U.S. Army Research Institute for the Behavioral and Social Sciences

Basic Research Priorities for Fiscal Year 2026

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) Basic Research program periodically adjusts its priorities in accordance with Army needs and emerging scientific trends. The purposes of this document are to 1) introduce the Basic Research program and its mission, 2) describe current Army problems and priorities that inform current Basic Research objectives, and 3) outline Basic Research objectives and priorities for Fiscal Year 2026.

ARI Basic Research

ARI's mission is to drive scientific innovation to enable the Army to acquire, develop, employ, and retain professional Soldiers and enhance personnel readiness. **The mission of the Basic Research Program is to execute high-risk, high-reward foundational research to develop state-of-the-art theory, methods, and models to create the innovative concepts required to support the Army's future capabilities and build a force of committed and high-performing personnel.**

To meet its operational objectives in the coming decades, the U.S. Army must improve its capability to acquire, develop, employ, and retain Soldiers and leaders who can individually and as part of a group:

- Prepare for and adapt quickly to dynamic missions, unpredictable operational environments, and a wide spectrum of contexts;
- Act and coordinate to rapidly respond to challenges in complex, information-rich environments;
- Retain the willingness and ability to innovate, reorient, and learn in response to technological, logistical, and operational developments;
- Coordinate extensively across team, multiteam, organizational, and occupational boundaries to rapidly address evolving challenges in all domains, including land, space, and cyberspace.

The ARI Basic Research program aims to provide a scientific foundation to support these broad capabilities.

The Basic Research program focuses on four strategic areas for advancing personnel science.

1. Measurement of Individuals and Collectives: Advanced psychometric theory for deriving valid measurements from complex assessments and continuous streams of data
2. Teams and Small Groups: Understanding dynamic restructuring, coordination, and adaptation within and between teams
3. Organizations and Systems: Multi-level theory and methods for complex organizations
4. Formal and Informal Learning and Development: Holistic models of individual and collective learning and development across work settings and contexts throughout the career span

Highly innovative and impactful research that meets gold standard science practices, including designing for reproducibility, rigorous methodology and analyses, and publication through unbiased peer review, are particularly valuable to our program.

To this end, multidisciplinary approaches have become increasingly important to the Basic Research program, enabling researchers to creatively combine theories, models, and approaches to address a research problem. Highly multidisciplinary research incorporates areas outside of psychology, including the other social sciences, natural and physical sciences, technology, engineering, and mathematics. At the same time, multidisciplinary teams should have the expertise to conduct and convey the results of human-based social science.

Basic Research Topic Areas of Interest

Basic research is effort directed toward increasing knowledge and understanding in science and engineering, rather than the practical application of that knowledge and understanding. **Basic Research is systematic study directed toward a fuller knowledge or understanding of the fundamental aspects of phenomena and/or observable facts. Basic research aims for broad impact rather than to develop specific processes or products for targeted applications.** The ARI Foundational Science Research Unit (FSRU) manages the Basic Research Program and maintains close contact with ARI's applied scientists and other relevant agencies within the Army and Department of Defense. These contacts help define issues that require foundational research, ensure that the Basic Research Program is coordinated across Services, and facilitate the transition of basic research results to applied programs for eventual use by the operational Army.

The ARI Basic Research Program currently supports foundational research in the following four topic areas, with awards sometimes involving multiple areas:

1. **Measurement of Individuals and Collectives**

2. **Teams and Small Groups**

3. **Organizations and Systems**

4. **Formal and Informal Learning and Development**

An in-depth description of each topic area follows. Additionally, these reports by the National Research Council of the National Academy of Sciences (available at http://www.nap.edu) contain additional information on these topic areas, and other potential areas of interest:

- "Adult Learning in the Military Context" (2024) supervised by the Board on Behavioral, Cognitive, and Sensory Sciences and the Board on Science Education

- "Measuring Human Capabilities: An Agenda for Basic Research on the Assessment of Individual and Group Performance Potential for Military Accession" (2015) supervised by the Board on Behavioral, Cognitive, and Sensory Sciences

- "The Context of Military Environments: Social and Organizational Factors" (2014) supervised by the Board on Behavioral, Cognitive, and Sensory Sciences

Detailed descriptions of the four broad research topic areas are provided below. Each area description includes: (a) a broad overview of the relevant Army problems and the strategic goal of the area, (b) up-to-date primary research objectives, and (c) up-to-date high-priority research questions.

