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INSTITUTE FOR DEFENSE ANALYSES

External Review Panel Report to the U.S. Army Research Institute

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About This Publication

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Executive Summary

Background

The U.S. Army Research Institute for Behavioral and Social Sciences (ARI) asked the Institute for Defense Analyses (IDA) to facilitate the formation and execution of an external review panel to provide independent advice to ARI leadership on the scientific quality, potential impact, structure, and potential military relevance of the basic research programs of ARI's Foundational Science Research Unit. The instruction from ARI to the review panel was twofold. First, it was to review ARI's basic research program with attention to scientific quality, impact, and the overall portfolio of research. Second, it was to provide feedback to ARI on the review, noting strengths on which to build and weaknesses to be addressed.

The review panel comprised researchers with experience in the type of research conducted by ARI: Dr. Rick DeShon (panel chair), Dr. Margaret Beier, Dr. Scott Morris, Dr. Michael Miller, Dr. Terri Scandura, and Dr. James Belanich. In preparation for the review, the panel reviewed summaries of funded projects. The review panel meetings were held on October 7–9, 2020. The review included an overview of ARI's complete science and technology program to provide a strategic perspective, along with an overview of the Basic Research program. Most of the review consisted of presentations of the four research portfolios: (1) Leader Process and Measurement, (2) Learning in Formal and Informal Environments, (3) Personnel Testing and Performance, and (4) Organizational Effectiveness. For each portfolio at least one in-house research project conducted by ARI researchers and an ARI-funded extramural research were presented as exemplars of the work in the portfolio.

Recommendations

- Basic research emphasis—Recognizing the importance of high-risk, high-reward basic research, we encourage the Foundational Science Research Unit to maintain the current focus and seek other avenues to increase external alignment. We think that the current orientation could be maintained, and alignment and value could be demonstrated, through more effective external outreach and communication

- Workload and collaborative agreements—We encourage identifying ways to work smarter because it is unlikely that the team can sustain working any harder.

Working more collaboratively, spreading out the Broad Area Announcement cycle, focusing efforts on high-reward opportunities, adopting an entrepreneurial orientation, and finding ways to leverage resources to multiply impact are critical moving forward. To this end, the panel continues to see great advantage in the team's concept of cooperative agreements. These cooperative agreements provide a source of new ideas, research skills, and potential future employees that would not be available from within the standard silos of "external grants" and "internal projects." Because these types of agreements tend to be relatively rare in research settings, we encourage the unit to develop a set of best practices for establishing and executing cooperative agreements.

- Quality vs. quantity—In general, the panel members are concerned that team members are working too hard and too fast; focusing on fewer projects with more intensity may result in better outcomes. One consideration, however, is that fewer projects means fewer opportunities for successful outcomes. A hybrid model might make the most sense. For instance, the unit might consider engaging in, and supporting, a relatively large number of small, short-term projects. After identifying those with the greatest chance of success (however defined), the unit could then invest substantial time and resources into this much smaller pool of research projects.

- Consider eliminating portfolios and focus instead on the strategic foci—Given the new emphasis on collaborative research efforts and research supervision (i.e., funding external research), the panel members think that increasing the emphasis on the strategic foci and decreasing the emphasis on independent research portfolios would be a positive move. In fact, disbanding the portfolio approach altogether and focusing exclusively on the strategic foci might make it possible to better clarify strategy, develop metrics, and communicate effectiveness to stakeholders and partner units. If such a transition away from portfolios is made, it will be important to detail how work with be organized, distributed, and prioritized within the new approach.

- Additional resources—The team appears to be fully staffed at this point and ready to execute the new strategies that have been developed. It is clear that the team needs more resources to fully realize the potential of what is currently in place. This is a critical time to explore ways to obtain additional resources by being creative, entrepreneurial, and collaborative.

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1.   Introduction

A. Background

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is the Army's lead agency for conducting research on personnel, organization, training, leader development, and other social and individual behavior. ARI's mission is to drive scientific innovation to enable the Army to acquire, develop, employ, and retain professional soldiers and enhance personnel readiness. ARI conducts research and analysis on personnel performance for the entire soldier life cycle of recruitment, selection, assignment, training, and mission performance. ARI's research scope includes basic research (Budget Activity 6.1), applied research (6.2), and advanced technology development research (6.3) as a Field Operating Activity of the Office of the Army's G-1.

ARI and the Army's research in behavioral and social sciences has had a profound impact on the U.S. Army. These research accomplishments include assessing the aptitude and cognitive ability of soldiers, which led to the development and refinement of entrance exams that have been used to bring personnel into the Army since World War I; developing methods and tools for collective training of combat units, which revolutionized military training; and using research techniques to inform Army leadership on personnel policy issues (e.g., active/reserve component integration, talent management, unit stabilization issues, diversity and integration issues).

Within ARI, the Foundational Science Research Unit (FSRU) conducts basic research to develop new knowledge and concepts supporting the needs of the Army by providing research in high-risk, high-reward areas (ARI Special Report 74, May 2018). FSRU works to advance the state-of-the-art behavioral and social science knowledge, research, theory, measures, and methods that build on past research or may represent a paradigm shift to conventional thinking. Common program themes are leader effectiveness, learning and behavior change, team and organizational effectiveness, advancing the science of psychological measurement, identifying new principles that may be used for personnel selection, and integrating computational, network and other analytic models into the scientific study of human behavior.

FSRU conducts in-house research and funds extramural research, providing a link between the behavioral and social science community within and outside the military, as well as to military consumers of scientifically valid research. Researchers within FSRU also maintain collaborative relationships with ARI-applied units, as well as other basic and applied research organizations across the Department of Defense (DoD). By contributing

to the knowledge base and building relationships with other interested partners, FSRU pursues knowledge generation that may lead to applied research and development that may positively influence the U.S Army and the Nation.

B. External Review Process

ARI asked the Institute for Defense Analyses (IDA) to facilitate the formation and execution of an external review panel to provide independent advice to ARI leadership on the scientific quality, potential impact, structure, and potential military relevance of the basic research programs of ARI. Dr. James Belanich of IDA (former ARI researcher and Chief of the Program, Budget, and Strategic Initiatives Office) collaborated with ARI to first identify an experienced researcher who also had an understanding of the domain of research conducted by ARI to be the panel chair. The research review panel chair selected was Dr. Rick DeShon, a professor at Michigan State University who has an extensive research record of accomplishments in the areas of organizational dynamics, individual motivation, team coordination, and who was also part of a previous review of ARI's basic research program in 2018. Additional panelists were identified and accepted the invitation to serve on the review panel:

- Dr. Margaret Beier, professor at Rice University, with research experience in individual differences and training, and who participated in a previous review of ARI's basic research program.

- Dr. Scott Morris, professor at Illinois Institute of Technology, who has conducted research in personnel selection, test development workforce legal issues, and job analysis.

- Dr. Michael Miller, professor at the University of California, Santa Barbara who has conducted research in decision-making, memory, cognition, perception, and individual differences in neuroscience, and who is a member of the Defense Science Study Group.

- Dr. Terri Scandura, professor at the University of Miami, who has conducted research in organizational management and leadership.

The instruction from ARI to the review panel was twofold. First, it was to review ARI's basic research program with attention to scientific quality (i.e., scientific contributions, innovation, multidiscipline perspective, and ability to take advantage of potential scientific opportunities that may lead to fundamentally new or improved capabilities); impact (i.e., potential military relevance and scientific influence); and the overall portfolio of research (i.e., coherence of strategy across programs, balance of portfolio, and potential for transition to ARI, other DoD research laboratories, or industry). Appendix A provides more detail on the criteria for consideration. Second, it was to provide feedback to ARI on the

review, noting strengths on which to build and weaknesses to be addressed. Feedback was in the form of face-to-face interaction with the FSRU professional staff and this report.

In preparation for the review, ARI (Dr. Greg Ruark, Chief, Foundational Science Research Unit; and Dr. Alexander Wind, Basic Research Team Lead) provided two prior ARI Basic Research Review reports (2016 and 2018), along with summaries of funded projects with brief descriptions of the nature of the projects and products of the research to date, and, if still active, future projections. Before the review meeting, the panelists reviewed the material and met virtually to discuss it.

