White Paper

An Operational Approach for Conducting Transdisciplinary Research at West Point

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An Operational Approach for Conducting

Transdisciplinary Research at West Point

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ABSTRACT

Transdisciplinary research extends the ideas of single-disciplinary research, multidisciplinary research, and interdisciplinary research to include non-academic participants, an orientation toward application, and a mandate to support action and/or intervention to support the common good. Transdisciplinary research is inherently more complex than other modalities of research because there are more interwoven components that must be synchronized to effectively reach established research goals. An imperative of such research is the involvement of a research lead empowered to synchronize enterprise efforts, including academic and non-academic participants across multiple specialties and disciplines. This paper builds upon Army Design Methodology to describe a framework that enables innovative transdisciplinary research to be conducted at the United States Military Academy (West Point) with the goal that other research institutions may benefit from this West Point faculty exploration.

Keywords: transdisciplinary, interdisciplinary, multidisciplinary, Army Design Methodology, complexity

INTRODUCTION

The United States Military Academy at West Point defines research "as a systematic investigation designed to propose, develop, or contribute to generalizable or disciplinary knowledge" with the expressed goals:

1) Enhance the education of Cadets (undergraduate students)

2) Develop the faculty (military and civilian Masters and PhD) professionally

3) Address important issues facing the Army and the Nation

Since before the establishment of its first research center nearly 57 years ago (Photonics), USMA efforts in this domain have had a significant impact on Department of Defense (DoD) collaborations, reimbursable research funding, faculty and Cadet publications, conference presentations, and employment of research scientists across disciplines. Our undergraduates have been awarded 500+ National-level scholarships and fellowships (e.g., Rhodes, NSF, Hertz, Churchill, etc.), and our faculty was nawarded $24 million in research funding in the past year. West Point scholars enhance the Army's capacity to partner with the DoD, Federal government, and research entities across academe. The synergy from these partnerships results in meaningful and deliberate insight into problems facing our Army, DoD, and the Nation. Accordingly, investigating new approaches to improve our ability to address the three expressed goals of USMA research is critical.

Research collaboration between West Point academic departments and our partners across the DoD and beyond fosters innovative, critical, and creative thinking. We use the words "multidisciplinary," "interdisciplinary," or even "transdisciplinary" to describe research practices as they apply to DoD problems and bring those applications into the classroom to inform context-based education. There are many available research modalities for faculty and West Point non-academic partners to support West Point's mission; transdisciplinary research challenges the traditional single-disciplinary research paradigm. Indeed, we cannot solve the problems of today with the (stovepiped) thinking used to create them, so a faculty team considered the implications and requirements for increasing our institution's capacity for transdisciplinary research. Increasing the complexity of our research modalities from disciplinary to transdisciplinary may realize a benefit, but those benefits will come with the cost of increased leadership, coordination, and administration requiring greater levels of management. Accordingly, where more complex

transdisciplinary research is desired, planning and resourcing must be included to facilitate structure that supports such diversity in research teams.

PURPOSE

Align research modalities with appropriate classes of problems and define barriers to the conduct of research in those different modalities.

BACKGROUND

Multidisciplinary and interdisciplinary research are traditional methods to increase the effectiveness of an organization's and/or individual's research efforts. Multidisciplinary research is defined as "the cooperation of researchers from several different disciplines, but each working in their own context with little cross-fertilization among disciplines, primarily sharing information and results at the end of their research to support the overall combined findings."[1] The West Point Photonics Research Center (PRC) was founded as a multidisciplinary research center with faculty from electrical engineering, physics, and chemistry each contributing to the photonics research efforts. Interdisciplinary research fosters shared understanding: "Interdisciplinary research in contrast [to multidisciplinary] involves a much closer interaction, including transferring methods and knowledge between the academic disciplines (sometimes, in turn, leading to the development of what is eventually considered new academic disciplines, with their own characteristic knowledge, approaches, and boundaries to other disciplines); like the long history of transdisciplinarity, extensive work has also gone into understanding forms of

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[1] Lawrence, M.G., P. Nanz, O. Renn, and S. Williams. 2022. "Characteristics, potentials, and challenges of transdisciplinary research." *One Earth* 5: 44-61.

interdisciplinary," as opposed to working within the individual discipline of knowledge.[2] Multidisciplinary research is parallel while interdisciplinary research is integrative.

