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THESIS

DOES HOMELAND SECURITY CONSTITUTE AN EMERGING ACADEMIC DISCIPLINE?

by

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March 2013

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In the wake of 9/11, the enterprise now called homeland security rocketed into the limelight leaving an educational gap that many academic institutions rushed in to fill. Educators and scholars alike from various disciplines rallied together to form a useful curriculum, and in doing so, they established a new community that shares a common intellectual commitment to making insightful, valuable, and practical contributions to the sphere of human knowledge focused on societal resilience and prosperity. Once the dust settled, a debate began to unfold. Is homeland security an emerging academic discipline? This paper seeks to answer the question by defining a common analytical framework for what constitutes an academic discipline including the concept of legitimacy and the interrelationships or "co-evolution" between academia, industry, and government. It then compares through qualitative research and weighted scoring several widely accepted disciplines to see how they fit within this model. Finally, given the persistent threat of natural and manmade disasters, steady funding and continuous career prospects, ongoing rapid advances in technology, and systematic widespread integration into university curricula, this research concludes that homeland security has begun its emergence as a formal academic discipline especially given the interdisciplinary nature of its dynamic and complex domain.

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DOES HOMELAND SECURITY CONSTITUTE AN EMERGING ACADEMIC DISCIPLINE?

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ABSTRACT

In the wake of 9/11, the enterprise now called homeland security rocketed into the limelight leaving an educational gap that many academic institutions rushed in to fill. Educators and scholars alike from various disciplines rallied together to form a useful curriculum, and in doing so, they established a new community that shares a common intellectual commitment to making insightful, valuable, and practical contributions to the sphere of human knowledge focused on societal resilience and prosperity. Once the dust settled, a debate began to unfold. Is homeland security an emerging academic discipline? This paper seeks to answer the question by defining a common analytical framework for what constitutes an academic discipline including the concept of legitimacy and the interrelationships or "co-evolution" between academia, industry, and government. It then compares through qualitative research and weighted scoring several widely accepted disciplines to see how they fit within this model. Finally, given the persistent threat of natural and manmade disasters, steady funding and continuous career prospects, ongoing rapid advances in technology, and systematic widespread integration into university curricula, this research concludes that homeland security has begun its emergence as a formal academic discipline especially given the interdisciplinary nature of its dynamic and complex domain.

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LIST OF ACRONYMS AND ABBREVIATIONS

AIR	Association for Institutional Research
CFC	Chlorofluorocarbons
CHDS	Center for Homeland Defense and Security
CIA	Central Intelligence Agency
CNO	Computer Network Operations
CSS	Central Security Service
DCF	Discipline Component Factor
DHS	Department of Homeland Security
DNP	Discipline Normalized Percentage
DOD	Department of Defense
DSS	Discipline Specific Score
DSWS	Discipline Specific Weighted Score
DSWV	Discipline Specific Weighted Value
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
HLS	Homeland Security
HSE	Homeland Security Enterprise
IA	Information Assurance
ICS	Incident Command System
NPS	Naval Postgraduate School
NSA	National Security Agency
OED	Oxford English Dictionary
U.S.	United States

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EXECUTIVE SUMMARY

September 11, 2001, triggered an avalanche of change in the United States. The government's epic response to the terrorist attacks was monumental and far-reaching. In the decade since 9/11, more than $630 billion has been spent on what is now called *homeland security*. This massive influx of funding created tens of thousands of jobs in the public and private sector, and the country witnessed significant and substantial structural and personnel reorganizations at the federal, state, and local level. In an attempt to keep pace with this colossal paradigm shift, academic institutions around the country responded by creating dozens of programs of study (both degree granting and professional certification-based) all in the name of homeland security. While clearly tackling a real societal need, the rush to deal with these issues ignited a debate as to whether or not homeland security was emerging as a unique and legitimate academic discipline.

To address this dilemma, the first step toward generating an answer involves putting some boundaries on the dynamic and constantly evolving field of homeland security. Looking at the extensive list of components currently contained within homeland security (see Table 1), a common theme of prosperity and the preservation of the American way of life does emerge.

Table 1. Topic Areas Contained within Homeland Security According to Bellavita and Gordon[1]

1. Threats to the Homeland
2. Risk Management and Analysis
3. Critical Infrastructure Protection
4. Laws Related to Homeland Security
5. Homeland Security Policies & Strategies
6. Responses to Terrorism
7. Terrorism
8. Intelligence
9. Overview of Homeland Security Mission Areas
10. Organization of Homeland Security
11. Sociology of Homeland Security (e.g., politics, roles, behavior, power, conflict, communication)
12. Systems Integration and Administration of Homeland Security
13. Border Security
14. Cyber Security
15. History of Homeland Security and Terrorism
16. Strategic Planning & Budgeting
17. Civilian & Military Relationships
18. Comparative & International Homeland Security
19. Federal Role in Homeland Security
20. Future of Homeland Security
21. Preparedness
22. Private Sector Role in Homeland Security
23. Public Health & Medical Issues
24. Role of State and Local Governments
25. Homeland Security Technology
26. Weapons of Mass Destruction
27. Critical Thinking
28. Federalism
29. Strategic Communications
30. Transportation Security
31. Basics of Homeland Security
32. Civil Liberties
33. Decision-Making
34. Ethical Issues
35. Interagency Coordination
36. Leadership
37. Media
38. Politics of Homeland Security
39. Prevention of Terrorism
40. Psychology of Homeland Security
41. Recovery After an Attack
42. Risk Communications
43. Utilities and Industrial Facilities Security
44. Emergency Management
45. Engineering
46. Exercises and Training
47. Geospatial Dimensions of Homeland Security
48. Human Resource Management
49. Modeling & Simulation
50. Role of Communities in Homeland Security
51. Role of Individuals in Homeland Security

