the ATAF undergoes an annual review cycle to revise and refine the framework to ensure it meets changing and emerging needs of the Army (e.g., Royston et al., 2022; Royston & Berger, in preparation; Royston & Glerum, in preparation).

The ATAF model is structured within three tiers or levels in order to facilitate Army talent management professionals to visualize and understand how attributes are interrelated. Tier 1 consists of seven Talent Domains representing broad categories of attributes: (1) Cognitive, (2) Communication, (3) Disposition, (4) Interpersonal, (5) Leadership & Management, (6) Expertise & Personal Competence, and (7) Physical. Tier 2 represents 42 sub-categories or Talents, which are defined as “unique, measurable clusters of highly interrelated knowledge, skills, and behaviors possessed by an individual, which results in effective performance when properly aligned against a particular job” (Royston et al., 2022, p. 7). Tier 3 contains 198 measurable KSBs that are contained within the 42 Talents. In contrast to most traditional talent management

systems, which use the terminology of KSAO (Knowledge, Skills, Abilities, and Other Characteristics) to describe attributes required by individuals with a given position, the Army uses the term KSB (Knowledge, Skills, Behaviors), where Behavior is used as a substitute for Ability and Other Characteristics.

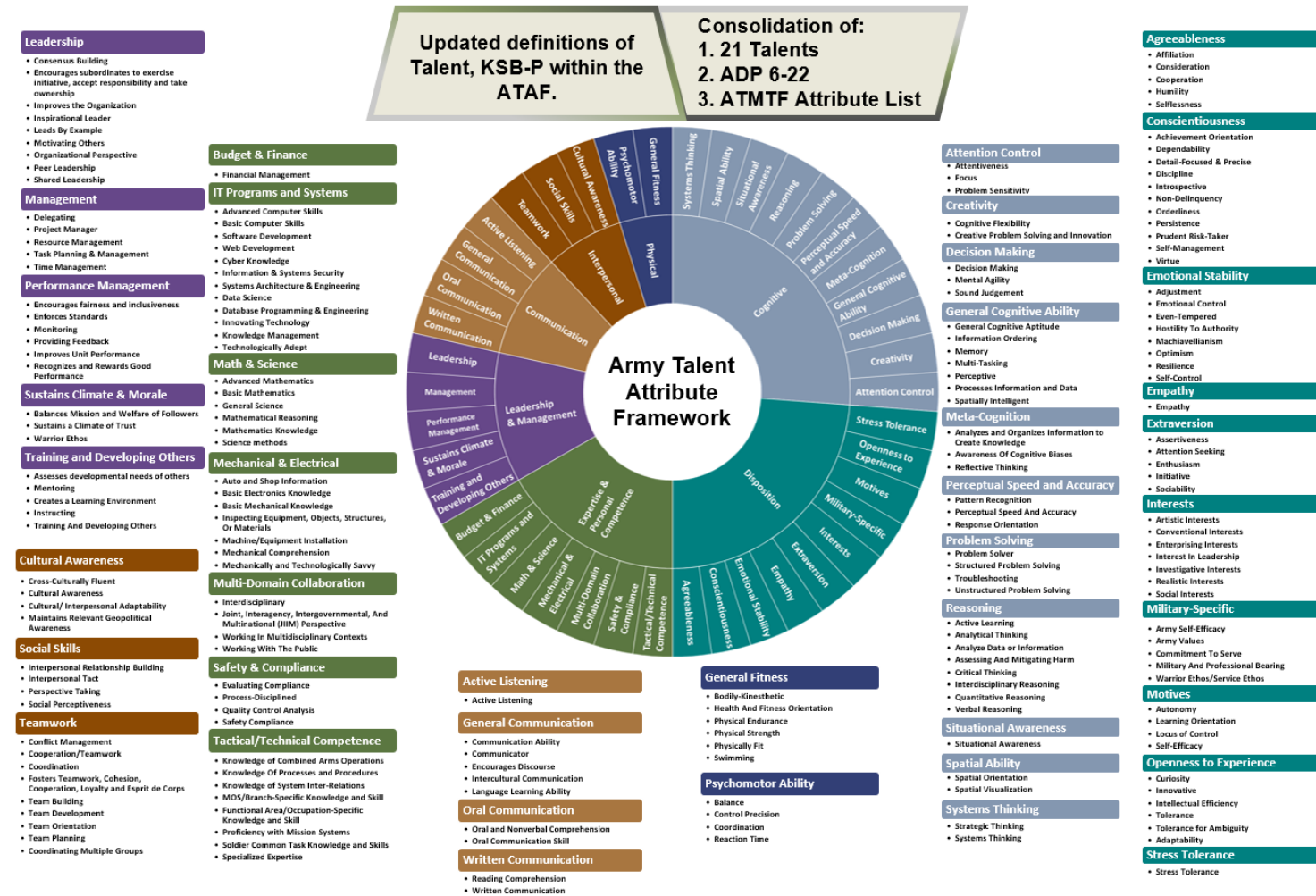
KSBs are further defined as follows (Royston et al., 2022):

- Knowledge:** “What I know”: A topically organized set of facts and information acquired by a person through experience, education, or training, which supports work-related performance.
- Skill:** “What I can do”: A person’s proficiency and ability to perform a job-related activity that contributes to effective performance or learning.
- Behavior:** “How I act”: A person’s values, attitudes, and temperament as evidenced through their actions.

For a complete visual representation of the ATAF, see Figure 1.

Figure 1

Complete Army Talent Attribute Framework



Note: Tier 1 Talent Domains depicted in the inner circle, Tier 2 Talents in the outer circle, and Tier 3 measurable KSBs listed on outside of circle.

Job Analysis Purpose

Job analyses are a critical component of workforce planning and may be conducted for a variety of reasons. Job analyses are intended to identify job requirements and establish criticality of job duties and tasks, along with what worker qualifications are needed to successfully perform work duties. Job analyses also provide information for job descriptions, classification, evaluation, and design. They are the basis for developing performance appraisals, conducting training needs analysis, strategic workforce planning, identifying hazardous behaviors and conditions, and determining compliance with regulations and laws. Of relevance to the current study, job analysis can be used for identifying the knowledge, skills, and abilities required for a role, which can then be used to match individuals to jobs (Morgeson et al., 2020). Person-job alignment has long been recognized as being critical for improving worker job satisfaction, motivation, and retention (e.g., Barrick & Mount, 2005; Barrick & Parks-Leduc, 2019) and the Army has also acknowledged this concept and is now taking strides to improve how individuals are matched to positions.

There are a variety of job analysis methods that can obtain the necessary information to accomplish one's goals. The goals of this job analysis were to: 1) determine the relative importance of job duties for each position, and 2) determine which KSBs are critical to successfully job performance, therefore a task inventory approach was determined to be most appropriate. The task inventory approach involves developing a list of tasks or duties that make up a job position, then administering the list to job incumbents (i.e., an individual who currently holds a given position) who rate each task or duty on importance, frequency, or difficulty (Gael, 1983). Tasks are usually generated from sources such as job descriptions, job incumbent interviews, or other documents describing duties or tasks (Wyse & Babcock, 2018). After tasks are generated, incumbents provide task ratings which allow researchers to create a statistical summary of the importance, frequency, or difficulty of each task. This summary is determined through the calculation of means and standard deviations (*SD*) of task ratings selected (e.g., importance, frequency). For this research, each WO rated the importance of each ATAF KSB for successful performance in their job position. Importance scales used in job analysis tend to be one of the most reliable scales in these studies (e.g., Dierdorff & Wilson, 2003; Sanchez & Fraser, 1992).