1. **Measurement of Individuals and Collectives**

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   Much success of the U.S. Army can be attributed to the selection, assignment, development, and retention of highly skilled and exceptional Soldiers. To achieve maximum force readiness, the Army is transforming in ways that ensure Soldiers possess the capacity to succeed on a highly kinetic, multidomain, rapidly evolving battlefield. To do so, the Army must identify and prioritize the core knowledge, skills, and abilities (KSAs) critical to Soldier success, both across the Army as a whole and within each military occupational specialty (MOS). The Army is also committed to ensuring that personnel systems support an adaptable and agile force based on an improved understanding of Soldier performance. Advancements in the foundational science of measurement can help support the Army's transformation priorities. While the following section provides background information on Army-specific issues and priorities for context, the Basic Research program aims to advance fundamental, broadly applicable research in measurement, psychometrics, and testing.

   Traditional Army personnel tests were designed to capture diffuse constructs, such as cognitive ability, that attempt to aggregate individual experiences over long periods of time. These tests were, and still are, often administered in mass testing events in conjunction with initial training, career continuance, and annual performance assessment. More recent technological advances like high-precision global positioning systems and wearable physiological sensors facilitate observing and recording human behavior and its context at increasingly finer-grained resolution without the need for direct elicitation of information from participants by traditional means. However, extracting meaningful psychological information from such observations has proved challenging, at least with respect to the psychometric models from which traditional personnel tests were developed.

   Rapid technological advancement will have a substantial impact on personnel assessment. New technologies like artificial intelligence (AI) could address many difficulties associated with traditional assessment methods and increase the accuracy, efficiency, and utility of personnel evaluations. These new approaches may improve the Army's ability to extract meaningful information from complex datasets, allowing the Army to learn more from hybrid data streams and adapt to changing personnel needs. However, the Army's transformation of personnel assessment faces many challenges. Significant scientific efforts are needed to understand the impact of emerging analytical techniques and to discern the best ways to use these technologies for measurement purposes.

   Data from Soldiers is among the Army's most valuable decision-making tools. Collection of that data can be disruptive to Soldiers, or difficult to deploy effectively, if participating in assessments is intrusive to Soldier performance. For more than a decade Army leadership has expressed concerns regarding the burden that the frequent administration of surveys has

placed on military members and their families. Furthermore, there are concerns in the Army community regarding the impact of survey burden on response rates, data quality, and effective sampling. Developing methods to collect information that are less disruptive to Soldiers is an Army priority. More work is needed to (a) understand how perceptions of survey burden develop (i.e., advance theory of survey burden), and (b) to design measurement techniques that produce high-quality data while requiring less direct engagement from Soldiers.

Psychometric models and methods have advanced greatly since the advent of traditional personnel tests. Lagging, however, is the refinement of such models and methods to better understand human behavior in organizations, particularly with respect to performance in the massively interdependent and constantly fluid situations in which the Army operates. While the Army has leveraged a range of methods for measuring performance, limitations still exist in the Army's ability to assess performance in meaningful ways. What are needed now, more than ever, are psychometric models and methods for quantifying patterns of human behaviors in complex situations.

The primary objective of the Measurement of Individuals and Collectives domain is to fundamentally improve psychological testing and measurement by deriving means of enhancing testing efficiency, decreasing survey burden, and increasing overall precision, understanding, and prediction of individual and collective behavior and performance. To further progress to this goal, the basic research program in Measurement of Individuals and Collectives aims to a) expand understanding of survey burden and unobtrusive measurement approaches, b) advance conceptualization and measurement of performance, and c) advance psychometric theory and methods. Objectives of this area are:

- **Survey Burden and Unobtrusive Measurement.** As concerns rise regarding the testing demand placed on Soldiers, there is a need to expand understanding of survey burden. Thinking more widely about the factors that influence perceptions of survey burden will help scientists understand more about what drives respondent attitudes, feelings, and behaviors toward surveys and other assessments. A more specific focus on the interaction between factors influencing both objective and subjective survey burden will also help develop a deeper understanding of *when* surveys become burdensome. More research is also needed that explicitly focuses on the cognitive and affective mechanisms driving perceptions of survey burden and related outcomes. These concerns regarding over-surveying also provide both an opportunity and need for innovative measurement techniques that efficiently and accurately assess complex social and behavioral processes via unobtrusive and other non-traditional methods. By leveraging emerging technologies (e.g., wearable sensors) and non-traditional data sources (e.g., process data, archival data), researchers can advance the theory and practice of measurement and expand the "toolkit" of methodologies with which to assess individual and collective behavior and performance. Methodologies of strongest interest include measurement approaches for unobtrusive, efficient, and simultaneous multi-construct measurement and innovative methods for extracting novel information from archival and real-time, high-dimensional behavioral data.

- **Performance Conceptualization and Measurement.** The ability to accurately and comprehensively measure individual-, team-, and organizational-level performance is essential for evaluating the effectiveness of Army policies and practices. While many significant advances have been made on identifying factors which predict performance, theory has remained relatively stagnant in the performance space overall. Significant innovation in performance measurement and theory is needed to better understand performance in complex organizations, including sub-domains of performance of particular interest to the Army (e.g., adaptive and creative performance). This will require an integration of multi-level, contextual, and temporal factors into the understanding and empirical study of performance as well as conceptual explorations of the definition of performance that clarify the differences between performance and related constructs such as effectiveness. Conceptualizing how performance measurement should evolve with shifts in organizational priorities and strategies and ensuring that performance measurement aligns with how performance is defined is also important to achieve this objective. Finally, because many performance evaluations are dependent on supervisor ratings, research is needed on ways rater training can improve the accuracy and precision of ratings, how raters make judgements (e.g., how information is used and combined, the impact of rater goals on scores), and factors that influence conscious and subconscious distortion of ratings.
- **Psychometric Theory and Methods.** Novel psychometric theory and methodology is needed to understand and accurately assess complex behavior in organizations with a strong need for innovative paradigms and approaches to expand the boundaries of existing test theory. Key to addressing this objective is the development of theory and psychometric quantities beyond those of classical (e.g., reliability, validity) and modern (e.g., item and test information) test theory that explicitly address the limitations of existing methodology. Additional important issues include: (a) psychometric approaches for deriving construct score estimates from dynamic flow data or behavioral streams and to examine complex longitudinal data more accurately, (b) new and refined theory related to understanding the impact of emerging technologies and algorithms (e.g., machine learning, generative AI, natural language processing) on psychological testing and measurement, and (c) methodologies for preventing, identifying, and addressing careless responding.

High Priority Research Questions. While the Basic Research program values a broad range of research questions related to this domain, the following represent high-priority research questions for the Measurement of Individuals and Collectives:

1. What methodologies can be leveraged to increase testing efficiency and reduce survey burden on participants? How can these methodologies (e.g., unobtrusive measurement; adaptive sampling techniques; non-traditional data sources) be utilized, independently or in tandem, to decrease testing demands and address sources of confounding frequently present in traditional testing models?

2. What are the similarities and differences between the effects of objective (i.e., actual) and subjective (i.e., perceived) survey burden? How do interactions between objective and subjective survey burden influence survey-related outcomes such as response rates and quality?
3. What cognitive, affective, and psychological mechanisms influence respondent perceptions of specific and general survey burden? How do feelings of survey burden develop over time? What factors most strongly influence the strength and direction of change in (general) attitude towards surveys and survey burden?
4. How can we expand our understanding of the criterion space by developing novel theories and measures of performance? What assessment methodology and testing models can be developed to better predict performance and effectiveness in modern organizations?
5. What are the specific limitations of classical and modern test theory and what novel methodologies and psychometric quantities can be developed to overcome them? How can traditional and novel psychometric methods be integrated and combined to improve the testing development and construct validation process?
6. How can emerging technologies and AI-facilitated methods be used to enhance performance assessment and improve data scope and granularity? What novel methods can be developed, or existing methods be adapted, to extract meaningful patterns from high dimensional behavioral data (e.g., video, audio, physiological data)?