The review panel meetings were held on October 7–9, 2020, and conducted virtually through Microsoft Teams because of COVID-19 travel restrictions. Before the panel review meeting, the briefing slides were sent to all panel members in case there were technical difficulties during the presentations and for ongoing reference while developing this report. See Appendix B for the meeting agenda.

The on-site review began with a half-day (October 7, 1230–1615) session in which introductory remarks were provided by Drs. Ruark and Wind. This first session also included brief introductions of the participants in the meeting—the panelists, ARI researchers, and other DoD researchers who attended. Appendix C has the full attendee list. Next, Dr. Michelle Zbylut, ARI Director and Chief Psychologist of the U.S. Army, provided an overview of ARI's complete science and technology program. This was followed by Drs. Ruark and Wind, who provided an overview of the Basic Research program. The second day (October 8, 0900–1300) included presentations on the Leader Process and Measurement portfolio and the Learning in Formal and Informal Environments portfolios, including in-house research conducted by ARI researchers and ARI-funded extramural research. The final day (October 9, 0900–1300) of the review panel meeting included presentations of the Personnel and Organizational Effectiveness portfolios, including in-house research conducted by ARI researchers and ARI-funded extramural research. At the end of each day, the panel met privately to discuss what occurred during the day and to prepare for the next day. The following week, the panel exchanged emails and met virtually to discuss initial feedback that could be provided to ARI quickly, along with a few questions to ARI to clarify some information presented. A few days later, Rick DeShon and Jim Belanich met with the ARI Basic Research Team for an initial feedback, question-and-answer session to provide some initial feedback to ARI and get some clarification on some remaining questions. The panel then developed this report to provide formal feedback to ARI.

C. Structure of the Report

The report begins with an overall evaluation (Chapter 2) that includes the panel's general perspective on the evaluation of the FSRU based on the material review committee members were provided before the visit, presentations on the face-to-face meeting days, and a feedback question-and-answer session held with ARI the week following the panel

sessions. Next is the main body of the report (Chapter 3), which includes more detailed discussion on each of the research portfolios (Personnel Testing and Performance, Organizational Effectiveness, Leader Processes and Measurement, and Learning in Formal and Informal Environments), along with specific feedback and recommendations. For each of the portfolios, an initial description of the program of research is followed by some exemplars of the research and evaluative comments (e.g., scientific quality, innovation, impact, and connection to strategic foci), ending with a discussion of potential next steps. The report concludes with Chapter 4, recommendations from the panel.

2.   Overall Evaluation

A.   Managing Change

Much has changed at ARI since the 2018 review, including the unit leadership, most of the research staff, increasing the Broad Agency Announcement (BAA) cycle from 1 to 2 years, and increasing the emphasis on transitional research. In the 2018 review, the number of portfolios was reduced from six to five, and in the present research review the number of portfolios has been further reduced from five to four. There has also been considerable turnover in the staff, only the Chief of the FSRU and one other researcher being part of the basic research team in 2018, and a mix of early- and mid-career researchers joining the team. The professional research positions are now fully staffed, but the disciplinary backgrounds of these researchers have shifted from being largely centered in industrial and organizational psychology to a more multidisciplinary and diverse set of backgrounds and interests.

B.   Change for the Better

The panel reacted favorably to many of the planned changes. A consist theme present in the panel reviews from 2016 onward has been the workload shouldered by the professional research team members. Managing complex research portfolios, supervising research conducted by interns and post-docs (i.e., temporary developmental positions for recent Ph.D. graduates), performing mission-aligned primary research, supporting BAAs every year, and managing the paperwork associated with all these efforts must be overwhelming. The panel members reacted positively to efforts undertaken to reduce the overall workload and yet execute the unit's mission more effectively. For instance, decisions to increase the BAA cycle time, work more collaboratively, emphasize collaborative agreements with external research teams, and emphasize quality over quantity of research were viewed as positive moves forward by the panel members. Note that a few of the intended changes were not viewed as positively by panel members; these will be highlighted elsewhere in the report.

C.   Aligned, Productive Strategy

The unit continues to successfully use cooperative agreements to more effectively partner with external researchers to effectively leverage limited financial resources. Professional staff also selects interns, graduate students, post docs, and others to work with the unit for limited amounts of time, on discrete projects, where new ideas work their way

into ongoing activities. This strategy both increases capacity and expands the pool of new research and technical knowledge available to the unit.

The professional level staff continue to use BAAs and other standard means to communicate the unit's goals and objectives. But the unit is also proactively going beyond the standard BAA approach by trying to attract researchers they identify as behavioral and social scientists with new ideas whose works they feel are important for the mission. To this end, professional staff attends conferences, visits university faculty, and networks with social and behavioral scientists, along with researchers from other disciplines (e.g., computer science, architecture).

Although a new transitional research strategy is still in early stages of conceptualization, the panel sees great opportunity in expanding the traditional transitional research model, where basic constructs are scientifically tested, refined, retested, until products are developed that are applied in real-world settings. In theory, it is a logical, hierarchical, and linear process, one that the military has a long history of success using. Yet the intentions and behavior of the unit show some modification of this linear process to support the transition of research contributions as they occur throughout the research cycle over time and not simply in sequence. By creating collaborative networks of individuals doing related research, multiple transitions occur and products are developed that may have been missed in the more linear and controlled process anticipated in the transitional model. Likewise, identifying potential transition partners as part of this collaboration network may facilitate future transitions. The agile model of cross-boundary teamwork and dynamic research networks broadens the transitional research process and amplifies the research outcomes.

D. Good People Doing and Supervising High-Caliber Research Relevant to the Army's Needs and Mission

The ARI team has high-quality, experienced leadership, and the team members are clearly engaged, empowered, and capable of continuing to execute the high level of scholarship and research supervision that has characterized this unit over the years. The unit has assembled motivated, capable people who work well together to accomplish the unit's goals. The panel members viewed the movement away from siloed research and research portfolios and toward collaborative oversight and execution of strategically aligned research as a big step forward.

In sum, the panel was pleased with the responses and accomplishments of the unit over the last 2 years. The tumult of leadership and professional staff changes appears to have been navigated successfully, and the unit is structured to continue overseeing and executing high-quality basic research aligned with the Army's mission and strategy. The panel was impressed by the enthusiasm, eagerness, and thoughtfulness of the relatively new team and encouraged it to nurture and grow that positive, productive climate.

3. Comments on Research Portfolios

Four research portfolios were presented to the review panel. In each case, written materials for each portfolio were provided, outlining brief overviews of projects in the portfolio, their principal investigators, objectives, progress to date, and actual and anticipated outputs. Appropriate unit staff members gave the presentations, which were followed by a brief discussion with the review panel. For each portfolio, an exemplar project was selected for presentation either by the staff member or, in several cases, by principal investigators outside ARI whose projects were funded by ARI's portfolio. The comments below reflect the review panel's discussion as stimulated by these materials, presentations, and discussions with the unit. The panel kept firmly in mind the criteria from FSRU as it prepared narrative comments on each portfolio. The panel did not respond directly to each criterion, both to limit the length of the report and because not all the criteria fit each portfolio.