The second step necessary in addressing whether or not homeland security is emerging as an academic discipline requires an in-depth evaluation of just what it means to be recognized as a formal academic discipline. Assuming this step was simple, applying homeland security to the definition of an academic discipline would be the next plausible move. Unfortunately, while a great deal of literature addresses academic

[1] Christopher Bellavita and Ellen Gordon, "Changing Homeland Security: Teaching the Core," *Homeland Security Affairs* 2, no. 1 (April 2006): 1.

disciplines and how they have emerged and grown organically just as society has, no specific agreed-upon framework is available to allow a simple test. However, a fundamental relationship seems to exist between the emergence of academic disciplines and man's quest for knowledge based upon his discoveries, advancement, and significant societal events both positive and negative. Taking all of this into account along with the shared structures and configurations of academic disciplines, it is necessary to attempt to define that elusive analytical framework. Although no guarantee exists that an effective analysis can be accomplished without the injection of at least some amount of speculation, assumption, and inference, once a framework is defined and in the absence of a simple equation, the next logical step is to develop a quantitative model in which fields of study can be scored.

Starting with the work of King and Brownell, in their highly cited work *The Curriculum and the Disciplines of Knowledge*, as well as other noted scholars including the great philosopher Aristotle himself, eleven characteristics (or components) are combined together to create the following analytical framework:

Table 2. Analytical Framework for What Defines an Academic Discipline

1.	Community of Persons
2.	Expression of Human Imagination
3.	Domain
4.	Tradition
5.	Syntactical Structure—Mode of Inquiry
6.	Conceptual Structure—Substance
7.	Specialized Language or System of Symbols
8.	Heritage of Literature—Communications Network
9.	Valuable and Affective Stance
10.	Instructive Community
11.	Projected Demand of the Discipline's Knowledge

This framework coupled with the concepts of legitimacy and interdisciplinarity might prove useful in testing the validity of a given field of study and whether or not it has sufficient depth, breadth, and uniqueness to stand on its own as an academic discipline. To test this hypothesis adequately, a scoring mechanism is used that provides

a weighted tally and basis for comparison using the following simple quintile-based system for classifying academic disciplines within their evolutionary lifecycle.

Figure 1. Quintile-based Breakdown of Academic Disciplines

Several relatively new disciplines are analyzed to see how they "fit" within the analytical model. Public administration, international relations, computer science, and construction economics serve as case study disciplines/fields of study. In addition, the baseline or core disciplines of mathematics, physics, medicine, and law, all of whose acceptance by the academy as academic disciplines is unlikely to be disputed, are also included.

The results of the quantitative analysis validates that mathematics, physics, medicine, and law are full-fledged parent academic disciplines, as all receive values in the 90-plus percentile range. The case study disciplines show public administration at 73.39% (a maturing academic discipline), international relations at 62.16% (also a maturing academic discipline), computer science at 87.75% (a full-fledged parent academic discipline), and construction economics at 14.10% (not an academic discipline). Homeland security is then processed through the model, and it receives a score of 41.34%, putting it just over the threshold of a young/emerging academic discipline.

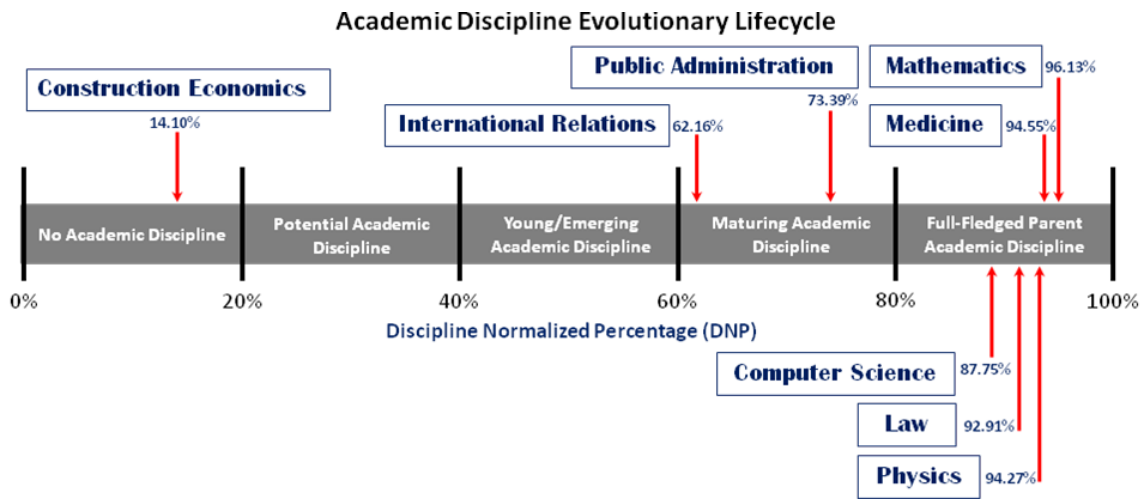

Figure 2. Quintile-based Representation of All Referenced Disciplines

So what does all this mean? Over the past 150 years or so, the number of academic disciplines has multiplied rapidly in an effort to try to accommodate the needs of industry, government, and society in general. Disciplines have emerged from other disciplines as they share various components of themselves and create overlapping schemas. For decades (or perhaps centuries), scholars have attempted to define and describe ways to deal with the rapid changes occurring all around them. In many cases, the changes in society that originally caused the existence of a particular discipline began hyper-accelerating, which in turn, fueled the discipline's growth. The speed at which change occurs is awe inspiring to say the least, and its acceleration will likely continue. This nation's security is dependent upon many complex, intricate, and tightly coupled components focused on maintaining the survival and prosperity of this great nation and way of life. As such, homeland security and its emergence as an academic discipline is simply a response to the dynamism of these complexities of society and the institutions within it. It will continue, as U.S. survival and prosperity depends upon it.