2. **Teams and Small Groups**

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Teams are the core of the U.S. Army. Although team structures may vary throughout the organization, Army teams are typically comprised of a few junior enlisted Soldiers and a noncommissioned officer (NCO) leading the team. A set of teams combine into a squad led by a squad leader, typically an NCO such as a Staff Sergeant. Specialization may occur on every level, with individuals, teams, and teams of teams (i.e. multi-team systems) fulfilling specific functions while maintaining extensive coordination with others to achieve effective performance. NCOs and commissioned officers may be paired at different levels of these multi-team systems to form dual leadership structures. Soldier training for their responsibilities and for teamwork begins before they are assigned to their intact teams and continues after assignment. While teams are trained for potential contingencies, they must be agile and adaptable to deal with unforeseen, unpredictable, and constantly changing conditions. Dynamic conditions and mission requirements therefore require continual learning in teams. Threats to communications in future combat environments may also require that teams coordinate without direct guidance or communication. Advances in scientific understanding are needed in both field work and laboratory settings to manage and train adaptable, resilient, and capable teams. While the following section provides extensive background information on Army-specific issues and priorities for context, the Basic Research program aims to advance a fundamental and general understanding of team and

multi-team processes and dynamics.

Turnover of personnel is a frequent phenomenon for Army teams. Team turnover and membership changes in the Army can happen in three contexts that are of interest to the Army. First, team turnover can occur when loss of personnel in large-scale combat requires that the Army effectively reorganize and reassign teams such that they can continue to meet mission requirements. This kind of turnover, known as reconstitution, can occur in conditions where resources are limited, such that teams may need to be consolidated to function at an acceptable level. Turnover in these conditions can occur at large scales and displace multiple positions on the same team. Second, team membership can fluctuate when specific tasks require the formation of ad hoc teams, specialized teams that are temporarily formed to meet a particular objective. Members may be brought together from different teams, who may operate with the loss of a member. Third, team turnover can occur in normal organizational dynamics, such as when Soldiers enter and leave the Army as part of their career trajectories, or when Soldiers change teams through promotion or regularly recurring reassignment. Nuances distinguish each instance of turnover. For example, the timing of turnover likely matters; unexpected turnover in the middle of a task may afford less preparation than turnover in planned circumstances. The perceived meaning of turnover can affect morale – for example, losing a member to injury would impact morale differently than when a team member leaves for a promotion to a new position.

Turnover problems require a deep understanding of team member loss and integration so that teams can be rapidly assembled or members efficiently reassigned. Teams require a high degree of flexibility in multi-team systems and a readiness to adjust to new team members among Soldiers, especially since new team members may have varying degrees of experience, competencies, and other attributes. At the same time, these teams must be cohesive, and Soldier morale and discipline must be maintained throughout these operations. From the perspective of the Army organization, team assignment, structuring, and training must be done to adequately support efficient turnover. From the perspective of the Soldier, individual characteristics, motives, and social dynamics must support flexibility in adapting to new teams and team structures. Basic research on team dynamics and processes is therefore needed to understand flexibility in team, multi-team, and leadership structures. What strategies, processes, and individual/collective characteristics support efficient reassignment and integration of members into new or modified teams? Similarly, what strategies, processes, and characteristics support efficient integration of new teams into a multi-team system? What training and learning elements are necessary to prepare team members for circumstances that require rapid team restructuring? Accomplishing effective team integration, adaptation, and reconstitution may require scientific innovations in the conceptualization of coordination strategies as well as team, task, or organizational structures, among other team elements.

More generally, team coordination is a key construct of interest. Soldiers operate in teams, and teams operate in teams of teams, so coordination must occur within and between teams. Hence, understanding team and multi-team performance requires theoretical accounts of how individual, within-team, and between-team processes may facilitate coordination. Novel theories are needed to clarify the social dynamics and team characteristics that influence coordination both within and between teams.

