



**An Exploration of Supervisory Duties and Technical
Authority in the U.S. Army Combat Capabilities
Development Command Aviation & Missile Center**

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Abstract

This qualitative study explores supervisory duties and technical authority in the U.S. Army Combat Capabilities Development Command (DEVCOM) Aviation & Missile Center (AvMC) considering the Future of Work, the Army Modernization Strategy, and the Army People Strategy. The research shows that AvMC supervisors need competencies in accountability, customer service, decisiveness, flexibility, integrity/honesty, interpersonal skills, oral communication, problem solving, resilience, and written communication to execute their core supervisory duties (U.S. Office of Personnel Management, n.d.-b). AvMC supervisors must also have technical expertise in the discipline over which they lead to both supervise and lead the technical mission (Civilian position descriptors & organizational information, n.d.). The research indicates that the hybrid work environment dominating the Future of Work necessitates that supervisors dedicate more time to leading people than in the traditional work setting (Keilty & Burke, 2022; Kirchner, Ipsen, & Hansen, 2021). Furthermore, the Army modernization effort requires the organization set the conditions for innovation and creative thinking throughout the workforce (U.S. Department of the Army, 2019a). AvMC first-line supervisors must dedicate time to create this culture while staffing or developing personnel with the necessary competencies and capabilities. Despite the demands placed upon first-line supervisors in this environment, the AvMC needs strong technical leadership to provide technical expertise and oversight in support of programs. The study recommends that the AvMC address both the need for supervisors to spend more time on leading people and the need for strong technical leadership using training and DB-03+ Subject Matter Experts (SMEs) empowered with technical authority.

Introduction

“We must transform quickly so we have continued overmatch against those who wish us harm and those who threaten our national security” – Army Chief of Staff Gen. James McConville (Judson, 2022, para. 10).

The Department of Defense (DoD) is experiencing a time of accelerated technical development because of the modernization priority action under Pillar III: Preserve Peace Through Strength of the 2017 National Security Strategy (Trump, 2017). The National Security Strategy Guidance issued by President Biden (2022) re-enforces the necessity for modernization by stating an intent to “modernize and strengthen our military so it is equipped for the era of strategic competition with major powers, while maintaining the capability to disrupt the terrorist threat to the homeland” (p. 11).

The U.S. Army Futures Command (AFC) leads the Army’s six priority modernization programs with the intent to field new equipment. The subordinate U.S. Army Combat Capabilities Development Command (DEVCOM) provides people and expertise that enables the Army’s six modernization priorities (DEVCOM, n.d.). According to Defense News, the Army is hoping to release twenty-four new systems by September 2023 to “prove the Army can move past its previous acquisition failures and address threats posed by Russia and China” (Judson, 2022, para. 9). Rapid development and acquisition of new systems will require DEVCOM to focus on technical innovation while simultaneously prioritizing talent management to prepare the systems and workforce necessary to “make sure Soldiers have what they need, before they need it, to protect tomorrow...today” (Army Futures Command, n.d., banner).

The purpose of this study is to explore supervisory duties and technical authority within one DEVCOM Center, the Aviation and Missile Center (AvMC), in support of the modernization and talent management priorities.

Background

The focus on modernization within the Army is detailed in the 2019 Army Modernization Strategy (AMS). The AMS identifies six modernization priorities that will require materiel development: “long-range precision fires, next generation combat vehicles, future vertical lift, network technologies, air and missile defense capabilities, and Soldier lethality” (U.S. Department of the Army, 2019a, p. 3). The “DEVCOM is a major subordinate command of the AFC” (DEVCOM, n.d., para. 3) which “focuses on scientific research, technology development, engineering and analysis to support the Army’s six modernization priorities” (DEVCOM, n.d., para. 6). The DEVCOM’s focus requires a workforce equipped with a broad range of technical knowledge and skills across scientific and engineering disciplines. The DEVCOM is comprised of eight major competency areas, including the DEVCOM AvMC. The AvMC provides the DEVCOM capability for aviation, missile, and unmanned aerial system research, development, and lifecycle engineering support (U.S. Army Combat Capabilities Development Command, 2019). Providing technical expertise and oversight in support of project execution is also critical to the AvMC’s support to the aviation and missile modernization effort (DEVCOM Aviation and Missile Center, 2022; U.S. Department of the Army, 2021).

The AvMC’s role in providing technical expertise to project execution fills the role described by the concept of technical authority. The DoD previously defined technical authority as “the organization outside the program manager’s chain of command with responsibility and accountability to establish, approve, and assess conformance of products and technical processes to technical safety, and certification requirements during all phases of product development, acquisition, and sustainment” (Defense Acquisition University, 2011, p. 24). The AvMC is sought by Program Executive Offices (PEOs) and Program Managers to provide technical

expertise to fulfill the technical authority role (DEVCOM Aviation and Missile Center, 2022). The National Aeronautics and Space Administration (NASA) is similar to the AvMC in that NASA develops complex aerospace systems with demands for high reliability, human safety, and flight certification. The NASA (2014) defines engineering technical authority as the role that “establishes and is responsible for the engineering design processes, specifications, rules, best practices, and other activities necessary to fulfill programmatic mission performance requirements” (p. 243). The Office of Personnel Management (OPM) (1998) provides a different definition for technical authority applicable to grading supervisory positions.

Full and final technical authority means that the supervisor is responsible for all technical determinations arising from the work, without technical advice or assistance on even the more difficult and unusual problems, and without further review except from an administrative or program evaluation standpoint. (p. 24)

How an organization enacts the concept of technical authority will be dependent on which of these definitions is applied.

The Army is also placing a priority on talent management to address the readiness, modernization, and reform priorities. The mission of the Army People Strategy (APS) is to “acquire, develop, employ, and retain the diversity of Soldier and Civilian talent needed to achieve Total Army readiness” (U.S Department of the Army, 2019b, p. 3).

The Army People Strategy describes how we will shift from simply ‘distributing personnel’ to more deliberately managing the talents of our Soldiers and Civilians. This means creating a 21st century talent management system with policies, programs, and processes that recognize and capitalize the unique knowledge, skills, and behaviors

possessed by every member of the Army team, allowing us to employ each to maximum effect. (U.S Department of the Army, 2019b, p. 2)

The DEVCOM is developing a talent management strategy with the intent of “evolving, adaptive talent pools and the agile employment of multi-talented teams to deliver science, technology, and engineering in support of Army Modernization” (J. Willison, personal communication, February 2, 2022, p.2). The framework of the strategy will necessitate clear definition of required talents, continual assessment of the health of the talent pool, a strategic approach to talent acquisition, detailed workforce development plans, and a culture of effective talent management and engagement.

The United States Federal government is also adapting the future work environment in response to the COVID-19 pandemic-initiated transition to a new way of working. Although telework has been an option within the Federal Government for many years, many organizations did not use it prevalently until the COVID-19 pandemic (U.S. Office of Personnel Management, 2021). DEVCOM released a Future of Work Concept to enable hiring and developing diverse talent by reframing the workplace to include telework and remote work (George & Willison, n.d.). Although organizations across the Federal Government are still considering what the Future of Work entails to support their missions, the hybrid use of telework and on-site work is dominating the discussion (Gnau, 2022; Summey, 2022a; U.S. Office of Personnel Management, 2021). As organizations transition to increased use of telework, additional burdens are placed upon supervisors and employees to maintain success.

Managing teleworkers places added responsibility on supervisors and their performance management skills. Maintaining performance levels and meeting improvement goals in a teleworking environment requires excellent supervisory skills for-

- planning the work
- setting expectations
- monitoring performance
- recognizing employees for their performance (U.S. Office of Personnel Management, n.d.-a, para. 2).

In addition to these skills, the OPM (n.d.-b) identifies ten important competencies for supervisory work in general: “accountability, customer service, decisiveness, flexibility, integrity/honesty, interpersonal skills, oral communication, problem-solving, resilience, and written communication” (Supervisory Work section).

Problem Statement

The technical capabilities needed to support modernization of the Army, the effort necessary to sustain talent management, and adaptation to the Future of Work, place increased workload upon the leaders within the AvMC charged with supervising and executing technical authority.

Statement of Purpose and Research Questions

The purpose of this qualitative study is to explore supervisory duties and technical authority in the AvMC considering the Future of Work, the AMS, and the APS. The following research questions guide the study.

1. What are the responsibilities of a supervisor according to the OPM?
2. What is technical authority within federal organizations?
3. How are supervisory duties and technical authority distributed within the AvMC?
4. How does the Future of Work, as defined by the OPM, impact supervisory duties?

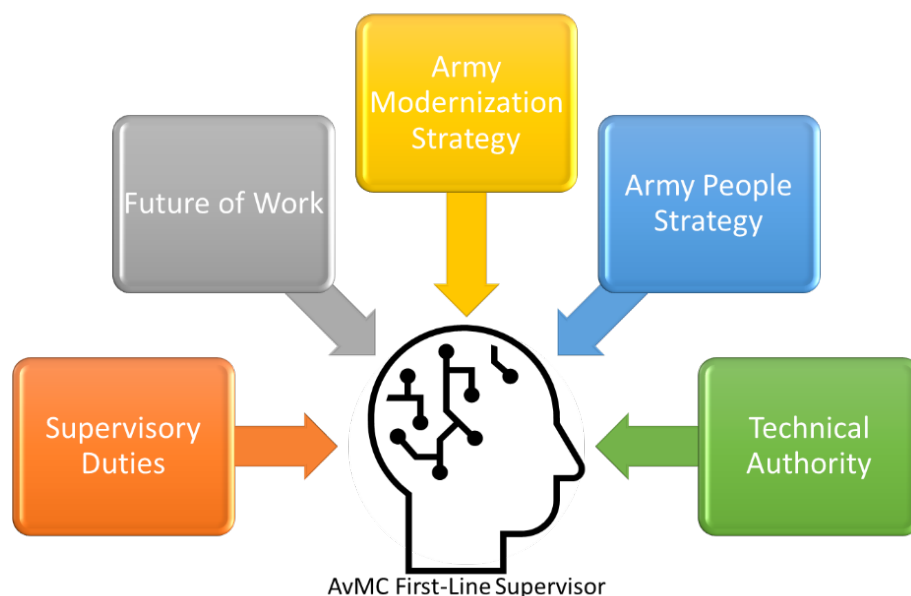
5. How does the innovation desired by the APS and the AMS affect the supervisor and technical authority roles?

Conceptual Framework

The AMS is driving an accelerated period of technical development in the AvMC. At the same time, there is an increased focus on talent management driven by the APS and a need to maintain a competent workforce. These activities are occurring as the work environment changes through the post-pandemic Future of Work. This research will first review the definition of a supervisor to understand the inherent roles therein. The study will then introduce and research the concept of technical authority. The research will then study the distribution of duties within the AvMC. The research will continue by reviewing the impact of the Future of Work on the supervisor's duties. The research will conclude with studying the barriers and enablers for leading in the innovative environment driven by the AMS and APS. Figure 1 graphically depicts the convergence of these topics on AvMC first-line supervisors.