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Clearly, this thesis would not have been possible without the outstanding guidance, direction, and encouragement of my thesis co-advisors, Nadav Morag, PhD, and Stanley Supinski, PhD. Thank you both for your help, support, feedback, and expertise.

Finally, I wish to dedicate this thesis to my grandmother, Bess Falkow, of blessed memory, who passed away suddenly while I was working diligently on this thesis on January 15, 2013, at the age of 94. Throughout my life, she was always very proud of my accomplishments but was not able to share in the joy related to the completion of this one. As the devoted and loving matriarch of the Falkow family and the last of my grandparents to move on, she will be deeply missed.

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I. INTRODUCTION

> Initiative is a little like creativity in that both require curiosity. Not the search for the 'right' answer, as much as an insatiable desire to understand how something works and how it might work better.
>
> The difference is that the creative person is satisfied once he sees how it's done. The initiator won't rest until he does it.
>
> —Seth Godin[2]

Nearly 12 years ago, the shocking and tragic events of 9/11 triggered the fast and furious creation of what is now referred to as *homeland security*. More than $630 billion has been spent in the first decade since 9/11 developing, incubating, and refining this new theme.[3] Along with these massive expenditures, tens of thousands of jobs in both the public and private sectors have been created in the name of homeland security,[4] enormous governmental reorganizations at the federal, state, and local level have occurred,[5] and the American way of life has been dramatically altered—perhaps forever.

In an effort to keep pace with this dramatic transformation and the major policy-based decisions being made, educational institutions responded by creating dozens of programs of study in this emerging field (both degree granting[6] and professional

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[2] Seth Godin, *Poke the Box: When Was the Last Time You Did Something for the First Time?* (Irvington, NY: Do You Zoom, Inc., 2011), 24.

[3] Funding for homeland security has risen from $16 billion in FY2001 to $71.6 billion requested for FY2012. Adjusted for inflation, the United States has spent $635.9 billion on homeland security since FY2001. Of this $163.8 billion has been funded within the Pentagon's annual budget. The remaining $472.1 billion has been funded through other federal agencies. National Priorities Project, "U.S. Security Spending Since 9/11," May 26, 2011, http://nationalpriorities.org/publications/2011/us-security-spending-since-911/.

[4] This website lists the most-recent 1,000 jobs nationwide that relate to homeland security. The postings are constantly updated. Homeland Security.com, "Job Board," (n.d.), http://jobs.homelandsecurity.com/job-board.php.

[5] According to Peter Andreas, the creation of DHS constituted the most significant government reorganization since the Cold War and the most substantial reorganization of federal agencies since the National Security Act of 1947, which created the National Security Council and Central Intelligence Agency. TopTenz.net, "Top 10 U.S. Government Changes Since 9/11," http://www.toptenz.net/top-10-u-s-government-changes-since-911.php.

[6] Emergency Management, Training & Education, "Homeland Security Degrees," January 1, 2009, http://www.emergencymgmt.com/training/Homeland-Security-Degrees.html.

certification-based[7]). Despite this colossal paradigm shift,[8] an ongoing debate exists as to whether or not homeland security is or will become a legitimate academic discipline. However, what does it really mean to be an academic discipline? Is it some coveted achievement similar to when a bill becomes a law after what could be numerous iterative cycles and occasional rewrites? Or, is it some greatly anticipated metamorphosis that happens naturally in a field of study's lifecycle akin to a caterpillar transforming from one stage to the next until it becomes a beautiful adult butterfly?

Either way, while a complete and exhaustive review of every piece of literature surrounding academic disciplines cannot be accomplished, much of the literature regarding formalized academic disciplines focuses on the interrelationships between faculty and students and does not address the core need of this research, which is a definable framework and structured methodology by which it is possible to evaluate whether or not a field of study is or will become an academic discipline. In the absence of a formula or equation that could be used to solve this complex question, the classification schemes detailed in the literature are reviewed in an attempt to create (or perhaps assemble) a definable framework that might offer an empirical perspective into how fields of study become academic disciplines. This analysis will also need to include the concept of *legitimacy* as it relates to how a new or emerging discipline may be viewed by the academic community because the collinear relationship between the traditional notion of an academic discipline and institutions for higher learning is inescapable.

As such, the initial stage of evaluation is focused upon by exploring four (4) principal areas that appear essential in addressing this question: 1) the boundaries that loosely quantify the subject area, at least as seen today by considering the need for it to evolve, mature, and change (possibly radically) over time, 2) the long-term projections of demand for the subject area knowledge (e.g., will the need for a specialized workforce

---

[7] Emergency Management, Training & Education, "Emergency Management Certificate Programs," January 1, 2009, http://www.emergencymgmt.com/training/Emergency-Management-Certificate-Programs.html.

