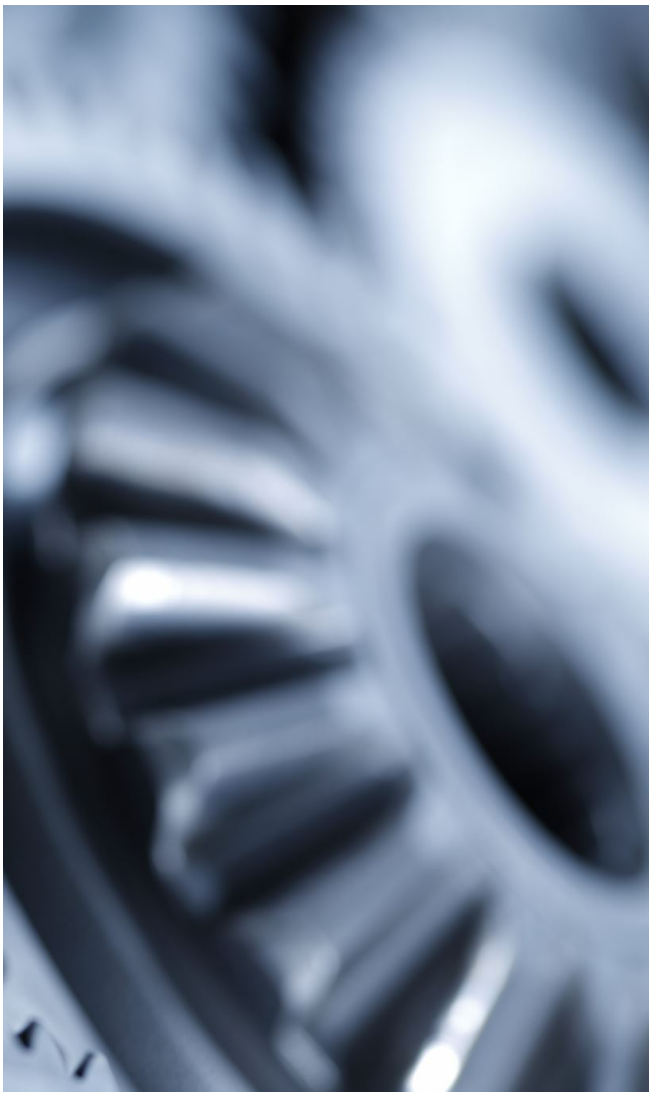
On Education and Training for Operations in the Information Environment



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On Education and Training for Operations in the Information Environment

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The Services and the Joint Staff provide both professional military education as well as academic education through the various schools, colleges and academies. These elements are currently working on developing courses and modifying curricula to address the guidance provided by the 15 May 2020 policy CJCSI 1800.01F. However, there is need for a short-term, temporary approach to inculcate rapidly the force across all levels on the challenges of operating in the information environment. Such an approach, based on a similar challenge faced by the USAF in the early 2000s, is outlined in a short paper.

Introduction

At the second meeting of the Office of Strategic Multilayer Assessment's Senior Review Group on 17 March 2021, participants raised the question of how to educate DoD personnel (both military and civilian) on operations in the information environment (OIE). This is a complex problem that does not lend itself to a single solution.

It is a well-understood concept that education and training evolve as individuals progress through their careers. Furthermore, education and training are perceived as a continuum within which later stages build on earlier ones (the well-known concept of "prerequisites" in academia). This poses a challenge in developing an approach for introducing OIE concurrently at all levels. For example, it will take about ten years for military academy graduates that have been taught about OIE to be in a position to effect discernible change. Consequently, a daunting challenge is that both short-term and long-term approaches are needed concurrently.

Enlisted and officers progress through different programs as they move up in the ranks. Consequently, the DoD education and training structure is stratified by rank to reflect that different ranks have different roles in the decision processes associated with conducting operations. DoD has started the process of revising the educational and training requirements to include OIE by issuing policy regarding officer professional military education (Chairman of the Joint Chiefs of Staff Instruction 1800.01F, 2020). The Services' long-established professional military education (PME) programs for the various ranks are now in the process of implementing the new guidance, but it takes time to revise curricula and develop courses. When a new fundamental concept is introduced, such as OIE, it is necessary that provisions be

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made for all ranks to receive appropriately focused education concurrently without assuming that the prerequisites have been satisfied. This is the first challenge. Special courses need to be introduced to address the needs of the higher ranks; these special courses will change or disappear in time as the higher ranks are populated by individuals who have progressed through the revised PME continuum.