The term "transdisciplinary" research arose in the 1970s, but the debate of its utility and the specifics of operating in a transdisciplinary manner have only been widely discussed in the past 20 years. Transdisciplinary is not meant to replace either multidisciplinary or interdisciplinary but is an application of both, focusing on solving real-world situations or problems. Citing the same paper,[3] the authors summarize the tenants of transdisciplinary research into seven understandable principles:

1) A focus on theoretical unity of knowledge to transcend disciplinary boundaries;

2) The inclusion of multidisciplinary and interdisciplinary academic research;

3) The involvement of (non-academic) societal actors as process participants;

4) A focus on specific, complex, societally relevant, real-world situations or problems;

5) Working in a transformative manner, i.e., going beyond the focus on real-world problems to proactively support action or intervention;

6) An orientation toward the common good (including the betterment of society and a humanistic reverence for life and human dignity);

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[2] Ibid.

[3] Lawrence, M.G., P. Nanz, O. Renn, and S. Williams. 2022. "Characteristics, potentials, and challenges of transdisciplinary research." *One Earth* 5: 44-61.

7) Reflexivity, i.e., consciously contemplating the broader context and ensuring the compatibility of the project's components and tasks throughout the course of the project.

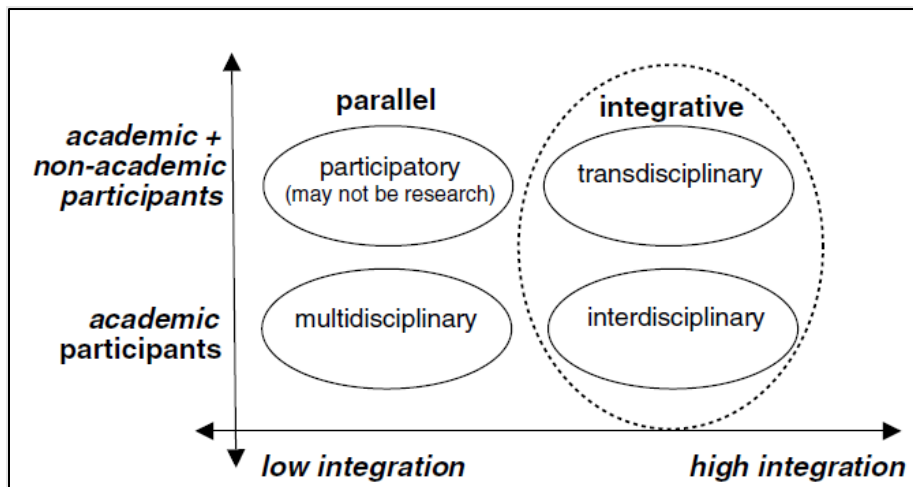Figure 1 illustrates the differences in research modalities, as described by Tress et al.[4]

Figure 1. Degrees of integration and stakeholder involvement in integrative and non-integrative approaches (Tress, Tress and Fry 2005).[5]

Morton et al. expand Tress' figure to illustrate the interaction of stakeholders, academics, disciplines, and conventional knowledge[6]; however, Tress's figure elegantly characterizes the integration of participants and disciplines, supporting an understanding of each research modality. Lang et al. describe the uniqueness of transdisciplinary research and the space it occupies between societal and scientific problem-solving methods. Those who engage in research generally operate

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[4] Tress, Gunther, Bärbel Tress, and Gary Fry. 2005. "Clarifying Integrative Research Concepts in Landscape Ecology." *Landscape Ecology* 20 (4): 479-93. https://doi.org/10.1007/s10980-004-3290-4.
[5] Tress, Gunther, Bärbel Tress, and Gary Fry. 2005. "Clarifying Integrative Research Concepts in Landscape Ecology." *Landscape Ecology* 20 (4): 479-93. https://doi.org/10.1007/s10980-004-3290-4.
[6] Morton, Lois Wright, Sanford D. Eigenbrode, and Timothy A. Martin. 2015. "Architectures of Adaptive Integration in Large Collaborative Projects." *Ecology and Society* 20 (4). https://doi.org/10.5751/es-07788-200405.

with free will, unalienable rights, and diverse perspectives and worldviews[7]. Comprehensive insights into situations and solutions to problems account for quantifiable scientific data, observed behaviors, inherent morality and ethics, and other factors. The inherent complexity of applied scientific and societal problems requires transdisciplinary approaches for those solutions to have maximal impact.