Figure 1

Convergence on AvMC First-line Supervisors



Significance of This Research

The AvMC requires a strong technical workforce to support the Army aviation and missile modernization programs (DEVCOM Aviation and Missile Center, 2022). Maintaining a trained workforce requires strategic recruitment and talent management. In addition, providing technical authority to programs requires leadership engagement and expertise (National Aeronautics and Space Administration, 2014). This research is significant in that it explores supervisory duties and technical authority to identify approaches to addressing increasing AvMC supervisor workload resulting from the Future of Work and initiatives of the AMS and APS. This will enable the AvMC to support the National Defense Strategy goal of building enduring advantages by “undertaking reforms to accelerate force development, getting the technology we need more quickly, and making investments in the extraordinary people of the Department [of Defense]” (U.S. Department of Defense, 2022, p. 2).

Overview of the Research Methodology

The research was conducted using a qualitative research methodology. Creswell and Guetterman (2019) define qualitative research as “an inquiry approach useful for exploring and understanding a central phenomenon” (p. 627). The researcher collected data through a literature review of books, journal articles, OPM materials, Army documents, NASA documents, position descriptions, DEVCOM documents, and internal AvMC documents. The research questions guided the literature review through identification of sources pertaining to each question individually. The researcher obtained literature sources through the Defense Acquisition University (DAU) Virtual Library, the Lawrence Technological University (LTU) Library, the Defense Technical Information Center (DTIC), the OPM website, the Fully Automated System for Classification (FASCLASS), Army websites, NASA websites, and AvMC internal sources.

Limitations of the Study

This research is limited in scope to evaluating the definition of supervisory duties, the concept of technical authority, and how the modernization and people strategies may impact the workload at the first-line supervisor level within the AvMC. When researching the assignment of duties within the AvMC, the research is limited to engineering positions. This research does not consider AvMC employee perceptions of workload or supervisor job satisfaction. In addition, this research does not undertake assessing workload of each work unit independently.

This research does not use interviews or surveys. This research is further limited to the availability of data from published sources and through the AvMC internal distribution. The AvMC is currently developing talent management programs to hone technical competencies at the employee level. The details of these programs are not captured in this research because these are in work and unpublished.

Summary

An evaluation of the distribution of supervisory duties and technical authority within the AvMC is needed in response to the convergence of the innovation required by the AMS and APS and the new work environment spawned from the COVID-19 pandemic. This research will guide understanding of the responsibilities of supervisors per OPM and in practice within the AvMC. This research will then review the concept of technical authority as it pertains to federal organizations. This research continues reviewing the impact of new work environments driven by the Future of Work on supervisors. Finally, this research concludes with studying how innovation desired by the AMS and APS affect the roles of supervisors and technical authority.

Literature Review

There are certainly challenges, including performance, measures, managing a hybrid workforce and biases, and those aren't to be minimized or trivialized – those are all significant and we'll have to get at them, but I'm really enthused by what I've seen so far and really optimistic about the future – John Willison (Summey, 2022a, p. 58)

Introduction

The literature review provides a study of the literature relevant to the research questions. The review begins with examining the definition of a supervisor and the concept of technical authority. The review proceeds to examine the AvMC organization, specifically researching the duties of engineering supervisors at the first-line level and the assignment of technical authority. The research then studies the impacts of the Future of Work on the role of the supervisor. Finally, the review concludes by examining literature pertaining to leading for innovation.

The research began by examining the AvMC organization using internal documentation obtained through the unclassified AvMC intranet and databases. The research continued through Army, NASA, and OPM documents followed by articles and books available through online libraries and the public domain. The following documents the research findings relevant to this study.

Statement of Purpose and Research Questions

The purpose of this qualitative study is to explore supervisory duties and technical authority in the AvMC considering the Future of Work, the AMS, and the APS. The following research questions guide the study.

1. What are the responsibilities of a supervisor according to the OPM?
2. What is technical authority within federal organizations?
3. How are supervisory duties and technical authority distributed within the AvMC?

4. How does the Future of Work, as defined by the OPM, impact supervisory duties?
5. How does the innovation desired by the APS and the AMS affect the supervisor and technical authority roles?

Supervisor

Public law, OPM guidance, and local regulation all provide definitions of a supervisor within the AvMC. Title 5 United States Code (2022) Part III Subpart F Chapter 71 Subchapter 1 paragraph 7103(a)(10) defines a supervisor as,

an individual employed by an agency having authority in the interest of the agency to hire, direct, assign, promote, reward, transfer, furlough, layoff, recall, suspend, discipline, or remove employees, to adjust their grievances, or to effectively recommend such action, if the exercise of the authority is not merely routine or clerical in nature but requires the consistent exercise of independent judgment, except that, with respect to any unit which includes firefighters or nurses, the term "supervisor" includes only those individuals who devote a preponderance of their employment time to exercising such authority.

OPM (1998) further defines a supervisor as a “position or employee that accomplishes work through the direction of other people” (p. 6). Managerial authority is defined for positions which direct the work of an organizational unit, are held accountable for the success of specific line or staff functions, monitor and evaluate the progress of the organization toward meeting goals, and make adjustments in objectives, work plans, schedules, and commitment of resources. (U.S. Office of Personnel Management, 1998, p. 7).

The General Schedule Supervisory Guide (GSSG) (U.S. Office of Personnel Management, 1998) further identifies supervisory work and managerial responsibilities as

requiring at least 25% of the positions time to accomplish work “through combined technical and administrative direction of others” (p. 2) and meeting at least the first level of “Factor 3 - Supervisory and Managerial Authority Exercised” (p. 14). Factor 3 of the GSSG grades supervisors into three levels (U.S. Office of Personnel Management, 1998). Factor Level 3-2a focuses specifically on production-oriented work.

Plan and schedule ongoing production-oriented work on a quarterly or annual basis, or direct assignments of similar duration. Adjust staffing levels or work procedures within their organizational unit(s) to accommodate resource allocation decisions made at higher echelons. Justify the purchase of new equipment. Improve work methods and procedures used to produce work products. Oversee the development of technical data, estimates, statistics, suggestions, and other information useful to higher level managers in determining which goals and objectives to emphasize. Decide the methodologies to use in achieving work goals and objectives, and in determining other management strategies. (p. 15)

Factor Level 3-2b addresses another level of supervision for work contracted out.

Where work is contracted out, perform a wide range of technical input and oversight tasks comparable to all or nearly all of the following:

1. Analyze benefits and costs of accomplishing work in-house versus contracting; recommend whether to contract;
2. Provide technical requirements and descriptions of the work to be accomplished;
3. Plan and establish the work schedules, deadlines, and standards for acceptable work; coordinate and integrate contractor work schedules and processes with work of subordinates or others;

4. Track progress and quality of performance; arrange for subordinates to conduct any required inspections;
5. Decide on the acceptability, rejection, or correction of work products or services, and similar matters which may affect payment to the contractor. (U.S. Office of Personnel Management, 1998, p. 15).

Factor Level 3-2c identifies ten authorities and responsibilities for administrative and process focused supervisors.

1. Plan work to be accomplished by subordinates, set and adjust short-term priorities, and prepare schedules for completion of work;
2. Assign work to subordinates based on priorities, selective consideration of the difficulty and requirements of assignments, and the capabilities of employees;
3. Evaluate work performance of subordinates;
4. Give advice, counsel, or instruction to employees on both work and administrative matters;
5. Interview candidates for positions in the unit; recommend appointment, promotion, or reassignment to such positions;
6. Hear and resolve complaints from employees, referring group grievances and more serious unresolved complaints to a higher level supervisor or manager;
7. Effect minor disciplinary measures, such as warnings and reprimands, recommending other action in more serious cases;
8. Identify developmental and training needs of employees, providing or arranging for needed development and training;
9. Find ways to improve production or increase the quality of the work directed;

10. Develop performance standards. (U.S. Office of Personnel Management, 1998, p. 16).

The lowest grade of administrative or process focused supervisor must execute “at least three of the first four, and a total of six or more” (U.S. Office of Personnel Management, 1998, p. 15) of the authorities and responsibilities identified above. Factor Levels 3-3 and 3-4 grade two additional levels of supervisor based on increasing levels of authority and responsibility. Both increased levels require execution of the ten authorities and responsibilities identified above.

The AvMC operates personnel management under a Science and Technology Reinvention Laboratory Personnel Demonstration Project (Federal Register Vol. 65, No. 170, 2000). Redstone Arsenal (RSA) Regulation 690-5 establishes the responsibilities for implementing the demonstration project (US Army Garrison - Redstone, 2004). RSA 690-5 addresses the use of the term supervisor in two key areas. First, “a supervisory prefix is used only in situations where a benchmark position description is selected that depicts the continuous assignment of both technical and administrative supervisory duties” (p. 10). Second, in Section I, 5-1.d, the regulation introduces the term “rating supervisor”.

Rating supervisors are responsible for assigning work and for working with employees in establishing job-related performance objectives for employees. They provide information to and obtain feedback from employees on goals and priorities, performance, and professional development plans. (US Army Garrison - Redstone, 2004, p. 22)

The definition of a supervisor has been the center of legal battles as well. The U.S. Equal Employment Opportunity Commission held the position that “supervisors include those whom the employer vests with authority to direct and oversee another employee’s daily work” (Deschenaux, J., J.D., 2013, p. 8). The U.S. Supreme Court opinion is that “an employee is a

‘supervisor’ for purposes of vicarious liability under Title VII if he or she is empowered by the employer to take tangible employment actions” (Vance v. Ball State University, 2013, p. 2). The Court opinion cited the Seventh Circuit affirmation that “supervisor status requires ‘the power to hire, fire, demote, promote, transfer, or discipline an employee’” (p. 4). This decision highlights the consistent application of the public law definition of a supervisor to commercial and Federal entities (Government Organization and Employees, 2022).

Technical Authority

The GSSG further differentiates the grade level of supervisory positions by considering the program scope, organizational setting, supervisory and managerial authority exercised, personal contacts, difficulty of work directed, and other conditions (U.S. Office of Personnel Management, 1998). Factor 6 measures the difficulty and complexity of the supervisory role due to other conditions for which the supervisor is responsible. The other conditions include the supervisor having oversight over increasing levels of work as differentiated by the General Schedule (GS) level. Factor 6-2 introduces the concept of technical authority as a contributing condition. The GSSG defines technical authority as authority where “the supervisor is responsible for all technical determinations arising from the work, without technical advice or assistance on even the more difficult and unusual problems, and without further review except from an administrative or program evaluation standpoint” (p. 24). The GSSG, therefore, considers technical authority as a condition that contributes “to the difficulty and complexity of carrying out supervisory duties, authorities, and responsibilities” (p. 23).

The DAU and the NASA describe the concept of technical authority differently from OPM. Although the Defense Acquisition Guidebook (DAG) is being replaced by new guidebooks, previous versions provide an insight into the concept of technical authority from the

DoD acquisition perspective. The DAG tied technical authority to the role of program technical oversight.