A second challenge has to do with the pre-existing demarcation of tactical, operational, and strategic levels of war and how the pervasive information environment manifests itself at each level. A third challenge has to do with shifting focus from information being a contributing element in all operations to conceptualizing operations in which the objective is to cause changes in the information environment itself. This last challenge is the hardest one to address because it involves cultural change.

An approach to address the immediate and short-term requirements for inculcating the concept of OIE across the force is outlined in this document. It is based on the experience of the author when in 2002, while serving as Chief Scientist of the Air Force, he was directed by the then-SECAF James Roche and CSAF John J. Jumper to develop a program that would instill "systems thinking" to improve systems engineering across the Air Force. This was the time that DoD was migrating from requirements-based systems engineering to an architecture-based one. This was a change in technology but one that also required a change in culture. A comprehensive program was developed and implemented; many of the changes took root, while others only lasted for one or more cycles.[2]

The key concept that drives the approach is that different cohorts within DoD require education in OIE that is focused differently. Introductory material has to be included at all levels in the beginning; the need for that material will be reduced with time as courses with appropriate prerequisites are established by the Services and become part of the required curricula.

A Multi-level Approach for the Short-Term

Six distinct levels have been identified that are consistent with the Joint Professional Military Education (JPME) education continuum. For each level, the cohort that it addresses is first defined, and then actions to be taken commensurate with the level's role in executing OIE are outlined. For example, Level 3 education and training should be focused on **how** to implement the selected course of action while cognizant of the impact the choices will have on the information environment. The focus of Level 4 education and training should be on a deeper understanding of the information environment in selecting **what** to do, i.e., in developing alternative courses of action and planning. At the next level, the focus broadens to the formulations of **options** that address a Commander's intent in which information is both a supported and a supporting function. Finally, at the senior leader level, the focus is on

[2] This document addresses educating the Joint Force in OIE. Experiences that are USAF-specific and associated comments appear in the footnotes.

articulating the **Commander's intent** that incorporates OIE and recognizes that DoD efforts in OIE are part of an **interagency approach.**

Level 1. *Cohort*: *Enlisted personnel and civilian counterparts.*
Educating the enlisted force is critical if OIE is to be successful. If enlisted persons do not understand OIE, we will have a serious problem, for two reasons. First, all actions of military personnel, especially when deployed, have an impact on the information environment that can be exploited by adversaries. Second, the actual implementation of any OIE depends on enlisted personnel. The information environment is pervasive—all persons on the networks need to be made aware of the opportunities and risks. Incorporate OIE courses into the Associate degrees offered by military schools.[3]

Level 2—Precommissioning. *Cohort: Students in the military academies such as the United States Military Academy (USMA), United States Naval Academy (USNA), United States Air Force Academy (USAFA), and the US Coast Guard Academy (USCGA); students in Reserve Officers' Training Corps (ROTC) programs in civilian institutions; and students in the Officer Candidate Schools (OCS).*
This is the easiest to implement. In the military academies, there are core courses that all students must take. For example, in USAFA, there is no department of Information Sciences.[4] However, a core inter-departmental course could be introduced that is designed (and delivered) by the faculties of the departments of Computer & Cyber Sciences, Systems Engineering, and Behavioral Sciences & Leadership. Then the individual departments could create upper-level courses on the subject pertinent to their discipline. Eventually, a concentration area on OIE could be developed, and in the future, a new Department could possibly be created.

Level 3—Primary. *Cohort: O1 to O3 and civilian equivalents.*
The implementation of the approach for this cohort is also relatively easy. The Air Force and the Navy have their graduate schools (Air Force Institute of Technology, or AFIT, and Naval Postgraduate School, or NPS, respectively). The Army does not. Both schools have qualified faculties that could introduce

[3] The Community College of the Air Force is a federally chartered academic institution that serves the United States Air and Space Forces enlisted total force. As far as I know, this is an exceptional success story for the Air Force. In the 2000s, airmen were considered to be the best educated enlisted in any service. Recently, the Navy established the Naval Community College.