A. Portfolio 1: Personnel Testing and Performance
Lead Presenter: Garett Howardson

1. Panel Comments

a. Overall Program of Research
The Personnel Testing and Performance research portfolio contains projects involving a variety individual differences relevant to individual and team effectiveness and uses diverse assessment methods to measure these characteristics (see Figure 1). This variety was favorably evaluated, consistent with the high-risk, high-reward nature of basic research. The strong record of projects leading to publications speaks to the high quality of the research portfolio. A strength of the portfolio is that many projects involve constructs and methodologies from scholarly domains outside the normal sphere of personnel testing. The current portfolio has been responsive to the 2018 review with regard to the need for more criterion-focused research (e.g., new performance and construct validity theories and approaches) and the importance of developing new data-analytic methods. The near-term and mid-future portfolio plans continue to support research on performance in highly interconnected and fluid contexts, as well as the development of sophisticated analytic methods to support the evaluation of large, varied, and dynamic datasets.
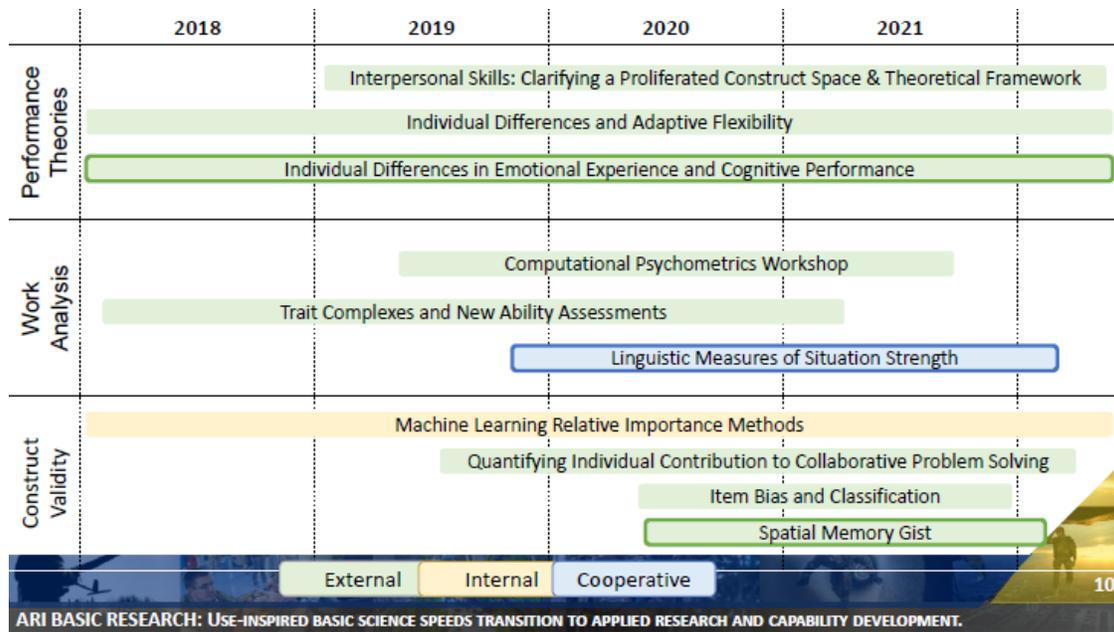
Figure 1. Overview of Projects Included in the Personnel Testing and Performance Portfolio

b. Research Exemplars

Two research exemplars were presented. The intramural example explored the application of machine-learning methods to determine the relative importance of predictors in validation research. The volume of information available in personnel testing is on the rise, and the presence of numerous intercorrelated predictors creates challenges for evaluating the contribution of individual predictors. Relative-importance statistics are an established solution to this problem, but some methods are not scalable as the number of predictors increases. Integrating relative-importance analysis with machine-learning methods designed for high-dimensional data would provide an important advancement. To date, the intramural project has identified important parallels between relative-weights analysis and regularization techniques from machine learning. It was not clear from the presentation whether this research will lead to improvements in relative-weights analysis or to its being replaced by existing regularization methods. But either way, the work will provide new insights into the topic.

The project Collaborative Problem-Solving Skill (Patrick Kyllonen, ETS) is developing methods to objectively measure individual contributions to small-group performance. Thus far in the project, the researchers have developed an innovative computer-mediated platform for studying team-member interactions while performing group tasks. Importantly, the platform provides objective, performance-based indicators of individual contributions through process-oriented behaviors exhibited during group problem-solving. The platform, which is capable of presenting a variety of group problem-solving tasks, collects detailed data on team-member interactions. Through text analysis of group chat

transcripts, the researchers have identified markers of collaborative tactics that are predictive of group outcomes. The potential for the platform to measure team-member contribution using behavioral data rather than subjective ratings is an important advancement. Future plans for this project include dynamic modeling of team-member interactions. The panel sees this as an essential step toward developing a generative model that can effectively partition individual contributions.

c. Innovativeness of the Portfolio

There is substantial innovation in the projects currently funded in the portfolio. The portfolio includes a good balance of research exploring new individual-difference constructs (e.g., work by Ackerman and Chamberlain) and projects aimed at providing an integrative framework to unify existing constructs (e.g., work by Heggestad and LeBreton). Several highly innovative projects explore interactions among cognitive, affective, and physiological systems in predicting task performance, including the research by Patrick on adaptive flexibility and the project by Quigley on emotional reactivity. Other projects involve innovative multilevel approaches to understanding team effectiveness, in particular the research by Kyllonen to isolate individual behaviors that contribute to team performance and the work of Curtin on collective spatial cognition in teams. Contemporary personnel testing increasingly relies on complex interactive assessments that capture examinee responses in the context of team processes or situational demands, and there is a need for measurement models that can account for the effect of context on examinee behavior. Several of the funded projects contribute toward building models and measures of behavior in context, such as the research on individual contributions to group performance (Kyllonen) and models of person-situation interaction in personality assessment (Wood). In addition to these developments in personnel assessments, the portfolio is also innovative in terms of research methodology and data analysis, including applications of natural-language processing and other machine-learning methods to score unstructured data such as group chat transcripts or hand-drawn maps. The work by Oswald to integrate machine learning with psychometric considerations is of critical importance given the increased use of these new analytic tools in scoring assessment data. The use of workshops that bring together multidisciplinary researchers has great potential to encourage cross-fertilization and fuel future innovation.

With regard to the projected portfolios over the next 5–10 years, several of the planned research areas are well suited to produce innovations that will serve the strategic, operational, and tactical missions of the Army, including (1) developing models of how individuals interact with natural and artificial environments and (2) understanding the linguistic foundations of work analysis and the use of natural-language-processing techniques to assist in identifying work requirements. The panel also sees value in plans to develop new models for construct validation that can better address the complexities of modern

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personnel testing data and analytic methods. However, the rationale for the specific research directions in terms of causal inference methods (counterfactuals, directed acyclic graphs) was not clear. It would beneficial for the Basic Research Team to more fully articulate how these research goals connect to broader strategic objectives.

2.   Next Steps

The panel encourages the Basic Research Program to continue many of the features of the current portfolio. These include using diverse research approaches and methodologies and examining individual, interpersonal, and situational factors and their interactions. In particular, we see value in continued work to advance models and methods for measuring individuals within complex, interdependent, and dynamic contexts. The panel also supports a continued investment in developing advanced analytic methods and the work to integrate machine learning with psychometric methods. The Basic Research Program should continue to support researchers from diverse disciplines, while maintaining a strong core of research rooted in personnel testing. The panel had some difficulty seeing how the full collection of individual projects fit together into a systematic stream of research in support of the portfolio's strategic objectives. We encourage additional attention to strategically aligning projects and developing messaging to help researchers and outside parties understand the collective contribution of the portfolio.

B.   Portfolio 2: Organizational Effectiveness

Lead Presenter: Dr. Christopher Goode

1.   Panel Comments

a. Overall Program of Research

The panel had a positive impression of this portfolio, particularly the presentation of the external project and its innovative use of network analysis as a method to improve team building. The U.S. Army is a very large organization, naturally burdened with a 25% turnover every year and a strict, hierarchically based composition. At the same time, the size of its personnel provides a data-rich opportunity, and this portfolio seeks to take scientific advantage of that. There is a clear link between the projects in this portfolio and the stated overall goals of ARI "to acquire, develop, assign, and retain talent," although this link could have been more clearly stated in the presentation. Other than the external project, the other projects presented or highlighted appear to be in the early stages (see Figure 2), so the panel looks forward to seeing these research efforts mature.
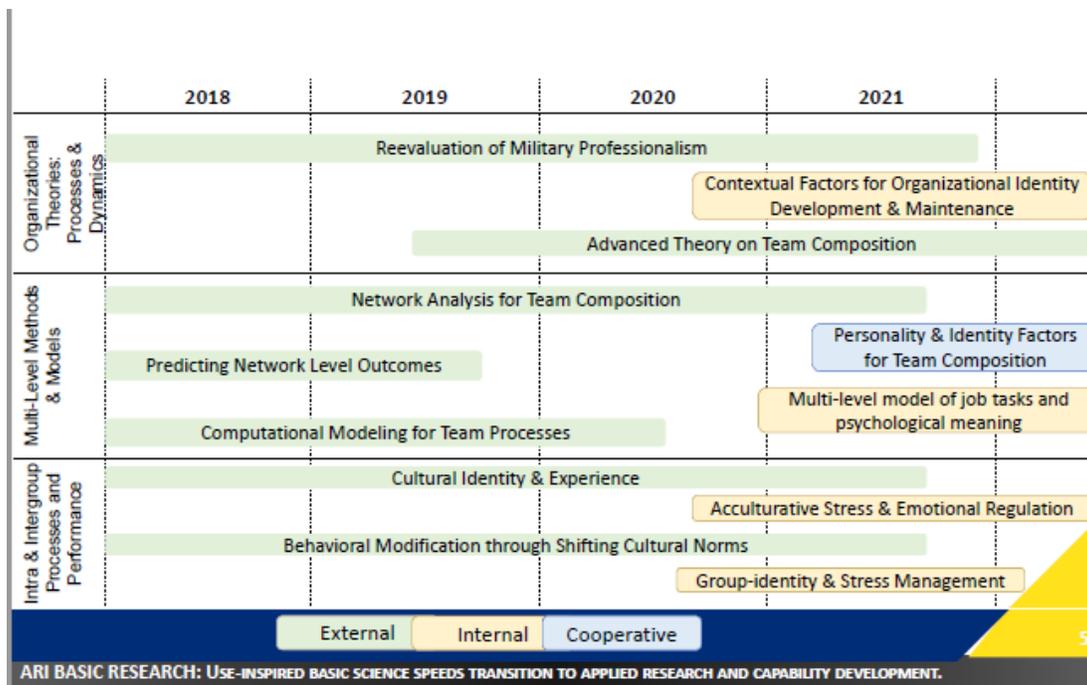
Figure 2. Overview of Projects in the Organizational Effectiveness Portfolio