Technical authority is the organization outside the program manager's chain of command with responsibility and accountability to establish, approve, and assess conformance of products and technical processes to technical, safety, and certification requirements and policy during all phases of product development, acquisition, and sustainment. (Defense Acquisition University, 2011, p. 24)

In this context, technical authority is not inherently the domain of the supervisor. It is the domain of an independent organization to which the program is accountable. Though the DAG has been replaced, the Engineering of Defense Systems Guidebook identifies the use of independent technical review teams as a “best practice fundamental to engineering and risk management” (Office of the Under Secretary of Defense for Research and Engineering, 2022, p. 105). This independent team enables the Component Acquisition Executive (CAE) to obtain technical assessments that document issues that “jeopardize achieving safety and security thresholds, and program and mission objectives” (Office of the Under Secretary of Defense for Research and Engineering, 2022, p. 105) without influence from the Program Management Office (PMO). Independent technical review team members are chosen specifically to ensure all influences from the PMO are avoided. Independent technical review teams in this role are a means of ensuring technical acceptability.

The NASA (2014) perspective on technical authority aligns with historic DAU guidance and the current use of independent review teams in that the authority is independent. In NASA, however, the authority is “formally delegated responsibility that is traceable to the [NASA] Administrator” (p. 238). Technical Authorities in the NASA’s definition are intended to provide

a level of independent oversight outside the program management chain to assure checks and balances are in place “in support of safety and mission success” (p. 239). Like the DAG definition, the NASA definition indicates technical authority is a separate function from the role of a supervisor.

The history of NASA’s implementation of a technical authority provides insight into the value of separating program and project decisions from technical authority. NASA established technical authority as a checks and balances process to strengthen safety and likelihood for mission success following the Columbia disaster (National Aeronautics and Space Administration, 2014; Hirshorn, 2019). The Columbia Accident Investigation Board (CAIB) recommended that NASA “establish an independent Technical Engineering Authority that is responsible for technical requirements and all waivers to them, and will build a disciplined, systematic approach to identifying, analyzing, and controlling hazards” (Columbia Accident Investigation Board, 2003, p. 193). The CAIB further recommended that this independent authority have no responsibility for program schedule or cost. In making this recommendation, the CAIB referenced the U.S. Navy’s Submarine Safety (SUBSAFE) Program. One of the differences between NASA programs and the Navy submarine programs at the time of the report was in requirements ownership. The CAIB (2003) identified that “both the SUBSAFE and Naval Reactors’ organizational approach separates the technical and funding authority from program management in safety matters” (p. 184). The CAIB determined that separation of authority between cost and schedule sensitive program managers and safety and technical rigor focused technical requirements owners was crucial.

NASA established the role of Engineering Technical Authority with responsibility “for engineering design processes, specifications, rules, best practices, and other activities necessary

to fulfill programmatic mission performance requirements” (National Aeronautics and Space Administration, 2014, p. 243). The Technical Authority process “is built on the organizational and financial separation of the Programmatic and Institutional Authorities” (p. 239). Institutional Authority includes Engineering, Safety and Mission Assurance, Health and Medical organizations, Mission Support Organizations, and Center Directors.

Technical independence to ensure safety is not unique to post-Columbia NASA. Department of Defense Directive (DODD) 5030.61 requires that Military Departments establish policies for establishing airworthiness authority in accordance with (IAW) the directive (Deputy Secretary of Defense, 2018). U.S. Army Regulation (AR) 70-62 “implements guidance in accordance with DODD 5030.61 for establishing airworthiness” (U.S. Department of the Army, 2016, p. i). AR 70-62 assigns the responsibility for Army airworthiness authority to the Commanding General (CG), U.S. Army Aviation and Missile Command (AMCOM). The CG, AMCOM, delegated authority for Army airworthiness and engineering cognizance to the Director, Systems Readiness Directorate (SRD), in the DEVCOM AvMC (O’Conner, 2022). This delegation authorizes the Director, SRD, to issue airworthiness releases (AWRs) and Statements of Airworthiness Qualification (SAQs). In part, when activities develop or modify aircraft, AR 70-62 (U.S. Department of the Army, 2016) requires “the head of each appropriate Army activity and program executive office, program manager, project manager, product director or product manager” (p. 2) to

- (1) Program for development of the system design, design documentation, verification, and life cycle airworthiness activities to generate data in accordance with approved airworthiness requirements.

- (2) Ensure that the airworthiness requirements of the Army have been met throughout the aircraft system life cycle.
- (3) Ensure that hazards identified by the airworthiness process are eliminated, mitigated, transferred, or accepted under the Army system safety management process.
- (4) Obtain an AWR prior to aircraft operation.
- (5) Obtain Army airworthiness approval or Army AWR for all FMS [Foreign Military Sale] aircraft prior to operation or transfer of the aircraft system.
- (6) Ensure that product improvement programs for aircraft systems and their major components include appropriate efforts for airworthiness.
- (7) Manage all system configurations and ensure that approved configurations of aircraft systems, including officially promulgated modification work orders (MWOs), have been determined to be airworthy before issuing the item to the user. (p. 2)

The regulation establishes independence between project/product execution and technical authority. The head of each activity is responsible for programming for airworthiness, ensuring that airworthiness requirements are met, and obtaining an AWR. The Director, SRD is delegated airworthiness authority from the CG, AMCOM to issue AWRs. In this case the technical authority is specifically airworthiness authority.

The Army Materiel Release process regulated by AR 770-3 mandates independence in the process as well (U.S. Department of the Army, 2021). Section 1-7 assigns materiel release authority (MRA) to the Assistant Secretary of the Army (Acquisition, Logistics and Technology) for development of materiel, medicines, and medical devices developed through the Joint Program Executive Officer for Chemical, Biological, Radiological and Nuclear Defense (JPEO CBRND). ASA (ALT) also serves “as the MRA for training aids, devices, simulators, and

simulations, instrumentation, targets, and threat simulators for training, testing, and combat training center instrumentation” (p. 1) developed through the Program Executive Officer for Simulation, Training, and Instrumentation (PEO STRI). AR 770-3 identifies The Surgeon General (TSG) “as the MRA for medical material (devices)” (p. 2). Finally, AR 770-3 designates the Commanding General, U.S. Army Materiel Command as the

MRA for all acquisition programs, systems, and equipment managed by the ASA (ALT), PEOs or MATDEVs [Materiel Developers], except for cases where this regulation grants MR authority to the PEO, Joint PEO, U.S. Army Network Enterprise Technology Command, U.S. Army Cyber Command, Corps of Engineers, or TSG, unless TSG has transferred MRA authority. (U.S. Department of the Army, 2021, p. 2)

In all these cases, the MRA is independent from the materiel developer. Similar to airworthiness, the regulation identifies many DEVCOM organizations to serve in functional authority roles in support of the MRAs, including human systems integration (HSI), quality, reliability, availability, and maintainability, as examples.

The value of independent oversight applies to cost estimating as well. Department of Defense Instruction (DODI) 5000.73 states “independent and sound cost estimates are vital for effective acquisition decision making and oversight” (Office of the Director, Cost Assessment and Program Evaluation, 2020, p. 4). Cost estimates conducted independent of the PMO are required for all Major Defense Acquisition Programs (MDAPs), major subprograms, some Middle Tier of Acquisition (MTA) programs, contracted services at the discretion of the Director of Cost Assessment and Program Evaluation (DCAPE), some software programs, and Defense Business Systems at the discretion of the DCAPE (Office of the Director, Cost Assessment and Program Evaluation, 2020). In this realm, cost estimating is another form of technical authority.

The value of independent technical authority discussed in the cases above is relative to independence between the program/project/product management responsible for cost and schedule and organizations with specific expertise in the technical disciplines necessary to evaluate compliance with requirements. These cases do not restrict assigning technical authority to personnel that also have supervisory responsibilities; however, these cases do not require that personnel with supervisory duties oversee the technical output of the organization either (National Aeronautics and Space Administration, 2014; U.S. Department of the Army, 2016; U.S. Department of the Army, 2021; Office of the Director, Cost Assessment and Program Evaluation, 2020).

AvMC Organization

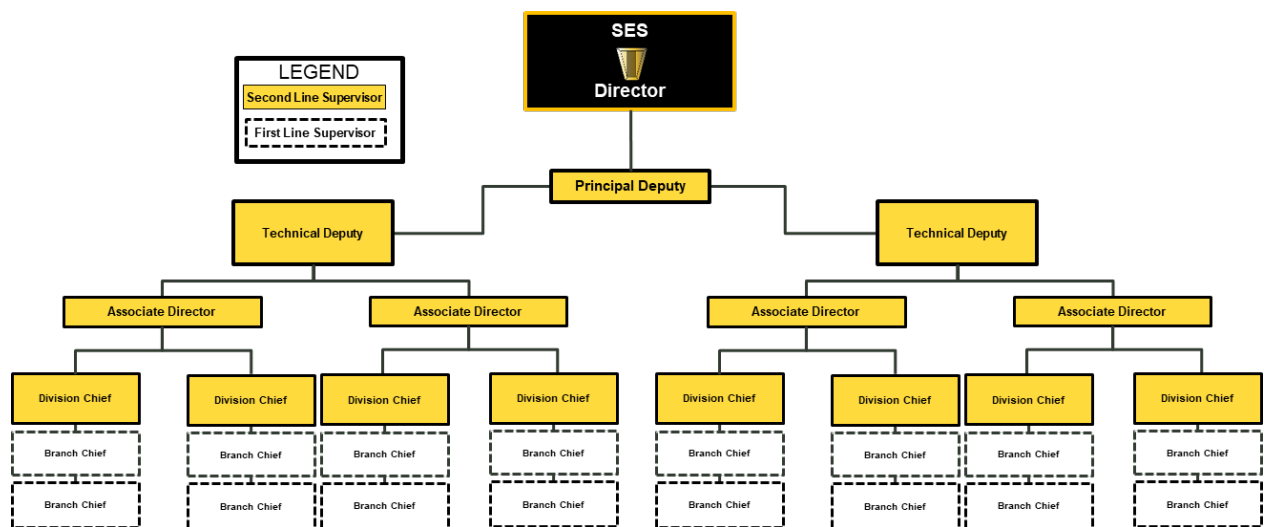
The AvMC is one of the eight major competency areas under the DEVCOM (DEVCOM, n.d.). The AvMC mission is to “develop, integrate, demonstrate, and sustain aviation and missile systems capabilities to support modernization priorities and improve readiness” (DEVCOM Aviation and Missile Center, 2022, p. 2).

The AvMC executed \$4.4B in FY21 utilizing 19 military personnel, 2,983 civilian service employees, and approximately 9,358 contractor support personnel (DEVCOM Aviation and Missile Center, 2022). The three largest customers, based on funding in FY21, were PEO AVN (\$915.8M), PEO Missiles and Space (PEO M&S) (\$658.8M), and the Rapid Capabilities and Critical Technologies Office (RCCTO) (\$418.6M). PEO AVN and PEO M&S alone provided 35.8% of the total funding executed in FY21. It is no surprise, therefore, that the AvMC lists one of the critical organization areas is to “provide world class functional engineering expertise to our PEOs, [Missile Defense Agency] MDA, RCCTO, and other critical partners” (p. 6).