Adapting the concepts of the four papers discussed above, we define transdisciplinary research as **an integrated research approach requiring academic and non-academic participants to partner and integrate disciplines, including (but not limited to) science, engineering, social science, and the humanities, to produce useful insights and/or implementable solutions to an identified societal or defense problem**. Transdisciplinary research is then a means to align our Academy-wide applied research efforts within an integrated mindset, promoting insight into a solution to Army, DoD, and National problems. Integrating societal actors and identifying specific societal or defense problems to be solved is not a basic science endeavor, which can be both multidisciplinary and interdisciplinary but is never transdisciplinary. Additionally, if the research question is being addressed only by West Point faculty, it does not constitute a transdisciplinary research effort – societal engagement is a definitional component of transdisciplinarity.

As we worked to understand the differences between research modalities, we compared the transdisciplinary research with the Army's planning and problem-solving methods. For this paper, we specifically examine the Army Design Methodology as described in Army Techniques

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[7] Lang, Daniel J., Arnim Wiek, Matthias Bergmann, Michael Stauffacher, Pim Martens, Peter Moll, Mark Swilling, and Christopher J. Thomas. 2012. "Transdisciplinary Research in Sustainability Science: Practice, Principles, and Challenges." *Sustainability Science* 7 (S1): 25-43. https://doi.org/10.1007/s11625-011-0149-x.

Publication (ATP) 5-0.1. The Army Design Methodology is a systems-based problem-solving method requiring integrating and understanding multiple interconnected and overlapping systems that compose the operating environment[8].

ATP 5-0.1 approaches design through clear identification of the environmental frame, which includes defining the problem, current state, and desired end state. Framing the environment enables the design portion of problem-solving: developing the operational approach. Development of an operational approach within the Army Design Methodology ultimately results in a refined planning and decision-making process, the production of directives, and the organization accomplishing the tasks needed to complete the assigned mission. Army Design Methodology is similar to the previously mentioned transdisciplinary research approach with some clear limitations and challenges to application.

First, Army Design Methodology places one leader (the commander) in the "center" of the process. A commander's "vision," iterative involvement, and drive throughout the process are critical to the development of an operational approach, and ultimately, to achieving the desired future state (Figure 2). Second, Army staffs are inherently multidisciplined and, at higher echelons, possess subject matter expertise from nearly every factor and/or system that influences the environment. Army Design Methodology guidelines recommend forming a planning team comprised of members with experience and expertise appropriate to the operating environment and scope of the problem[9]. Finally, the design of an operational approach and the planning of transdisciplinary research in the initial stages are similar, but they diverge sharply in execution: Army Design methodology informs planning, decision-making, and orders production by one

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[8] HQDA, 2015. Army Design Methodology.
[9] Ibid.

team, which ultimately informs another unit's actions; transdisciplinary research must be accomplished by the team that developed the operational approach. This background discussion leads us to our research question.
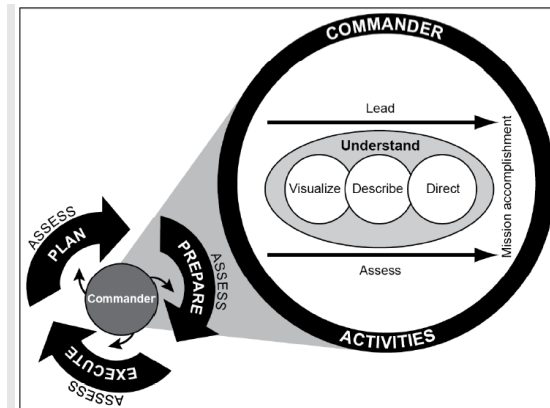

Figure 2. The operations process (HQDA 2015).[10]

Research Question: What is an operational approach to implement tr ns disciplinary Cadet and Faculty research at West Point to provide innovative solutions to problems facing the Army, DoD, and the Nation?

THE WEST POINT TRANSDISCIPLINARY PROCESS

There are two substantive obstacles in pursuing transdisciplinary research and the Army design methodology solely within West Point: a dearth of non-academic participants and research "commanders." Any operational approach to implement transdisciplinary research at West Point must address both. We begin by addressing non-academic participants.