b. Research Exemplars

Dr. Christopher Goode presented an internal project that he is conducting in collaboration with Drs. Garett Howardson (ARI) and Lucas Keefer (USM) titled "Assessing Meaning Through Identification of Job Skills & Tasks." Dr. Goode, a trained social psychologist, is a relatively new scientist recently hired at ARI, first working in the Emergent Research Unit starting in January 2019, and then transitioning to FSRU in April 2020. The panel applauded ARI's efforts to hire young and enthusiastic investigators from outside traditional personnel science domains who could bring a fresh basic research perspective to the ARI portfolios. At the same time, the panel agrees that guidance from those with strong industrial and organizational (I/O) backgrounds will be valuable. The project that Dr. Goode presented is a good example of how findings from social psychology could be used to gain a new perspective on personnel data from the Army. The project seeks to understand whether the identifiers used by the Army to describe job skills and tasks could predict the level of psychological meaningfulness that Army personnel derive from their jobs. This work applies some well-known principles from social psychology: the action identification theory and the self-determination theory. The study seeks to use a linguistic category model to analyze personnel data from O*Net. It was surprising to hear that one of the key military problems identified by Dr. Goode in his presentation is a lack of "methods for consolidating and utilizing existing data for research questions related to improved talent management." Indeed, given the data-rich possibilities within Army personnel, it is the hope of the panel that the Army heed this call and provide the necessary resources to make this possible. Too few organizations have this kind of scientific opportunity. In addition,

while the panel appreciated hearing from a new ARI scientist on one of his proposed projects, we were concerned about the quantity of projects in early stages of development (i.e., proposal) with no accomplishments yet to report.

Dr. Alexander Volfovosky, from Duke University, presented an external project titled, "Building Better Teams: A Network Analysis Approach." All panel members felt that was an interesting and innovative scientific project that illustrated how network analyses could be used to improve team building and to achieve some of ARI's goals in its Army Talent Management Reform program. Like all good network analysis projects, this one brings together a diverse group of experts from different fields, including statisticians, sociologists, and I/O psychologists. The presentation by Dr. Volfovsky highlighted three potential applications of this project, some of which overlap with the other portfolios: (1) evaluating leadership skills that are context-dependent, (2) identifying and assessing key dimensions in team dynamics, and (3) assessing organizational effectiveness and team performance when changes occur in the group's composition. Using a network analysis perspective, the study takes two approaches: (1) building models based on existing data (e.g., Duke basketball teams) and (2) curating a novel dataset in a naturalistic setting by analyzing interactions, performance, and self-assessments in a 10-week, 4-team, summer project with a group of students. The study had completed one summer session's worth of data, which included videoing and coding the social interactions of team members across the 10-week period. This provided a wealth of naturalistic data. The panel was impressed with the sophistication of the model development and network analyses, and the preliminary results of this study appears promising. The key innovation of this project is its ability to quantify leadership skills and team effectiveness, with a focus on a holistic view of team development rather than the contributions of individual traits (e.g., the communication between any two nodes of a network). This project has the potential to develop models and tools for many other applications that could be useful to the Army, some of which these investigators are currently working on, including an epidemic spread on dynamically evolving networks and so forth. This is a labor-intensive, large-scale approach that will require a lot of resources to be successful, but the panel feels this could have a tremendous impact on the scientific advancement of personnel science and be a practical and effective way for the Army to optimize its organizational effectiveness and performance. The panel strongly encourages continued funding of these kinds of approaches.

2. Criteria under Consideration

a. Scientific Quality

The novelty and innovativeness of the portfolio was evident, particularly in the presentation of the external project, with its use of network analysis and latent models to evaluate team dynamics and performance. It was also clear that ARI is attempting to

broaden the multidisciplinary approach by, for example, borrowing principles from social psychology and applying them to the wealth of personnel data that exists with the Army. It was difficult for the panel to assess the scientific accomplishments and results of the portfolio since the projects presented were at the early stages of development or data collection, but they seemed promising and have a reasonable expectation for success and advancement of the field.

b. Impact

In terms of personnel, the Army has some unique strengths (e.g., large numbers of personnel, standardized training and measurement) and weakness (e.g., high turnover, tough competition to recruit and retain talent). The projects presented in the Organizational Effectiveness portfolio are clearly relevant to the needs of the Army (e.g., using sophisticated and quantitative measurements to analyze the impact of changes to a group dynamic) and make good use of Army resources to better understand its personnel (e.g., mining the vast data within O*Net to study the psychological benefits of job and task descriptions). The panel found this encouraging. Further, these opportunities, coupled with the innovative techniques, present an opportunity to significantly contribute to the field of Organizational Effectiveness.

c. Program Evaluation

There appears to be a lot of coordination and collaboration between the portfolios, which is encouraging. We noted that some ARI scientists are working on more than one portfolio (e.g., Dr Howardson) and some aspects of the Organizational Effectiveness portfolio are directly relevant to other portfolios (e.g., leadership training). But given the wealth of personnel data that ARI has to work with and the enormous opportunity these data present to the Army for addressing many issues directly relevant to its mission, the panel was discouraged that more resources are not being devoted to this program. There also appeared to be little evidence of collaborations and interactions with other DoD laboratories, such as the Army Research Labs.

3. Next Steps

The panel was encouraged with the direction of the Organizational Effectiveness portfolio. The sophistication of its quantitative analyses, the multidisciplinary approach, and the enthusiasm of its staff bode well for its future success. The panel recommends three next steps for this portfolio. One, more resources are needed to mine the vast wealth of personnel data that the Army possesses. The current portfolio is excellent and asking some great questions, but it just scratches the surface. The panel believes that a larger investment in this area could pay great dividends down the line for the Army (e.g., using network

analyses in real time to improve communications between individuals and optimize performance across the organization). Two, the Army needs to continue to support the multi-level modeling and network analyses. This can be a labor-intensive enterprise that chews through a lot of data and takes time to develop. But the panel believes there is a promising aspect of the current portfolio and strongly encourages the Army to stick with it. Three, the panel sees the value in bringing in fresh and enthusiastic scientists from different disciplines to address these important questions in personnel science. Their perspectives can have a great effect in advancing the science and bring in new ideas that will benefit the Army. But we urge ARI not to lose sight of its I/O psychology roots—maybe just an informal I/O advisory board would be particularly helpful to this portfolio.