[8] Thomas Kuhn, in his highly referenced book *The Structure of Scientific Revolutions*, suggests that when "confronted with anomaly or with crisis, scientists take a different attitude toward existing paradigms, and the nature of their research changes accordingly."

drive the demand for sustained educational preparation and continual training through programs of study designed to educate, train, and prepare professionals and academics to solve an ever-growing list of issues and problems), 3) a methodology for determining the legitimacy of a potential academic discipline, and 4) the need for a curriculum at the doctoral level.

If it is determined that what today is referred to as homeland security is (or will be) an academic discipline, the next logical step is to evaluate the strategic worthiness of creating an advanced curriculum and formal course of study eventually leading to a PhD in the discipline. The latter of which would hopefully produce a new cadre of faculty with sharper vision, deeper insight, and greater inspiration. If homeland security is ready to be promoted to a full-scale academic discipline, then it is time to enhance the domain of knowledge in this arena and better prepare tomorrow's thinkers and problem solvers to adapt to the ever-changing homeland security landscape.

A. PROBLEM STATEMENT—BACKGROUND

Prior to 9/11 and the creation of what is called the homeland security enterprise (HSE), much of the federal, state, and local government focus was on key areas of defense, intelligence gathering, emergency management, public safety, and law enforcement. The impact of natural disasters was planned for and responded to (although perhaps not well at times), and training and education focused on the practitioner side of how to execute plans efficiently and effectively. After-action reports and lessons learned became the norm, and recursive feedback loops were implemented in an effort to avoid making the same mistakes time and again. The use of the Incident Command System (ICS) to command, control, and coordinate emergency response grew to be standard practice, and crisis management developed into a routine.

However, what about areas focused more toward prevention, such as this nation's aging critical infrastructure, public health, psychological and medical issues, alternative energy, global climate concerns, and the use of technology and its impact on society? Furthermore, how it is possible to tie all these together in a meaningful way? These areas were not new issues prior to 9/11, and many were being dealt with in their own arenas.

However, in the aftermath of 9/11, some critics might say the pendulum swung too far the other way, as it seemed that virtually everything was being thrown into the HSE (see Table 3).

Table 1. Topic Areas Contained within Homeland Security According to Bellavita and Gordon[9]

1. Threats to the Homeland
2. Risk Management and Analysis
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12. Systems Integration and Administration of Homeland Security
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21. Preparedness
22. Private Sector Role in Homeland Security
23. Public Health & Medical Issues
24. Role of State and Local Governments
25. Homeland Security Technology
26. Weapons of Mass Destruction
27. Critical Thinking
28. Federalism
29. Strategic Communications
30. Transportation Security
31. Basics of Homeland Security
32. Civil Liberties
33. Decision-Making
34. Ethical Issues
35. Interagency Coordination
36. Leadership
37. Media
38. Politics of Homeland Security
39. Prevention of Terrorism
40. Psychology of Homeland Security
41. Recovery After an Attack
42. Risk Communications
43. Utilities and Industrial Facilities Security
44. Emergency Management
45. Engineering
46. Exercises and Training
47. Geospatial Dimensions of Homeland Security
48. Human Resource Management
49. Modeling & Simulation
50. Role of Communities in Homeland Security
51. Role of Individuals in Homeland Security

[9] Bellavita and Gordon, "Changing Homeland Security: Teaching the Core," 1.

Looking at this extensive list of components, one common theme that does emerge is that of prosperity and the preservation of the U.S. way of life. Nevertheless, as the HSE rocketed into the forefront and the topics grew to include more than just response and recovery, the need emerged for a broader cadre of skilled knowledge workers that could actually do more than just respond to and recover from localized or regional disasters. The first on scene in the midst of the foray were the highly trained first responders, which was beneficial, as a sincere need existed for a practical, *get-it-done* methodology based upon effective tactical execution. However, as the HSE began to take shape and more in-depth topics and components were added to the mix, it quickly exceeded the boundaries of a practitioner-only mindset. Clearly, it should be noted that because the emotion, anxiety, insecurity, and plain old uncertainty was so widespread, just about everything became connected to the HSE, which also meant that funding for HSE-related activities, education, and projects was abundant at just about every level. Therefore, this mass hysteria, as some might call it, rightly or wrongly created a frenzy that produced a knowledge gap rooted in theory more than practice.

Too much practice results in training based upon what has happened before and is retrospective evaluation leading to prospective execution, which typically contains little independent thought, and thus, less flexibility that also tends to foreclose forward, out-of-the-box creativity, innovation, and collaboration. Too much theory and what results is in-depth foundational philosophy difficult to apply to the real world and the problems that naturally present themselves, which is akin to knowing all the rules of algebra and geometry but not having the ability to solve the often dreaded word problems. Clearly, a need exists for both, that of theory and practice, in the formal study of the HSE. The key is to determine the most effective balance between the two coupled with the proper ratio of ingredients (e.g., the components that should be included).

Since this new field of study is dynamic, fluid, and unpredictable, the investigation into the core of the argument as to whether or not homeland security is an emerging academic discipline requires in-depth research involving more than just a cursory overview of the topic because few if any theorems are available that can be used to test the hypothesis. Also, one might ask, why is it even important to try and determine

whether or not homeland security is or will be an academic discipline? The philosophical answer to this question seems very straightforward. With discipline, comes order; and with order, less chaos. With a reduction in chaos, expansion of knowledge and human mental growth persist. When the knowledgebase expands, it is possible to solve problems, some of which have yet to even be uncovered. Solving problems that impact a way of life or its very existence promotes the longevity of the species. Furthermore, no guarantee exists that an effective analysis can be accomplished without the injection of at least some amount of speculation, assumption, and inference, all of which may erode the scientific value of the research because in essence what results is the analysis, synthesis, and potential proposition of new knowledge. Finally, the end-result evaluation must include the ability to self-correct and adjust midstream, as the evolution of the field is rapidly changing.