The primary objective within the Teams and Small Groups domain is to further science that can build agile, resilient, and capable teams through team assignment, development, learning, or optimization. Theories that account for fluid and unpredictable team environments are particularly suited to this aim. The Research Objectives of this area are:

- **Team Assignment and Integration.** New theories to optimize team assignment and integration are needed, including for reconstituted and ad hoc teams. More research is needed on how teams are rapidly assembled or how new team members are rapidly integrated into existing teams. Advances are needed in our understanding of how time spent in an intact team affects team processes, development, and performance, and how these dynamics may shift when one or more members are replaced. Research is needed on training strategies, whether at the individual or the collective level, to prepare teams for turnover possibilities and optimize the integration of new members. Another objective is understanding the individual, team, and leadership attributes that optimize rapid assembly or integration of team members, such that they can potentially inform team assignment strategies. Finally, research is needed on reconstitution in multi-team systems. How do team member replacement and team restructuring, such as consolidation into new teams, affect coordination and functioning in multi-team systems? How does turnover of members in critical roles (e.g., formal and informal boundary spanners) impact the effectiveness of multiteam systems? How do multi-team systems facilitate smooth team membership changes? Large-scale empirical studies and computational modeling using real-world data may be valid approaches to addressing questions about reconstitution in multi-team systems.
- **Team Coordination and Adaptation.** Generally, improved understanding of team coordination and adaptation to disruption is a key priority for the Teams and Small Groups domain. Of particular interest is understanding team functioning in the face of major disruptions to communication and coordination. How do social dynamics within and between teams determine how well teams adapt to such disruptions? How can teams maintain coordination in conditions where the ability to communicate is restricted? What team structures, strategies, norms, characteristics, and other elements facilitate adaptation to these conditions, and how do they relate to task requirements and contexts? Answers to these questions may also require that teams maintain certain kinds of flexibility, such as allowing for proactive shifts in team structures or norms. Additionally, new methods are also needed to study collaboration and interaction between teams in shared and distributed environments, as well as an understanding of how novel team constructs impact these processes and performance outcomes.
- **Team Processes and Performance.** Theories of team functioning are needed to better understand how structural elements, task properties, leadership, individual characteristics, strategies, beliefs, and other attributes within teams and multi-team systems influence team performance. In particular, clearer understanding of the specific processes by which these elements affect team outcomes can more precisely delineate their roles in team functioning and generate insights into how they might contribute to team performance and learning in different contexts. Another priority is new means to measure, model, and represent team constructs such as collective

efficacy, team-specific norms, assimilation, and trust at the collective and individual levels.

High Priority Research Questions. While the Basic Research program values a broad range of research questions related to this domain, the following are provided as high-priority research questions for the Basic Research Program in Teams and Small Groups:

1. What are the mechanisms underlying the developmental trajectories of rapidly formed and ad hoc teams and what conditions and approaches best optimize this process?
2. What factors support the rapid assimilation of new members into teams? What processes, strategies, individual/collective characteristics, and team/leadership structures best enable new members to quickly acquire team competencies, coordination, norms, and trust?
3. How do team restructuring and team member replacement affect coordination and functioning in multi-team systems? How does turnover among members in key roles impact multi-team systems? What approaches can multi-team systems take to minimize disruption from these events?
4. How do teams and multi-team systems respond given limits on the ability to communicate or information overload? What factors and processes allow them to coordinate despite such disruptions?
5. What are the determinants of team and multi-team success over time? What is the relative importance of composition, continuity of membership, leader behaviors, external support/intervention?
6. How do team norms, team image, and assimilation into teams influence team goals and outcomes? How do these factors influence coordination and functioning within multi-team systems?

3. **Organizations and Systems**

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The U.S. Army is a large organization structured into hierarchically nested groupings from teams of four up to corps with tens of thousands of members. The Army must operate in coordination with other services to provide the military forces needed to deter war and ensure our nation's security. Additionally, the Army must often engage with other federal agencies and at a multi-national, coalitional level. The composition, foci, and context of all elements in these systems are always changing. Soldiers operate as individuals, members of teams, members of teams of teams (i.e. multi-team systems), and members of the broader Army organization. As such, Soldiers are expected to manage their commitments in different roles. Roles are not static, as members of the Army often move throughout the organization through reassignment or turnover. The complexity of Army organizational structure means that bottom-up, top-down, and external changes may flow through the organization at different tempos, exerting influence within and across levels. Since the Army also operates jointly with other armed services and agencies, Soldiers must overcome differences in organizational structures and norms to coordinate action. Further, the Army must adapt to

technological and societal changes to ensure that it can address new problems and leverage new capabilities that become relevant. While the following section provides extensive background information on Army-specific issues and priorities for context, the Basic Research program aims to advance a fundamental and general understanding of organizational functioning.