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[10] HQDA, 2015. Army Design Methodology.

Although not embedded within the institution, West Point has access to research partners who may be non-academic participants or stakeholders: DoD, national labs, the federal government, non-governmental organizations, and corporations.

Using the breakdown provided by Tress et al.[11] and Morton et al.,[12] the different disciplinary approaches vary along two dimensions: the role of multiple academic disciplines and the role of non-academic stakeholders.

Multiple academic disciplines can be involved at three discrete levels (although in practice, this probably varies continuously):

- None: disciplines research independently.

- Separate contributions to a shared goal: disciplines conduct separate research that aims to tackle questions related to a shared theme.

- Coproduction: disciplines work directly together to produce research tackling a shared goal.

The three traditional disciplinary, multidisciplinary, and interdisciplinary categories vary along this dimension.

However, the discussion of transdisciplinary research adds a second dimension of the role of non-academic stakeholders, which can again take three discrete levels:

- None: non-academic stakeholders are not involved in the research. This is true of single-disciplinary, multidisciplinary, and interdisciplinary work, as well as basic science.

[11] Tress, Gunther, Bärbel Tress, and Gary Fry. 2005. "Clarifying Integrative Research Concepts in Landscape Ecology." *Landscape Ecology* 20 (4): 479-93. https://doi.org/10.1007/s10980-004-3290-4.
[12] Morton, Lois Wright, Sanford D. Eigenbrode, and Timothy A. Martin. 2015. "Architectures of Adaptive Integration in Large Collaborative Projects." *Ecology and Society* 20 (4). https://doi.org/10.5751/es-07788-200405.

- Provide goals: non-academic stakeholders bring problems or questions for academic researchers to investigate; often referred to as applied research where the questions are from the real world, but the knowledge production is still completed primarily by the academics.

- Coproduction: non-academic stakeholders work with academics to produce knowledge together

Transdisciplinary research occurs when multiple disciplines and non-academic stakeholders coproduce knowledge. However, this typology points to other modalities of knowledge production that have not typically been named: We will simply call these "Unknown #" and provide a short description. The following paragraphs are illustrated in Table 1.

The first of these (Unknown 1) combines a single academic discipline producing knowledge while coproducing knowledge with non-academic stakeholders. This combination does not have a name but probably describes one of the most common modalities of knowledge production at West Point. An example would be any collaboration between DoD and a particular academic department.

The second new combination (Unknown 2) is separate disciplinary contributions to a shared goal that is provided by a non-academic stakeholder. An example of this would be separate disciplines providing complementary research on the theme of autonomous weapons systems.

The third new combination (Unknown 3) is separate disciplinary contributions to a shared goal that is coproduced by non-academic stakeholders. In this case, the non-academic stakeholder would be the hub that would separately work with multiple academic disciplines. An example of this situation would be a DoD stakeholder separately working with multiple academic

departments at USMA to answer a question of interest to their community. For instance, the

Defense Intelligence Agency (DIA) might separately collaborate with the Department of Electrical

Engineering and Computer Science to design its new cyber defense architecture and with the

Department of Behavioral Sciences and Leadership to model human interactions with that system.

Finally, the fourth new combination (Unknown 4) would have multiple academic disciplines

producing knowledge together to answer a question provided by a non-academic stakeholder.

An example here could be that West Point is asked to design a machine learning system that

can ethically make autonomous firing decisions. A team is constructed of law professors,

computer scientists, ethicists, and mechanical engineers who collaborate to design a prototype

machine learning system that is presented to DoD stakeholders. This differs from true

transdisciplinary research because the non-academic stakeholder provides the question rather

than helping to produce the solution (although it is likely that there would be ongoing

conversations between the stakeholder and academic teams).