C. Portfolio 3: Leader Processes and Measurement
Lead Presenter: Alex Wind, PhD

1. Panel Comments

a. Overall Program of Research

The science being conducted in this portfolio has many strengths: (1) research that improves leader adaptability over the career lifespan; (2) understanding how leader knowledge, skills, abilities, and other characteristics (KSAOs) change over time; (3) understanding influence processes; and (4) improving measurement in terms of observed and unobtrusive measures of leadership. This portfolio contains three external grants (ending in 2020) and two internal projects. One cooperative agreement (CA) will end in 2020; another extends through 2021. The portfolio summaries provided described a large CA (Lord, Durham University) which has the potential to advance leadership research by bringing together 22 researchers from 16 universities (10 U.S., 5 EU, and 1 from Chile) supporting 11 separate research projects. The leadership portfolio sponsored much-needed longitudinal research on leadership, including the Fullerton Longitudinal Study (FLS), which is a 38-year-long investigation of individual development across the lifespan. This research examines early life predictors of adult leadership and well-being such as the family environment. The committee was also pleased to see the portfolio reflect more research on ethical leadership, which was recommended in the 2018 review.

b. Research Exemplars

Two research exemplars were presented. The intramural research focused on a review and development of a conceptual model of ethical leadership (Kira Foley, ARI), and the extramural project focused on training team leaders and members to exhibit more adaptive leadership (Geradus Uitdewillgen at Maastricht University). The intramural project is in

its early stages. A literature review was presented along with discussion of the most commonly used measure of ethical leadership. While the committee supports this research direction of examining moral leadership, it was unclear what the next steps in the research stream will be. This might be an area where unobtrusive and observational research methods of ethical leader behavior in military settings would make a significant contribution to the leadership literature since there are social desirability concerns with survey measures of ethical leadership. The extramural exemplar examined leader switching behavior during team projects from directive to participative. This project is a series of six studies (two have been completed) that examine whether leaders change their behavior during team projects and the impact of such switching on team performance. Results from a study of 90 student teams indicated that leaders do switch, which appears to improve performance. A second study presented examined the complexity of the task and follower passivity, which may be boundary conditions on the effectiveness of switching. While this research has potential to make significant contributions, the committee felt that it was in the early stages, which made it difficult to evaluate. The future direction of co-leadership in teams by pairing directive and participative leaders has the potential to make a significant contribution. In general, these projects are interesting but at the early stage. It would have been helpful to see projects at later stages to better evaluate the scientific contributions.

c. Innovativeness of the Portfolio

Many aspects of the portfolio are innovative, especially the longitudinal study of leadership that identified certain early family experiences as predictors of leader effectiveness 38 years later (Riggio). Continuing to study ethical leadership and how this is exhibited in military contexts is a worthwhile direction for research. Studying co-leadership is consistent with leadership research that examines shared leadership in team and organizational contexts. Overall, the portfolio is contributing to innovative basic research in the leadership field and supporting a range of research methods, including longitudinal studies and interventions. The committee saw less emphasis on qualitative research methods than in the past and would like to see more qualitative and mixed-method research going forward.

In terms of the projected move to eliminate the portfolios, the change may benefit research on leader processes and measurement for the following reasons. Leadership is a multidisciplinary field by nature that reflects the expertise of scholars with varying backgrounds, such as I/O psychology, social psychology, and sociology. Also, the other portfolios reflect leadership. For example, the research presented in the Learning in Formal and Informal Environments portfolio on variability in repeated adaptive performance (Mindy Schloss, UCF) has implications for the selection or training of adaptive leaders. Research in the Personnel portfolio on the development of a measure of collaborative problem-solving skills (Patrick Kyllonen, ETS) has implications for the selection of team leaders. There are a number of intersections of leadership with the Organizational Effectiveness portfolio.

One example is the research on building better teams through social networks (Alex Volfovsky, Duke) which seeks to optimize team performance through leadership and communication networks. These are but examples of the how the leadership portfolio might be strengthened by creating ties to projects in other existing portfolios.

2. Next Steps

First, the committee noted that much of the extramural research in the leadership portfolio has been completed (of the three funded projects, two are completed, one is ongoing). The CA is in the third year of a 4-year funding cycle. It may have been helpful to have more information on the activities of the CA for this review. It was not clear from the documents provided that this is a large project that reflects a significant portion of the overall portfolio (this was clarified in the question-and-answer session). In addition, the question-and-answer session clarified that there are two additional recently funded projects not in the summaries. As the CA comes to an end in the coming year, the committee recommends that it be carefully evaluated to determine the costs and benefits of the approach and whether it is worthwhile to fund another CA.

3. Connections to Strategic Foci

The presentation on the first day of the review on the U.S. Army research strategy was helpful in providing context for the following presentations of research. The Army is interested in deliberate people management to "recognize and capitalize the unique KSAOs possessed by every member of the Army team, allowing us to employee each to maximum effect." The Army believes that every soldier is a leader, and the goal for the next 8 years is the focus on the assessment of talent, leader development, and career paths, bridging the gaps between the individual, team, and enterprise levels. The presentation of strategic foci within the leadership portfolio clarified the alignment of research within the portfolio currently and in the future (see Figure 3).
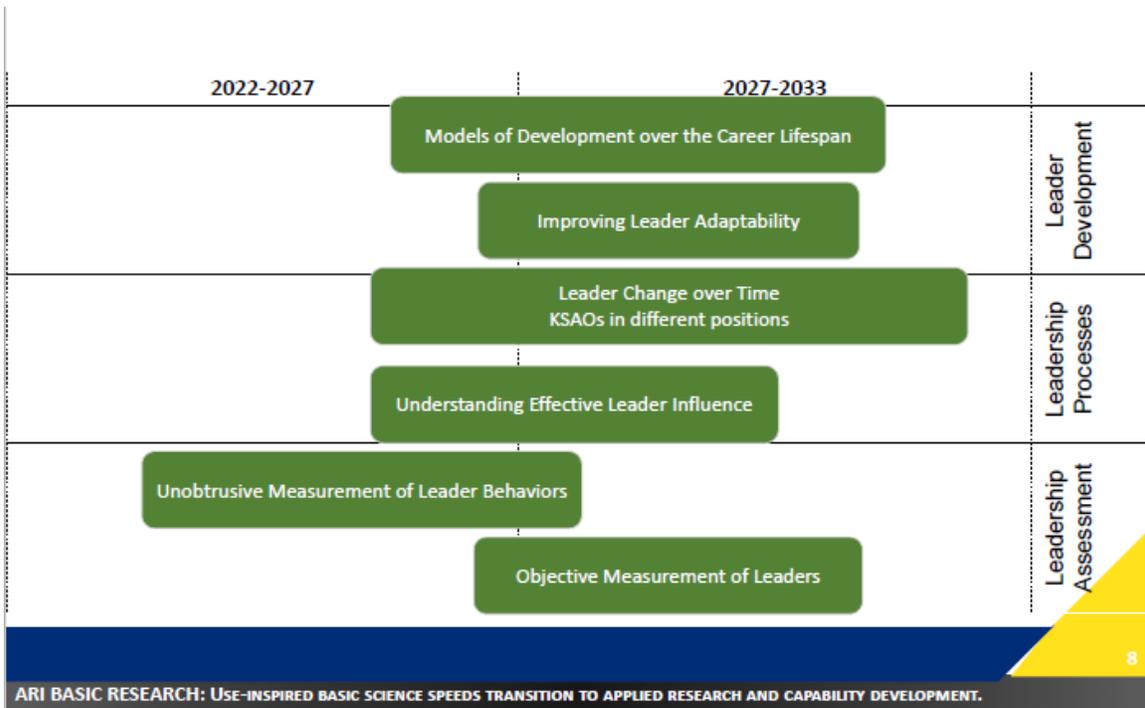
Figure 3. Overview of the Projects within the Leadership Portfolio. Slides 7 and 8 from the Leadership Portfolio briefing.

First, the research on leader development agenda will shift from identifying predictors of leader identity to the metamorphosis of leader identity over the lifespan. The committee

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recommends continued longitudinal research on how Army careers evolve over time. Second, research on leadership processes will focus more on co-leadership and leader dyads. The committee recommends that this research identify leaders with co-leadership capabilities. Third, the measurement area will shift from emphasizing leader memory to identifying objective and unobtrusive measures of leadership. The committee recommends that that this goal be pursued through cooperative research between the Army and universities. The leadership portfolio future directions indicated that ARI will continue to address advancements in talent-management by focusing on basic research that can be translated into applied settings.

D. Portfolio 4: Learning in Formal and Informal Environments
Lead Presenter: Garett Howardson, PhD

1. Panel Comments

a. Overall Program of the Research

The aims of the formal and informal learning research portfolio are to better understand learning across a wide array of settings to develop well-trained and adaptable Army personnel. The basic research portfolio has three objectives: (1) examining the choice to engage in learning and characteristics of the individual learner, (2) understanding learning and socialization, and (3) developing multi-scale learning theory and methods. Priority research problems are understanding learner choice and developing social learning theory that integrates psychological research and theory with disciplines such as communication and engineering.