These KSB importance ratings can then be observed to build soldier profiles outlining the most important KSBs for WOs by rank or in a particular MOS. The aim of these soldier profiles is to provide a critical baseline to support current and future Army talent management, including improving person-job alignment, identifying training needs, increasing job satisfaction, aiding career progression, and facilitating succession planning. Traditionally, the Army assigned individuals to positions based on availability and rank, rather than considering how one's talents and attributes aligned with position requirements. However, as the Army begins modernizing its talent management system, it has recognized the advantages of emphasizing person-job fit and understanding what attributes facilitate success in particular positions. Additionally, this job analysis may allow for an improved AIM 2.0 Marketplace process for Soldiers by enabling them to communicate their attributes and strengths to units, and identify attributes to further develop in preparation for a desired position.

Method

Survey Development

The survey contained a Privacy Act Statement and a Project Summary, which provided information about the survey’s purpose, voluntary participation, confidentiality of data, and estimated time needed to complete the survey. The first section contained position and service questions such as time in position, time in rank, and Military Occupational Specialty (MOS). See Appendix A for complete list of position and service items, along with demographic items. The second section consisted of a MOS-specific duty list¹ based on their MOS input in Section 1.

Please see Appendix B for complete MOS-specific duty lists. In the third section, participants were presented with the complete 198 KSBs from the ATAF and asked to rate the importance of each for performance in their position. See Appendix C for complete ATAF and rating scale. Following importance ratings of the 198 KSBs, participants responded to several demographic items. See Table 1 for overview of each section of the job analysis survey.

Table 1

Overview of Army-wide Job Analysis Flow and Content

| | |
|--|--|
| Section I: Service and Position Background items (9 Items) | |
| <ul style="list-style-type: none"> • Rank • Time in Rank • Time in Service • Time in Position • Army Component (e.g., Active) | <ul style="list-style-type: none"> • Current Position • Branch/combat/medical or not • Select MOS code • Select numeral following MOS code |
| Section II: Position-specific Item Importance Ratings | |
| <ul style="list-style-type: none"> • Positions with a specific duty list: • Four Common Warrant Officer Items • 3-20 MOS-specific Duty Items • Three Open-ended “Other Duties” Optional Items | <ul style="list-style-type: none"> • Positions without a specific duty list: • Four Common Warrant Officer Items • One Broad Position Duty Item • Ten Open-ended Most Critical Duties/Tasks |
| Section III: ATAF KSB Importance Ratings (198 Items) | |
| <ul style="list-style-type: none"> • Importance Ratings of Complete ATAF 198 KSBs | |
| Section IV: Demographics (4 Items) | |
| <ul style="list-style-type: none"> • Gender • Hispanic, Latino, or Spanish origin or ancestry • Race • Age | |

¹ Analyses of MOS duty lists were not a focus of this report and are presented in a subsequent report. The survey consisted of a series of items that all participants rated in terms of importance: four common WO duties, between 3-20 MOS-specific duties. WOs without publicly available ICTLs were provided with 10 free response textboxes and asked to list up to ten of their most important tasks rather than rating specific duties.

Duty List Development

Duty lists were developed for various positions that would be rated on importance by incumbents (Wyse, 2019). These duty lists were developed by obtaining ICTLs for warrant officer positions from the Central Army Registry (CAR) and then aggregating the tasks listed on the ICTLs to the duty level, which provided a more meaningful unit of rating for incumbents. A team of three industrial-organizational psychologists reviewed each warrant officer position's ICTL and aggregated the tasks to the duty level by identifying clusters of job tasks that were directed at general job goals. Following generation of these duty lists, each list was reviewed by an additional ATMTF Subject Matter Expert (SME) to ensure that all tasks from each ICTL was appropriately represented in their respective duty list, that language was appropriate for Army respondents, and that no lists contained any operationally sensitive or classified information. When ICTLs were not available in the CAR, incumbents were presented with 10 open-ended items in which they were instructed to list the most critical duties or tasks associated with their position. For a complete list of specifying which positions responded to specific duty lists versus open-ended critical duty inputs, please see Table 2 below:

Table 2

Summary of WO MOS-Specific Duty Ratings or Top Ten Critical Duty Input

| Warrant Officer MOS | MOS-specific Duty List | Top Ten Critical Duty Input |
|---|------------------------|-----------------------------|
| 120A - Construction Engineering Technician | X | |
| 125D - Geospatial Engineering Technician | X | |
| 131A - Field Artillery Technician | X | |
| 140A - Air Defense Command and Control Systems Integrator | X | |
| 140K - Air and Missile Defense Systems Tactician | X | |
| 140L - Air and Missile Defense Systems Technician | X | |
| 150A - Air Traffic Control Technician | X | |
| 150U - Unmanned Aircraft Systems Operations Technician | X | |
| 151A - Aviation Maintenance Technician | X | |
| 152-154 - Rotary Wing Aviator | X | |
| 152-155 - Fixed Wing Aviator | X | |
| 170A - Cyber Warfare Technician | | X |
| 170B - Electronic Warfare Technician | | X |
| 170D - Cyber Capabilities Developer Technician | | X |
| 180A - Special Forces Warrant Officer | | X |
| 255A - Information Systems Technician | X | |
| 255N - Network Systems Technician | X | |
| 255S - Information Protection Technician | X | |
| 270A - Legal Administrator Warrant Officer | | X |
| 311A - CID Special Agent | X | |
| 350F - All Source Intelligence Technician | X | |
| 350G - Geospatial Intelligence Imagery Technician | X | |
| 351L - Counterintelligence Technician | X | |
| 351M - Human Intelligence Collection Technician | X | |
| 351Z - Attaché Intelligence Operations Technician | X | |
| 352N - Signals Intelligence Analysis Technician | X | |

| | | |
|--|---|---|
| 352S - Signals Collection Technician | X | |
| 353T - Military Intelligence Systems Maintenance/Integration | X | |
| 420A - Human Resources Technician | X | |
| 420C - Army Music Bandmaster | X | |
| 640A - Veterinary Services Food Safety Officer | X | |
| 670A - Health Services Maintenance Technician | X | |
| 740A - Chemical, Biological, Radiological and Nuclear Technician | | X |
| 880A - Marine Deck Officer | X | |
| 881A - Marine Engineering Officer | X | |
| 882A - Mobility Officer | X | |
| 890A - Ammunition Warrant Officer | X | |
| 913A - Armament Systems Maintenance Warrant Officer | X | |
| 914A - Allied Trades Warrant Officer | X | |
| 915A/915E - Automotive Maintenance/Senior | X | |
| 919A - Engineer Equipment Maintenance Warrant Officer | X | |
| 920A - Property Accounting Technician | X | |
| 920B - Supply Systems Technician | X | |
| 921A - Airdrop Systems Technician | X | |
| 922A - Food Service Technician | X | |
| 923A - Petroleum Systems Technician | X | |
| 948B - Electronic Systems Maintenance Technician | X | |
| 948D - Electronic Missile Systems Maintenance Technician | X | |

Sample Approach

The target population for this survey was Active Duty WOs ranked WO1-CW5. The initial pool was exported from Army Vantage personnel database on 29 September 2021, on the last day of the fiscal year. The survey was open from 4 November 2021 to 31 March 2022. The initial sample of 14,396 was further reduced using the following process. WOs who were either students, WO candidates, entering into a position, or transitioning out of the Army were screened out of the sample.² Additionally, WOs with missing DOD email addresses were filtered out due to the survey being distributed via email. Filtering out these individuals reduced the total WO sample pool from 14,396 to 10,783 Soldiers. Table 3 summarizes survey email invitations according to rank.

² Within the Army Vantage database, Active Duty Warrant Officers have Position Numbers indicating their position status.