The AvMC organization is structured into three directorates reporting to the Center Director (DEVCOM Aviation & Missile Center, n.d.). The Systems Readiness Directorate (SRD), the Software, Simulation, Systems Engineering and Integration Directorate (S3I), and the Technology Development Directorate (TDD) are each led by a Senior Executive Service (SES) Director. Researching the organization charts of each Directorate reveals similar supervisory hierarchical structures to the notional structure shown below in Figure 2 (K. Darrow, C. Dolbeer, M. Oden, personal communications, August 29, 2022).

Figure 2

AvMC Notional Hierarchy



The first-line level supervisor in this notional structure is in the “Branch Chief” position. As of September 2022, the AvMC has 388 personnel identified as having supervisory duties. 187 of these positions are at the non-matrixed Branch Chief level. Prior to March 2018, supervisors in the AvMC were on positions designated as DB-04 full performance levels with maximum salary rates equivalent to the GS-15 step 10 (US Army Garrison - Redstone, 2004). Following 23 March 2018, the AvMC established two full performance levels within the DB-III pay band (Harris, 2018).

Category 1 represents DB-III positions originally described in 62 FR 34875 where the maximum salary rate is equivalent to GS-13 step 10. Category II represents a new DB-III full performance level where the maximum salary rate is equivalent to GS-14 step 10 (i.e., DB-03+). The DB-03+ full performance level will be restricted to only those subject matter expert (SME) and supervisor positions which perform to GS-14 equivalent level work, authorities, and responsibilities. (Harris, 2018, p. 3)

The information paper further noted that “no current AMRDEC employee will have their position downgraded as a result of the implementation” (Harris, 2018, p. 5). Note that the AvMC was previously the Aviation and Missile Research, Development, and Engineering Center (AMRDEC).

The result of the establishment of the DB-03+ performance level is that currently the AvMC has a mix of supervisors at the DB-03+ and DB-04 grades (Harris, 2018). The AvMC is transitioning first-line supervisors to the DB-03+ grade through attrition unless the duties assigned are commensurate with GS-15 equivalent level work, authorities, and responsibilities. In addition, the information paper reinforces the separation of subject matter expert positions, technical experts in their assigned discipline, from supervisor positions (Harris, 2018).

AvMC civilian personnel are assigned positions associated with Army position descriptions. The engineering job series position descriptions assigned to AvMC supervisors use consistent Factors and common language under the Contribution-Based Compensation and Appraisal System (CCAS) (Civilian position descriptors & organizational information, n.d.). Position descriptions for supervisors in engineering job series contain six (6) factors of duties: (1) Problem Solving; (2) Teamwork/Collaboration; (3) Customer Relations; (4) Leadership/Supervision; (5) Communication; (6) Resource Management.

A more detailed assessment of the position descriptions for DB-03+ supervisors provide an understanding of the duties assigned to this level. The Problem Solving factor identifies duties that include independently leading and resolving complex problems, identifying and implementing solutions, enhancing existing processes, and taking action to resolve organizational issues (Civilian position descriptors & organizational information, n.d.). The Teamwork/Cooperation factor assigns duties focused on leading the workforce in resolving problems using innovative approaches. This factor also assigns a duty to implement strategic plans. Finally, this factor annotates that the supervisor should be sought by peers for their expertise.

DB-03+ supervisors are assigned duties to lead and manage interactions with customers, to establish customer alliances, to anticipate and meet customer needs, and to establish programs fulfilling customer needs in the Customer Relations factor (Civilian position descriptors & organizational information, n.d.). Duties under the Leadership/Supervision factor include leading individuals and teams, resolving conflict, fostering development of team members, and pursuing professional development. In addition, the Leadership/Supervision factor further annotates that the supervisor should be considered a technical expert who is sought by others for their expertise. The Communication factor assigns duties related to communicating program results and organizational positions through authoring/contributing to reports or presenting briefings with the intent to obtain approval or to convey a strategic message. The Resource Management factor outlines duties for identifying resources, acquiring the resources, and allocating resources to manage multiple projects/programs. In addition, duties are assigned to develop organizational strategies, tactics, and budget plans. Summarizing the supervisory engineering position

description, supervisors are assigned a broad range of duties applying their technical competency and addressing the OPM competencies for supervisory work.

The available literature does not identify a singular AvMC position designation assigned technical authority in terms of the project/program independence identified in the previously discussed literature review. However, engineering supervisors are assigned duties that require technical competency to resolve complex problems/challenges and to be sought for their technical expertise as specified in the Problem Solving and Leadership/Supervision factors (Civilian position descriptors & organizational information, n.d.). The AvMC also has positions designated as “Subject Matter Experts” (SMEs) at the DB-03+ grade (Harris, 2018).

Generalizing the duties from current DB-03+ engineering SME position descriptions identifies that individuals in these positions are expected to serve as experts in their discipline with responsibility for conceiving, planning, and conducting work for difficult and complex projects/programs (Civilian position descriptors & organizational information, n.d.). The literature shows that the AvMC relies on supervisors and SMEs to provide technical authority, either in terms of independent technical support or technical oversight, to projects/programs.

The AvMC is recognizing the importance of non-supervisory employees developing leadership competencies in preparation for future supervisory positions (C. Holcomb, personal communication, October 11, 2022). The AvMC is designing a year-long program to develop competencies that align with ten competencies for supervisory work identified by OPM (U.S. Office of Personnel Management, n.d.-b). This effort highlights the importance that the AvMC is putting on developing supervisory competencies apart from technical capability.

Future of Work

The COVID-19 pandemic introduced the broader use of telework and remote work into Army organizations (U.S. Office of Personnel Management, 2021). Establishing the mix of telework and traditional on-site work following the pandemic is described as the “Future of Work”. Monroe & Haug’s (2022) study of the Defense Logistics Agency (DLA) Office of Operations Research and Resource Analysis (DOORA) prior to the COVID-19 pandemic showed positive outcomes from using telework. The study found that the teams were able to “accomplish the mission, even with teammates who telework” (p. 740). Employees are also seeing increased flexibility to maintain personal activities and work responsibilities (Monroe & Haug, 2022; U.S. Office of Personnel Management, 2021). However, the increased work capacity and flexibility come at the cost of additional time on the part of the supervisor to effectively supervise and deliberately communicate (Kirchner, Ipsen, & Hansen, 2021; Keilty & Burke, 2022). For DEVCOM, the Future of Work provides opportunities to increase productivity, employee satisfaction, and the talent pool. Figure 3 contrasts the pre-pandemic model to the Future of Work from DEVCOM’s concept.

Figure 3

DEVCOM Future of Work (George & Willison, n.d., p. 7)

CONTRASTING THE PAST AND CURRENT AND THE FUTURE		
	Past/Current	Objective
WHY	Remains constant.	
WHAT	Remains constant.	
WHERE	Work primarily at official duty location.	Work where you are most productive.
HOW	<ul style="list-style-type: none"> • Local, discrete teams operating within constraints of organizational boundaries. • Linear, requirements-driven process. • Local management of networks and device data. 	<ul style="list-style-type: none"> • Agile, cross-competency and cross-organization teams rapidly formed to deliver integrated solutions. • Iterative, Soldier-centered design. • Enterprise solution enabling broad collaboration.
WHO	<ul style="list-style-type: none"> • The best talent to "come" to us. • Reactively filling organizational vacancies. • Permanent positions, "career" development. • Limited, local view of diversity, equity and inclusion (DE&I). 	<ul style="list-style-type: none"> • The best talent, anywhere. • Proactively building competency-based talent. • Movement built into the system. • Fully inclusive—opportunities with few boundaries.
WHEN	<ul style="list-style-type: none"> • Locally defined "core hours." • Largely synchronous operations. 	<ul style="list-style-type: none"> • Work when you are most productive. • Asynchronous operations emphasizing output.

It is clear from DEVCOM’s concept that telework and hybrid work will be the reality for AvMC supervisors and employees into the future (George & Willison, n.d.). Supervisors will need to adapt to supervising a workforce potentially dispersed geographically, enabled to work where and when they are most productive, and supporting agile, cross-competency teams. The term hybrid workforce is used to describe a workforce with a mix of personnel functioning on-site or via telework on any given day. This paper leaves the task of researching the benefits of hybrid environments fully to other authors. This paper researches the additional burdens placed

upon supervisors to maintain employee engagement and mission success when using hybrid environments.

OPM identifies ten important competencies for supervisory work as shown in Table 1. In addition, some supervisors may have technical requirements that must be met.

Table 1

10 Competencies for Supervisory Work (U.S. Office of Personnel Management, n.d.-b, para. 4)

Accountability	Holds self and others accountable for measurable high-quality, timely, and cost-effective results. Determines objectives, sets priorities, and delegates work. Accepts responsibility for mistakes. Complies with established control systems and rules.
Customer Service	Anticipates and meets the needs of both internal and external customers. Delivers high-quality products and services; is committed to continuous improvement.
Decisiveness	Makes well-informed, effective, and timely decisions, even when data are limited or solutions produce unpleasant consequences; perceives the impact and implications of decisions.
Flexibility	Is open to change and new information; rapidly adapts to new information, changing conditions, or unexpected obstacles.
Integrity/Honesty	Behaves in an honest, fair, and ethical manner. Shows consistency in words and actions. Models high standards of ethics.
Interpersonal Skills	Treats others with courtesy, sensitivity, and respect. Considers and responds appropriately to the needs and feelings of different people in different situations.

Oral Communication	Makes clear and convincing oral presentations. Listens effectively; clarifies information as needed.
Problem Solving	Identifies and analyzes problems; weighs relevance and accuracy of information; generates and evaluates alternative solutions; makes recommendations.
Resilience	Deals effectively with pressure; remains optimistic and persistent, even under adversity. Recovers quickly from setbacks.
Written Communication	Writes in a clear, concise, organized, and convincing manner for the intended audience.

The increased use of telework highlights the need for additional competencies for supervisors to enable the Future of Work (Summey, 2022a; U.S. Office of Personnel Management, n.d.-a). OPM (n.d.-a) emphasizes that supervisors will need excellent skills in “planning the work, setting expectations, monitoring performance, and recognizing employees for their performance” (para. 2) to succeed in meeting goals in telework. However, just having these skills is insufficient to make the supervisor/employee relationship successful under a telework agreement. The supervisor must dedicate more time to communicating with telework employees, establishing relationships, creating a safe environment, and maintaining work equity between teleworking and on-site employees (Summey, 2022b; U.S. Office of Personnel Management, 2021; Keilty & Burke, 2022). According to Keilty and Burke (2022), leaders must be capable of using video conferencing and chat functions to be effective communicators in the hybrid work environment.