The current and near-future (from 2018 to 2021; see Figure 4) research portfolio includes four extramural projects (one that ended in 2019, three ongoing), five intramural projects, and three cooperative projects. Three projects were briefly mentioned in the overview: a cooperative project examining decision inertia and the dilemma faced by military personnel in making "least worst" decisions; an internal project on onboarding to improve socialization; and a cooperative project, begun in 2020, on the evolution of training/learning/and education. This last cooperative project uses the O*NET to identify skill taxonomies (a "skill ontology"). The panel was impressed by the scientific quality of the research in this portfolio. The projects have produced multiple publications, the majority in journals, and have funded young scholars including graduate students, post-docs, and early career scientists.
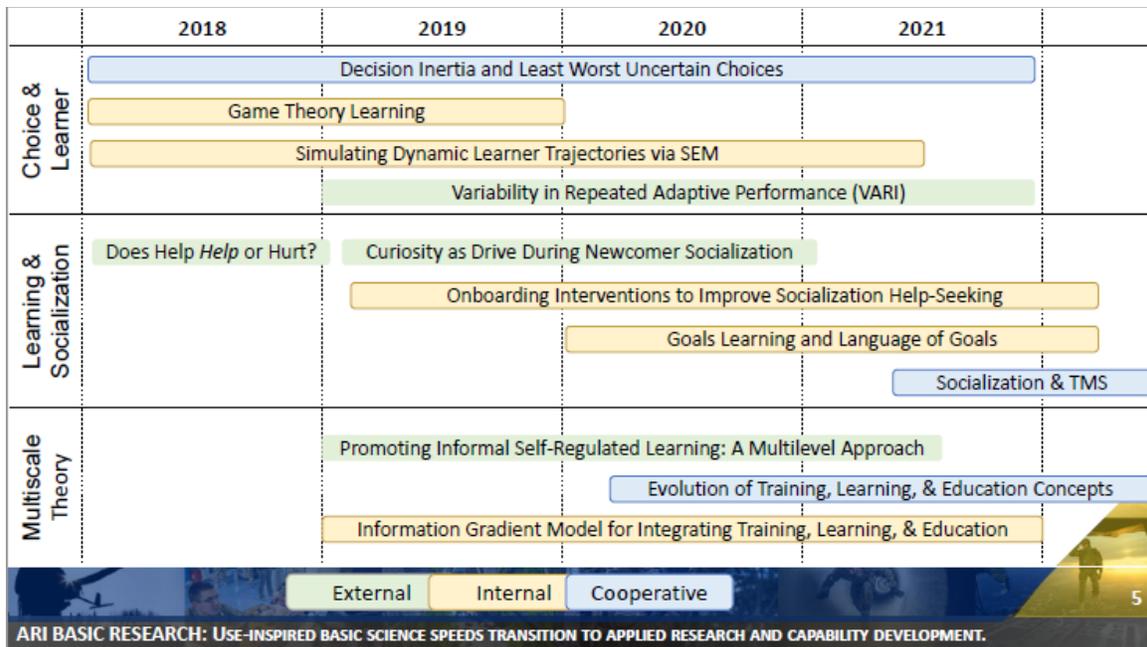
Figure 4. Overview of Projects in the Formal and Informal Learning Portfolio

One general concern with the portfolio is the sheer volume of ongoing projects that are internal and cooperative, given relatively limited resources and recent staff turnover. Compared with the review in 2018, which included six extramural projects, four intramural projects, and plans for one cooperative project, the balance of the portfolio has shifted to internal and cooperative projects, which will potentially strain limited resources. The panel balances this concern with the recognition that ARI staff members want to engage in their own scientific research.

b. Research Exemplars

Two research exemplars were presented to the panel. An internal project, Links between Generational Status and Retention, was presented by Kathy Vu (a relatively new PhD hired by ARI in August 2020). This project examines the challenges of first-generation students making the transition to college. Dr.. Vu presented an impressive literature review and a derived model focusing on acculturative stress and emotional distress as a mediating mechanisms for predicting retention based on first-generation college student status. She plans to examine emotion regulation as a moderator of these relationships. The panel was excited about this project, given its relevance both within and outside the Army and its promise to identify barriers to success for first-generation college students. As of early October 2020, Dr. Vu had not yet collected data for this study, and the panel encouraged her to think about the characteristics of the sample that would best generalize to her population of interest. Considerations include sampling an array of school types (private or public universities, 4-year, and 2-year colleges).

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The extramural research exemplar, Variability in Repeated Adaptive Performance (VARI) Examining Personality Predictors, was presented by Dr. Mindy Shoss of the University of Central Florida. The panel was impressed with this project, which examines variability and speed of adaptive performance across changes in an air traffic controller (ATC) task. Personality is examined as a predictor of adaptive performance in the ATC task. The panel cited the complexity of the task and the relatively long duration of skill engagement, which better simulates learning than single-session laboratory studies. Data collection has not yet begun, and there is an ambitious goal of collecting 300 participants to achieve power to conduct necessary analyses. The panel cautioned the research team about focusing on personality predictors, given that norms for performance in laboratory environments tend to be well understood, making them relatively strong situations unlikely to elicit personality expression. The panel encouraged the researchers to include tests of cognitive ability in their study design, given that working-memory capacity is likely related to adaptive performance in the context of complex tasks.

c. Innovativeness of the Portfolio

The set of projects in the portfolio represents a broad array of innovative projects. Topics range from game theory, learning over time, adaptive performance (as described earlier), and learning in formal and informal environments. Moreover, the portfolio expands the determinants of learning beyond those abilities normally associated with learning and development to emotions, motivation, self-regulation, and personality.

The plans presented to extend the portfolio beyond 2022 (i.e., through 2033) include three broad foci: (1) network and system theories of social learning (estimated 2022–2027); (2) interdisciplinary theory and methods for modeling change across diverse spatial, social, organizational, and temporal contexts (estimated 2020–2030); and (3) skill systems theory (estimated 2027–2030). The panel was impressed by the innovation planned for the future of the portfolio, particularly those related to ambitious goals such as modeling change across diverse contexts and systems theory, which transcend the separate consideration of the person and the environment.

2. Next Steps

Although the committee recognizes that future plans are subject to change and that forecasting is difficult, the panel was concerned that the forecasted period did not include consideration of learner choice and the individual learner. ARI has been instrumental in funding and conducting research on individual learning for decades, and the panel would encourage a continuation of this strong program of research. At minimum, the panel encourages decision-makers to ensure that the type of research that would normally fall within the scope of this research foci be incorporated into the other research thrusts moving forward.

Moreover, the panel is concerned that despite the innovative nature of the portfolio, many of the current projects are in the relatively early stages of development, exemplified by the presentations of proposals rather than results in the Learning portfolio. Although the panel is excited to see these projects come to fruition, and understands delays related to the pandemic, a concern remains that the staff is engaged in multiple internal and cooperative projects and managing external projects, most of which are in early stages of development. In sum, we caution that the research agenda may stretch existing personnel.

4. Overall Recommendations

A. Strategic Clarification and Alignment

As mentioned above, the FSRU team is on the tail end of big changes in both leadership and professional staff. Although the unit's mission is largely unchanged, the strategies for accomplishing the mission are being reevaluated and updated to better align with Army needs. It is understandable that the strategic foci are not yet well honed. However, the sooner the strategies and timelines are put into writing and the team has had multiple opportunities to align around them, the better the team will be able to execute in support of the strategies.

To be concrete, the review panel thought additional clarity and team alignment on the following issues would be beneficial. The connection between the research portfolios and the strategic foci could have come through more strongly in the presentations and messaging. The desired shift toward collaborative research and collaborative oversight of research sounds promising, but additional clarity on how this will further the unit's goals and better connect to the strategic foci would be useful. The relative emphasis on basic vs. transitional (to application) research could be further clarified. For example, the panel would caution that a focus on translating basic to applied research may take the focus away from the high-risk, high-reward projects that are the hallmark of basic research. The quality over quantity strategy presented could solve many problems, but it could introduce others. Therefore, a model guiding when to focus on quality and potential and when to focus on quantity could help guide decisions. Finally, decisions around content areas to emphasize and de-emphasize should be connected to strategies and goals.