Much of the challenge in enhancing Army performance therefore arises from two sources of complexity: structural and temporal. Structural complexity suggests that any given issue may be associated with factors on multiple levels (e.g., individual, team, team of teams, and organizational) of the organization. Moreover, a change, problem, or intervention on one level may produce effects on another level. Factors on different levels may also interact to produce a given outcome. Temporal complexity suggests that understanding Army organizational processes may require attention to temporal factors, as any given process may be impacted by changing conditions, changing individual or collective characteristics, or other dynamic elements. The Army organization must be agile and quickly adapt to multifaceted and changing operational environments. Current organizational direction outlined in the Army Transformation Initiative seeks to make the Army leaner, more efficient, and faster at adapting to new conditions.

The Army maintains high standards among Soldiers by requiring high levels of commitment and sacrifice. These standards are reinforced by moral expectations for Soldiers, such as the Army Values (Leadership, Duty, Respect, Selfless Service, Honor, Integrity, Personal Courage). These organizational values promote discipline, cooperation, and strength among Soldiers while maintaining a sense of tradition and cohesion within the Army. While these organizational values create broader, shared principles among Soldiers, the Army must also foster innovation, creative thinking, and flexibility to enable effective problem-solving amid changing mission requirements and conditions.

Future operational environments are projected to involve greater mission complexity as Soldiers deal with greater numbers of factors that affect mission success. They may also require increased autonomy from teams who must make decisions when communications with their chain of command and coordinated units are disrupted. Information warfare may intensify, as adversaries may strategically proliferate or deny information to disrupt Army operations. Key issues that may emerge in future environments include bolstering Soldier resilience against events in the information space and increased mission difficulty and complexity, as well as promoting sound decision-making that adheres to organizational values in the absence of direct guidance, as highlighted in mission command approach.

Finally, understanding career decision-making and trajectories is important to the Army, as personnel recruitment, selection, advancement, and retention are key processes for maintaining a high-quality and resilient military force. As with other organizational processes in the Army, these operations need to take into account both structural and temporal complexities of a large, highly structured, hierarchical, and multi-level organization. Scientific theories about how people make career decisions in organizations, particularly theories that take into account the structured, dynamic, and multi-level nature of an organization, are useful. Scientific theories about how organizational, leadership, and team structures/norms drive career decisions are also useful.

The primary objective within the Organizations and Systems research area is to identify means to leverage theories, methods, and models of organizational functioning to effect sustained systemic outcomes. To further progress to this goal, the program aims to a) advance deeper or more comprehensive theories of organizational processes; b) advance deeper or more comprehensive theories of how organizational values and norms influence social dynamics and behavior within organizations; c) boost novel, empirical research on organizational theories; and d) produce novel insights into career decision-making within complex organizations. To follow is a brief overview of each research objective in the area.

- **Organizational Processes.** Understanding the processes underlying dynamic, multi-level organizational behaviors is a key objective. Some major themes are top-down vs. bottom-up influences on performance, change over time, and influences from multiple levels of an organization on cognitions and behaviors. Important issues include: 1) the integration of theoretical approaches to identify how individuals make decisions based on organizational, team, and personal goals, contextual and experiential information, and other factors; 2) novel theories on organizational interventions that account for implementation at different scales, at multiple levels, and over time; 3) situating organizational influences and factors that affect organizational outcomes in changing contexts, such as shifts in norms, affordances, or threats, to understand organizational functioning over time; and 4) generating novel theories to capture the broader multi-level and multifactored nature of organizations, particularly those with frequent between- and within-organization member changes.
- **Organizational Values and Norms**. Another key objective is understanding the effects of organizational values and norms on cognitions and behaviors within organizations, as well as overall organizational performance. Important issues include: 1) identifying social resources, such as history and tradition, that organizations draw on to promote performance; 2) investigating the inception and dissemination of organizational norms and values; and 3) identifying how members interpret organizational values and norms to take action.
- **Empirically-Supported Organizational Theories**. Generally, novel, empirically-supported theories are needed to make substantial advancements in understanding organizational functioning. These include theories that can identify factors influencing effectiveness at different or multiple levels of an organization (e.g., individual, dyad, team, team of teams, organization) and their interactions across levels.
- **Career Trajectories**. Novel and impactful theories are needed to understand how people make career decisions in organizational contexts. Theories that meet this need will likely take into account structures, norms, and/or longitudinal dynamics within an organization to explain and predict career trajectories. The program aims to advance research that can inform recruitment, career development, and/or retention.