Table 1. Integration-levels of non-academic participants in West Point research

Role of non-academic stakeholders				
		None (basic research)	**Provide Goals (applied research)**	**Coproduce knowledge**
Role of multiple academic disciplines	**None**	Disciplinary	Participatory	Unknown 1 (Disciplinary co-production with non-academics)

		Multidisciplinary	Unknown 2 (Applied multidisciplinary)	Unknown 3 (non-academic hub and multidisciplinary spokes)
	Separate contributions to shared goal	Multidisciplinary	Unknown 2 (Applied multidisciplinary)	Unknown 3 (non-academic hub and multidisciplinary spokes)
	Coproduce knowledge	Interdisciplinary	Unknown 4 (Applied interdisciplinary)	Transdisciplinary

At West Point, each of these research types occurs to varying extents but with a different emphasis on the left side of the Table. Table 2 provides a current example of each research modality being conducted at West Point. As illustrated in Table 2, the nascent Sustainable Infrastructure, Resilience, and Climate Consortium (SIRCC) Academy-wide and Army partnership is an example of a research idea that could eventually become a transdisciplinary research effort. At this point, the coproduction of knowledge has probably not been achieved for the SIRCC due to its infancy.

Table 2. Current examples of USMA research disciplines and non-academic participants integration

Role of non-academic stakeholders				
		None (basic research)	**Provide Goals (applied research)**	**Coproduce knowledge**
Role of multiple	**None**	Metal Organic Framework characteristics	Metal Organic Frameworks as a hasty gas mask	Metal Organic Frameworks

academic disciplines				collaboration with DEVCOM CBC***
	Separate contributions to shared goal	Quantum Science Applications - specifically, electromagnetic signature detection and characterization	Construct a quantum antenna; demonstrate 3- and 4-level electromagnetic induced transparency	Development of efficient and smaller communication and SIGINT detection systems with DEVCOM ARL****
	Coproduce knowledge	Energy systems modeling	Energy research collaborations with DEVCOM* Army Research Laboratories or SERDP ESTCP**	Sustainable Infrastructure, Resilience, and Climate Consortium (SIRCC) academy-wide partnership

* U.S. Army Combat Capabilities Development Command

** Strategic Environmental Research and Development Program (SERDP), Environmental Security Technology Certification Program (ESTCP)

*** U.S. Army Combat Capabilities Development Command Chemical Biological Center

*** U.S. Army Combat Capabilities Development Command Army Research Laboratory

The advantages and disadvantages of each knowledge production modality are primarily those described in Table 3 (discipline composition) and Table 4 (role of non-academic participants). There are additional challenges and opportunities presented by specific combinations.

Table 3. Advantages and disadvantages of the roles of academic disciplines

Role of multiple academic disciplines	Advantages	Challenges
None (Disciplinary)	• Research speaks clearly to the existing community of scholars • Agreement on methods and priorities • Lower "translation" costs • Fits with existing organizational structures	• Ignores problems at or outside disciplinary boundaries • Turf wars • Parallel or duplicate research • Methods and skills from one area may be valuable to another • Relevant skills for a problem may not be contained within a single discipline
Separate contributions to the shared goal (multidisciplinary)	• Research still relies on disciplinary methods and priorities • Allows problems to be tackled from multiple (existing) perspectives	• Some research tasks may require resources from multiple disciplines working together • Multidisciplinarity can be tokenistic and unproductive if not well-motivated
Coproduction of knowledge (interdisciplinary)	• Genuine collaboration between disciplines	• High "translation" costs for scholars to collaborate effectively • How to pick an effective team

	• Creation of new perspectives • Knowledge transfer	• Institutional support and recognition are needed

Table 4. Advantages and disadvantages for the roles of non-academic stakeholders

Role of non-academic stakeholders	Advantages	Challenges
None (Disciplinary)	• Academics are best placed to identify problems within academia • Problems within academia are more easily tackled with the expertise of academics • Basic research can generate unexpected, applied payoffs	• Lack of immediate societal impact • Focus on niche problems that only matter within a particular academic community • Ideas are not tested against reality
Separate contributions to the shared goal (multidisciplinary)	• Tackle problems that matter • Real-world problems can lead to theoretical breakthroughs • Help to rethink assumptions within academia	• Problems may not match with skills of academics • Problems might be better tackled by experts in implementation • Stakeholders may reduce the impartiality of academics • Academic answers may not be specific enough for stakeholders

Coproduction of knowledge (interdisciplinary)	• Stakeholders can complement the skills of academics • Stakeholder involvement increases the chances that outputs match expectations and are useful	• Outputs may not match academic, personal, or institutional priorities (i.e., publications) • High relationship management and communication costs • Higher manpower commitments from non-academic stakeholders

A trend for challenges in both tables is in the category of "coproduce knowledge." For instance, the non-academic hub with disciplinary spokes modality would require a non-academic stakeholder to independently identify relevant disciplines and then manage a research relationship separately with each of them. This modality is straightforward for the academics but places a high burden on the non-academic stakeholder. Similarly, transdisciplinary research maximizes the variety of perspectives and tools available for solving a problem. Consequently, it will also have high coordination costs and is likely to involve the largest commitment of manpower.