Table 3*Warrant Officer Sample Pool by Rank*

| Rank | N |
|-----------------------------|--------|
| WO – Warrant Officer | 1,061 |
| CW2 – Chief Warrant Officer | 4,923 |
| CW3 - Chief Warrant Officer | 2,812 |
| CW4 - Chief Warrant Officer | 1,589 |
| CW5 - Chief Warrant Officer | 398 |
| Total | 10,783 |

These remaining individuals in the sample pool were then asked to participate in the survey via email sent directly to their DOD email address. Due to somewhat low response rates to the email invitation after approximately 4 weeks of administration ($n = 891$ complete responses),³ ARI received IRB approval on 3 Dec. 2021 to create an open link to the survey, which resulted in an additional 263 complete responses, for a total of 1,154 complete responses. For WOs, the Army-wide job analysis survey was administered from 4 November 2021 to 31 March 2022 (email invitation from 4 November 2021 to 31 March 2022 and open link survey from 3 December 2021 to 31 March 2022).

Data Cleaning

A multistep process was used to clean the final response dataset. For those that completed the open-link survey, 37 duplicate cases were dropped for individuals who had already responded to the initial email invitation survey. An additional eight individuals were removed who were not Active Duty, leaving a total of 1,109. After removing these duplicate responses, we used a multiple phases approach for data cleaning, detecting careless responders (Bowling et al., 2018), and ensuring data were of high quality.

First, 13 participants who completed the survey were removed because they did not respond to at least 80% of KSB ratings, leaving a total of 1,096 individuals. Second, participants were removed because they were highly unlikely to have read the items using a survey time analysis, in which participants were removed if they completed the survey unrealistically quickly. Previous research suggests that two-seconds per question tends to be an effective cut-off and converges well with other measures of careless responding (Bowling et al., 2018; DeSimone et al., 2015). Consequently, seven participants were removed because they completed the survey in less than seven minutes (DeSimone et al., 2015; as there are roughly 220 items on this questionnaire, depending on number of MOS-specific duty list items), leaving a total of 1,089 cases.

³ Survey administration coincided with Army’s transition to new @army.mil email addresses and began transition to A365, which may have led to a lower response rate.

The final hurdle entailed a statistical approach to detect individuals who showed little, if any variance across many items, which is often indicative of insufficient effort responding (e.g., selected “Extremely Important” across an unusually high number of consecutive items). This analysis used intra-individual response variability (IRV), which provides an individual-level variance or standard deviation of responses across consecutive item responses. Very low IRV scores indicate individuals who provide straight-line responses (e.g., select ‘Extremely Important’ on most or all items), while individuals with exceptionally high IRV scores may represent highly random responses (Dunn et al., 2018; Marjanovic et al., 2015). This approach has shown to be effective when items in a survey represent several different constructs and contain both positively and negatively worded items (Schroeders et al., 2022). Because including too many items in calculating an IRV index score reduces the sensitivity of the index, it is advised to calculate an IRV index on between 50 and 150 items (Dunn et al., 2018). Further, it is recommended that IRV indexes be calculated in the latter sections of a survey because insufficient effort responding “is more likely to occur later in questionnaires as participants become bored or frustrated and develop strategies to complete the questionnaire as quickly as possible” (Dunn et al., 2018, p. 118). Further, Dunn et al. (2018) point out that calculating IRV indexes in the latter sections of a survey is a strength over insufficient effort response calculations, such as the even-odd consistency index because these forms are “calculated using responses to items that appear early, where IER is less likely to occur. As such, the ratio of the number of responses for which there was IER to the number of responses to which there was attentive responding may be small, creating a degree of insensitivity in the index” (p. 118). We calculated IRV index scores based on participant responses to the last 100 KSB importance ratings, as this represents roughly half of the ATAF KSBs. Using the last 100 KSB ratings in the IRV index calculation was based on previous research suggesting that insufficient effort responding tends to occur more frequently towards the end of a survey as participants grow bored or frustrated (Dunn et al., 2018). Individuals with IRV index scores further than three standard deviations away from the mean IRV index score ($M = 1.30$, $SD = 0.38$) were removed from analysis. Consequently, 24 participants were removed because they either lacked variability (24 cases) or too much variability (no cases).

Following collection of survey responses and data cleaning procedures, the final sample consisted of 1,065 WOs. The final analytic dataset included WOs who met the following inclusion criteria: (a) they completed at least 80% of KSB importance ratings, (b) they are currently serving in Active Duty ranks of WO1-CW, and (c) they met quality control analyses described in the data cleaning procedures.

Participants

Table 4 provides a comparison of the demographic breakdown of the final sample and the Warrant Officer population from the 2021 Annual Demographics Profile of the Military Community (Department of Defense, 2022).

Table 4*Comparison of Sample and 2021 Annual Demographics Profile*

| Demographic | Final Survey Sample and Proportions | 2021 Annual Demographics Profile and Proportions – Warrant Officers |
|---|-------------------------------------|---|
| <i>Gender</i> | | |
| Male | 930 (87.3%) | 13,237 (90.1%) |
| Female | 118 (11.1%) | 1,449 (9.9%) |
| Gender Not Reported | 17 (1.6%) | - |
| <i>Age Range</i> | | |
| 21-25 | - | 300 (2.0%) |
| 26-30 | 22 (2.1%) | 1,483 (10.1%) |
| 31-35 | 166 (15.6%) | 3,758 (25.6%) |
| 36-40 | 362 (34.0%) | 4,834 (32.9%) |
| 41-45 | 295 (27.7%) | 4,311 (29.4%) |
| 46+ | 206 (19.3%) | - |
| Age Not Reported | 14 (1.3%) | - |
| <i>Ethnicity</i> | | |
| Hispanic or Latino | 163 (15.3%) | 1,730 (11.8%) |
| Not Hispanic or Latino | 883 (82.9%) | 12,956 (88.2%) |
| Ethnicity Not Reported | 19 (1.8%) | - |
| <i>Race</i> | | |
| American Indian or Alaska Native | 11 (1.0%) | 72 (0.5%) |
| Asian | 29 (2.7%) | 536 (3.6%) |
| Black or African American | 175 (16.4%) | 2,442 (16.6%) |
| Native Hawaiian or Other Pacific Islander | 12 (1.1%) | 115 (0.8%) |
| White | 721 (67.7%) | 10,137 (69.0%) |
| More Than One Race | 108 (10.1%) | - |
| Race Not Reported/Unknown | 9 (0.8%) | 1,384 (9.4%) |

Note: The 2021 Annual Demographics Profile reports the highest age category as 41+ when reporting demographic data, does not report multi-racial data, and includes students in counts and percentages.

In terms of demographics, 87.3% ($n = 930$) of WOs were male, while 11.1% ($n = 118$) reported being female. A total of 17 WOs did not report their gender. The proportion of men to women reflects the sample reported in the 2021 Annual Demographics Profile of the Military Community, in which 90.1% of WOs ranked WO1-CW5 were male and 9.9% were female (Department of Defense, 2022).

In terms of age, no WOs reported being 21-25 years old, 2.1% were 26-30 years old ($n = 22$), 15.6% were 31-35 years old ($n = 166$), 34.0% were 36-40 years old ($n = 362$), 27.7% were 41-45 years old ($n = 295$), and 19.3% were 46 or older ($n = 206$). A total of 14 individuals did not report their age.