High Priority Research Questions. While the Basic Research program values a broad range of research questions related to this domain, the following are provided as high-priority research questions for the Basic Research Program in Organizations and Systems:

1. How do members of organizations draw on organizational values and other resources to take action, evaluate the behaviors of other members, and evaluate the

organization? How do members engage with perceived mismatches between their organizational values and attitudes within society at large, or with competing organizational values? How do organizational values interact with contextual and individual differences to structure, coordinate, and give meaning to cooperation among individuals, teams, and the organization over time?

2. How can organizations bolster commitment and high standards of behavior among members in the face of adversarial social influence, information overload, and increasing mission difficulty? What aspects of organizational values and practices could support resilience against these threats without suppressing innovation and creative conflict?
3. How can organizations move quickly and remain adaptable to everchanging contexts and threats? What structures, strategies, norms, characteristics, and other elements can support organizational flexibility and resilience as disruptions increase in both frequency and intensity?
4. What are novel theories and models that can improve current prediction of behavior within organizations at the individual, team, team-of-teams, and overall organizational levels?
5. How can recent advances in measurement, modeling, and analyses of multi-team and complex systems be leveraged to develop and further approaches to interventions at the organizational level?
6. How do people make career decisions in organizational settings? How do they make sense of their roles and contributions in the organization as their responsibilities shift? What structural and temporal factors influence these decisions? Also, how do top-down organizational values, structures, and practices influence the career trajectories of members?

4. **Formal and Informal Learning and Development**

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To strengthen our focus on merit as determined by ability, character, and strength, and to increase efficiency of operations, it is necessary to consider how the Army operates as a learning organization. Our military personnel must be demonstrably ready for myriad and varied scenarios. Recently, the operational landscape has evolved to include irregular warfare, stability requirements, and multi-domain operations across land, sea, air, space, and cyber fronts. Projections suggest that the trends to greater complexity and scope will continue. As such, there is significant pressure on the Army, its educational institutions, Soldiers, and leaders to identify and optimally utilize all available learning vehicles to prepare for, adapt to, and maintain readiness and combat effectiveness in a complicated and unpredictable future. Traditional Army approaches to personnel training and development, characterized by temporary relocations for the purpose of training, on-the-job-learning, and drill and scenario exercises, have done well historically to prepare our forces for myriad mission types. However, success in a future operational environment will rely on further scientific advances to augment, complement, and improve our educational models. Distributed learning, self-directed learning, and new educational technologies have high potential to support future learning.

Developmental trajectories of our personnel are also greatly important. Like learning, development is conceptualized as being incremental, iterative, and driven by the individual. Developmental maturation continues throughout one's career and facilitates the individual to take on roles and responsibilities that require interpersonal and intrapersonal capabilities. Leadership roles and responsibilities are a notable example of positions that require those skills. Since the Army develops its own leaders, research in leader development and understanding the developmental trajectories of emerging leaders is a key focal point in this area. To meet the needs of the future, the Army requires leader development models, strategies, and measures to guide the Army to grow the leadership talent needed to face future challenges. Understanding how to prepare leaders to recognize and get the most out of leader development opportunities across domains and sources is crucial to developing leaders efficiently and effectively.