At this point, the second obstacle to the transdisciplinary operational approach crystallizes: a defining characteristic of transdisciplinary research is a "commander" or expert project manager to coordinate and galvanize the interdisciplinary efforts of academic and non-academic participants. A solution to this problem is the advent of the research center; however, research center directors are rarely empowered as leaders for multiple principal investigators (PIs) across disciplines as well as non-academic stakeholders. Accordingly, the institution must re-imagine its research center design if West Point is to actualize transdisciplinary research. Specifically, the role of the research center director would need to be empowered or a research project manager

defined who can bring together PIs from multiple departments and coordinate with external partners.

Our proposal is to create a new option for West Point teams that seek engagement in transdisciplinary research, not to prescribe a procedure for all transdisciplinary research. Where existing research (of any modality) can be successfully conducted without such a procedure, we would recommend continuing to support that research without adding additional requirements for it to conform to this mold. However, making such a model feasible would enable new projects that are currently difficult in the current West Point institutional environment. The goal is to reduce the overhead of managing projects that would otherwise suffer high coordination costs, not to impose new overhead on projects. It is also important to emphasize that other research modalities will not require intensive institutional support due to their lower coordination costs.

In the example below, we suggest a procedure in response to an external agency's request to solve a societal or defense problem. We propose that West Point faculty be given a special assignment as research project managers to work within an Academy "Innovation Hub" and guide a Transdisciplinary research project (Figure 3).

To summarize, an external agency approaches West Point through the Innovation Hub to determine if the institution can apply intellectual capital toward the identified transdisciplinary societal or defense problem. This begins the Innovation Hub evaluation of whether West Point faculty can support this research project and if the external agency is able to appropriately fund the level of effort required from its faculty. As we have demonstrated, leading a transdisciplinary team of West Point academics and partners from an external agency who are non-academics requires a project manager or research director to coordinate and synchronize the diverse

interdisciplinary coproduction of knowledge across organizations. At this point, the Innovation Hub determines: 1) is the external agency's problem an appropriate, solvable problem 2) do West Point faculty have the capacity and interest to support the project, and 3) will the external agency fund the transdisciplinary research to include backfilling a faculty member to serve as a project manager.

This process may consume a large portion of an academic year. If those determinants are satisfied, then during year 2, the project manager or research director will lead the transdisciplinary team of West Point faculty and/or Cadets and external agency non-academics in completing this applied research effort. Depending on the problem being addressed, this research effort may span one or two academic years. This research must include Cadets from multiple departments to be consistent with the purpose of West Point research: to enhance the education of Cadets. Upon completion of the project, Innovation Hub again ensures proper resolution through final reports and peer-reviewed publications. A proposed sequence of events with more details is illustrated in Figure 3.
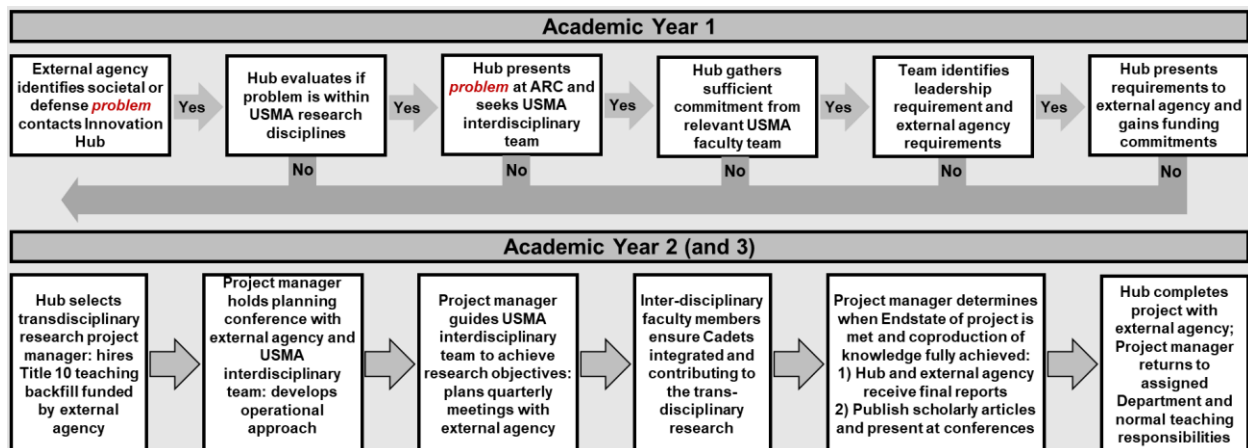

