# Architecting the Future U.S. Military Psychological Health Enterprise via Policy and Procedure Analysis

Wiljeana J. Glover, PhD*†; Jayaprasad Plmanabhan, MS†;
Donna Rhodes, PhD†; Deborah Nightingale, PhD†

**ABSTRACT** Although researchers suggest that a systems approach is required to make meaningful advances in the U.S. psychological health care system for service members, limited research has considered such an approach. This research uses an enterprise architecting framework to identify the system's strengths and areas for opportunity as they relate to the Ecosystem, Stakeholders, Strategy, Process, Organization, Knowledge, Information, and Infrastructure. Codifying qualitative data from publicly available U.S. Defense Health Agency and U.S. Service Branch doctrine, policy guidance, and concepts of operations, our findings indicate that the psychological health care system is strongly process-oriented and mentions a variety of key stakeholders and their roles and responsibilities in the enterprise. Potential opportunities of improvement for the system include a stronger emphasis on the development and transfer of knowledge capabilities, and a stronger information-based infrastructure.

## INTRODUCTION

The U.S. Defense Health Agency (DHA) faces an increasing demand for psychological health care among its population.[1–3] To address increase, the Department of Defence (DoD) Task Force on Mental Health stated that a full continuum of psychological health care was needed and should be achieved using a systematic approach.[4] Taking a systems approach to the U.S. military psychological health enterprise (MPHE) is ideal because of the multilevel structure of the DHA and individual U.S. Service Branches and the comorbidities associated with psychological health.

The present study uses enterprise architecting (EA) to compare the current MPHE to an ideal service member/family-centered health enterprise design. EA is a systems approach to design, evaluate, and select a preferred future state enterprise structure to realize its value proposition and desired behaviors.[5] Using Nightingale and Rhodes' architecting approach to assess the enterprise, we reduce the complexity of the enterprise to its dominant elements for understandability and comparison to the ideal state. We examine the MPHE through 10 EA elements, including the ecosystem, stakeholders, process, and information, in order to derive a holistic view of MPHE and how it can be improved to become more service member/family-centric.

In addition to illustrating the applicability of EA to describe and identify improvements for the MPHE, we contribute to the study of enterprises and EA. First, previous EA studies have primarily used interview data to describe the current state

of a targeted enterprise.[6] Although this approach yields rich enterprise descriptions,[5] it is largely dependent on the availability and perceptions of the interviewed experts. Thus, this study uses qualitative data from secondary sources (policy, concept of operations and military health guidance documentation) and quantitative data analysis techniques[7] to gain insights about the current state of the MPHE. Second, researchers recommend describing how the relationships at one level of an enterprise may be applicable to other levels.[8] In this research, we apply EA to a multilevel enterprise by examining how the macrolevel of the MPHE (controlled by the DHA) relates to the mesolevel of the MPHE (controlled by the individual U.S. Military Service Branches). The following sections provide background information on EA, contextual information about the MPHE, our analysis methods, findings, and discussion of practical implications and future research.

## BACKGROUND

An enterprise is a "goal-directed organization of resources—human, information, financial, and physical—and activities, usually of significant operational scope, complication, risk, and duration. Enterprises can range from corporations, to supply chains, to markets, to governments, to economies."[9] Enterprise studies have been traditionally conducted through a single view of the enterprise, for example, studying the organizational structure or the information technology architecture. More recent enterprise analyses have considered multidisciplinary views. In particular, the EA approach developed by Nightingale and Rhodes[5] notes that greater perspective of an enterprise can be gained by using "view elements" to assess the enterprise, as illustrated in Figure 1. The view elements are as follows:

(1) Strategy: The vision, strategic goals, business model, and enterprise level metrics.
(2) Process: Core, leadership, lifecycle, and enabling processes by which the enterprise creates value for its stakeholders.

*Technology, Operations, and Information Management Division, Babson College, Babson 320, Babson Park, MA 02457.

†Sociotechnical Systems Research Center, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Building E38-642, Cambridge, MA 02139.
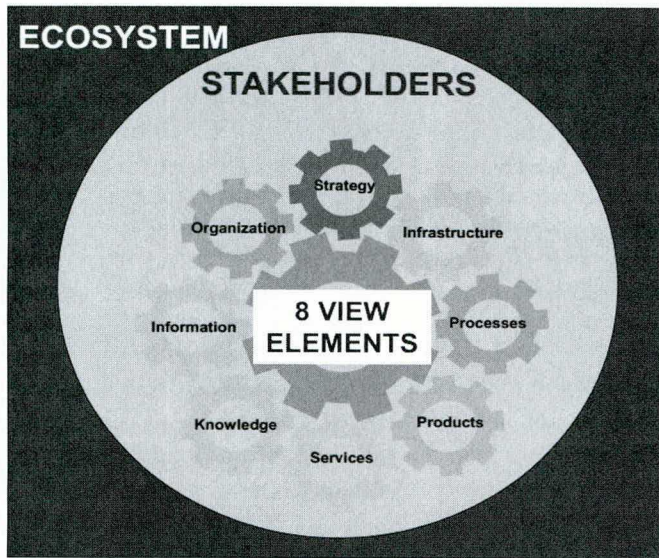
**FIGURE 1.** Enterprise elements.[6]

(3) Organization: The culture, organizational structure, and the underlying social network of the enterprise.

(4) Knowledge: The competencies, explicit and tacit knowledge, and intellectual property resident in the enterprise.

(5) Information: The available information required by the enterprise to perform its mission and operate effectively.

(6) Infrastructure: Systems and information technology, communications technology, and physical facilities that enable enterprise performance.

(7) Product: The products that the enterprise acquires, markets, develops, manufactures, and/or distributes to stakeholders.

(8) Services: The offerings derived from enterprise knowledge, skills, and competences that deliver value to stakeholders, including support of products.

In addition to the eight view elements, this framework includes the ecosystem in which the enterprise exists, and the stakeholders that are involved with the enterprise. The ecosystem is exogenous to the enterprise, and stakeholders are individuals and groups who contribute to or benefit from the enterprise.[5]

Although there are several approaches to EA, we use the Nightingale and Rhodes framework for this study. Previous research has illustrated the comprehensiveness of this framework compared to others.[10] Some of the most popular EA approaches include The Open Group Architecture Framework[11] and DoD Architecture Framework.[12] These approaches have an information technology focus and do not explicitly consider other critical components of an enterprise such as the enterprise's strategy, processes, or services. As Table I summarizes, the Nightingale and Rhodes framework view elements are inclusionary of the elements captured in several classic frameworks, including Van de Ven's[13] framework for organizational assessment and Tushman and Nadler's[15] classic information processing organizational design.