In terms of ethnicity and race, 15.3% ($n = 163$) of WOs reported being of Hispanic, Latino, or Spanish ancestry. Approximately 82.9% ($n = 883$) of WOs reported that they were not of Hispanic, Latino, or Spanish ancestry, while 19 individuals did not respond to this item. A total of 4.3% ($n = 46$) of WOs reported their race as American Indian/Alaska Native (35 of which also selected another race) while 5.6% ($n = 60$) of WOs reported their race as Asian/Asian-American (31 of which also selected another race). A total of 19.7% ($n = 210$) of WOs reported their race as Black/African American (35 of which also selected another race) while 73.1% ($n = 779$) of WOs reported their race as White (58 of which also selected another race). A total of 2.6% ($n = 28$) WOs reported their race as Native Hawaiian or other Pacific Islander (16 of which also selected another race). Nine WOs did not report their race.

Warrant Officers Service and Rank Details

Army WOs varied by rank, number of years in their current rank, and number of years in their current position, as shown in Tables 3, 4, and 5. CW2s represented the largest group of WOs at 32.0%, followed by CW3s who composed 27.8% of the sample. CW5s and WO1s represented the smallest groups at 9.9% and 6.9%, respectively. See Table 5 below.

Table 5

Warrant Officers by Rank (Frequencies) and Comparison to Sample Pool

| Rank | n | % | N Sample Pool | Response Rate |
|-----------------------------|-------|-------|-----------------|---------------|
| WO1 – Warrant Officer | 73 | 6.9% | 1,061 | 6.9% |
| CW2 – Chief Warrant Officer | 341 | 32.0% | 4,923 | 6.9% |
| CW3 – Chief Warrant Officer | 296 | 27.8% | 2,812 | 10.5% |
| CW4 – Chief Warrant Officer | 249 | 23.4% | 1,589 | 15.7% |
| CW5 – Chief Warrant Officer | 106 | 9.9% | 398 | 26.6% |
| Total | 1,065 | 100% | 10,783 | |

In terms of WOs' time in current position, 14.5% ($n = 154$) indicated that they were in their current position for less than 6 months, while 18.9% ($n = 201$) indicated they had been in their current position for more than 6 months, but less than one year. Another 28.7% ($n = 305$) indicated they were in their current position for more than one year but less than two years, while 23.7% ($n = 252$) were in their current position for at least two years but less than three years. Finally, 14.2% ($n = 151$) reported that they were in their current position for more than three years. See Table 6.

Table 6*Warrant Officers' Total Time in Current Position by Rank (Frequencies)*

| Rank | Time in Current Position | | | | |
|-----------------------------|------------------------------|--|----------------------------|----------------------------|------------------------------|
| | <6 months <i>n</i> (row%) | 6 months to <1 year <i>n</i> (row%) | 1 to <2 <i>n</i> (row%) | 2 to <3 <i>n</i> (row%) | 3 or more <i>n</i> (row%) |
| WO1 – Warrant Officer | 19 (26.4%) | 26 (36.1%) | 23 (31.9%) | 1 (1.4%) | 3 (4.2%) |
| CW2 – Chief Warrant Officer | 43 (12.6%) | 58 (17.30%) | 100 (29.6%) | 101 (29.6%) | 39 (11.4%) |
| CW3 – Chief Warrant Officer | 36 (12.2%) | 53 (18.0%) | 87 (29.5%) | 79 (26.8%) | 40 (13.6%) |
| CW4 – Chief Warrant Officer | 41 (16.5%) | 49 (19.7%) | 57 (22.9%) | 54 (21.7%) | 48 (19.3%) |
| CW5 – Chief Warrant Officer | 15 (14.2%) | 15 (14.2%) | 38 (35.8%) | 17 (16.0%) | 21 (19.8%) |
| Total <i>n</i> (%) | 154 (14.5%) | 201 (18.9%) | 305 (28.7%) | 252 (23.7%) | 151 (14.2%) |

Note. Two individuals did not respond to this item

In terms of WOs' time in current rank, 8.0% ($n = 84$) indicated that they had held their current rank for less than 6 months, while 11.3% ($n = 118$) indicated they had been in their current rank for more than 6 months, but less than one year. Another 22.1% ($n = 231$) indicated they were in their current rank for more than one year but less than two years, while 22.3% ($n = 233$) reported they were in their current rank for at least two years but less than three years. Finally, 36.3% ($n = 380$) indicated that they were in their current rank for more than three years. See Table 7.

Table 7*Warrant Officers' Time in Current Grade by Rank (Frequencies)*

| Rank | Time in Current Grade | | | | |
|-----------------------------|------------------------------|---|----------------------------|----------------------------|------------------------------|
| | <6 months <i>n</i> (row%) | 6 months to <1 year <i>n</i> (row%) | 1 to <2 <i>n</i> (row%) | 2 to <3 <i>n</i> (row%) | 3 or more <i>n</i> (row%) |
| WO1 – Warrant Officer | 6 (8.2%) | 17 (23.3%) | 50 (68.5%) | 0 (0%) | 0 (0%) |
| CW2 – Chief Warrant Officer | 22 (6.5%) | 27 (7.9%) | 68 (19.9%) | 102 (29.9%) | 122 (35.8%) |
| CW3 – Chief Warrant Officer | 27 (9.2%) | 37 (12.5%) | 53 (18.0%) | 73 (24.7%) | 105 (35.6%) |
| CW4 – Chief Warrant Officer | 20 (8.1%) | 35 (14.1%) | 46 (18.5%) | 45 (18.1%) | 102 (41.1%) |
| CW5 – Chief Warrant Officer | 11 (10.4%) | 6 (5.7%) | 18 (17.0%) | 16 (15.1%) | 55 (51.9%) |
| Total <i>n</i> (%) | 86 (8.1%) | 122 (11.5%) | 235 (22.1%) | 236 (22.2%) | 384 (36.1%) |

Note. Two individuals did not respond to this item.

Table 8 below summarizes the frequencies of WOs based on MOS included in this sample.

Table 8*Warrant Officers by MOS (Frequencies)*

| MOS | <i>n</i> (% of total) |
|--|-----------------------|
| 120A - Construction Engineering Technician | 39 (3.7%) |
| 125D - Geospatial Engineering Technician | 17 (1.6%) |
| 131A - Field Artillery Technician | 28 (2.6%) |
| 140A - Air Defense Command and Control Systems Integrator | 12 (1.1%) |
| 140K - Air and Missile Defense Systems Tactician | 6 (0.6%) |
| 140L - Air and Missile Defense Systems Technician | 6 (0.6%) |
| 150A - Air Traffic Control Technician | 9 (0.8%) |
| 150U - Unmanned Aircraft Systems Operations Technician | 30 (2.8%) |
| 151A - Aviation Maintenance Technician | 16 (1.5%) |
| 152-154 - Rotary Wing Aviator | 222 (20.8%) |
| 152-155 - Fixed Wing Aviator | 13 (1.2%) |
| 170A - Cyber Warfare Technician | 11 (1%) |
| 170B - Electronic Warfare Technician | 6 (0.6%) |
| 170D - Cyber Capabilities Developer Technician | 0 (0%) |
| 180A - Special Forces Warrant Officer | 19 (1.8%) |
| 255A - Information Systems Technician/255Z - Senior Information Systems Technician | 37 (3.5%) |
| 255N - Network Systems Technician | 27 (2.5%) |
| 255S - Information Protection Technician | 15 (1.4%) |
| 270A - Legal Administrator Warrant Officer | 10 (0.9%) |
| 311A - CID Special Agent | 32 (3%) |
| 350F - All Source Intelligence Technician | 42 (3.9%) |
| 350G - Geospatial Intelligence Imagery Technician | 15 (1.4%) |
| 351L - Counterintelligence Technician | 21 (2%) |
| 351M - Human Intelligence Collection Technician | 10 (0.9%) |
| 351Z - Attaché Intelligence Operations Technician | 1 (0.1%) |
| 352N - Signals Intelligence Analysis Technician | 26 (2.4%) |
| 352S - Signals Collection Technician | 3 (0.3%) |
| 353T - Military Intelligence Systems Maintenance/Integration Technician | 8 (0.8%) |
| 420A - Human Resources Technician | 54 (5.1%) |
| 420C - Army Music Bandmaster | 6 (0.6%) |
| 640A - Veterinary Services Food Safety Officer | 13 (1.2%) |
| 670A - Health Services Maintenance Technician | 11 (1%) |
| 740A - Chemical, Biological, Radiological and Nuclear (CBRN) Technician | 5 (0.5%) |
| 880A - Marine Deck Officer | 2 (0.2%) |
| 881A - Marine Engineering Officer | 4 (0.4%) |
| 882A - Mobility Officer | 15 (1.4%) |
| 890A - Ammunition Warrant Officer | 20 (1.9%) |
| 913A - Armament Systems Maintenance | 5 (0.5%) |
| 914A - Allied Trades Warrant Officer | 8 (0.8%) |
| 915A - Automotive Maintenance/915E - Senior Automotive Maintenance | 93 (8.7%) |
| 919A - Engineer Equipment Maintenance | 10 (0.9%) |
| 920A - Property Accounting Technician | 42 (3.9%) |
| 920B - Supply Systems Technician | 23 (2.2%) |
| 921A - Airdrop Systems Technician | 5 (0.5%) |
| 922A - Food Service Technician | 20 (1.9%) |
| 923A - Petroleum Systems Technician | 4 (0.4%) |
| 948B - Electronic Systems Maintenance Technician/948E – Senior Technician | 27 (2.5%) |
| 948D - Electronic Missile Systems Maintenance Technician | 16 (1.5%) |
| Total | 1065 (100%) |