1. Metrics

The metrics used to evaluate and track progress and goal achievement could be further clarified and connected to the unit's strategic foci. The panel members were interested in understanding the extent to which the recent changes in leadership, professional staff, and strategy affected the unit's effectiveness. A clear set of metrics—closely tied to goals and strategies—would help make this clear and would focus efforts on what matters most to success as a unit. Based on the data in the portfolio presentations, the number of research projects, the number of publications and conference presentations, and the number of postdocs and interns engaged in the process appear to be key metrics. These metrics are important and tracking these metrics is valuable, but the review panel encourages the team to consider a variety of additional metrics, such as research impact (e.g., citations to supported

research), stakeholder satisfaction and engagement, effective transitions from basic research to application-oriented research and actual application, and team outcomes such as satisfaction, cohesion, efficacy, engagement, and effectiveness.

B.   Communicating Strategy and Effectiveness

The review panel members uniformly had a positive reaction to Dr. Michelle Zbylut's presentation providing the overview of ARI, its history and purpose, and how basic research aligns with Army needs. This big-picture, strategic perspective helped the panel better understand the context, where the FSRU team fits, and stakeholder expectations. The notion of being able to explicitly connect basic research conducted within the unit to subsequent research on application and then its actual application resonated strongly with the panel members. Based on this presentation, it seems clear that increased communication with peers and other Army research units focused on the unit's purpose, its strategies, and the successes would be valuable. Thinking about these communications as internal marketing and sales might not be far from the target. Having a clear set of messages or talking points that are repeated at every opportunity, refining the talking points over time, and explicitly connecting the talking points to the needs and goals of the partner units would likely increase effectiveness. Finally, we note that the panel members didn't see a clear connection between the individual projects and the strategic foci. Highlighting the purpose of each project and connecting the projects to both the developmental phases of basic research and to the metrics would likely improve internal project effectiveness and external messaging and communication efforts.

1.   Basic Research Emphasis

During the research presentations and in surrounding conversations, the panel got the sense that the plan is to more clearly align with Army strategies and needs and with other Army research units by placing more emphasis on transitional research and less on basic research. The panel had strong concerns about this shift. Recognizing the importance of high-risk, high-reward basic research, we encourage the FSRU team to maintain the current focus and seek other avenues to increase external alignment. It's important to highlight that this recommendation is coming from a panel consisting of three members with strong applied research orientations and one member who focuses on basic research. We do recognize that, as outsiders, it is likely impossible for us to appreciate the pressures and tensions encountered by a basic research unit in an applications-oriented organization. It would be better to shift focus, of course, than to be viewed as unimportant to the Army's mission. But we think that the current orientation could be maintained, and alignment and value could be demonstrated, through more effective external outreach and communication.

2.   Workload and Collaborative Agreements

As mentioned above, the workload shouldered by the FSRU research team is intense. In our opinion, the workload has been too high for too long. We encourage identifying ways to work smarter because it is unlikely that the team can sustain working any harder. Working more collaboratively, spreading out the BAA cycle, focusing efforts on high-reward opportunities, adopting an entrepreneurial orientation, and finding ways to leverage resources to multiply impact are critical moving forward. To this end, the panel continues to see great advantage in the team's concept of cooperative agreements. The cooperative agreements offer a number of major supplements to the core grants and projects that can greatly enhanced the unit's ability to serve the Army, the external scientific community, and the consumers of applied products of the research. Referred to as "strategic enablers," those outside the formal boundaries of ARI work in cooperative agreements with staff to perform boundary-spanning activities that enhance the ability of the joint research to serve a broader audience by increasing awareness of the work that is being done. These cooperative agreements provide a source of new ideas, research skills, and potential future employees that would not be available from within the standard silos of "external grants" and "internal projects." In addition, the partnership aspect inherent in the cooperative agreements likely means that the FSRU research team can influence the direction of the projects over time to increasingly align with the unit's and the Army's missions. Finally, we understand that cooperative agreements carry additional administrative and logistical burdens and encourage the unit to continue to be selective about the collaborators it chooses. Further, because these types of agreements tend to be relatively rare in research settings, we encourage the unit to develop a set of best practices for establishing and executing cooperative agreements.

3.   Quality vs. Quantity

Related to the issue of workload highlighted above is the issue of transitioning from a focus on conducting and guiding a large number of research projects to a focus on fewer projects with a greater probability of scientific advances. In general, the panel members are concerned that team members are working too hard and too fast; focusing on fewer projects with more intensity would result in better outcomes. One consideration, however, is that fewer projects means fewer opportunities for successful outcomes. A hybrid model might make the most sense. For instance, the unit might consider engaging in, and supporting, a relatively large number of small, short-term projects. After identifying those with the greatest chance of success (however defined), the unit could then invest substantial time and resources into this much smaller pool of research projects.

4. Consider Eliminating Portfolios and Focus Instead on the Strategic Foci

In the Basic Research Program Overview briefing, an organization of the basic scientific foundation (i.e., the strategic foci) of the Basic Research team links to the four research portfolios. The strategic foci on the left of Figure 5 remain consistent in the 2018 review, but the foci are now distributed over four rather than five portfolios. The new configuration was achieved by shifting the work performed in the culture portfolio into other existing portfolios.
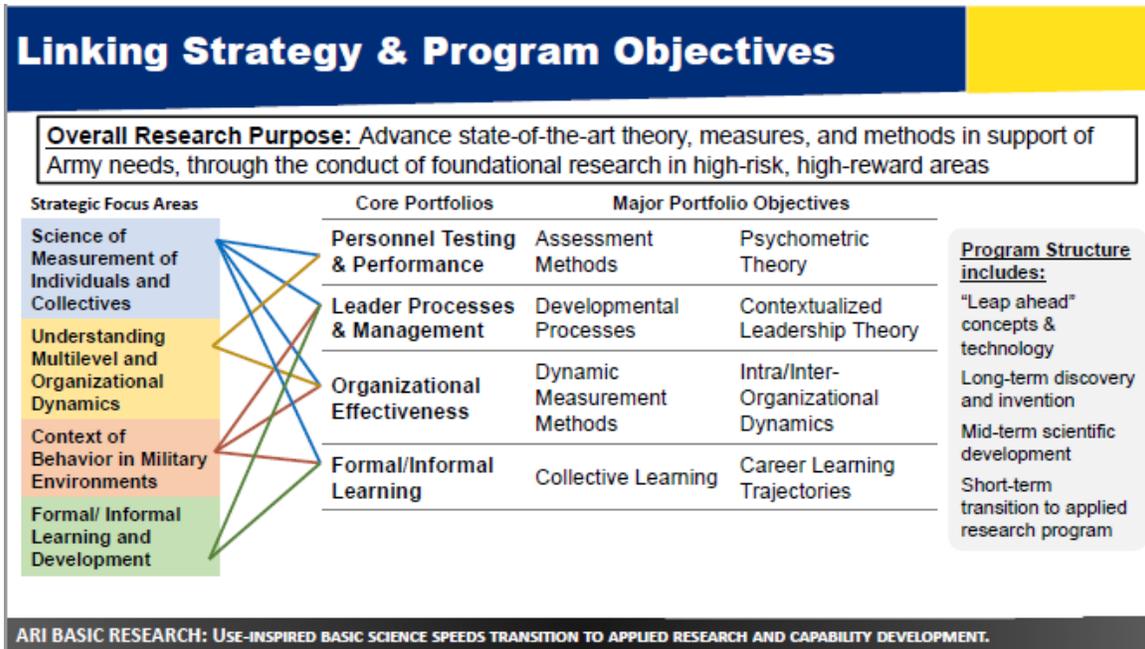

Figure 5. Linking Strategy and Program Objectives

During the presentation there was some discussion of whether grouping research into portfolios is helping or hindering effectiveness. Given the new emphasis on collaborative research efforts and research supervision (i.e., funding external research), the panel members think that increasing the emphasis on the strategic foci and decreasing the emphasis on independent research portfolios would be a positive move. In fact, disbanding the portfolio approach altogether and focusing exclusively on the strategic foci might make it possible to better clarify strategy, develop metrics, and communicate effectiveness to stakeholders and partner units. If such a transition away from portfolios is made, it will be important to detail how work with be organized, distributed, and prioritized within the new approach.