The Nightingale and Rhodes framework considers both social and technical system factors to reduce the complexity of the enterprise to these view elements, thus making our understanding of the current state and planning for the future state more feasible.[5] For example, changes to health care systems tend to result in unintended consequences because of the interplay between the change and the existing social and technical systems, including work processes, organizational culture and social interactions, and information technologies.[21] The Nightingale and Rhodes framework considers all of these elements, making it a particularly useful approach for assessing the current state of the MPHE before additional changes being made.

## RESEARCH METHODS

Figure 2 provides a summary of the methods used in this study. First, we conducted a systematic review of secondary sources from the macrolevel (i.e., DHA) and the mesolevel (i.e., Army, Air Force, and Navy/Marine Corps) to assess the current state of the MPHE.[22] These sources included policy, concept of operations, and military health guidance documentation. For this analysis, Navy and Marine Corps secondary sources were examined together because the Navy provides medical care to both Navy and Marine Corps personnel. Next, we completed coding analysis on the identified secondary sources using the view elements as our key coding themes. Finally, we developed display matrices to

**TABLE I.** Comparing Views to Classic Organizational Frameworks[10]

| | EA Views | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Organization Assessment Framework[13] | X | X | X | X | X | X | | |
| Multilevel Congruence Theory of Organization[14] | | X | X | | | | | |
| Information Processing Organization Design[15] | | X | X | X | X | X | | |
| Congruence Framework for Organization Analysis[16] | X | X | X | X | | | | |
| 7-S Framework[17] | X | X | X | | | | | |
| Congruence Perspective of Organizational Design[18] | X | X | X | | | | | |
| Organization Information Requirements[19] | | X | X | X | X | X | | |
| Generalized Process Model of Organizations[20] | X | X | X | | | | | |

(1) Strategy; (2) Process; (3) Organization; (4) Knowledge; (5) Information; (6) Infrastructure; (7) Product; (8) Services.

Step 1: Secondary Data Identification (32 docs)

Step 2. Code Data and Validate Coding with Experts

Step 3. Analyze Findings and Identify Areas for Future State Improvement
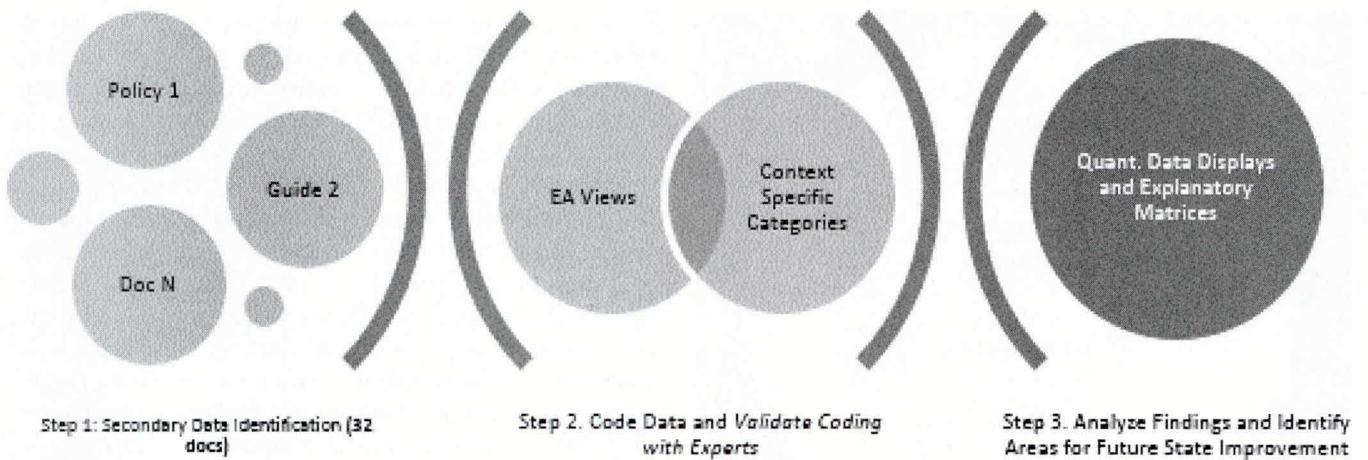
**FIGURE 2.**  Summary of research methods.

illustrate the similarities and differences across view elements and levels of the MPHE. The following sections describe these methods in more detail.

### Step 1: Document Identification

Table II summarizes detailed, formal protocol used to identify the documents to review and a set of a priori criteria to assess the quality of the set of selected documents.[22]

Out of this search, 60 relevant documents were identified, which were then analyzed using the exclusion criteria. From the exclusion criteria, the 60 documents were reduced to a final collection of 32 documents that was closely associated with the topic of interest, psychological health. Table III summarizes the final list of 32 documents.

### Step 2: Qualitative Coding

Using qualitative coding, response segments from the 32 documents were coded in order to assist in making replicable and valid inferences from the data. To code the response segments, we used an abductive qualitative coding approach. A combination of deduction and induction,[23] abductive coding allowed us to code starting with a deductive list of the view elements as our primary themes, Ecosystem, Stakeholder, Strategy, Process, Organization, Knowledge, Information and Infrastructure.[5] For each view element, there are components[5] that were labeled as the subthemes, and within each subtheme, there were examples that formed the individual codes. These individual codes were allowed to emerge inductively. Table IV shows the hierarchy of the coding system.

One of the authors served as the primary coder and iteratively coded the data, whereas two of the authors served as informal auditors of the coding process, making suggestions to refine the coding throughout the process. MaxQDA was used to manage the coding process. Approximately 10 coding iterations between the primary coder and informal auditors were used to yield the final results presented here.

**TABLE II.**  Systematic Documentation Review Protocol

| | |
|---|---|
| Search Strategy | Search the identified databases by specific keywords |
| Exclusion Criteria | A Eocument Will be Excluded From the Systematic Review of MPHE Documents If the Majority of the Document Does Not Address Psychological Health Remove Any Duplicates |
| Keywords | (1) Mental |
| | (2) Behavioral |
| | (3) Psychological |
| | (4) PTSD |
| | (5) TBI |
| | (6) Care Delivery |
| | (7) Retention |
| | (8) Resources |
| | (9) Staffing |
| | (10) Depression |
| | (11) Anxiety |
| | (12) Deployment |
| | (13) Mental Health Provider |
| | (14) Mental Health Professional |
| Databases | (1) The Health Affairs Policies & Guidelines Portal Which is a Repository Maintained on the Military Health System's Site That Allows Users to Search for Policies and Guidelines Ranging Back to 1992, |
| | (2) The Navy Medicine (BUMED), ARMY Medicine, and Air Force Medical Portals |