Keilty & Burke (2022) emphasize that to be successful leaders in telework, supervisors must execute the leadership styles of “delegating, supporting, coaching, and directing” (p. 103)

within situational leadership. Supervisors will need training and confidence to adapt the telework agreements to their subordinates' personalities, skills, and roles within the organization. Jamie Mukopf, DSW goes a step further by indicating that supervisors need to “create an environment of psychological safety” (Summey, 2022b, p. 73). Once the safe environment is established, the supervisor must check in with personnel regularly to monitor for indications of trouble (Summey, 2022b).

In the traditional on-site work environment, supervisors have the opportunity to check in with employees frequently through hallway interactions, informal discussions before formal meetings, and dropping by their desks. These methods are not feasible in a telework environment. Supervisors must say “goodbye to the drop by” (Keilty & Burke, 2022, p. 102) when dealing with telework employees. Checking in with telework employees takes deliberate engagement through telework tools, and email alone does not fill the need adequately. Keilty & Burke (2022) argue that supervisors should use video conferencing, chat and group chat, and one-on-one engagements to proactively address the potential psychosocial risks of telework. For many supervisors this is a new way of communicating that takes more time than they are used to when all employees were working on-site together. To be effective communicators in a telework or hybrid environment supervisors will need to become proficient in these methods using the tools provided while still maintaining the skills they have developed to interact with personnel in person (Keilty & Burke, 2022; Summey, 2022a). A study on the impact of teleworking on Danish managers identified that due to the inability for informal non-planned discussions to occur, leaders spend more time in scheduled on-line meetings, working longer hours, and becoming less productive because it is more-time consuming to conduct daily supervisory duties (Kirchner, Ipsen, & Hansen, 2021).

Beyond communication, supervisors will need to consider the tasks that they assign to a given employee considering the employees preferences for work environment. In addition, supervisors must also consider how they will monitor employee performance and how to assign work equitably, fairly, and without bias (U.S. Office of Personnel Management, n.d.-a; Gratton, 2021). These considerations must be consistently reassessed to address imbalances in work assignments to negate any unfairness. “Research tells us that feelings of unfairness in the workplace can hurt productivity, increase burnout, reduce collaboration, and decrease retention” (Gratton, 2021, Inclusion and Fairness section). Supervisors will need extra time above what was typical in the traditional work environment to evaluate and reorganize the work (Kirchner, Ipsen, & Hansen, 2021). “It is much more time consuming to coordinate and quickly clarify difficult problems...at a distance” (Kirchner, Ipsen, & Hansen, 2021, p. 497). Supervisors need more time to support the people to accomplish work in the telework and hybrid environments than in a traditional on-site setting (Kirchner, Ipsen, & Hansen, 2021).

Leading for Innovation

The AMS states that “key to developing the technologies necessary to meet our modernization goals is encouraging a culture of innovation within the Army” (U.S. Department of the Army, 2019a, p. 7). The APS recognizes that the global strategic environment driving the need for Army modernization is also driving a need for innovation “in the realm of people management” (U.S Department of the Army, 2019b, p. 15). The need to innovate is also a consistent theme in the national security strategy (Biden Jr., 2022). This need for establishing a culture of innovation led to researching the literature on leading for innovation to understand the impacts on the supervisor and technical authority roles.

Leading for innovation requires strategic thinking, not only about technology, but also about the processes within the organization (Le Storti, 2022). Leaders thinking strategically must consider the competencies and capabilities that are needed to execute the strategy. Once necessary competencies and capabilities are in place, innovation requires employee empowerment to think creatively (Grant, 2016; Anthony, Cobban, Painchaud, & Parker, 2021; Anthony, Cobban, Nair, & Painchaud, 2019).

Empowering creativity does not mean that employees operate alone though. Allowing employees to generate lots of innovative ideas that are evaluated by the collective expertise of the organization drives a balance between executable innovation and risk aversion (Grant, 2016). A strong leader creates the opportunity for an innovative culture to thrive by providing the right resources and removing roadblocks to enable employees to execute their tasks without constantly seeking approval (Anthony, Cobban, Painchaud, & Parker, 2021). The leader then provides oversight of the task execution to identify when something is not working.

The Army strategic environment considers the shift in employee and employer relationship (U.S Department of the Army, 2019b). Employees are seeking opportunities to apply their creative thinking to achieve personal fulfillment and job satisfaction. The key behaviors of innovative organizations enable these opportunities.

Innovative organizations exhibit five key behaviors: They always assume there's a better way to do things. They focus on deeply understanding customers' stated and unstated needs and desires. They collaborate across and beyond the organization, actively cross-pollinating. They recognize that success requires experimentation, rapid iteration, and frequent failure. Last, they empower people to take considered risks, voice dissenting

opinions, and seek needed resources. (Anthony, Cobban, Nair, & Painchaud, 2019, pp. 94-96)

The Army has made a commitment “to innovation and thoughtful leadership in the realm of people management” (U.S Department of the Army, 2019b, p. 15). Research on leading for innovation indicates that barriers to innovation in this manner may include a lack of supervisor time, a lack of innovation skills, and a lack of ability to make change (Anthony, Cobban, Nair, & Painchaud, 2019). Organizations may have additional blockers preventing innovative behaviors as well. A three-step process can be used to identify blockers and create interventions (Anthony, Cobban, Nair, & Painchaud, 2019). First, document the desired traits of the organization. Second, identify blockers to establishing these traits. Finally, design interventions to remove these blockers. Modifying processes to remove innovation blockers and to encourage the five key innovative behaviors are necessary to begin creating an innovation culture within the organization.

The rapidly changing environment of the twenty-first century drives the need for organizations to utilize management skills and leadership skills throughout all levels (Kotter, 2012). Management is traditionally focused on planning, budgeting, organizing, staffing, and problem solving. Leadership, on the other hand, requires the ability to create and communicate visions and strategies. In the rapidly changing environment of innovation within today’s Army, the first-line supervisor will need to apply both leadership and management skills (Kotter, 2012; U.S Department of the Army, 2019a; U.S Department of the Army, 2019b; Anthony, Cobban, Painchaud, & Parker, 2021).

Furthermore, Kotter (2012) states that the “hearts and minds of all members of the workforce are needed to cope with the fast-shifting realities of the business climate” (p. 175).

Broad empowerment of the workforce provides the structure to enable organizations to operate in shifting conditions (Kotter, 2012). Developing leadership knowledge and employee empowerment are essential to preparing the organization, and the personnel within, to adapt and innovate as the environment shifts (Grant, 2016; Anthony, Cobban, Painchaud, & Parker, 2021; Anthony, Cobban, Nair, & Painchaud, 2019; Kotter, 2012).

Summary

The literature review examined the definition of a supervisor within the AvMC by looking at governing laws, regulations, and guidance. The review then provided insight into the concept of technical authority. The study reviewed the AvMC organization's structure pertaining to the assignment of duties to engineering first-line supervisors and DB-03+ SMEs. The review continued by covering the changing work environment as driven by the post-COVID pandemic Future of Work. Finally, the review considered publications on leading for innovation. The following section will discuss the research methodology used to generate this paper.

Research Methodology

Statement of Purpose and Research Questions

The purpose of this qualitative study is to explore supervisory duties and technical authority in the AvMC considering the Future of Work, the AMS, and the APS. The following research questions guide the study.

1. What are the responsibilities of a supervisor according to the OPM?
2. What is technical authority within federal organizations?
3. How are supervisory duties and technical authority distributed within the AvMC?
4. How does the Future of Work, as defined by the OPM, impact supervisory duties?
5. How does the innovation desired by the APS and the AMS affect the supervisor and technical authority roles?

Research Methodology

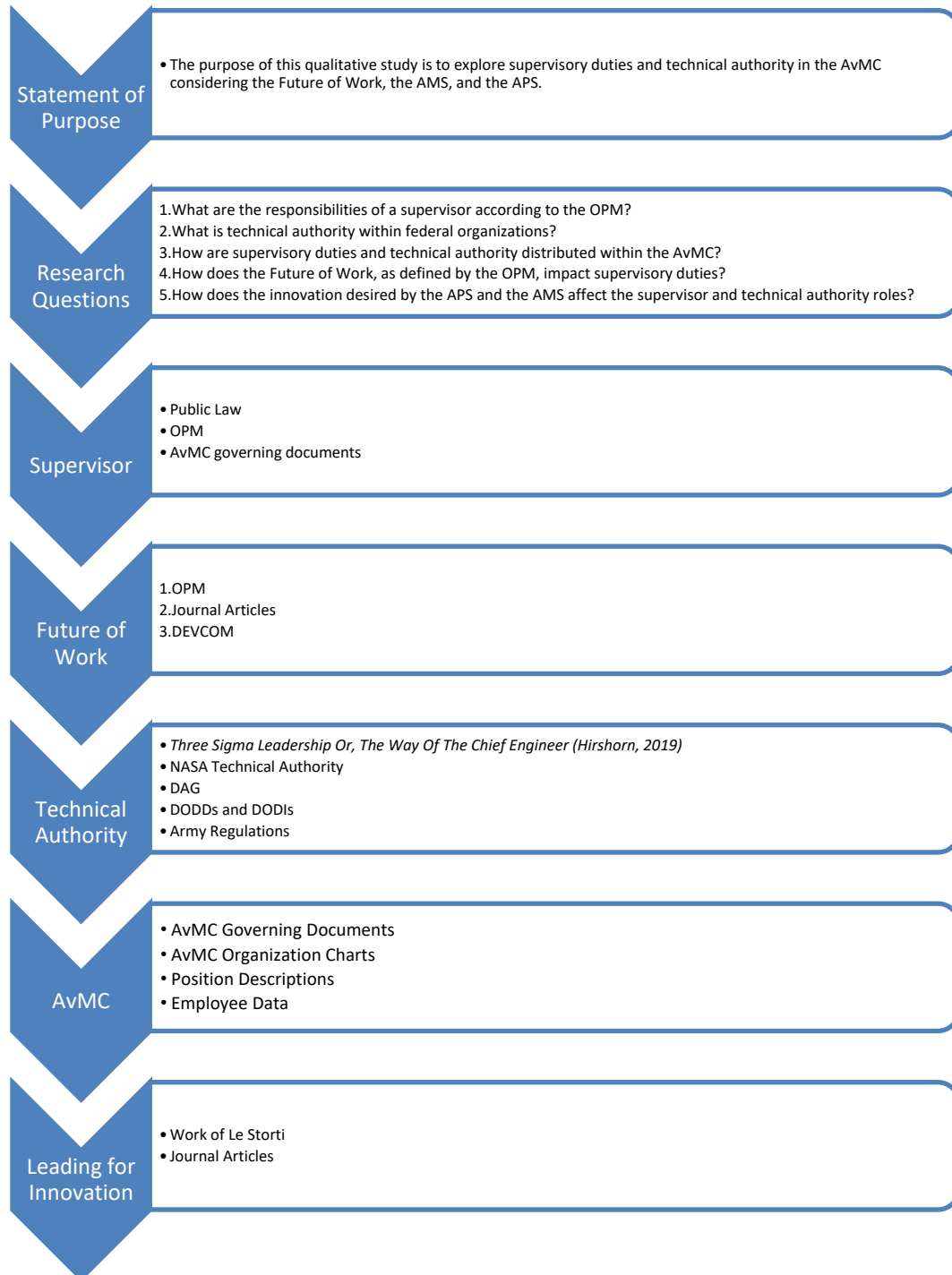
The research was conducted using a qualitative research methodology. Qualitative research is used to explore a problem using open-ended questions to guide the collection of data (Creswell & Guetterman, 2019). The research problem focuses on a central phenomenon that is the key idea or concept being studied. The central phenomenon for this research is exploring the impact of the Future of Work and leading for innovation in support of the AMS and APS on supervisory duties and technical authority within the AvMC.