For homeland security, it is clear that it is essential to create a foundation of knowledge and abstract theory that prepares individuals for the future in both thought and practice so it is possible to solve the wicked problems that are not even known to exist yet. It might be asked why introduce the philosophical perspective into the practitioner's job. The answer lies in knowing that when the practical aspects of a job are studied, it is possible to learn *how* to act. When critical thinking and the ability to perform in-depth research leading toward well-constructed analyses are added, the mind is developed and strengthened. Thus, learning *how* to think is achieved, which is necessary if individuals are expected to develop new ways to act. The late Vice Admiral Arthur K. Cebrowski summarized this philosophical perspective when he said, "that there's a difference between education and training. You train for the known; you educate for the unknown."[10]

[10] Arthur K. Cebrowski, "Special Briefing on Force Transformation," *The Air University*, November 21, 2001, http://www.au.af.mil/au/awc/awcgate/transformation/t11272001_t1127ceb.htm.

B. RESEARCH QUESTIONS

1. Primary Question

Does homeland security constitute an emerging academic discipline? The starting point of this endeavor clearly needs to focus on two things: 1) what is an academic discipline, and 2) what is homeland security?

2. Secondary Questions

Does the interdisciplinary nature of homeland security lend itself to an emerging academic discipline, or is it a new fad that is nothing more than a repackaging of something already in existence? In other words, will new knowledge be developed or simply be characterized differently to satisfy the proverbial flavor of the day? To evaluate this aspect of the problem, it will be essential to determine if a mode of inquiry exists that defines how homeland security-related data is collected, interpreted, and classified to help quantify what constitutes new knowledge.

C. THEORETICAL FRAMEWORK

This research delves into the new field of study called homeland security in an effort to determine if sufficient impetus exists for it to be or soon become an emerging academic discipline. Based upon this proposition, it is anticipated that the necessary characteristics of what constitutes an academic discipline coupled with the current scope of the HSE can be identified from a review of the relevant literature combined with a case study-based examination of various other fields of study, some of which are widely considered today to be formal academic disciplines.

This research seeks to identify the specific characteristics of academic disciplines to understand better how and where homeland security and its component architecture fit in. Do existing academic disciplines provide sufficient depth and breadth to cover all of the interdisciplinary aspects of homeland security, or is enough unique substance emerging to generate self-sufficiency? These boundaries of the framework must be carefully evaluated.

D. SIGNIFICANCE OF RESEARCH

This research helps solidify the question as to whether or not homeland security is or will become an academic discipline. In addition, the results of this effort will help homeland security leaders and educators develop and implement educational policies, practices, knowledge units, and skills-based objectives to support the future evolution of homeland security. As the world becomes more dynamic and complex each and every day, the ability to prepare current and future homeland security professionals properly and effectively may necessitate the birth of a new culture rooted in both philosophy and practicality. While nature will likely outline its course, it will be necessary to do more than simply participate in the evolution—the homeland security leaders of tomorrow must define it.

II. LITERATURE REVIEW

A literature review can be viewed much like a multilayered treasure hunt in which the objective is to find as much useful and worthwhile reference material on a given topic while continually searching for that often elusive *mother lode*. Along the way, some material the reader finds may be packed with tempting treasures in the form of additional and highly valuable references that can spawn further *hunts*. Yin makes reference to the purpose of the literature review. He contends that it should not be a process by which to determine answers about what is known, but rather it helps the investigator "develop sharper and more insightful questions about the topic."[11] As such, the following breakdown of the literature first and foremost is not exhaustive, and second, it will serve to help establish a research strategy, the goal of which is to determine what an academic discipline is, why it is important, what role it plays in the academic environment (specifically within institutions of higher learning), and whether or not a common analytical framework can be derived that might help evaluate if homeland security is emerging or will emerge as an academic discipline.

A. LITERATURE ON CURRICULA/PROGRAMS

On September 19, 2011, just eight days after marking the tenth anniversary of the 9/11 terrorist attacks, Christopher Gearon, in his *U.S. News and World Report* article entitled "Discover 9 Hot College Majors," ranked Homeland Security as fifth. Furthermore, he brought to light that over the past decade more than 300 programs have sprung up with 75 leading to undergraduate degrees.[12] With the number of institutions of higher learning offering graduate-level degrees with emphases in homeland security growing, the question arises whether or not this field of study has become an academic discipline. The leading institution, which shares its curriculum with other universities, is the Center for Homeland Defense and Security (CHDS) at the Naval Postgraduate School

[11] Robert K. Yin, *Case Study Research: Design and Methods* (Beverly Hills, CA: Sage Publications, 1984), 20.

[12] Christopher J. Gearon, "Discover 9 Hot College Majors," *U.S. News and World Report*, September 19, 2011, http://www.usnews.com/education/best-colleges/articles/2011/09/19/discover-9-hot-college-majors.