**TABLE III.**  Final List of Documents Identified for Analysis

| Organization Level | Title | Description |
|---|---|---|
| Macro | Army_Medicine_2020_Strategy | Strategic Enabling Objectives |
| Macro | 2012_MHS_Stakeholders_Report-120207 | This strategy is a call to action that contains the vision, strategic imperatives and way ahead for Army Medicine |
| Macro | DHIMS_BHModule | The Behavioral Health Module team took a step forward on March 14, launching system qualification testing to allow members of the Army, Air Force, Navy, and Defense Centers of Excellence for Psychological Health to evaluate the Web-based tool before its deployment to the behavioral health community |
| Macro | Medical Situational Awareness in the Theater | MSAT provides a common operating picture and decision support capability for assisting staff in assessing risks, mitigating operational vulnerabilities and allocating scarce combat resources during the planning and conducting of operations |
| Macro | IMIT_Strategic_Plan_2010-2015_Brochure_Final_January_2010 | Developing and executing a successful strategy requires initiatives that will close the gap between our current state and our future state vision. During our strategic planning workshops, functional and technical leaders of the IM/IT community drafted 13 unique action plans, with an executive owner and action plan owner being assigned to each plan. In order to develop a realistic focus for these plans, action plan teams developed an initial set of deliverables, milestones and strategies for each of the 13 plans, acknowledging the assumption that additional initiatives would be identified as we further mature our objectives under each goal |
| Macro | DoD VA PTSD Summary | This 2010 VA/DoD Post-Traumatic Stress Guideline Update builds on the VA/DoD Clinical Practice Guideline for the Management of Post-Traumatic Stress published in 2004. The goal of this update is to integrate the results of recent research and update the recommendations of the original guideline to reflect the current knowledge of effective treatment interventions |
| Macro | 97-017 (Policy for Post-Deployment Mental Health Screening in the Bosnian Theater) | Modification regarding the psychological screening procedure |
| Macro | 97-046 (Clarification of Mental Health Utilization Review Policies) | This memorandum provides clarification for two areas where policy interpretation has been inconsistent |
| Macro | 98-046 (Policy for Transition to the SAIC Mental Health Utilization Review Criteria) | This memorandum establishes Office of the Assistant Secretary of Defense (Health Affairs) (OASD(HA)) policy for the Military Health System (MHS) regarding the new SAIC utilization review (UR) criteria as the sole mental health UR tool for both direct care providers as well as managed care support contractors in all future contracts |
| Macro | 01-016 (Psychological Autopsies) | The purpose of psychological autopsies is to assist in asserting the manner of death |
| Macro | 03-009 (Policy for Individual Medical Readiness) | The Departments overall readiness to accomplish any mission is greatest when each service member is fully medically ready |
| Macro | 03-010 (MHS Measures for Success) | The MHS senior leadership recently completed a set of performance measures aligned with their strategic objectives |
| Macro | Guideline_11_07_2006 (Policy Guidance for Deployment Limiting Psychiatric Conditions and Medications) | Provides guidance on deployment and continued service for military service personnel |
| Macro | 05-011 (Post Deployment Health Reassessment) | Research has indicated that health concerns regarding mental health are identified several months following return from deployment |
| Macro | Guideline_10-29-2007 (Clinical Guidance for Mild TBI) | Mild TBI is a serious health concern for all service members. To mitigate the concerns of mTBI, the best clinical practices must be used |
| Macro | 07-022 (Tricare Prime Access Standards) | Recommendations by the DoD task force on improvements to access to mental health care |
| Macro | 07-030 (TBI Definitions and Reporting) | To ensure accurate identification of TBI, proper identification and documentation of TBI needs to be in place |
| Macro | Guideline_5-28-2008 (Baseline Pre Deployment Neurocognitive Functional Assessment) | Guidance on how to reassess the neurocognitive state of a service member before returning to active duty |
| Macro | 08-003 (Policies for Conducting Surveys and Studies in the MHS) | Instructions on steps to be taken when conducting surveys at any MHS facility |

*(continued)*

**TABLE III.** Continued

| Organization Level | Title | Description |
|---|---|---|
| Macro | Guideline_3_9_2009 (Diplomat Pay for Psychologists and Board Certification Pay for Non-Physician Health Care Providers) | This memorandum promulgates policy guidance for the implementation of Non-Physician Health Care Provider Board Certified Pay (NPBCP) for Army, Navy, and Air Force officers designated as Psychologists and Non-Physician Health Care Providers |
| Macro | 10-005 (Mental Health Assessments for Members of the Armed Forces Deployed in Connection with a Contingency Operation) | Guidance for complying with the legislation on mental health assessment |
| Macro | 12-003 (Guidance for Providers Prescribing Atypical Antipsychotic Medication) | Guidance for Providers Prescribing Atypical Antipsychotic Medication |
| Macro | 12-006 (DoD Instructions for Directors of Psychological Health) | Establishes policy, assigns responsibilities, and prescribes procedures to ensure visible leadership and advocacy for the psychological health and mental health disease and injury |
| Meso\Army | ARMY 2010 OPORD 10-7028CBHSOC-CP29 CORRECTED (USAMEDCOM Comprehensive Behavioral Health System Of Care Campaign) | Description of USAMEDCOM Behavioral Health System Of Care Campaign |
| Meso\Air Force | AFI44-172 (Guidance Memorandum to Air Force Instruction (AFI) 44-172, Mental Health) | This is an Air Force Guidance Memorandum immediately changing AFI 44-172, Mental Health |
| Meso\Navy | BMI 6320.97 (BUMED INSTRUCTION 6320.97) | To establish consistent quality care standards for staffing and management of Navy intensive care units (lCUs) throughout the enterprise |
| Meso\Navy | BMI 6320.80 (BUMED INSTRUCTION 6320.80) | To set forth guidance concerning organization, staffing, professional qualifications of personnel assigned, and triage procedures mandated for the safe and efficient operation of emergency medical systems (EMS) |
| Meso\Navy | BMI 6320.70 (BUMED INSTRUCTION 6320.70) | To establish guidance for involvement in the Family Advocacy Program for naval medical treatment facilities (MTF) and dental treatment facilities (DTF) |
| Meso\Navy | SECNAV 6320_24a (SECNAV INSTRUCTION 6320.24A) | To issue Department of Navy (DON) policy, assign responsibility, and prescribe procedures per reference (a) for the referral, evaluation, treatment, and administrative management of service members who are directed by their commands for mental health evaluation and/or assessment of risk for potentially dangerous behavior |
| Meso\Navy | NAVMED POLICY 07-021 (Policy Guidance For TBI Reporting and Definition) | Policy Guidance For TBI Reporting and Definition |
| Meso\Navy | BUMED 6300_19 (PRIMARY CARE SERVICES IN NAVY MEDICINE) | To implement a new model of patient and family-centered health care delivery for primary care that is team-based, comprehensive, and designed to fully meet the complete primary care health and wellness needs of our patients |
| Meso\Navy | Navy Medicine Charted Course_FINALversion | Mission, priorities, vision, and strategic objectives of BUMED |

### Step 3: Quantitative Synthesis of Qualitative Codes

After coding, we determined frequency count for each code within each view element. Table V summarizes the top codes for each view element. Because of space constraints, we focus our discussion of results on the view elements that generated the greatest and fewest code occurrences for the macrolevel and mesolevel of analysis. Findings based on the most frequent codes found in the current state analysis are used to develop recommendations for future state EA of the MPHE.