[4] The US Air Force Academy did not have a Systems Engineering department in 2001; it had one in General Engineering. After much discussion, including a five-hour meeting with the senior faculty, it was agreed to create a Systems Engineering curriculum and establish such a department in 2002. The first graduates were in the class of 2006. Within two years, it was the most popular major in the Academy, forcing a cap on the number of students enrolled in that program. This is relevant because, similarly, one would not have to "persuade" undergraduates to gravitate to information systems provided it is clear that such a choice does not diminish their chances of going to pilot school. The faculty, however, may be reluctant because the department's demographics and budgets will change. USMA has had a department of Systems Engineering for a long time and currently has a department of Information Sciences that could serve as the home for OIE by expanding its offerings to include courses from the departments of Cyber Science and Defense and Strategic Studies. USNA has a Department of Information Sciences.

appropriate courses. There may be a small resistance from faculty (this is to be expected of any faculties; faculties prefer to initiate change rather than be told to initiate change). A high-level directive could address that[5]. O1-O3 need to get a Master's degree to be promoted to O4. However, most opt to go to civilian institutions, and many of them opt for pre-COVID "correspondence" courses. It is difficult to reach those in the civilian educational institutions. However, they need to take Professional Military Education (PME). Consequently, a required core course could be integrated in the Services' PME programs.[6]

Level 4—Intermediate. *Cohort: O4 and civilian equivalents.*

The focus here is on planning and Course of Action (COA) development, with emphasis on the cause-and-effect relationships in the information environment. Given a Commander's intent, what are the possible COAs, and how can their effect on the information environment be assessed? This builds on technical knowledge of the information environment but focuses on behavioral/cultural issues. Appropriate short courses (one to two weeks long) could be provided by the services' Command and Staff Colleges and War Colleges, as well as the colleges of the National Defense University in their JPME offerings.[7] Inculcating this cohort to the broader consequences of operations and their impact on the information environment is essential, especially if proactive approaches are considered. These short courses would eventually fade away as the standard curricula are updated and as new O4s have received OIE-related education while in the primary education cohort.

Level 5—Senior. *Cohort*: *O5 and O6 and civilian equivalents*.

This could be a short course up to a week long on how to direct the planners, what to expect from them regarding OIE, and what questions to ask. Such a course could be offered by the Air University Air Command and Staff College, by the corresponding schools in the other services, and by the National Defense University as part of the JPME. The focus of the short course would be on how OIE would be employed to meet the Commander's intent. An appreciation of how OIE impact the prevailing cultural narratives is essential at this level. This is a temporary measure until OIE is an established part of the Service War Colleges' curricula. These short courses will also fade away.

[5] AFIT was reluctant to emphasize Systems Engineering. The resistance was mostly by the traditional engineering departments. It took the intervention of the then-Commander of the Air Force Education and Training Command and the then-Commander of the Air Force Materiel Command to make it happen. After a difficult start, the Program is operational now.

[6] This was attempted in the Air Force by creating an integrated program that led to satisfying both the PME requirements and the AFIT MS requirements. However, it did not take root because the then-rapid rotations necessitated by the Gulf war (90 days, then 120 days) made it impossible for officers to take the integrated program.

[7] For the Air Force, this education should occur at the Air University's Air Command and Staff College. In the past, when the AFCEA Educational Foundation was offering courses, I was teaching a five-day course on architecture-based systems engineering that was attended by military, civilian, and industry personnel. The AFCEA course was also given at Air Force and Navy bases. In the USAF case, this course was often sponsored by AFRL

Level 6—General/Flag. *Cohort: General/Flag officers and civilian leaders (O7 and above)*.

There are two aspects of OIE that need to covered for this cohort. First, to consider the implications of including information operations as a supported activity when articulating Commander's intent. This includes recognition of the associated benefits and costs and ways to assess risk. The second aspect is the recognition that DoD's role in OIE is a small but significant part of the interagency OIE approach. This can be accomplished through a series of seminars (in person and remote) or in a one-day workshop. Speakers should include senior representatives from DOS, DHS, and the intelligence community. Attendance to these seminars or workshop would be through invitation by a very senior leader.

Conclusion

An approach has been described for concurrent education at all levels of DoD. It is argued that different content is appropriate for different cohorts, and the duration of the training is designed to match the availability of the targeted personnel. The role of the various educational institutions that provide education and training for the Services and the Joint Force has been outlined.

References

Chairman of the Joint Chiefs of Staff Instruction 1800.01F. (2020, May 15). Officer professional education policy. Joint Chiefs of Staff. https://www.jcs.mil/Portals/36/Documents/Library/Instructions/CJCSI%201800.01F.pdf?ver=8nDVUf_llM2YAIuMuwjpnw%3d%3d