The researcher obtained literature sources through the DAU Virtual Library, the LTU Library, the DTIC, the OPM website, the FASCLASS, Army websites, NASA websites, and AvMC internal sources. In a few instances, the researcher obtained data from personal written communications in which the information was not releasable. The research questions served to

guide the collection of data from these sources. Figure 4 presents the research methodology graphically.

Figure 4

Research Methodology



The researcher began by collecting data from OPM, public law, and AvMC governing documents to understand the duties which are inherently supervisory. The researcher then collected sources that addressed how a supervisor's duties change when shifting to a hybrid workforce, which is a workforce with personnel located both on-site and off-site, or the Future of Work. Sources were focused on those related to the federal workforce and not specific to the COVID-19 pandemic solely. In addition, the OPM website supplied information pertaining directly to supervising in a telework environment (U.S. Office of Personnel Management, 2021). When researching the Future of Work, the study focused on the impact when supervising a hybrid workforce. The research does not consider the benefits or costs to the organization by using a hybrid workforce.

Hirshorn's (2019) writing about NASA's use of technical authority introduced the concept of technical authority. Data collection expanded the concept to consider technical authority within the DoD and Army by collecting data from DAU, relevant DODDs and DODIs, and Army regulations where technical oversight, with or without independence, affected duties within the AvMC.

The AvMC organization was studied through collection of data from the AvMC website, AvMC intranet, and internal databases. Where the data collected was considered to not be releasable, it was used to generalize the structure of the Directorates and duties assigned to supervisor or SME positions. For the purposes of this study, the AvMC data that cannot be released is considered personal communication. Data of this nature is specific to organization charts below the Center level and position descriptions. Data collection about the assignment of duties was focused on engineering positions.

Data collection about leading for innovation was influenced by the research of Anthony J. Le Storti (2022) as presented through the University of Pennsylvania Program in Leadership Dynamics. More data was collected through searching academic databases with a focus on leading innovation.

This research does not consider AvMC employee perceptions of workload or supervisor job satisfaction. This research does not use interviews or surveys and is limited to the availability of data from published sources and that can be obtained through the AvMC internal distribution.

Summary

The research was conducted using a qualitative research methodology. Creswell and Guetterman (2019) define qualitative research as “an inquiry approach useful for exploring and understanding a central phenomenon” (p. 627). The researcher collected data through a literature review of books, journal articles, OPM materials, Army documents, NASA documents, position descriptions, DEVCOM documents, and internal AvMC documents. The research questions guided the literature review through identification of sources pertaining to each question individually. The researcher obtained literature sources through the DAU Virtual Library, the LTU Library, the DTIC, the OPM website, the FASCLASS, Army websites, NASA websites, and AvMC internal sources. The following section provides the findings generated through analyzing the literature.

Findings

Introduction

The purpose and research questions guided the literature review and are restated to guide the analysis. The supervisory duties and application of technical authority within the AvMC are analyzed based on literature discussed in the literature review. The impact of the Future of Work, the APS, and the AMS on supervisory duties and technical authority are then assessed.

Statement of Purpose and Research Questions

The purpose of this qualitative study is to explore supervisory duties and technical authority in the AvMC considering the Future of Work, the AMS, and the APS. The following research questions guide the study.

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5. How does the innovation desired by the APS and the AMS affect the supervisor and technical authority roles?

Results

The AvMC is using personnel at the DB-03+ grade in first-line supervisory positions (Harris, 2018). The job series position descriptions define the supervisory duties for these first-line supervisors (Civilian position descriptors & organizational information, n.d.). The position descriptions describe a broad range of administrative and technical factors of duties for first-line supervisors in an engineering job series, including problem solving, teamwork/collaboration, customer relations, leadership/supervision, communication, and resource management.

Title 5 United States Code (2022) Part III Subpart F Chapter 71 Subchapter 1 identifies that supervisors have specific “authority in the interest of the agency to hire, direct, assign, promote, reward, transfer, furlough, layoff, recall, suspend, discipline, or remove employees, to adjust their grievances, or to effectively recommend such action” (para. 7103(a)(10)). OPM (1998) applies this definition to grade supervisory levels based on increasing levels of authority and responsibility. There are ten core authorities and responsibilities that are identified for administrative and process focused supervisors in Factor 3-2c. The engineering supervisors in the AvMC predominantly fall into this administrative and process focused level.

1. Plan work to be accomplished by subordinates, set and adjust short-term priorities, and prepare schedules for completion of work;
2. Assign work to subordinates based on priorities, selective consideration of the difficulty and requirements of assignments, and the capabilities of employees;
3. Evaluate work performance of subordinates;
4. Give advice, counsel, or instruction to employees on both work and administrative matters;
5. Interview candidates for positions in the unit; recommend appointment, promotion, or reassignment to such positions;
6. Hear and resolve complaints from employees, referring group grievances and more serious unresolved complaints to a higher level supervisor or manager;
7. Effect minor disciplinary measures, such as warnings and reprimands, recommending other action in more serious cases;
8. Identify developmental and training needs of employees, providing or arranging for needed development and training;

9. Find ways to improve production or increase the quality of the work directed;
10. Develop performance standards. (U.S. Office of Personnel Management, 1998, p. 16)

OPM (n.d.-b) further identifies ten competencies that are most important to execute the authorities and responsibilities identified above. Table 1 on page 27 of this paper describes these competencies in detail. They include “accountability, customer service, decisiveness, flexibility, integrity/honesty, interpersonal skills, oral communication, problem solving, resilience, and written communication” (U.S. Office of Personnel Management, n.d.-b, para. 4).

OPM (n.d.-b) does not identify technical credibility as one of the ten important competencies for supervisors in general. Regardless, within AvMC supervisors need to have technical knowledge relevant to the organization that they supervise. Technical knowledge is needed to execute the core supervisory responsibilities to plan and assign work, evaluate work performance, interview candidates, identify developmental needs, and define performance standards, at a minimum. OPM (1998) also considers the application of technical authority, per the GSSG definition, as a contributing factor when grading the “difficulty and complexity of” (p. 23) assigned supervisory duties. The position descriptions for AvMC engineering job series supervisors do not use the term technical authority specifically (Civilian position descriptors & organizational information, n.d.). However, the technical duties described in the position description are consistent with the GSSG definition of technical authority.

The AvMC requires technical leadership to provide the technical expertise and oversight in support of project execution that is critical to the mission (DEVCOM Aviation and Missile Center, 2022). Currently the AvMC assigns this technical leadership responsibility to multiple

positions at the DB-03+ grade level and above, including supervisors and SMEs (Civilian position descriptors & organizational information, n.d.).

The technical leadership needed within the AvMC falls into two categories. First is leadership through the concept of technical authority that is independent of the materiel developer (U.S. Department of the Army, 2021; U.S. Department of the Army, 2016; National Aeronautics and Space Administration, 2014; Defense Acquisition University, 2011; Office of the Director, Cost Assessment and Program Evaluation, 2020). Second is technical authority applied through leadership over the technical determinations made by the work unit (U.S. Office of Personnel Management, 1998). Per RSA 690-5, the term supervisor applies only when the position description “depicts the continuous assignment of both technical and administrative supervisory duties” (US Army Garrison - Redstone, 2004, p. 10). However, the literature on technical authority does not indicate a requirement to assign technical authority, using either definition, to supervisory positions solely. The assignment of technical authority is a condition that contributes to the difficulty of the supervisory duties rather than identifying technical authority as being assignable only to supervisory positions (U.S. Office of Personnel Management, 1998).

The key competency for technical leadership is technical expertise in the relevant discipline(s) (U.S. Department of the Army, 2021; U.S. Department of the Army, 2016; National Aeronautics and Space Administration, 2014; Defense Acquisition University, 2011). The DB-03+ SME position within the AvMC requires the technical expertise in the relevant discipline necessary to conceive, plan, and conduct work for difficult and complex projects/programs; potentially fulfilling the technical leadership needs to execute the mission (Civilian position descriptors & organizational information, n.d.).

The demands on supervisors at the first-line level of the AvMC organization is shifting with the Future of Work as well (U.S. Office of Personnel Management, n.d.-a). The reality that a hybrid model of employee work location will dominate the Future of Work drives the need for supervisors to master performance management competencies in work planning, performance planning and monitoring, and employee recognition (George & Willison, n.d., Summey, 2022a, U.S. Office of Personnel Management, n.d.-a). Effectively communicating with employees using virtual tools, establishing relationships across dispersed locations, and maintaining work equity across the hybrid workforce will require more of the supervisor's time since the opportunity to informally check in with employees will no longer exist (Summey, 2022a, Keilty & Burke, 2022; Kirchner, Ipsen, & Hansen, 2021). Furthermore, the supervisor's ability to apply a situational leadership style through "delegating, supporting, coaching, and directing" (Keilty & Burke, 2022, p. 103) will be essential to their success as a leader of people in the Future of Work. The literature emphasizes that in a hybrid work environment, organizations need supervisors to dedicate more time to leading people to accomplish work than in a traditional on-site setting (Kirchner, Ipsen, & Hansen, 2021).

In conjunction with the shift in the work environment, the Army is investing in rapid materiel modernization under the priorities of "long-range precision fires, next generation combat vehicles, future vertical lift, network technologies, air and missile defense capabilities, and Soldier lethality" (U.S. Department of the Army, 2019a, p. 3). The AvMC directly supports these modernization efforts (U.S. Army Combat Capabilities Development Command, 2019). The APS concurrently recognizes a shift in the employee and employer relationship such that "innovation and thoughtful leadership in the realm of people management" (U.S. Department of the Army, 2019b, p. 15) is also required.