## RESULTS AND DISCUSSION

### Macrolevel Analysis

At the macrolevel (Fig. 3), Stakeholder is the best represented view element (with 112 occurrences), followed closely by Process (with 108 occurrences). Organization and

Strategy are the next two elements that have significant occurrences (51 and 45, respectively). The remaining elements are represented the least, with Ecosystem and Infrastructure having three occurrences each.

### Stakeholders

For Stakeholders, the top five codes were Assistant Secretary of the Air Force, Navy, Army, and Reserve Affairs (52 occurrences), Surgeon General of the Air Force, Navy, and Army (9 occurrences), Secretary of the Air Force, Navy, and Army (8 occurrences), and Primary care providers (8 occurrences). The Assistant Secretary of the Air Force, Navy, Army, and Reserve Affairs role is the most frequently mentioned stakeholder role, in part, because the majority of the macrolevel documents were memoranda addressed to this role from the Assistant Secretary of Defense for Health

**TABLE IV.** Coding System Hierarchy[2]

| Coding Stages | Outputs From Coding Stages | | | | |
|---|---|---|---|---|---|
| (1) Deductively Identify Which EA View Element is Best Represented by the Code | Ecosystem, Stakeholder, Strategy, Organization, Process, Knowledge, Information, Infrastructure, Products, or Services | | | | |
| (2) Deductively Identify Which Category Within the EA View Element is Best Represented by the Code | Structure | Behavior | Artifacts | Measures | Periodicity |
| (3) Inductively code the individual code segment. Examples for the EA View Element, *Process:* | Integrated vs. Departmental (Silo) Process Design | Degree of Standardization of Processes; Level of Adherence to Processes; Process Description Forms (Graphical, Text-Based) | Libraries Including Process Documents; Process and Value Stream Maps | Process Compliance Measures; Process Maturity Measures | Frequency of Process Audits; Cycles for process improvement |

Affairs. This suggests that the Secretary of Defense for Health Affairs and the Assistant Secretaries for each branch of the U.S. Armed Services must communicate in order to enact health-related policies, perhaps even more than the communications needed between the Assistant Secretary of Defense for Health Affairs and Surgeons General. The frequency with which the Assistant Secretary of the Air Force, Navy, Army, and Reserve Affairs are cited in the documentation also suggests their importance in forming and enforcing future policies and decisions for the MPHE. These observations led us to the following proposition to inform future state architecting for the MPHE:

*Future State Architecting Recommendation 1*

Given the current state documentation, the Assistant Secretary of the Air Force, Navy, Army, and Reserve Affairs are key stakeholders of the MPHE. Therefore, any future state architecting decisions should involve these roles early in the architecting process.

Surgeon General of the Air Force, Navy, and Army, primary care physicians and mental health providers are also mentioned at the macrolevel, although less frequently (8, 8 and 1 occurrences, respectively). For example, the Surgeon General of the Air Force, Navy, and Army were carbon copied on some memoranda,[24] but not all.[25] This suggests that DHA at the macrolevel aims to guide or instruct health providers from the operational or tactical side of the MPHE hierarchy as opposed to communicating directly to the mesolevel's medical professionals. In such an operationally driven organization like the DoD, this finding is not surprising and may be ideal in future state documentation as well. However, leadership should consider the potential misalignment of having such distance between key policies and its medical community; such distance may conflict with the service member–centric, readiness aims of the MPHE.[26] In other words, it may be difficult for this functionally siloed enterprise to truly achieve the service member-centeredness it desires as functionally siloed organizations can inhibit communication.[27] Thus, our recommendation aims to mitigate the current divide in targeting policy to operationally focused as opposed to also targeting policy to medically focused personnel.

*Future State Architecting Recommendation 2*

Given the current state documentation, the MPHE should include both medical and line stakeholders in future documentation, explaining their shared relationship and responsibility for the mental health of service members, to reinforce the service member–centric, readiness aims of the MPHE.

## Process

For process, the top codes were very specific to both preventative and acute mental health care processes. They included processes detailing what should be done when a service