Note: One individual did not respond to this item.

Procedure

The Army-wide Job Analysis was administered online using AAG Verint® Systems Inc. Enterprise Feedback Management (EFM version 8) survey software and was open from 4 November 2021 to 31 March 2022. During the time the survey was open, participants who had not started the survey received a weekly reminder email for the first eight weeks of administration until the open-link was created, then biweekly reminders for the rest of the time the survey was open.

The survey contained a *Privacy Act Statement* and a brief *Project Summary*, which provided information about the survey's purpose, participation rights, procedure used for confidentiality of data, and an estimate of the time needed to complete the survey. After reading this information, participants responded to position and service-related questions (e.g., time in position, MOS), and MOS-specific duty questions (as shown in the Duty List Development section). Participants were then presented with the complete list of ATAF KSBs and asked to rate the importance of each KSB as it related to their current position.

Following data cleaning procedures, we assessed KSB requirements for officers by assessing the importance ratings for overall officers, by rank, and by Branch/FA. When there were sufficient responses (i.e., at least 30 responses or 15% response rate), we were further able to report KSB importance ratings by rank within specific Branches/FAs. Note that KSB ratings presented throughout this report have been variance weighted, such that KSBs with smaller standard deviations (which may indicate a higher level of agreement) would be given more weight in terms of its importance ranking. This weighted mean is calculated by inverting the standard deviation and multiplies that value by its original mean.⁴ Note that in some cases, KSBs with a high mean rating and low standard deviation resulted in a weighted mean above the scale anchor maximum (0 “Not at all important” to 4 “Extremely Important”). Inverted variance weighted averages are used quite commonly in meta-analytic studies where studies with greater precision are given greater weight (e.g., Hunter & Schmidt, 2004; Lee et al., 2016).

Results

Army-wide KSB Importance Ratings for Warrant Officers

The most highly rated attributes for WOs based on KSB importance ratings across the Army, regardless of rank or MOS, were Sound Judgement, Dependability, Mental Agility, Self-Management, and Attentiveness. While Army-wide ratings do not provide a very nuanced examination of position-required attributes, this overview does provide information on the typical attributes of a WO regardless of MOS. As WOs are highly skilled technical experts, they are frequently required to use their specialized skillset to lead subordinates and advise leaders as subject matter experts, these attributes related to decision making and problem solving are critical to success in their positions. See Table 9.

⁴ Weighted mean formula: $(M^*) = (2-SD)*M$

Table 9*Army-wide Warrant Officer Top KSBs*

| KSB Importance Rank | KSB | <i>N</i> | <i>M*</i> | <i>SD</i> |
|---------------------------|--|----------|-----------|-----------|
| 1 | Sound Judgement | 1,056 | 4.79 | 0.67 |
| 2 | Dependability | 1,060 | 4.57 | 0.70 |
| 3 | Mental Agility | 1,058 | 4.50 | 0.72 |
| 4 | Self-Management | 1,060 | 4.44 | 0.72 |
| 5 | Attentiveness | 1,057 | 4.42 | 0.71 |
| 6 | Detail-Focused and Precise | 1,055 | 4.34 | 0.74 |
| 7 | Problem Solver | 1,058 | 4.29 | 0.77 |
| 8 | Critical Thinking | 1,056 | 4.27 | 0.77 |
| 9 | Creative Problem Solving and Innovation | 1,052 | 4.26 | 0.77 |
| 10 | General Cognitive Aptitude | 1,057 | 4.26 | 0.75 |
| 11 | Communication Ability | 1,062 | 4.24 | 0.77 |
| 12 | Reading Comprehension | 1,061 | 4.18 | 0.78 |
| 13 | Cognitive Flexibility | 1,054 | 4.17 | 0.78 |
| 14 | Situational Awareness | 1,049 | 4.14 | 0.80 |
| 15 | Stress Tolerance | 1,048 | 4.12 | 0.79 |
| 16 | Analytical Thinking | 1,056 | 4.11 | 0.79 |
| 17 | MOS/Branch-Specific Knowledge and Skill | 1,048 | 4.10 | 0.82 |
| 18 | Communicator | 1,060 | 4.10 | 0.79 |
| 19 | Analyzes and Organizes Information to Create Knowledge | 1,057 | 4.10 | 0.79 |
| 20 | Decision Making | 1,056 | 4.07 | 0.81 |
| 21 | Processes Information and Data | 1,053 | 4.07 | 0.81 |
| 22 | Active Learning | 1,057 | 4.04 | 0.79 |
| 23 | Adaptability | 1,055 | 4.04 | 0.81 |
| 24 | Problem Sensitivity | 1,053 | 4.02 | 0.81 |
| 25 | Oral Communication Skill | 1,057 | 4.00 | 0.82 |
| 26 | Time Management | 1,051 | 3.94 | 0.84 |
| 27 | Active Listening | 1,060 | 3.89 | 0.82 |
| 28 | Sustains Climate of Trust | 1,036 | 3.88 | 0.84 |
| 29 | Analyze Data or Information | 1,057 | 3.88 | 0.84 |
| 30 | Multi-Tasking | 1,056 | 3.87 | 0.85 |

Note: *M** = variance weighted mean. KSB Importance rated on scale of 0 = “Not Important”, 1 = “Somewhat Important”, 2 = “Important”, 3 = “Very Important”, 4 = “Extremely Important”. Means have been weighted by inverting variance and multiplying by original mean value, which provides greater weight to KSBs where there is less variance, and therefore a higher level of agreement on the importance rating. Note that in some cases, this weighting produces weighted mean ratings above the scale minimum and maximum scale anchors.

Rank-specific Army-wide Warrant Officer KSBs

The following tables present top-rated KSBs for WOs by rank regardless of MOS. For full ratings of each KSB according to rank, please see Appendix D. Ratings for MOS-specific KSBs can be found in Appendix E when there was a sufficient number of responses.