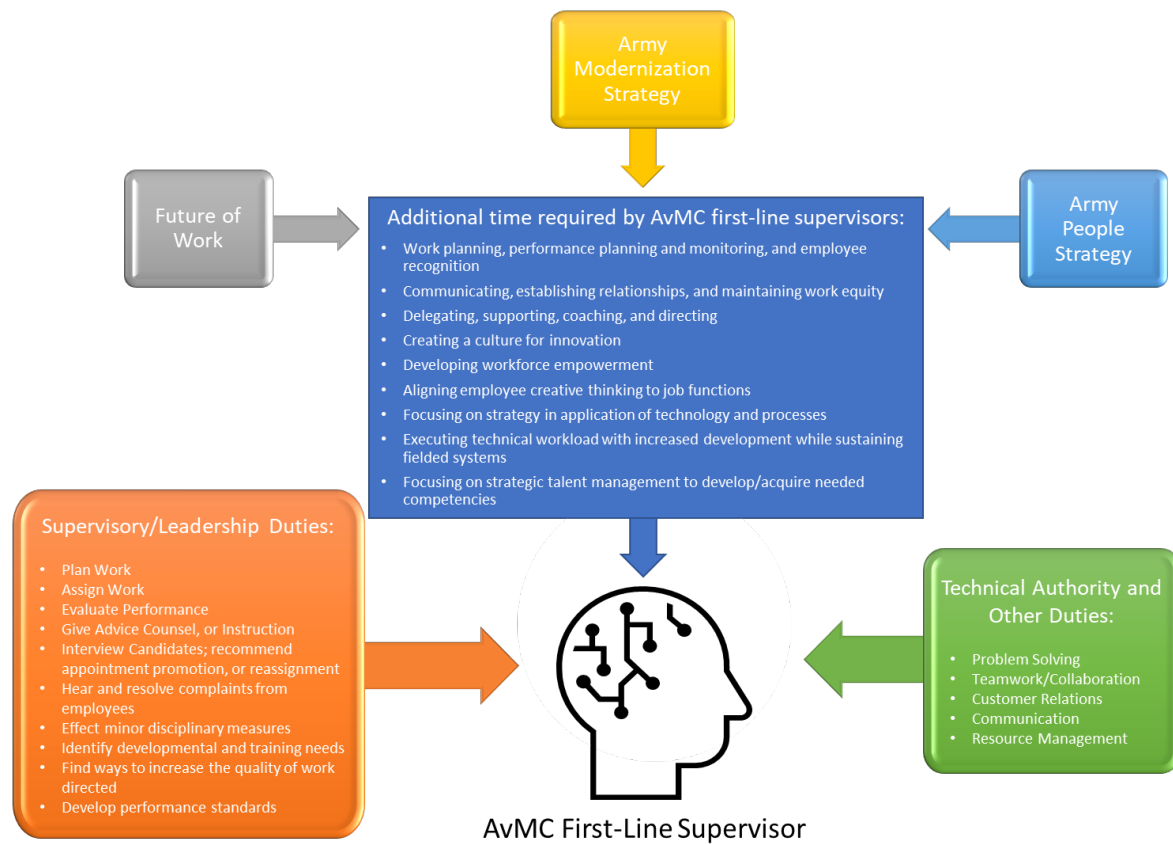
DEVCOM is developing a talent management strategy in alignment with the APS to provide the multi-disciplined talent necessary to support the modernization projects, recognizing that employees are seeking opportunities to apply creative thinking (J. Willison, personal communication, February 2, 2022). Executing talent management in this manner while modernizing across the six priorities necessitates a culture of innovation (U.S Department of the Army, 2019a, U.S Department of the Army, 2019b). Le Storti (2022) shows that leading for innovation requires strategy in both the application of technology and the adaptation of processes. Barriers to creating the needed culture for technological and talent management innovation may be a lack of supervisor time, a lack of innovation skills, and a lack of ability to make change (Anthony, Cobban, Nair, & Painchaud, 2019). The time demands in the Future of Work will only get more significant for AvMC supervisors. Nonetheless, the AvMC's role in providing technical expertise and oversight to execute the modernization priorities necessitates maintaining strong technical leadership, despite any additional demands because of the Future of Work or APS. Applying leadership and management, coupled with broad empowerment of the workforce, is needed to work in the rapidly changing environment (Kotter, 2012; U.S Department of the Army, 2019a; U.S Department of the Army, 2019b; Anthony, Cobban, Painchaud, & Parker, 2021).

The AvMC is recognizing the importance of developing both supervisory and technical leaders. The AvMC is designing a year-long program to develop competencies that align with the ten competencies for supervisory work identified by OPM (C. Holcomb, personal communication, October 11, 2022; U.S. Office of Personnel Management, n.d.-b). This effort highlights the importance that the AvMC is putting on developing supervisory competencies apart from technical capability.

The research indicates that leading in the Future of Work and for innovation in technology and people management demands additional leadership time. Figure 5 depicts the existing core duties of AvMC first-line supervisors and their technical authority with additional time required by the Future of Work, AMS, and APS impacts.

Figure 5

AvMC First-line Supervisor Workload



Summary

Results were presented from analyzing the data obtained in the literature review. The results indicate that the AvMC organization requires supervisory and technical leadership at the first-line level to execute the mission (DEVCOM Aviation and Missile Center, 2022; Civilian position descriptors & organizational information, n.d.). Mastering performance management skills and time are necessary to supervise within the Future of Work hybrid model (U.S. Office

of Personnel Management, n.d.-a). In addition, the AMS and APS are driving a need for innovation to modernize materiel and talent management (U.S Department of the Army, 2019a; U.S Department of the Army, 2019b). Key barriers to leading for innovation may be a lack of supervisor time, a lack of innovation skills, and a lack of ability to make change (Anthony, Cobban, Nair, & Painchaud, 2019). The convergence of Future of Work, AMS, and APS demands on AvMC first-line supervisors necessitates undertaking reforms as described in the National Defense Strategy “to accelerate force development, getting the technology we need more quickly, and making investments in the extraordinary people of the Department [of Defense]” (U.S. Department of Defense, 2022, p. 2). The conclusion section of this paper provides recommendations drawn from these findings.

Conclusions and Recommendations

Introduction

This section presents the conclusions drawn from the analysis of the literature review. The conclusions consider the statement of purpose and research questions. This section provides a conclusion for what defines a supervisor. The section also provides a conclusion for how supervising in hybrid workforce may impact supervisor duties and workload. The section then provides a conclusion for how the AvMC assigns technical authority. Finally, the section provides a conclusion on the impact of leading for innovation in support of the AMS and APS. Based on the conclusions, four recommendations are provided for addressing the potential increased workload placed on AvMC leaders charged with supervising and executing technical authority due to Army modernization, the increased emphasis on talent management, and the Future of Work. Finally, this section provides areas for further research identified through this study.

Conclusions

A supervisor, in simplest terms, is an employee “that accomplishes work through the direction of other people” (U.S. Office of Personnel Management, 1998, p. 6). By law, a supervisor is an organization leader with specific authority to “hire, direct, assign, promote, reward, transfer, furlough, layoff, recall, suspend, discipline, or remove employees, to adjust their grievances, or to effectively recommend such action” (Government Organization and Employees, 2022, para. 7103(a)(10)). Analysis of the responsibilities of a supervisor reveals that the application of technical authority, per the GSSG definition, is a consideration when grading the difficulty and complexity of the assigned duties. Although technical authority is considered

when grading supervisory positions, the literature does not require that technical authority be assigned only to supervisor positions.

The Future of Work is shifting the AvMC organization to a hybrid workforce. The research indicates that supervisors will need to devote more time in a hybrid workforce structure to leading people by communicating with employees, establishing relationships across disperse locations, and maintaining work equity. First-line supervisors must master competencies in work planning, performance planning and monitoring, and employee recognition to be successful in these duties. Although these competencies are important for supervising in a traditional on-site environment, the hybrid environment emphasizes the importance of supervisors investing more time in applying these performance management skills. These skills will also need to be applied in a different manner to address the hybrid workforce needs. The research indicates that supervisors will need to dedicate more time to leading people to accomplish work than in a traditional on-site setting (Kirchner, Ipsen, & Hansen, 2021). The AvMC is undertaking a year-long program to help personnel develop the ten competencies for supervisory work to be successful in leading people (C. Holcomb, personal communication, October 11, 2022; U.S. Office of Personnel Management, n.d.-b). The list of competencies utilized in the program should be adapted and expanded to address strengthening the competencies needed to lead the hybrid workforce and in an innovation environment.

In addition, supervisors will need to master communicating using the virtual tools (e.g., Microsoft Teams) provided by the organization (Keilty & Burke, 2022). The research consistently highlights the need for supervisors to maintain more regular contact with employees using video conferencing, chat and group chat, and one-on-one engagements (Keilty & Burke, 2022; Summey, 2022b; Summey, 2022a). Communication is not only essential for performance

management, but also to maintaining an environment of psychological safety and to address the psychosocial risks of telework (Keilty & Burke, 2022; Summey, 2022b). Organizations, supervisors, and employees must therefore invest time and financial resources to acquire and train with tools that support telework and hybrid work environments, such as Microsoft Teams.

The AvMC is a highly technical organization with a mission “to develop, integrate, demonstrate, and sustain aviation and missile systems capabilities to support modernization priorities and improve readiness” (DEVCOM Aviation and Missile Center, 2022, p. 2). Engineering supervisors in the AvMC organization are required to be technical experts (Civilian position descriptors & organizational information, n.d.). AvMC supervisors apply their technical expertise to the core OPM defined supervisory responsibilities to plan and assign work, evaluate work performance, interview candidates, identify developmental needs, and define performance standards. AvMC engineering supervisors also apply their technical expertise to solving complex problems, mentoring employees in technical areas, and establishing and communicating organizational positions.

The AvMC also has SME positions that are required to have technical expertise in the relevant discipline. The non-supervisory engineering SME’s, at the DB-03+ level, apply their technical expertise to provide technical leadership in conceiving, planning, and conducting work for difficult and complex problems. Although there is overlap between the technical expertise requirements for AvMC DB-03+ first-line supervisors and SMEs, there is a difference in how this expertise is applied. Whereas SMEs apply their expertise directly to the work, supervisors apply their expertise to lead personnel to execute the work. In both cases, the application of technical expertise aligns with the intent of the GSSG definition of technical authority; being “responsible for all technical determinations arising from work, without technical advice or

assistance on even the more difficult and unusual problems, and without further review except from an administrative or program evaluation standpoint” (U.S. Office of Personnel Management, 1998, p. 24).

Developing a culture of technical and talent management innovation is required to support the objectives of the AMS and APS. Leading for innovation mandates the application of both management and leadership skills, coupled with empowerment of the workforce (Kotter, 2012; U.S Department of the Army, 2019a; U.S Department of the Army, 2019b; Anthony, Cobban, Painchaud, & Parker, 2021). In order to create a culture of innovation, the AvMC will need to address the potential barriers of a lack of supervisor time, a lack of innovation skills, and a lack of ability to make change (Anthony, Cobban, Nair, & Painchaud, 2019). Furthermore, supervisors will need to think strategically about the competencies needed now and in the future, about the processes used within their formation, and the resources necessary to enable employees to execute their tasks efficiently in the modernization environment (Le Storti, 2022; Anthony, Cobban, Painchaud, & Parker, 2021).

AvMC first-line supervisors were already fully burdened with their duties when leading in the traditional on-site setting. Dedicating the additional time necessary to successfully supervise a hybrid workforce long-term may not be possible for AvMC supervisors also charged with technical authority, due to the rapid technical innovation needed to support the Army modernization priorities. Furthermore, the research indicates that creating a culture for innovation requires leaders at all levels to spend time thinking strategically about people management, identifying resources, and removing roadblocks to enable personnel to apply their creative thinking. Executing technical authority further adds to the workload placed on AvMC first-line supervisors.