**TABLE V.** Top codes for Each View Element at the Macro- and Mesolevels

| | Macro | Meso-Navy/Marine Corps | Meso-Army | Meso-Air Force |
|---|---|---|---|---|
| Ecosystem | Measures (2), Integrated (1) | n/a | Standardized (3) | Standardized (2) |
| Stakeholders | Asst. Secretary of the Air Force, Navy, Army, and Reserve Affairs (52) Surgeon General of the Air Force, Navy, and Army (9) Secretary of the Air Force, Navy, and Army (8) Primary Care Providers (8) | Military Treatment Facility (MTF) Commander (18) Deputy Chief, BUMED, Medical Operations (14) Mental Health Technician (13) Mental health Care Provider (8) Regional Commander (7) | Military Treatment Facility (MTF) Commander (18) Asst. Chief of Staff, Operations (14) Mental Health Technician (13) Asst. Chief of Staff, Information Management (7) Regional Medial Commander (7) Regional Commander (7) | Military Treatment Facility (MTF) Commander and/or Reserve Medical Commander (26) Mental Health Flight Commander or Equivalent-Commissioned or Noncommissioned Officer (19) Mental Health Technician (13) Installation Commander (6) MAJCOM/Direct Reporting Unit (SRU) SG or Equivalent (5) |
| Strategy | Goal (20), Periodicity (5), Core value list (4), Strategic Plan (4), Promotes shared vision (4), Performance Measures (4) | Goal (24), Periodicity (5), Strategic Plan (4) Promotes Shared Vision (4), Core Value List (4) Performance Measures (4), | Goal (14), Collaboration (2) | Goal (1), Promotes Shared Vision (1), Performance Measures (1) |
| Organization | Treatment (7), Psychological (e.g., Depression, PTSD) (7), Physical (4), Mild (4), Collaborative (3), Meeting Frequency (3), Resilience (3) | Multidisciplinary (2) Prevention v. resilience vs. Treatment (2) | RESPECT-Mil (4), Open to Discussions (2), Embedded Behavioral Health (2) | Document (2), Collaborative (2) |
| | Macro-MHS | Meso-Navy/Marines | Meso-Army | Meso-Air Force |
| Process | Unstable, Dangerous to Self or Others, or Need for Urgent Medic (7) Assess Medical and Functional Status (5) Ensure Basic Physical Needs Are Met (5) Monitor and Follow-Up (5) Assess Pre-Existing Psychiatric and Medical Conditions (4) | Commander-Directed Evaluations (CDE) Procedures (10) High Interest Patient Procedures (9) Oversight Procedures (8) Access to Care Guidelines (7) Management of Patients in Crisis (During Duty and After-Duty Hours) (6) | Transferring Mental Health Records and Coordination of Care at the Time of Permanent Change of Station (9) Deployment Mental Health Assessment (8) USAMEDCOM-Sustain-Develop-Capture Procedures (8) Oversight Procedures (8) Access to Care Guidelines (7) | Commander-Directed Evaluations (CDE) Procedures (10) High Interest Patient Procedures (9) Transferring Mental Health Records and Coordination of Care at the Time of Permanent Change of Station (9) Deployment Mental Health Assessment (8) Access to Care Guidelines (7) |
| Knowledge | Assets (6), Implicit (4), Knowledge (2), Internal (2), Understanding (2) | Assets (2) | Communities of Practice (1), Assets (1) | Assets (3) |
| Information | Assets (3), Information flow diagram (2), Logical Data Model (2), Standardization (2), Design (2) | Standardization (3), Design (2) | Seamlessness of Information Flow (1), Information Flow Diagram (1) | Standardization (1), Information Flow Diagram (1), Logical Data Model (1) |
| Infrastructure | IT architecture (2), Interoperability (2), Information Technology Assets (2), Physical Facilities (2) | IT Architecture (2), Communications Architecture (1), Physical Facilities (1) | Physical Facilities (1) | Physical Facilities (1) |

## Macro Level

Information 4%

Infrastructure 1%  Ecosystem 1%

Knowledge 5%

Process 30%

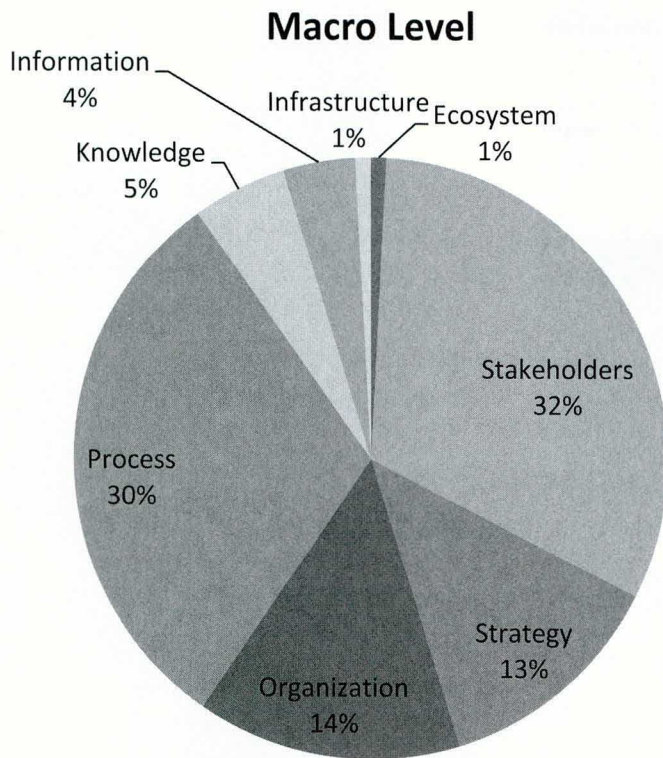Stakeholders 32%

Strategy 13%

Organization 14%

**FIGURE 3.** Macrolevel EA analysis.

member appears unstable, dangerous to self or others, or need for urgent medical care and processes to assess pre-existing psychiatric and medical conditions. Most processes were observed in the DoD/VA Clinical Practice Guidelines for post-traumatic stress disorder (PTSD).[28] There were also some supporting processes observed, for example, the new processes defining how the new Directors of Psychological Health for each U.S. Service Branch should meet.[29] Thus, it appears that for processes, there are some macrolevel documents that guide both mental health care at the patient-provider level as well as high-level supporting processes. The inclusion of both task-specific and supporting processes has been found to be a best practice in EA and transforma-tion. For example, Nightingale and Rhodes[30] emphasize that lifecycle and supporting or enabling processes are necessary for an enterprise to create value for its stakeholders. This observation leads us to the following recommendation:

*Future State Architecting Recommendation 3*

Given the current state documentation, the MPHS should provide macrolevel policies that are very specific to both preventative and acute mental health care processes and pro-vide guidance for supporting processes.

### Ecosystem and Infrastructure

The EA view elements with the fewest codes were Ecosystem and Infrastructure. For Ecosystem, there were two codes. The first, measures, indicates that there were two occurrences

where specific metrics and analytics associated with the eco-system were mentioned, both found in the DoD/VA Clinical Practice Guidelines for PTSD.[28] The second macrolevel ecosystem code, integrated, was also found in the DoD/VA Clinical Practice Guidelines for PTSD[28] and indicated the "need to maintain a coordinated continuum of care for chronic co-morbidities" via a coordinated enterprise. The Infrastruc-ture view element referred to some common IT architectural elements and interoperability that was enforced by the shared medical record system, Armed Forces Health Longitudinal Technology Application.

The infrequent consideration of the Ecosystem and Infra-structure view elements suggests that the policies and docu-mentation of the MPHE may not consider these views holistically. Harrison et al[21] find that health care enterprises often encounter unintended consequences from sociotechnical interactions, including workflows, culture, social interactions, and information technologies. For example, given the increas-ing role that Infrastructure may play in facilitating the Post-deployment Health Assessment processes,[31] considering the potential unintended consequences, such as privacy concerns, could prove to be beneficial long-term. Thus, we suggest the following:

*Future State Architecting Recommendation 4*

In architecting its future state, DHA should consider its eco-system and IT systems more explicitly in MPHE policies to ensure that both the overall system is considered and that IT is supporting future psychological health initiatives where possible.