(NPS) based in Monterey, California. Founded in 2002 and funded by the Department of Homeland Security (DHS), CHDS was designed (according to its website) to be the nation's premier homeland security educator.[13]

1. Literature on What Constitutes an Academic Discipline

The *Oxford English Dictionary* (OED) defines ACADEMIC as "Of, relating to, or characteristic of an educational institution or environment; concerned with the pursuit of research, education, and scholarship; scholarly, educational, intellectual."[14] DISCIPLINE is defined by the same source as "a branch of instruction or education; a department of learning or knowledge; a science or art in its educational aspect."[15] Another definition from OED suggests that DISCIPLINE is "the training of scholars or subordinates to proper and orderly action by instructing and exercising them in the same.[16] Looking at the etymological origins of the word DISCIPLINE, it seems it derives from the Latin *disciplina*, which means "instruction given, teaching, learning, knowledge," also "object of instruction, knowledge, science, military discipline," from *discipulus*, which means a disciple or one who receives instruction.[17] Based on this, Phenix suggests "a discipline is knowledge organized for instruction."[18]

A number of works discuss academic disciplines. First is Abbott's *Chaos of Disciplines*, which focuses on sociology and the intricacies this discipline has as it relates to social science.[19] From Abbott's work, the reader starts to obtain an understanding of the complexities inherent in how academic disciplines evolve, which is an important

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[13] The Naval Postgraduate School & The U.S. Department of Homeland Security, Center for Homeland Defense and Security, "Home," (n.d.), http://www.chds.us/.

[14] OED, Oxford English Dictionary, "Academic, *n.* and *adj.*," (n.d.), http://www.oed.com.libproxy.nps.edu/view/Entry/880.

[15] OED, Oxford English Dictionary, "discipline, *n.*," (n.d.), http://www.oed.com.libproxy.nps.edu/view/Entry/53744.

[16] Ibid.

[17] The Online Etymology Dictionary, "Discipline," (n.d.), http://www.etymonline.com/index.php?term=discipline.

[18] Philip H. Phenix, "The Use of the Disciplines As Curriculum Content," *The Educational Forum* 26, no. 3 (March 1962): 273.

[19] Andrew Delano Abbott, *Chaos of Disciplines* (Chicago: University of Chicago Press, 2001), 259.

perspective. It appears to be the natural order of things that an academic discipline would *self-evolve* by virtue of its own dynamic consumption of new knowledge. This recursively indispensable process in turn iteratively enhances and modifies the academic discipline. Looking at the progression and proliferation of homeland security-based education since 9/11, it is clear that an expansion and solidification of the domain is continually occurring as more scholars add their knowledge and experience to the mix. This process seems to fuel perpetually the domain's growth. The question is will this trend continue.

Next is Schiro's 1978 work, *Curriculum for Better Schools*, which brings everyone closer to the educational aspects of an academic discipline by describing it "as a community of people in search for truth within one partition of the universe of knowledge."[20] Clearly, it seems logical that any group of similarly situated people (practitioners and scholars alike) would focus on the same core body of knowledge in an effort to enhance it going forward.

Other works that provide worthwhile insight into the nature of academic disciplines include *Education and the Education of Teachers*, edited by R. S. Peters, which looks at education as an academic discipline.[21] Originally, this field of study was not given the recognition it deserved, and by today's standards, recognition still appears to be lacking especially in the United States. Peters suggests that the reason behind this phenomenon is "perhaps because it [education] is, unlike law and medicine, connected with a low-status profession whose members are very numerous,"[22] which is an interesting conclusion that begs another ancillary question…does the end-result profession have to be *high-status* to justify the means by which education and knowledge is created? Also, is homeland security itself a profession, or is it simply a catch-all phrase being used to garner excitement or obtain additional notoriety about a particular career choice or grab onto funding opportunities in the wake of 9/11?

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[20] Michael Schiro, *Curriculum for Better Schools: The Great Ideological Debate* (Englewood Cliffs, NJ: Educational Technology Publications, 1978), 361.

[21] R. S. Peters, *Education and the Education of Teachers* (London; Boston: Routledge & K. Paul, 1977), 195.

[22] Ibid., 108.

The next stop along the treasure hunt brings the reader to *A Handbook of Comparative Social Policy*, edited by Patricia Kennett. Kennett's work is very useful because it parallels the quest by posing very similar questions about social policy as an academic discipline versus a multidisciplinary field of study.[23] Furthermore, Kennett's research pointed to another respected work by Angus Erskine who argued that social policy is not an academic discipline because "it does not make a claim to having any unique set of methods, concepts, theories, or insights."[24] Sometimes knowing what something is not helps one learn what it is. Both of these works bring to light several important concepts. First, when focusing on a multidisciplinary field of study, which components of the various disciplines are present is just as important as how the respective components interact with one another. From a holistic sense, the whole is indeed greater than sum of its parts due to the interaction and interrelationships among the pieces. Second, the perspective that an academic discipline should have its own unique set of methods, concepts, theories, or insights may help the reader develop a strategy in determining how the boundaries (or lack thereof) in homeland security should be evaluated.

Another ideal piece of literature, *Engines of Innovation: The Entrepreneurial University in the Twenty-First Century* by Holden and Goldstein, focuses on the theory of academic disciplines, especially in business and entrepreneurship. This work provides additional insight into the dynamics of how universities are constantly being pushed to use academic knowledge to solve real-world problems.[25] This viewpoint could prove very beneficial, as many would agree that the field of homeland security is overflowing with real-world issues—the most complex of which are referred to as wicked problems.[26]

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[23] Patricia Kennett, *A Handbook of Comparative Social Policy* (Northampton, MA: Edward Elgar, 2004), 422.

[24] Peter Alcock et al., *The Student's Companion to Social Policy* (Oxford, UK; Malden, MA: Blackwell, 1998), 12.