Despite the burdens, the AvMC's role in providing technical expertise and oversight to execute the mission necessitates maintaining strong technical leadership. The result is that the innovation needed in support of modernization, the innovation needed in the realm of people management, and supervising in the hybrid work environment place increased workload upon the leaders within the AvMC charged with supervising and executing technical authority.

Recommendations

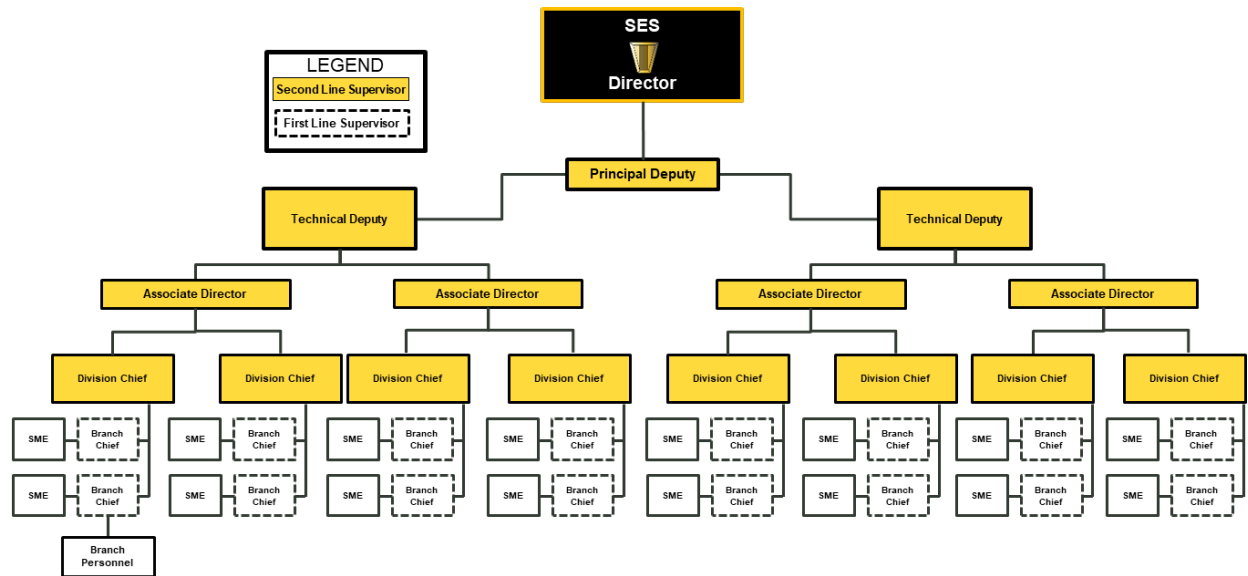
The workload of a single AvMC first-line supervisor is highly dependent on many factors, such as the number employees supervised, the role of the Branch in support of the mission, the phase of the projects/programs supported, and the methods in which they support the customer. Therefore, assessing the workload of each first-line supervisor will require an in-depth assessment of each Branch independently. As a result, there is no single set of recommendations that can be applied consistently to address the potential impact of the AMS, the APS, or the Future of Work on first-line supervisor workload across all AvMC work units.

Four recommendations are provided for AvMC to consider in preparing the organization to succeed in supervising and executing technical authority. The first three recommendations are training focused. These are not intended to eliminate workload, but rather to improve effectiveness and efficiency in supervising in the hybrid environment and in establishing a culture of innovation. The fourth recommendation adjusts supervisor workload using SMEs. This recommendation will be most beneficial in situations where the application of technical authority is a significant impact to the supervisor's workload.

1. AvMC supervisors should attend training focused on developing/strengthening the competencies for work planning, performance planning and monitoring, and employee recognition in the hybrid work environment. This training should

include techniques for maintaining work equity between on-site and teleworking employees. AvMC should also evaluate the AvMC processes related to applying these performance management skills, considering the hybrid work environment.

2. AvMC supervisors should attend training focused on communicating and establishing relationships in hybrid work environments using the virtual tools provided by the organization.
3. AvMC supervisors should attend training on leading for innovation. This training should emphasize the following topics:
 - a. Establishing a culture for innovation,
 - b. Talent management,
 - c. Employee empowerment and delegation,
 - d. Coaching and mentoring.
4. AvMC should consider elevating the position of the DB-03+ SME to a technical leader at the first-line level of the organization reportable to the first-line supervisor. In this elevated position, AvMC should empower the SME with technical authority over the technical determinations made by the work unit. Empowering the SME with this technical authority will allow AvMC first-line supervisors more time to focus on leading people. Figure 6 shows a portion of the notional AvMC directorate organization structure adapted to this recommendation.

Figure 6*Revised AvMC Hierarchy***Areas for Future Research**

There are three areas for future research identified from this study.

1. The literature reviewed for this study identified several key competencies that supervisors will need to master to successfully supervise in a hybrid work environment. However, the competencies identified have overlap with competencies that are important for supervising in a traditional on-site environment. Additional research into how these competencies should be adapted to the hybrid environment would be beneficial to developing training for supervisors. In addition, further research to identify other competencies that may be important to supervising in a hybrid environment will have value.
2. This study did not consider current supervisor and SME job satisfaction ratings due to a lack of survey data specific to this research. Additional study on job

satisfaction and a workload assessment should be undertaken to evaluate the roles of the supervisor and SME within the AvMC organization.

3. The convergence of technical authority and supervisory duties within one first-line position is not a concept unique to AvMC's organization. Future research on the distribution of these roles in commercial engineering organizations and other Government technical organizations may provide insights that were not discovered within the scope of this study.

Summary

This section identified the researcher's conclusions, recommendations, and areas for future research. The recommendations identify opportunities for AvMC to address the potential increased workload placed upon first-line engineering leaders charged with supervising and executing technical authority. The section provides future areas for research that will support developing implementation plans for these recommendations. This study ultimately provides approaches to address increasing supervisor workload, resulting from the Future of Work and initiatives of the AMS and APS, that will enable AvMC to support the National Defense Strategy goal of building enduring advantages.

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Appendix A – Glossary of Acronyms

AFC.....	U.S. Army Futures Command
AMCOM.....	U.S. Army Aviation and Missile Command
AMRDEC	Aviation and Missile Research, Development, and Engineering Center
AMS.....	Army Modernization Strategy
APS	Army People Strategy
AR.....	Army Regulation
ASA (ALT).....	Assistant Secretary of the Army (Acquisition, Logistics and Technology)
AvMC	DEVCOM Aviation & Missile Center
AWR	Airworthiness Release
CAE.....	Component Acquisition Executive
CAIB.....	Columbia Accident Investigation Board
CCAS	Contribution-Based Compensation and Appraisal System
DAG.....	Defense Acquisition Guidebook
DAU	Defense Acquisition University
DCAPE	Director of Cost Assessment and Program Evaluation
DEVCOM	U.S. Army Combat Capabilities Development Command
DoD.....	Department of Defense
DODD.....	Department of Defense Directive
DODI.....	Department of Defense Instruction
DSW	Doctor of Social Work
DTIC	Defense Technical Information Center
FASCLASS.....	Fully Automated System for Classification

FMS.....Foreign Military Sale

GSGeneral Schedule

GSSGGeneral Schedule Supervisory Guide

HSIHuman Systems Integration

IAW.....In Accordance With

JPEO CBRND.....Joint Program Executive Officer for Chemical, Biological, Radiological and
Nuclear Defense

LTU.....Lawrence Technological University

MATDEVMateriel Developer

MDAMissile Defense Agency

MDAPMajor Defense Acquisition Program

MRAMateriel Release Authority

MTA.....Middle Tier of Acquisition

MWOModification Work Order

NASA.....National Aeronautics and Space Administration

OPM.....Office of Personnel Management

PEOProgram Executive Office

PEO AVNPEO Aviation

PEO M&SPEO Missiles and Space

PEO STRIProgram Executive Officer for Simulation, Training, and Instrumentation

PMOProgram Management Office

RCCTORapid Capabilities and Critical Technologies Office

RSA.....Redstone Arsenal

S3I.....Software, Simulation, Systems Engineering and Integration Directorate

SAQ.....Statement of Airworthiness Qualification

SES.....Senior Executive Service

SMESubject Matter Expert

SRD.....Systems Readiness Directorate

SUBSAFE.....Submarine Safety

TDDTechnology Development Directorate

TSG.....The Surgeon General

Appendix B – Author Biography

Mr. Armstrong is currently a Fellow in the Defense Acquisition University Senior Service College Fellowship. Prior to the Fellowship, he served as the Propulsion Division Chief within the Combat Capabilities Development Command (DEVCOM) Aviation & Missile Center (AvMC) Systems Readiness Directorate (SRD) from 2019 through mid-2022 with supervisory and technical responsibility to oversee a division of government and contractor personnel providing engineering support and airworthiness oversight for aviation propulsion systems. During that time, he also served temporarily as the SRD Associate Director for Programs. From 2018 through 2019, he served as the Engine Projects Branch Chief with responsibility to supervise government personnel providing engineering support and airworthiness oversight for aviation turbine and reciprocating engines. From 2010 through 2018, Mr. Armstrong served in multiple engineering and leadership roles within the SRD, then the Aviation Engineering Directorate (AED), supporting aviation engine airworthiness, including leading the AED airworthiness support to the ACAT 1C Improved Turbine Engine Program. From 2000 to 2010, Mr. Armstrong was employed at Teledyne Brown Engineering supporting NASA. During that period, he served as a project manager overseeing multiple NASA task orders and sub-contractor agreements. He also served in International Space Station payload operations as a flight controller supporting payload planning and real-time operations. Mr. Armstrong started his career in 1999 at Raytheon Missile Systems supporting software engineering for a missile launch system.



Mr. Armstrong obtained a Bachelor of Aerospace Engineering degree from Auburn University in 1999. In 2004, Mr. Armstrong graduated from the University of Alabama in Huntsville with a Master of Science degree in Management, with a concentration in Management of Technology. In 2011, Mr. Armstrong became a member of the Army Acquisition Corp and is certified as a Practitioner in the Engineering & Technical Management functional specialty.

Among a few of Mr. Armstrong's career accomplishments include co-authoring a technical paper on knock criteria for aviation diesel engines and presenting the impact of diesel fuel cetane on aviation diesel engine combustion to the Turbine Engine Technology Symposium. Mr. Armstrong was recognized through selection to the first cohort of the DEVCOM Distinguished Leader Program in 2021. He was a recipient of the Army Achievement Medal for Civilian Service in 2018, the 2016 Army Research Lab Award for Analysis, multiple NASA Group Achievement Awards, and multiple Special Act awards.

Mr. Armstrong is very active with his local church and with a non-profit funding research to treat, prevent, and cure Type 1 diabetes. He currently resides in Madison, AL with his wife, and their daughter.