### Mesolevel Analysis

Figure 4 illustrates the percentage of each view element that was discussed within the mesolevel documents collected for each U.S. Military Service Branch. Processes is the best represented or strongest mesolevel EA view element (with 244 occurrences), followed closely by Stakeholders (with 240 occurrences). Organization and Strategy are the next two elements that have significant occurrences (51 and 45, respectively). Knowledge, Ecosystem, and Infrastructure were represented the least, with 11, 7, and 6 occurrences, respectively.

### Process

Overall, the processes documented for each service were focused on patient-related processes, including when to con-duct line commander-directed evaluations, access to care guidelines, and guidelines for pre- and postdeployment men-tal health assessments. For example, commander-directed evaluations are assessments completed by medical or line commanders for a variety of concerns including fitness for duty, safety concerns, or significant changes in performance or mental state.[32] Overall, there were some similarities in the types of processes described by each service. For example, the three branches all had some form of access to care
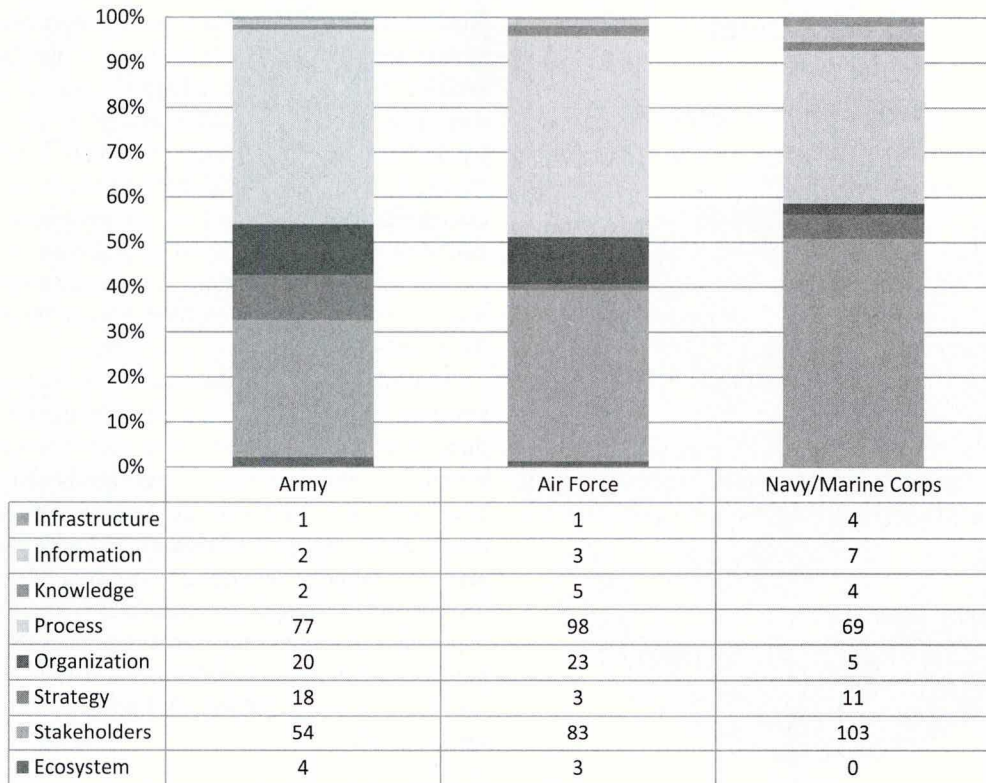
| | Army | Air Force | Navy/Marine Corps |
|---|---|---|---|
| ▪ Infrastructure | 1 | 1 | 4 |
| ▪ Information | 2 | 3 | 7 |
| ▪ Knowledge | 2 | 5 | 4 |
| ▪ Process | 77 | 98 | 69 |
| ▪ Organization | 20 | 23 | 5 |
| ▪ Strategy | 18 | 3 | 11 |
| ▪ Stakeholders | 54 | 83 | 103 |
| ▪ Ecosystem | 4 | 3 | 0 |

**FIGURE 4.**   Mesolevel EA analysis (bars ordered from top—infrastructure, to bottom—ecosystem).

guidelines. The Air Force processes, particularly as outlined in Air Force Instruction[33] appeared to be more detailed than the Navy/Marine Corps and Army documentation. This could be in part because the Air Force is smaller and can provide more specific instruction because of having a smaller group of service members and providers. Compared to the macroevel, fewer processes were related to supporting processes such as oversight procedures at the mesolevel. Again, because including task-specific and supporting processes are ideal when architecting an enterprise[5] we suggest the following recommendation:

*Future State Architecting Recommendation 5*

Given the current state documentation, the MPHE should provide more mesolevel policies that provide guidance for supporting processes.

## Stakeholders

The most commonly cited Stakeholder across all services was the military treatment facility (MTF) commander, followed by mental health technicians, providers, and program managers/directors. Unlike the macrolevel documentation, there was a noticeable lack of line command positions mentioned in the mesolevel documentation. The one role that was discussed for line commanders was their role in commander-directed evaluations. Thus, although the literature suggests that mental health is not only a medical command function but also a line command function,[34] this concept has not resulted in shared or mutual recognition of line and medical roles within the mesolevel documentation. This may also be indicative of unclear roles between MTF and line commanders in practice. This observation reinforces our Future State Proposition 2 and the shared roles and responsibilities of medical and line commanders should be included in future state documentation as opposed to only medical or only line command stakeholders. Also, although most of the stakeholders mentioned across Army, Navy/Marine Corps, and Air Force were similar, there were some notable exceptions. For example, the Army more explicitly refers to the role of their Assistant Chief of Staff for Information Management & Operations, whereas the other Service Branches did not frequently refer to an information management role or stakeholder. Future research should consider the gains from using these additional roles to determine if they would be beneficial across all Service Branches.

*Future State Architecting Recommendation 6*

Each Service Branch should share information with the other Branches about the stakeholder roles that are currently used and have been beneficial to the MPHE in order to leverage the benefits of such roles across all Branches where appropriate.

## Ecosystem, Knowledge, and Infrastructure

The EA view elements with the fewest codes were Eecosystem, Kknowledge, and Infrastructure. For Ecosystem, both Army and Air Force expressed the need for a

standardized from of information from the MPHE to outside organizations, for example, civilian providers, and vice versa. For Infrastructure, physical facilities were mentioned, but the overall information technology (IT) and communications architecture was only mentioned by Navy/Marine Corps, not Army or Air Force. This may be because the IT infrastructure is primarily defined at the macrolevel. However, the lack of discussion about Knowledge exchange and sharing at the macrolevel was 1 unexpected finding. All Service Branches mentioned the importance of having a time when they periodically invested in continuous training for key assets. Only the Army mentioned having mental health communities of practice to exchange knowledge. Therefore, examining the effectiveness of such communities of practice and implementing them across Service Branches is another area of future research and a possible opportunity for improvement for the Service Branches.