5. Additional Resources

The panel is impressed by what the FSRU team is able to accomplish with the limited resources it has available. The team appears to be fully staffed at this point and ready to

execute the new strategies that have been developed. It is clear that the team needs more resources to fully realize the potential of what is currently in place. This is a critical time to explore ways to obtain additional resources by being creative, entrepreneurial, and collaborative.

C. Looking Forward

The review panel was impressed by the FSRU team's engagement with the new collaborative approach and the shift in multiple strategies oriented toward better executing the unit's mission. This process is still in the early stages of implementation and much work remains ahead, but the panel is confident that this team is capable of executing the new strategies. The FSRU is attracting and sponsoring high-quality foundational science through research projects that contribute to the knowledge base for effective human behavior in the Army and beyond. The recent strategic shifts enacted by the team should enhance the team's ability to pursue foundational research that serves Army mission and needs, attracts and develops good researchers, and continues to interact with the research community in a way that its contributions are recognized and disseminated to a wide audience. The unit has excellent, well-seasoned leadership, and the research team members are skilled and fully engaged in executing the unit's mission. We are confident that the unit is well positioned to continue performing and overseeing basic research that advances the Army's mission while functioning within the fast-paced, complex organizational and interpersonal space in which the Army functions.

We are hopeful that future review panels will have a clear set of metrics in place that can be tracked over time to better demonstrate the success of the unit's efforts. We are also hopeful that the connections among the various research efforts, the unit's strategic foci, and the Army's talent needs will be clear, compelling, and easily communicated. We fully expect that future review panels will see that the changes being enacted now will positively contribute to increasing the unit's contributions to the Army's mission and increasing the quality of connections among the various units within the Army serving research and application-development needs.

Appendix A.
Criteria Consideration for Review

Scientific Quality

- Innovation: Within the context of the research domain, are the research questions novel or leading the field? Does the portfolio have a balance between high risk and potential for high payoff relative to the state of the field? To what extent is the research in the portfolio incremental in nature?

- Multidisciplinarity and Breadth: Does the research portfolio incorporate concepts and methods from multiple disciplines? Are the results likely to effect scientific progress in multiple disciplines?

- Scientific Contributions: Do the accomplishments and results of the portfolio research projects represent significant scientific advances in the relevant fields? Have the portfolio research projects produced multiple, high-quality journal articles, conference presentations, book chapters, and other forms of publication?

- Scientific Opportunity: Is there appropriate balance between research to overcome current problems and barriers and research to exploit scientific opportunities that might lead to fundamentally new or greatly improved capabilities? Is there some reasonable basis (e.g., anticipated breakthroughs, new understanding, novel theory, etc.) to believe that the objectives might be met? Are important scientific problems being addressed?

Impact

- Military Relevance: Are there potential long-term Army applications identified for the research in the portfolio/program? Is there evidence of interest from military users?

- Scientific Influence: Is interest in this topic growing or likely to grow as a result of this research? Is there indication that Army interest and funding are helping to grow the number or quality of researchers focused in this area of research? Do the portfolio research projects support one or more theses, dissertations, or post-doctoral projects?

Program Evaluation

- Coherence: Are the research portfolios complementary, collaborative, coordinated, and integrated with each other within the basic research program and, where appropriate, with other ARI, Army, or DoD programs? Are there critical Army-relevant gaps in the research program that are not addressed by the existing portfolios?

- Transitions: Are there appropriate examples of significant transitions, or anticipated transitions of research, to follow-on applied research or exploratory development either within industry or within an Army or DoD laboratory? Are appropriate strategies for transition being planned and employed in the basic research program as a whole?

Summary Comments and Recommendations

What are the particular strengths in the program and what were the weaknesses, if any? If there are notable weaknesses, what would be some suggestions for improvements in these areas? Specifically, are there any high-priority missed opportunities/areas that require new or additional funding? If so, what lower priority area(s) should be reduced or eliminated to accommodate the new area? Also, are there any efforts that are insufficient for any reason (e.g., marginal scientific quality, marginal innovation, redundancy, marginal Army relevance, etc.) that should be phased out? Should we consider reframing or restructuring the existing portfolios, and are there additional cross-cutting themes that should be considered?

Appendix B.
Agenda

Wednesday, October 7

All times EST

1230 – 1300	Welcome	Drs. Gregory Ruark & Alexander Wind
1300 – 1330	ARI Overview	Dr. Michelle Zbylut
1330 – 1400	Research Strategy Overview	Dr. Gregory Ruark
1400 – 1415	Break	
1415 – 1545	Basic Research Program Overview	Dr. Alex Wind
1545 – 1615	Closing and Discussion	
Panel decides	Panel Members Closed Meeting	Panel Members

Thursday, October 8

All times EST

0900 – 0915	Welcome and Day 1 Recap	Dr. Alex Wind
	Leader Processes and Measurement Portfolio	
0915 – 0940	Overview	Dr. Alex Wind
0940 – 1015	Intramural Research Projects	
1015 – 1040	"Switching Gears: Training Team Leaders and Members to Adapt Leadership Behaviors"	Dr. Geradus (Sjir) Uitdewilligen Maastricht University
1040 – 1050	Break	
	Learning in Formal and Informal Environments Portfolio	
1050 – 1115	Overview	Dr. Garett Howardson
1115 – 1140	Intramural Research Projects	
1140 – 1205	"Variability in Repeated Adaptive Performance (VARI): Examining Personality Predictors"	Dr. Mindy Shoss The University of Central Florida
1205 – 1235	Closing and Discussion	
12:35 - 1300	Panel Members Closed Meeting – Daily Synthesis	Panel Members

Friday, October 9

All times EST

0900 – 0915	Welcome and Day 2 Recap	Dr. Alex Wind
	Personnel Portfolio	Dr. Garett Howardson
0915 – 0940	Overview	
0940 – 1015	Intramural Research Projects	
1015 – 1040	"Collaborative Problem Solving (CPS) Skill: Estimating an Individual's Contribution to Small Group Performance"	Dr. Patrick Kyllonen Educational Testing Service
1040 – 1050	Break	
	Organizational Effectiveness Portfolio	Dr. Christopher Goode
1050 – 1115	Overview	
1115 – 1140	Intramural Research Projects	
1140 – 1205	"Building Better Teams: A Network Analysis Approach"	Dr. Alexander Volfovsky Duke University
1205 – 1235	Closing and Discussion	
1245-1345	Panel Members Closed Meeting – Summary/Synthesis	Panel Members

Appendix C.
List of Attendees

This listing is of attendees for all or part of the 3-day review meeting

    Richard DeShon, (Michigan State)

    Margaret Beier, (Rice)

    Teresa (Terri) Anne Scandura (Miami)

    Michael Miller (UCSB)

    Scott Morris, (IIT)

    Greg Ruark (ARI)

    Alexander Wind (ARI)

    Michelle Zbylut (ARI)

    Garett Howardson (ARI)

    Ghris Goode (ARI)

    Kathy Vu (ARI)

    Rachel Ames (ARI)

    Jim Belanich (IDA)

    Christian Dobbins (IDA)

    Sujeeta Bhatt (IDA)

    Caroline Mahoney, (Natick Soldier Research Center)

    Tad Brunye, Army – (Natick Soldier Research Center)

    Peter Khooshabehadeh, (Army Research Lab)

    Fred Gregory, (Army Research Lab)

    Lisa Troyer (Army Research Office)

    Ed Palazzolo (Army Research Office)

    Geradus (Sjir) Uitdewilligen, Maastrich U (GU)

    Mindy Shoss, UCF (MS)

    Shiyan Su, USF (SS)

    Mary Waller, York U/TCU (MW)

    Ramon Rico, U Western Australia (RR)

Kira Foley, GWU (KF)

Dustin Jundt, St. Louis U (DJ)

Patrick Kyllonen, ETS (PK)

Dessi Kirova, ETS (DK)

Hao Jiangang, ETS (HJ)

Alexander Volfovsky, Duke (AV)

Appendix D.
External Review Panel Members

Dr. Richard P. DeShon (Chair)
Professor
Department of Psychology
Michigan State University

Dr. Margaret Beier
Professor
Department of Psychology
Rice University

Dr. Scott Morris
Professor
Department of Psychology
Illinois Institute of Technology

Dr. Terri Scandura
Professor
School of Management
University of Miami

Dr. Michael Miller
Professor
Psychology and Brain Sciences
University of California – Santa Barbara

Dr. James Belanich
Research Staff Member
Science and Technology Division
Institute for Defense Analyses

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