Basic research investments in learning and development will expand the toolkit, empower individual learners, and support decision makers' improved capacity to best structure personnel training and development. The primary goal for the Basic Research program within the Formal and Informal Learning and Development domain is to understand, support, and optimize learning and development of Soldiers and leaders through formal learning settings, operational experience, and self-development. To further progress toward this goal, the basic research program in formal and informal learning and development aims to a) understand adult learning and career-long learning, b) measure and model learning, and c) promote practices and structures that support learning and development. A brief overview of each research objective in the area is presented below.

a) **Understand the Adult Learner and Career-long Learning.** Developing Soldiers and leaders who are efficient, lifelong, and motivated learners is key to meeting the demands of the future. Leaders are not only learners themselves but also influence their team's learning through the norms and values that they establish within the team. Thus, these leaders must develop leadership skills that are conducive to promoting efficient and lifelong learning and help them motivate their team. Novel measures and methods are needed that can help us understand how leaders can promote persistence and learning, with a particular focus on self-directed learning. Active self-directed learning, heutagogical learning, is an emerging theory on adult learning that has great potential to yield adaptive spontaneous learners. This type of learning involves a degree of learner control over their learning experience and the autonomy to engage in learning relevant for supporting the organizational mission and goals. Little is known about the mechanics of authentic informal self-directed learning processes nor of the contextual factors that incite and support in situ learning. Outside specific learning events, very little is known about adult learners' approach to meeting long-term learning outcomes. Diffuse development concurrent over many domains through sustained deliberate effort is a key to successful career-span development. Understanding how and why some learners excel at sustaining effort in the face of competing priorities and time constraints is critical for promoting readiness and adaptability in the face of uncertainty.

b) **Measure and Model Learning.** To study learning in any context, it is important to understand the antecedents, conditions, and the processes of learning. Much of the

scholarship on learning is indirect, relies on pre- and post-tests and behavioral outcomes, and says little about the actual processes. These measures give rudimentary feedback on what elements and approaches are most conducive and force more inference into educational design than would be necessary with better data. Furthermore, summative unidimensional data are not as useful to the learner or the instructor as specific contemporaneous feedback that reflects not just learning gains and understanding but also attitudinal, motivational, and engagement levels during the learning phase. Modern and multimodal data collection methods will need to be leveraged to obtain a more complete representation of learning processes and outcomes. As research leveraging more formative process level data on learning emerges, there will be a need to understand how negative affect impacts these learning processes and outcomes. Process models of learning that incorporate negative affect and examine moderating factors that impact the relation of negative affect on learning through learning processes are important for understanding how to promote learning in contexts commonly experienced by military personnel.

c) **Understand Practices and Structures that Promote Learning and Development.** The complexity and unpredictability of the future operational environment will mean application of learning will need to be highly distal to the acquisition phase. Deeper learning is defined in the 2012 National Research Council report, *Education for life and work: Developing transferable knowledge and skills for the 21st century,* as the process by which an individual becomes capable of taking what was learned in one situation and applying it to new situations. Research is needed to update practices to support deeper learning and optimize engagement with material at the cognitive, interpersonal, and intrapersonal levels. This requires a sustained focus on structures of learning environments, understanding individual and collective institutional training, and the best practices for incorporating technology into training. The increasing prevalence of artificial intelligence (AI) in learning environments has both positive and negative impacts on learning and development. Understanding how to leverage AI to aid and augment learning and problem solving and discourage counterproductive or ineffective ways of interacting with AI is critical for supporting deeper learning and optimizing engagement with learning material.

High Priority Research Questions. While the Basic Research program values a broad range of research questions related to this domain, the following are provided as high-priority research questions for the Basic Research Program in Formal and Informal Learning and Development:

1. How can we better understand, track, and support, spontaneous, in situ self-directed learning particularly for sustained, long-term, and diffuse learning goals?

2. Are there novel measures and methods that can help us understand how leaders facilitate and motivate learners to seek out and persist in learning and development opportunities? How can we assess whether leaders themselves would benefit from opportunities to develop skills that will promote learning among members of their team?

3. How can we better understand, train for, and capture adaptation and distal application of learning to real-world performance?

4. How do we assess learning, retention, and adaptation over time in operational and self-development realms with precision and accuracy?

5. What learning methods and theory can be developed to maximize individual and collective learning processes and outcomes? What theory can be developed to understand the bidirectional relationships between individual and collective learning? How do learning gains disseminate through groups, teams, and networks?

6. How do we promote interactions with AI that will lead to deeper learning?