*Future State Architecting Recommendation 7*

Methods for exchanging mental health information for shared patients, and knowledge, including treatment best practices, within and across the military branches and with outside civilian providers should be further developed and documented.

## Conclusions and Implications for Leadership

By applying a systematic EA approach, we identified the most and least dominant view elements of the enterprise and several recommendations that can inform future architecting activities. The MPHE should consider the following practical implications as they consider implementing the recommendations.

First, the MPHE should recognize where they have very strong documentation. Across the macro- and mesolevels, the MPHE appears to be Process- and Stakeholder-oriented. Within the Stakeholder view, greater emphasis on the shared responsibilities of line and medical leadership for the macro- and mesolevels is recommended. The implementation of this recommendation could take many forms. One change could be to explicitly address macrolevel documentation (that is usually written for line commander guidance) to medical commanders and to explicitly address mesolevel documentation (that is usually written for medical commander guidance) to line commanders. This has been done in some documentation,[35] and would help to ensure that two major categories of stakeholders are aware of each other's MPHE roles and policy changes. A more extensive change would be to have shared authorship of MPHE documentation by line and medical commanders; although this approach may be more time consuming, this would further ensure that both roles are reflected in MPHE documentation and practices.

For the Process view, greater emphasis on supporting processes is recommended for the macro- and mesolevels. Since supporting processes, for example, quality assurance processes,[30] enable rather than directly result in enterprise success, they can be overlooked but can be critical for the

success of the core pre-, during, and postdeployment MPHE processes. Although these types of supporting processes may be documented in other DHA policies, knowing how such policies impact the MPHE directly could be beneficial for the MPHE's ability to support its core processes. For example, research suggests a shortage of mental health providers,[36] but supporting human resource processes for addressing this shortage was not identified in our analysis of the 32 MPHE documents. Implementing this recommendation could include more cross-referencing of such research in the official policies and documentation of the MPHE.

Ecosystem, Knowledge, and Infrastructure were the least represented view elements across the MPHE documentation. This may explain some of the challenges with sharing knowledge about psychological health programs and best practices across the MPHE as well as sharing medical record information across professionals that may care for the same patient or family. Sharing best practices across the MPHE may be critical for the provision of high-quality, evidence-based care.[37] Sharing appropriate patient information across professionals has also been found to impact the quality of care for certain specialties.[38] Leadership should consider developing a more Knowledge-driven MPHE, encouraging patient-centric use of available data and online knowledge communities for providers that involves the relevant military and civilian stakeholders.

There are limitations to our study and ways that we attempted to mitigate those limitations. First, we aimed to include psychological health policy documents for service members and their families; our search did include some such policies, for example, the Navy Bureau of Medicine and Surgery Instruction 6320.70 that established guidance for involvement in the Family Advocacy Program for Naval MTFs.[39] However, the search still identified significantly more policies targeted to service members as opposed to families. Future MPHE policies should more explicitly explain how they may impact families. Future EA research should also consider a study exclusively on familial policies in the DHA.

One methodological weakness was that the search criteria targeted psychological health as opposed to health in general. Although this study focused on psychological health, we recognize that psychological health at the enterprise level is inextricably embedded in the overall DHA and the search may have led to a narrowed view of the enterprise. To minimize this weakness, the selected keywords were searched such that even a document that mentioned the search terms was considered for inclusion. Furthermore, several of the included documents were not specific to psychological health per se, for example, the Stakeholder Report for the enterprise.[26] Future research should consider expanding the search criteria to include all health policy documents to provide an even more holistic analysis of the enterprise.

Also, as an abductive qualitative study, many of the concepts, for example, the key stakeholders, were found during the inductive portion of the data collection and thus were

not a part of the deductive portion of the design. In order to mitigate this limitation, after each round of coding such codes were searched for again throughout the 32 studied documents. Also, as a qualitative study, we did quantify the frequency with which a concept was mentioned in the documentation but did not measure the concepts through other quantitative methods such as survey or medical record data. For future theory testing, quantitative studies should examine the relationship between the EA view elements and patient outcomes where appropriate. Finally, the findings are specific to the U.S. MPHE and we did not attempt to generalize these findings to other military or civilian health systems. Future research should examine the relevance of our recommendations in other health system settings.