Warrant officers ranked WO1 and CW2 were combined as they frequently share the same Individual Critical Task Lists (ICTLs) and are both early career WOs. As can be seen in the top KSBs reported by WO1 and CW2s, these KSBs are quite similar to the overall Army-wide WO KSBs, likely because they are a large group in this sample. The top five KSBs for WO1/CW2s were Sound Judgement, Mental Agility, Dependability, Attentiveness, and Self-Management. See Table 10.

Warrant officers ranked CW3 shared 26 of their top 30 KSBs with WO1/CW2s, including the top five most important KSBs, though the order changed slightly. Other KSBs, such as Stress Tolerance, Active Learning, and Adaptability, while still rated within the top 30 most important KSBs, dropped by at least 10 importance rankings, suggesting that those KSBs may be more important for new WOs learning their position, but less critical to more experienced WOs. Further, MOS-specific Knowledge and Skill rose from being ranked number 22 on importance for WO1/CW2s to being ranked number seven for CW3s, indicating the increased need for MOS-specific skill proficiency as one ranks up. There were four new KSBs that appeared in the top 30 most important KSBs for CW3s, including Sustains Climate of Trust, Oral Communication, Resilience, and Coordination. See Table 11.

Warrant officers ranked CW4 shared 25 of the top 30 KSBs reported by WO1/CW2s, along with two of the four new KSBs that appeared in the top 30 most important KSBs at the CW3 rank. New KSBs that appeared in the top 30 most important KSBs for CW4s included Written Communication, Active Listening, and Time Management. KSBs related to communication tended to increase in perceived importance with this rank. For instance, Communication Ability was ranked sixth on importance versus being ranked twentieth by WO1/CW2s and ranked eleventh by CW3s. See Table 12.

Warrant officers ranked CW5 shared 21 of the top 30 KSBs reported by WO1/CW2s along with three of the four new KSBs that appeared within the top 30 most important at the CW3 rank and two of the three new KSBs that emerged at the CW4 rank. Four new KSBs appeared in the top 30 most important for CW5s including Strategic Thinking, Army Values, Cooperation/ Teamwork, and Systems Thinking, suggesting that CW5s are required to think at a broader organization level, model Army Values, and show increased ability to work with others. See Table 13.

Table 10*Army-wide Top KSB Ratings for WO1s and CW2s*

| KSB Importance Rank | KSB | <i>N</i> | <i>M*</i> | <i>SD</i> |
|---------------------|--|----------|-----------|-----------|
| 1 | Sound Judgement | 411 | 4.71 | 0.69 |
| 2 | Mental Agility | 411 | 4.59 | 0.70 |
| 3 | Dependability | 412 | 4.46 | 0.73 |
| 4 | Attentiveness | 411 | 4.36 | 0.73 |
| 5 | Self-Management | 412 | 4.34 | 0.76 |
| 6 | Problem Solver | 413 | 4.33 | 0.76 |
| 7 | Creative Problem Solving and Innovation | 411 | 4.29 | 0.76 |
| 8 | Stress Tolerance | 411 | 4.27 | 0.76 |
| 9 | Detail-Focused and Precise | 410 | 4.27 | 0.76 |
| 10 | Cognitive Flexibility | 411 | 4.23 | 0.77 |
| 11 | Critical Thinking | 409 | 4.19 | 0.80 |
| 12 | General Cognitive Aptitude | 412 | 4.17 | 0.78 |
| 13 | Adaptability | 411 | 4.16 | 0.79 |
| 14 | Active Learning | 412 | 4.13 | 0.77 |
| 15 | Decision Making | 411 | 4.12 | 0.80 |
| 16 | Situational Awareness | 408 | 4.10 | 0.83 |
| 17 | Time Management | 408 | 4.09 | 0.81 |
| 18 | Problem Sensitivity | 410 | 4.04 | 0.80 |
| 19 | Analyzes and Organizes Information to Create Knowledge | 410 | 4.03 | 0.80 |
| 20 | Communication Ability | 413 | 4.02 | 0.83 |
| 21 | Processes Information and Data | 409 | 4.01 | 0.82 |
| 22 | MOS Branch Knowledge and Skill | 405 | 4.01 | 0.84 |
| 23 | Reading Comprehension | 413 | 3.93 | 0.84 |
| 24 | Focus | 410 | 3.92 | 0.83 |
| 25 | Analytical Thinking | 412 | 3.92 | 0.84 |
| 26 | Troubleshooting | 411 | 3.85 | 0.87 |
| 27 | Multi-Tasking | 412 | 3.84 | 0.86 |
| 28 | Analyze Data or Information | 414 | 3.82 | 0.86 |
| 29 | Communicator | 412 | 3.80 | 0.86 |
| 30 | Discipline | 411 | 3.79 | 0.85 |

Note: *M** = variance weighted mean. KSB Importance rated on scale of 0 = “Not Important”, 1 = “Somewhat Important”, 2 = “Important”, 3 = “Very Important”, 4 = “Extremely Important”. Means have been weighted by inverting variance and multiplying by original mean value, which provides greater weight to KSBs where there is less variance, and therefore a higher level of agreement on the importance rating. Note that in some cases, this weighting produces weighted mean ratings above the scale minimum and maximum scale anchors.

Table 11*Army-wide Top KSB Ratings for CW3s*

| KSB Importance Rank | KSB | <i>N</i> | <i>M*</i> | <i>SD</i> |
|---------------------------|--|----------|-----------|-----------|
| 1 | Dependability | 295 | 4.54 | 0.69 |
| 2 | Sound Judgement | 292 | 4.52 | 0.73 |
| 3 | Self-Management | 295 | 4.42 | 0.71 |
| 4 | Attentiveness | 295 | 4.30 | 0.73 |
| 5 | Mental Agility | 294 | 4.26 | 0.76 |
| 6 | Detail-Focused and Precise | 292 | 4.24 | 0.75 |
| 7 | MOS/Branch-Specific Knowledge and Skill | 290 | 4.20 | 0.80 |
| 8 | Critical Thinking | 295 | 4.14 | 0.78 |
| 9 | Problem Solver | 294 | 4.14 | 0.79 |
| 10 | General Cognitive Aptitude | 293 | 4.12 | 0.78 |
| 11 | Communication Ability | 295 | 4.12 | 0.79 |
| 12 | Creative Problem Solving and Innovation | 293 | 4.11 | 0.80 |
| 13 | Communicator | 294 | 4.10 | 0.79 |
| 14 | Reading Comprehension | 295 | 4.08 | 0.79 |
| 15 | Analytical Thinking | 292 | 4.08 | 0.79 |
| 16 | Processes Information and Data | 294 | 4.07 | 0.81 |
| 17 | Analyzes and Organizes Information to Create Knowledge | 294 | 4.06 | 0.81 |
| 18 | Multi-Tasking | 294 | 4.05 | 0.80 |
| 19 | Cognitive Flexibility | 294 | 4.01 | 0.79 |
| 20 | Sustains Climate of Trust | 286 | 4.01 | 0.79 |
| 21 | Stress Tolerance | 290 | 4.01 | 0.80 |
| 22 | Oral Communication Skill | 295 | 3.97 | 0.81 |
| 23 | Situational Awareness | 292 | 3.95 | 0.84 |
| 24 | Decision Making | 293 | 3.89 | 0.84 |
| 25 | Resilience | 296 | 3.89 | 0.80 |
| 26 | Adaptability | 293 | 3.89 | 0.82 |
| 27 | Analyze Data or Information | 293 | 3.85 | 0.84 |
| 28 | Time Management | 292 | 3.83 | 0.85 |
| 29 | Coordination | 292 | 3.82 | 0.80 |
| 30 | Active Learning | 294 | 3.81 | 0.83 |

Note. Bolded KSBs indicate newly emergent KSBs at this rank. *M** = variance weighted mean. KSB Importance rated on scale of 0 = “Not Important”, 1 = “Somewhat Important”, 2 = “Important”, 3 = “Very Important”, 4 = “Extremely Important”. Means have been weighted by inverting variance and multiplying by original mean value, which provides greater weight to KSBs where there is less variance, and therefore a higher level of agreement on the importance rating. Note that in some cases, this weighting produces weighted mean ratings above the scale minimum and maximum scale anchors.