[25] H. Holden Thorp and Buck Goldstein, *Engines of Innovation: The Entrepreneurial University in the Twenty-First Century* (Chapel Hill: University of North Carolina Press, 2010).

[26] The phrase "wicked problem" was coined by Horst W. J. Rittel and Melvin M. Webber in their 1973 work *Dilemmas in a General Theory of Planning* to mean problems that are difficult (possibly even impossible) to solve.

Finally, one area that could use some research is literature that compares and contrasts the constructs of academic disciplines between the United States and other countries. This comparative distinction is worth noting because homeland security, while certainly not unique to America, has only recently taken center stage due primarily to the events of 9/11. As a fundamental concept, homeland security to those in the United States may not be the same as homeland security in another country. This point of view is especially true in other developed nations where manmade and natural threats, emergency preparedness and disaster planning initiatives, public health issues, border security, etc., have been driving forces that impact and even alter their cultures and ways of life. However, for an academic discipline, any educational programs associated with it should be fluid enough to work globally, as only the specifics of the content may differ.

To understand this dichotomy better, a quick look at the historical development of the American academic profession is useful, as appreciating the role academic disciplines play within U.S. universities will serve to create a better foundation for why academic disciplines are important. Smart et al. provides an insightful history of the evolution of the American academic profession, which highlights the importance of academic disciplines. Specifically, Smart recounts that "prior to this century [the American academic profession] was heavily influenced by three European models."[27] The first model, according to Smart, was the English Oxford model. It "emphasized mental discipline for the ruling elite with the implicit goal of providing a common social, moral, and intellectual experience for the offspring of that elite."[28] In this model, Smart suggests that academic disciplines held little importance and simply served to "instill moral and intellectual values."[29] The second model to influence the American academic profession was the Scottish model. This model, according to Smart, "emphasized practical subjects and valued applied knowledge and the education of anyone who was qualified to

[27] John C. Smart, Kenneth A. Feldman and Corinna A. Ethington, *Academic Disciplines: Holland's Theory and the Study of College Students and Faculty*, 1st ed. (Nashville: Vanderbilt University Press, 2000), 3.

[28] Ibid.

[29] Ibid.

learn."[30] With this model, Smart contends, the importance of academic disciplines began to emerge in many American institutions. The third European model to provide influence came from Germany. Smart points out that this model "had a strong emphasis on scientific training and research to expand knowledge."[31] Furthermore he says, the German model's "dominant focus on scientific research, publications, and graduate education fully recognized the centrality of academic disciplines in the professional lives of faculty."[32]

With a baseline understanding of what constitutes an academic discipline, two choices are now possible: 1) continue down the path of evaluating literature focused on academic disciplines in search of commonality, practicality, belief, and speculation, or 2) turn toward a focus of homeland security and its emergence as a possible academic discipline.

2. Literature Focusing on the Development of an Academic Discipline

Staying on the path of 'is a field of study an academic discipline,' the journey brings the reader to *International Relations Today: Concepts and Applications* by Aneek Chatterjee. Much as the previous examples reviewed social policy, Chatterjee examines the nature and scope of international relations as an academic discipline by recounting the four decades between how it emerged in the 1920s until the 1960s when the field was given the recognition it deserved.[33] What is especially noteworthy is how Chatterjee refers to international relations as an autonomous academic discipline. He argues that it is independent because it has "mainly, a systematic body of theory, appropriate methodology, and a distinct subject matter."[34] International relations is one of the academic disciplines evaluated as a case study in Chapter IV.

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[30] Smart, Feldman, and Ethington, *Academic Disciplines: Holland's Theory and the Study of College Students and Faculty*, 3.

[31] Ibid.

[32] Ibid.

[33] Aneek Chatterjee, *International Relations Today: Concepts and Applications* (New Delhi, India: Dorling Kindersley [India] Pvt. Ltd, 2010).

[34] Ibid., 3.

Delving further into the evolution of separate disciplines within the social sciences, Larry Kirkhart suggests that the patterns of growth are "strikingly similar to the behavior of bureaucratic structures."[35] He points out that "like many other contemporary organizations, universities are confronted with interpenetrating demands from the environment."[36] These demands, Kirkhart says, "call for an understanding of the nature of existence in a complicated organizational society that is increasingly being placed into an emerging world society and having to deal with the omnipresent factor of organizational change."[37] Finally, Kirkhart observes, "each field of the social sciences has been undergoing continued differentiation into narrower and narrower areas of inquiry, and as this has occurred a league of specialized journals have arisen to meet the communication needs of the subspecialties."[38] This viewpoint is key to the development of a discipline, as discussed in Chapter III, that a network of communication appears to be a necessary component.

Another important aspect of academic disciplines involves the "organic evolution that takes place in knowledge and the ways it is organized."[39] Walter P. Metzger, in his work entitled "The Academic Profession in United States," coined the phrase "subject parturition" in 1987 to describe the emergence of new academic disciplines, which he posits are "outgrowths of more inclusive subjects that had established their academic worthiness, had absorbed an abundance of new material, and had grown too plethoric to stay intact."[40] In essence, it is the natural tendency of new subject matter to be born out of established subject matter areas. An academic discipline, Burton Clark contends, "is a domain of knowledge with a life and dynamic of its own."[41] With this concept in mind

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[35] Frank Marini, *Toward a New Public Administration; the Minnowbrook Perspective* (Chandler Pub. Co., 1971).

[36] Ibid., 130.

[37] Ibid.

[38] Ibid.