## ACKNOWLEDGMENTS

## REFERENCES

1. Strengthening Our Culture of Innovation June 2013, June 2013. Available at http://www.health.mil/~/media/MHS/Report%20Files/MHS%20Innovation%20Report_v20140304%20%20made%20compliant.ashx; accessed July 1, 2014.
2. Department of Defense: An achievable vision: report of the Department of Defense Task Force on mental. Falls Church, VA, 2007. Available at http://justiceforvets.org/sites/default/files/files/Dept%20of%20Defense,%20mental%20health%20report.pdf; accessed September 28, 2014.
3. Sundin J, Forbes H, Fear N, Dandeker C, Wessely S: The impact of the conflicts of Iraq and Afghanistan: a UK perspective. Int Rev Psychiatr 2011; 23: 153–9.
4. Burnam MA, Meredith LS, Tanielian T, Jaycox LH: Mental health care for Iraq and Afghanistan war veterans. Health Affair 2009; 28(3): 771–82.
5. Rhodes D, Ross A, Nightingale D: Architecting the System of Systems Enterprise: Enabling Constructs and Methods From the Field of Engineering Systems. Available at http://dx.doi.org/10.1109/SYSTEMS.2009.4815796, February 13, 2012; accessed July 1, 2014.
6. Ipollito A: Architecting the Future Telebehavioral Health System of Care in the U.S. Army. Massachusetts Institute of Technology, Master's Thesis, Cambridge, MA, 2012. Available at http://hdl.handle.net/1721.1/79523; accessed July 1, 2014.
7. Miles MB, Huberman AM: Qualitative Data Analysis: An Expanded Sourcebook, Ed 3. Thousand Oaks, Sage Publications, 1994.
8. Rousseau D: Issues of level in organizational research: multi-level and cross level perspectives. Res Organ Behav 1985; 7(1): 1–37.
9. Rouse WB: Enterprises as systems: essential challenges and approaches to transformation. Syst Eng 2005; 8(2): 138–50.
10. Fradinho JM: Towards High Performing Hospital Enterprise Architectures: Elevating Hospitals to Learn Enterprise Thinking. Massachusetts Institute of Technology, Doctoral Thesis, Cambridge, MA, 2011. Available at http://hdl.handle.net/1721.1/67757; accessed July 1, 2014.
11. The Open Group: The Open Group Architecture Framework (TOGAF), June 2013. Available at http://www.opengroup.org/togaf/, June 2013; accessed July 1, 2014.
12. DoD Architecture Framework Working Group: DoD Architecture Framework Version 1.5. Available at http://dodcio.defense.gov/Portals/0/Documents/DODAF/DoDAF_Volume_I.pdf, 2007; accessed July 1, 2014.
13. Van de Ven AH: A framework for organization assessment. Acad Manage Rev 1976;1(1): 64–78.
14. Nightingale DV, Toulouse JM: Toward a multilevel congruence theory of organization. Admin Sci Quart 1977; 22(2): 264–80.
15. Tushman ML, Nadler DA: Information processing as an integrating concept in organizational design. Acad Manage Rev 1978; 3(3): 613–24.
16. Nadler DA, Tushman ML: A model for diagnosing organizational behavior. Organ Dyn 1980; 9(2):35–51.
17. Waterman RH, Peters TJ, Phillips JR: Structure is not organization. Bus Horiz 1980; 23(3): 14–26.
18. Randolph WA, Dess GG: The congruence perspective of organization design: a conceptual model and multivariate research approach. Acad Manage Rev 1984; 9(1): 114–27.
19. Daft RL, Lengel RL: Organizational information requirements, media richness and structural design. Manage Sci 1986; 32(5): 554–71.
20. Lewin AY, Minton JW: Determining organizational effectiveness: another look, and an agenda for research. Manage Sci 1986; 32(5): 514–38.
21. Harrison MI, Koppel R, Bar-Lev S: Unintended consequences of information technologies in health care: an interactive sociotechnical analysis. J Am Med Inform Assn 2007; 14(5): 542–9.
22. Tranfield D, Denyer D, Smart P: Towards a methodology for developing evidence-informed management knowledge by means of systematic review. Brit J Manage 2003; 14(3): 207–22.
23. Reichertz J: Abduction: the logic of discovery of grounded theory. In The SAGE Handbook of Grounded Theory, pp. 214–228. Edited by Bryant A, Charmaz K. London, Sage, 2010.
24. Woodson J: Guidance for Providers Prescribing Atypical Antipsychotic Medication. Available at http://cdn.govexec.com/media/gbc/docs/pdfs_edit/051712bb1_policy.pdf, Febuary 22, 2012; accessed July 1, 2014.
25. Casscells SW: Baseline Pre-deployment Neurocognitive Functional Assesment: Interim Guidance. Available at http://www.health.mil/~/media/MHS/Policy%20Files/Import/baseline_pre-deployment_neurocognitive_functional_assessment_-_interim_guidance.ashx, May 28, 2008; accessed August 1, 2013.
26. MHS Stakeholders Report. June 2012. Available at http://www.health.mil/~/media/MHS/Report%20Files/Optimized%202012_MHS_Stakeholders_Report120207.ashx, June 2012; accessed September 28, 2014.
27. Weymes (editor): Relationships not leadership sustain successful organisations. J Change Manage 2002; 3(4): 319–31.
28. Management of Post-Traumatic Stress Working Group: VA/DoD Clinical Practice Guideline for Management of Post-Traumatic Stress. Available at http://www.healthquality.va.gov/guidelines/MH/ptsd/cpg_PTSD-FULL-201011612.pdf, 2010; accessed July 1, 2014.
29. Rooney JA: DoD Directors of Psychological Health, Available at http://www.health.mil/~/media/MHS/Policy%20Files/Import/12-006.ashx, February 27, 2012; accessed September 28, 2014.
30. Nightingale D, Rhodes D: Enterprise Systems Architecting: Emerging Art and Science Within Engineering Systems. MIT ESD Symposium, Cambridge, MA, 2004. Available at http://esd.mit.edu/symposium/pdfs/papers/nightingale.pdf; accessed July 1, 2014.
31. Winkenwerder W: Post Deployment Health Reassesment. Available at http://www.health.mil/~/media/MHS/Policy%20Files/Import/05-011.ashx, March 10, 2005; accessed July 1, 2014.
32. Secretary of the Navy: SECNAV Instruction 6320.24A. Available at http://doni.daps.dla.mil/Directives/06000%20Medical%20and%20Dental%20Services/06-300%20General%20Medicine%20Support/6320.24A.pdf, February 16, 1999; accessed July 1, 2014.
33. Green CB: Air Force Policy Directive (AFPD) 44-1, Medical Operations and Establishes Guidance for United States Air Force (USAF) Mental Health (MH) Services. Available at http://static.e-publishing.af.mil/production/1/af_sg/publication/afi44-172/afi44-172.pdf, March 14, 2011; accessed July 1, 2014.
34. Jonas WB, O'Connor FG, Deuster P, Peck J, Shake C, Frost SS: Why total force fitness? Mil Med 2010; 175(8S): 6–13.

35. Robinson AM: Evaluation and Disposition of Patients Presenting with Suicidal Ideation or Behavior. Available at http://www.med.navy.mil/directives/ExternalDirectives/6520.2.pdf, March 7, 2011; accessed July 1, 2014.

36. Harris D, Marr LM: A Population-Based, Risk-Adjusted Model for Forecasting Psychological Health Provider Workforce Needs. Available at http://www.cna.org/sites/default/files/HRP%20ARM%202011%20harris.pdf, June 13, 2011; accessed September 28, 2014.

37. Maffucci J: We've Got Your Back: IAVA's Campaign to Combat Suicide. Iraq and Afghanistan Veterans of America Policy Division White Paper, 2014. Available at http://media.iava.org/IAVACampaigntoCombatSuicideWhitePaper.pdf; accessed July 1, 2014.

38. Featherstone I, Keen J: Do integrated records systems lead to integrated services? An observational study of a multi-professional system in a diabetes service. Int J Med Inform 2012; 81: 45–52.

39. Chief of the Navy Bureau of Medicine and Surgery: BUMED Instruction 6320.70. Available at http://www.med.navy.mil/directives/ExternalDirectives/6320.70.pdf, June 1, 1999; accessed July 1, 2014.

40. Nadler DA, Tushman ML: A model for diagnosing organizational behavior. Organ Dyn 1980; 9(2):35–51.

41. Waterman RH, Peters TJ, Phillips JR: Structure is not organization. Bus Horiz 1980; 23(3): 14–26.

42. Randolph WA, Dess GG: The congruence perspective of organization design: a conceptual model and multivariate research approach. Acad Manage Rev 1984; 9(1): 114–27.

43. Daft RL, Lengel RL: Organizational information requirements, media richness and structural design. Manage Sci 1986; 32(5): 554–71.

44. Lewin AY, Minton JW: Determining organizational effectiveness: another look, and an agenda for research. Manage Sci 1986; 32(5): 514–38.