Table 12*Army-wide Top KSB Ratings for CW4s*

| KSB Importance Rank | KSB | <i>N</i> | <i>M*</i> | <i>SD</i> |
|---------------------|--|----------|-----------|-----------|
| 1 | Sound Judgement | 247 | 5.19 | 0.59 |
| 2 | Dependability | 247 | 4.72 | 0.68 |
| 3 | Mental Agility | 247 | 4.69 | 0.68 |
| 4 | Reading Comprehension | 248 | 4.69 | 0.67 |
| 5 | Attentiveness | 245 | 4.66 | 0.66 |
| 6 | Communication Ability | 248 | 4.57 | 0.69 |
| 7 | Self-Management | 247 | 4.55 | 0.69 |
| 8 | Detail-Focused and Precise | 247 | 4.53 | 0.68 |
| 9 | Communicator | 248 | 4.48 | 0.71 |
| 10 | Situational Awareness | 243 | 4.46 | 0.74 |
| 11 | General Cognitive Aptitude | 247 | 4.45 | 0.71 |
| 12 | Critical Thinking | 246 | 4.45 | 0.72 |
| 13 | Oral Communication Skill | 248 | 4.42 | 0.72 |
| 14 | Analytical Thinking | 246 | 4.33 | 0.74 |
| 15 | Problem Sensitivity | 243 | 4.30 | 0.74 |
| 16 | Problem Solver | 245 | 4.28 | 0.76 |
| 17 | Creative Problem Solving and Innovation | 243 | 4.27 | 0.78 |
| 18 | Written Communication | 246 | 4.23 | 0.77 |
| 19 | Active Listening | 246 | 4.20 | 0.75 |
| 20 | Analyzes and Organizes Information to Create Knowledge | 248 | 4.18 | 0.77 |
| 21 | Decision Making | 246 | 4.18 | 0.79 |
| 22 | Active Learning | 245 | 4.17 | 0.76 |
| 23 | Cognitive Flexibility | 244 | 4.17 | 0.79 |
| 24 | Adaptability | 245 | 4.14 | 0.79 |
| 25 | Processes Information and Data | 245 | 4.12 | 0.79 |
| 26 | Stress Tolerance | 242 | 4.05 | 0.80 |
| 27 | MOS/Branch-Specific Knowledge and Skill | 247 | 4.04 | 0.84 |
| 28 | Time Management | 246 | 3.99 | 0.82 |
| 29 | Analyze Data or Information | 244 | 3.95 | 0.83 |
| 30 | Sustains Climate of Trust | 243 | 3.93 | 0.84 |

Note: Bolded KSBs indicate newly emergent KSBs at this rank. *M** = variance weighted mean. KSB Importance rated on scale of 0 = “Not Important”, 1 = “Somewhat Important”, 2 = “Important”, 3 = “Very Important”, 4 = “Extremely Important”. Means have been weighted by inverting variance and multiplying by original mean value, which provides greater weight to KSBs where there is less variance, and therefore a higher level of agreement on the importance rating. Note that in some cases, this weighting produces weighted mean ratings above the scale minimum and maximum scale anchors.

Table 13*Army-wide Top KSB Ratings for CW5s*

| KSB Importance Rank | KSB | <i>N</i> | <i>M*</i> | <i>SD</i> |
|---------------------------|--|----------|-----------|-----------|
| 1 | Sound Judgement | 106 | 5.04 | 0.61 |
| 2 | Communication Ability | 106 | 4.76 | 0.66 |
| 3 | Dependability | 106 | 4.74 | 0.68 |
| 4 | Written Communication | 106 | 4.72 | 0.70 |
| 5 | Active Listening | 106 | 4.63 | 0.68 |
| 6 | Communicator | 106 | 4.63 | 0.69 |
| 7 | Self-Management | 106 | 4.63 | 0.69 |
| 8 | Critical Thinking | 106 | 4.62 | 0.70 |
| 9 | General Cognitive Aptitude | 105 | 4.55 | 0.69 |
| 10 | Creative Problem Solving and Innovation | 105 | 4.54 | 0.73 |
| 11 | Analytical Thinking | 106 | 4.53 | 0.72 |
| 12 | Problem Solver | 106 | 4.53 | 0.72 |
| 13 | Cognitive Flexibility | 105 | 4.46 | 0.74 |
| 14 | Mental Agility | 106 | 4.46 | 0.72 |
| 15 | Strategic Thinking | 106 | 4.44 | 0.77 |
| 16 | Detail-Focused and Precise | 106 | 4.43 | 0.72 |
| 17 | Discipline | 106 | 4.43 | 0.72 |
| 18 | Reading Comprehension | 105 | 4.42 | 0.75 |
| 19 | Attentiveness | 106 | 4.42 | 0.73 |
| 20 | MOS/Branch-Specific Knowledge and Skill | 106 | 4.34 | 0.77 |
| 21 | Analyzes and Organizes Information to Create Knowledge | 105 | 4.30 | 0.77 |
| 22 | Sustains Climate of Trust | 102 | 4.28 | 0.78 |
| 23 | Army Values | 106 | 4.27 | 0.78 |
| 24 | Oral Communication Skill | 106 | 4.22 | 0.78 |
| 25 | Cooperation Teamwork | 106 | 4.21 | 0.78 |
| 26 | Situational Awareness | 106 | 4.19 | 0.76 |
| 27 | Processes Information and Data | 105 | 4.15 | 0.80 |
| 28 | Coordination | 106 | 4.13 | 0.77 |
| 29 | Decision Making | 106 | 4.13 | 0.79 |
| 30 | Systems Thinking | 106 | 4.11 | 0.81 |

Note: Bolded KSBs indicate newly emergent KSBs at this rank. *M** = variance weighted mean. KSB Importance rated on scale of 0 = “Not Important”, 1 = “Somewhat Important”, 2 = “Important”, 3 = “Very Important”, 4 = “Extremely Important”. Means have been weighted by inverting variance and multiplying by original mean value, which provides greater weight to KSBs where there is less variance, and therefore a higher level of agreement on the importance rating. Note that in some cases, this weighting produces weighted mean ratings above the scale minimum and maximum scale anchors.

Discussion

The Army-wide Job Analysis for Warrant Officers survey was designed to identify the MOS-specific KSBs required for successful performance in one's job using the recently developed ATAF. As the Army is placing greater emphasis on effectively recognizing and utilizing individual attributes and aligning those attributes to position requirements, a critical step in this process is conducting a job analysis that can identify position requirements. The results of this study provide insight into the unique KSB requirements of WOs, which can then be used in the Army talent marketplace to match individuals more effectively to WO positions. Warrant Officers tend to have very specific skill requirements due to the high degree of specialization within their jobs. Consequently, person-job fit is a critical consideration for both overall Army readiness and individual performance.

Similarly, ARI researchers can use these results as a critical baseline for talent management lines of research. Some of these research efforts include comparing new approaches to more traditional methods of conducting job analyses (e.g., NLP and ML), determining how WO KSB requirements may change over time, and how force restructuring may influence KSB requirements. Researchers can also use this job analysis as a baseline for understanding current requirements and anticipate how emerging technology and changes in the operational and strategic operating environment may impact KSBs needed for future Army readiness.