Figure 3. A mechanism for completing a Transdisciplinary research project at West Point.

From Figure 3, it should be clear that West Point's engagement in and pursuit of transdisciplinary research must be deliberate and require synchronicity across departments. Individual faculty or even research center directors do not have the capacity or Academy-wide influence to effectively lead a transdisciplinary research project without this institutional support. As illustrated in Table 2, presumably, the majority of faculty and Cadet research resides within the left-side and upper 2/3 of the table. The six of nine modalities where West Point research exists are probably appropriate to the available time, resources, and capacity of faculty, Cadets, and partners.

Consequently, for West Point to increase the complexity of its research modalities to include transdisciplinary research, its faculty and leadership must ensure the increased cost of complexity results in commensurate benefits to Cadet development, faculty scholarship, and intellectual capital. Where a societal or defense problem is of sufficient importance and necessitates a transdisciplinary approach, the process described in Figure 3 will enable West Point faculty to address these important problems.

CONCLUSION

Our research modalities should match our research mission

In this paper, we have defined transdisciplinary research based on a current literature review and in the context of the Army Design Methodology. We have identified nine research modalities and provided examples of how those modalities relate to current USMA research projects. Two key requirements emerged as we evaluated more complex research modalities: the coproduction of knowledge across organizations and the requirement for a commander (project manager/research director).

Research is a fundamental component of the USMA Academic program and benefits Cadets, faculty, and the Army/Nation. However, research requires significant commitments, and the greater the complexity of the research modality, the greater those commitments become. Successfully using complex research modalities such as transdisciplinary research will often require a new process, such as the one described in Figure 3, given the challenges in coordinating across disciplines and external stakeholders.

West Point faculty and the academic leadership should appropriately evaluate the applicability of complex research modalities to its "build, educate, train, and inspire" mission. West Point's faculty and Cadet research should always be designed to support and enhance that mission. Our goal should be to design achievable basic science, applied science, engineering, social science, and humanities research for faculty and Cadets. In some cases, the appropriate research modality will be transdisciplinary, but other research efforts may be better suited to the other modalities identified in this paper.

Recommendations for Inclusion in Professional Military Education

a. Deliberately add transdisciplinary research to the suite of modalities taught to and employed by students. Each traditional modality: single-discipline, multidisciplinary, and interdisciplinary is appropriate to gain insight into certain problems faced in the contemporary operating environment. Transdisciplinary research, with its inclusion of non-academic participants, an orientation toward application, and a call to action and/or intervention provides imperatives that challenge the traditional disciplinary research paradigm.

b. Intentionally resist the employment of techniques (in both research and operation) that add superfluous complexity to the system. Einstein is attributed with the thought that "any

[person] can make a simple idea complicated, but it takes true genius to make a complicated thing simple." So, it is with research. Although transdisciplinarity, multidisciplinarity, and interdisciplinarity each bring added resources to the project over single-discipline research, those added resources come at a cost. When we intentionally match modality to problem or issue, we optimize the allocation of resources to need, rather than increase overhead to present the appearance of being thorough.

c. Empower a transdisciplinary research leader when employing that modality. Synchronizing experts in multiple disciplines with non-academic participants, orienting results toward application, and calling constituents to action requires visionary leadership that is empowered to facilitate the research group's achievement of milestones and goals. Absent that leadership and influence, it is rare that a larger group naturally progresses toward established goals and more likely that the group fractures along lines of discipline or expertise. A steady, guiding hand maintains the team's progress toward its common goal.

In short, research teams with broad reach develop the faculty professionally to address important issues facing the Army and the Nation; they should be pursued if the managerial burden does not impede enhancing student education.