While few differences emerged between different ranks in terms of their top 30 most important KSBs, results showed several differences in the top 30 most highly rated KSBs depending on WO rank. Early career WOs (WO1/CW2s) appear to rank Stress Tolerance, Active Learning, and Adaptability as more important than higher ranked WOs, which may be due to these attributes contributing to new WOs learning their position. Warrant officers ranked CW3 demonstrated an increased number of KSBs related to teams and leadership (e.g., Sustains Climate of Trust and Coordination). Warrant officers ranked CW4s tended to show increased ratings of the importance of Communication-related KSBs, while CW5s included Strategic Thinking, Army Values, Cooperation/Teamwork, and Systems Thinking, suggesting that CW5s are required to think at a broader organizational level, model Army Values, and increased ability to coordinate work with others.

Implications

The results of this job analysis will be used by ARI scientists as a critical baseline for a number of talent management research efforts. Advances in areas such as NLP and survey/assessment methodologies may allow for faster, more efficient ways of collecting data on position requirements – for example, advances in NLP and ML may allow researchers to use more efficient techniques for extracting WO KSB and job requirements from text data, which can be used to gain additional perspective into ATAF KSB importance ratings. Additionally, this data may help provide insight into how KSB requirements tend to change across a WO's career. Understanding KSB requirements at each rank and within each Branch/FA also facilitates the identification and development of assessments that can be used to identify individuals with the required KSBs. Further, a proper understanding of current KSB requirements may help researchers better anticipate how modernization efforts, force restructuring, technological

advances, and changes to the operating environment may impact KSBs and position requirements needed by the future Army.

This job analysis helped to identify the KSBs required by WO MOSs and provides an important baseline for supporting current and future Army talent management efforts. It also serves an important role in helping the Army transition to a strategic talent management-based personnel system aimed at Acquiring, Developing, Employing, Retaining talent (Army People Strategy, 2019). By having a consolidated framework describing relevant attributes and data informing the relative importance of KSBs required for WOs, future efforts can be directed at using this information to better match WOs to available positions, as well as identify skill or knowledge gaps that could be improved with training. Thinking about talent management initiatives across the Army, results from this Army-wide job analysis survey can be used to improve the AIM 2.0 Marketplace process for WOs applying to positions, as well as for strength managers in identifying applicants who match position requirements. For individual WOs, understanding KSB requirements for various positions in the Marketplace enables them to communicate their strengths to units of interest, and identify areas that need additional development to prepare for a desired position. For strength managers, the results of this study may allow them to better match candidates to available job positions based on alignment between the candidate's strengths and a profile of position requirements.

In addition to the importance of person-job fit for selecting individuals, consideration of how individual skills match position requirements has implications for retention of qualified and high-performing Soldiers as well. Retention is an area of interest for the Army, particularly with current recruitment challenges. While in the past, the Army has typically assigned Soldiers to positions based on their rank and availability of positions, there is more recently an increased focus on person-job fit. When an individual's knowledge, skills, abilities, and interests align with position requirements, individuals tend to experience greater work engagement (Cai et al., 2018), higher contextual work performance, i.e., activities workers engage in that promote an organization's social and psychological core, such as helping others, cooperation, and job dedication (Han et al., 2015), and career commitment (Huang, Yuan, & Li, 2019). Additionally, person-job fit is associated with decreased turnover (e.g., Boon & Biron, 2016), which is an important aspect of the Army's retention efforts.

Findings from this job analysis also have implications for career pathing and succession planning. Understanding the critical knowledge, skills, and abilities needed for specific positions allows the identification of reliable and valid assessments for selection, assignment, and evaluating performance for promotion. Further, individuals can identify developmental areas and engage in relevant trainings or experiences to prepare for positions of interest. Similarly, understanding critical KSB requirements by position allows leaders and strength managers to engage in more effective succession planning. Specifically, they can more readily identify potential candidates and ensure that they receive the appropriate experience and training to prepare for suitable positions.

Limitations

Low rate of response was an issue throughout this study across multiple MOS. We obtained sufficient data to report MOS-specific results for 23 of 48 WO MOS. The roughly 10% response rate indicates that most WOs did not respond to the survey. There were several factors that likely impacted response rates. First, there was a lack of sufficient force-wide messaging announcing the survey launch and aims of the study. While there was a strategic messaging plan in place, this plan relied on multiple organizations across the Army, which ultimately made it difficult to appropriately coordinate messaging before the survey launch. Further, due to messaging delays in distributing the survey, the survey was launched shortly before the holiday season, which likely reduced participant responses because many individuals take leave during the holiday season, reducing the days they are available to participate in the survey. Weekly reminders were used to alert potential participants of the opportunity to respond to the survey; however, this effort did not appear to be successful.

Related to the issue of low response rates, this survey was conducted online and required access to the NIPRNet and a CAC-enabled computer, which may have limited convenient access to the survey. This may be particularly problematic for accurately representing WOs who are in the field and do not have ready access to the NIPRNet or to a CAC-enabled computer. It is unknown whether WOs who completed the survey would have provided different ratings than those who did respond. The open link to the survey was intended to alleviate this issue as it did not require access to the NIPRNet, but response rates remained low. A common issue with small sample size for a job position is that when calculating means and standard deviations for importance ratings of required attributes, a single individual can significantly change the importance ratings.

An additional limitation was likely the length of the survey itself. As the ATAF contains 198 KSBs, many WOs may have been reluctant to invest the amount of time it may take to complete all KSB ratings. This was evident in the number of individuals who started but did not complete the survey. Related, military personnel are often asked to complete surveys, which may increase survey fatigue. There were several other surveys being run simultaneously by other organizations that were aimed at collecting KSB ratings, which may have decreased responses as individuals participated in similar surveys and may have assumed that they already completed the survey.

Future Directions

As the ATAF is designed to be updated and refined to ensure it meets current, as well as evolving and emerging needs of the Army, the results of this job analysis can inform researchers on where further refinement to the framework is needed. While the initial development of the ATAF was based largely on using a rational approach to determining which KSBs are relevant to Army personnel, researchers can now use dimension reduction techniques to determine whether some attributes overlap and can be consolidated.

Related, a common issue in job analyses that can be addressed in future efforts is that work and situational contexts and characteristics are infrequently considered, even though

contexts have been shown to play a significant role in the work performed. For example, one's work role usually involves factors such as autonomy in decision-making, social interactions, and interdependence with other individuals or work groups (Dierdorff & Morgeson, 2007; Morgeson & Dierdorff, 2010). Using the ATAF KSB importance ratings as a starting point for improving person-job fit, future job analytic efforts can be aimed at identifying the specific physical, social, and structural contexts in which work tasks are performed, along with situational characteristics and strengths, which play a role in human cognition, affect, and behavior in work performance (Dalal et al., 2021). Consideration of situational characteristics and strengths have not been adequately incorporated into job analyses methods but may moderate the relationship between personality traits and work performance (e.g., Barrick & Mount, 1993). Additional future investigation can investigate how attribute ratings may be influenced by one's rank (e.g., how do KSB requirements change as one ranks up).

In conclusion, the Army-wide Job Analysis for Warrant Officers identified the most important KSBs required for WOs and provided KSB requirements for many WO MOSs as well. Army-wide, WOs indicated critical KSBs as being Sound Judgement, Dependability, Mental Agility, Self-Management, and Attentiveness. These KSBs are applicable to all WOs, who are well-known for being technical experts in their respective areas. We also found that as WOs rank up, they develop additional KSBs related to leadership (e.g., Sustains Climate of Trust), communication (e.g., Oral Communication Skill), and increased big-picture thinking (e.g., Strategic Thinking and Systems Thinking). These results can also be used by strength managers to identify applicants who fit the job requirements for a particular MOS, as well as inform individual WOs of their own strengths and developmental areas to prepare for a specific position.

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