[39] Bjørn Stensaker et al., *Managing Reform in Universities: The Dynamics of Culture, Identity and Organisational Change (Issues in Higher Education)* (Palgrave Macmillan, 2012), 28.

[40] W. P. Metzger, "The Academic Profession in the United States," in *The Academic Profession: National, Disciplinary, and Institutional Settings*, ed. B. R. Clark (Berkeley: University of California Press, 1987), 128.

[41] Ibid., 381.

and as mentioned earlier, it is equally important to recognize the symbiotic relationship between an academic discipline and the structure, process, and organization of higher education both in terms of the institutions and their respective faculty. Clark suggests, "disciplines have conscious goals."[42] Furthermore, he concludes that

> In fact it is their intentions and strivings and not those stated as the broad aims of higher education, which determine the real goals of the many departments, schools, and sub-colleges that make up the operating levels of universities and colleges. The operating units are as much if not more the arms of the disciplines as they are the arms of the institutions, especially when research is emphasized over teaching and specialized training is more important than liberal education.[43]

This concept may be valuable when one evaluates how institutions accept or reject the emergence of an academic discipline based upon various change agents (e.g., internal and external forces, such as faculty research and social, cultural, or political pressures) and the issue of legitimacy, which is discussed later.[44]

3. Literature on the Development of Homeland Security

As part of *Public Administration: The Central Discipline in Homeland Security*,[45] Dale Jones and Austin Givens take this issue head on and provide a treasure trove of research in the area. They start out by showing how homeland security has developed into a profession since 9/11.[46] They continue by bringing to light 11 broad homeland security challenges that will persist, and how public sector leaders, administrators, and staff will have to deal with them.[47] Clearly, as Jones and Givens suggest, "homeland security is an evolving interdisciplinary area of study and practice."[48] Both researchers do

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[42] Metzger, "The Academic Profession in the United States," 381.

[43] Ibid.

[44] Stensaker et al., *Managing Reform in Universities: The Dynamics of Culture, Identity and Organisational Change (Issues in Higher Education).*

[45] John Smith, *The Future of Public Administration Around the World: The Minnowbrook Perspective*, eds. Rosemary O'Leary, David Van Slyke and Soonhee Kim (Washington, DC: Georgetown University Press, 2010).

[46] Ibid., 67.

[47] Ibid., 69.

[48] Ibid., 71.

a superb job of evaluating the diversity among the various educational programs, including the CHDS master's degree program at NPS. After discussing the topic with two of the school's professors, Christopher Bellavita and Ellen Gordon, Jones and Givens draw the conclusion that "there is widespread agreement that homeland security as an academic discipline has not reached full maturity."[49]

Suggesting that the field of homeland security has not reached full maturity on its journey toward being an academic discipline implies that it is heading in that direction. This focus is directly on par with the primary question at hand. At what point in its maturation process does a field of study reach the point when it can be called an academic discipline? Along these lines and perhaps more intriguing is the question of whether or not natural forces exist that might amplify the speed of incubation, or whether or not the process can be sped up artificially? Conversely, does some constraint or obstacle exist that could slow down the process or stop it completely? Jones and Givens point out that doctoral-level programs are coming soon because "the first wave of undergraduate and master's degree programs is paving the way."[50] Furthermore, they wrap up a detailed analysis of graduate-level coursework that addresses the 51 primary topics of homeland security as compiled by Bellavita and Gordon[51] (See Table 3) by saying, "the rapid emergence and growth of homeland security as an area of study and practice suggests a highly dynamic and progressive future field that will mature as an academic discipline."[52] Again, the questions are when, under what circumstances, and how fast (if at all) will this happen?

B. ANALYSIS—WHAT DOES IT ALL MEAN?

Much of the literature discussing fields of study focuses on why they should or should not be considered formal disciplines (or at least not yet). It is important at this juncture to note the difference between a field of study and a discipline. Davies and

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[49] Smith, *The Future of Public Administration Around the World: The Minnowbrook Perspective*, 72.

[50] Ibid.

[51] Bellavita and Gordon, "Changing Homeland Security: Teaching the Core," 1.

[52] Ibid., 74.

Devlin point out that "disciplines are generally considered more discrete than 'fields of study' or 'fields,' in that a field is generally outlined when undertaking a course of study in a discipline. Thus, a 'field' of study has a wider meaning than a 'discipline'…A 'discipline thus defines and delimits a 'field' of study, rather than the other way around."[53] This perspective is valuable, but it leaves the reader asking for more. The iterative process of researching, evaluating, applying, and synthesizing the existing literature could be described as a complex adaptive system, which has as part of its roots, emergence, iteration, patterns, and relationships.[54] For the purposes of deciding whether or not homeland security might or might not fit, liberally combining the formal definitions of ACADEMIC and DISCIPLINE may not be sufficient. Clearly, an academic discipline is comprised of many organic components, and homeland security as a possible emerging discipline is still taking shape. According to Tony Becher, the knowledge is what shapes thought and behavior within a discipline. He contends, "disciplines develop different ways of training and initiating new members, and they influence how members specialize, interact with one another, and move among positions within the field."[55] As such, additional research into the evolution of an academic field is necessary. This research can, and should, include resources and real-world examples of fields of study that emerged first as concentrations of established academic disciplines and then themselves became academic disciplines as their raw academic material began to settle and external formative factors sculpted them over time. In addition, it will be worthwhile to evaluate those fields of study that did not quite make it to the coveted position of being called an academic discipline. What did they lack? Where did they fall short in their maturation process? Was it external and through no particular fault of their own that they did not make the proverbial grade? Or, is it possible that the real world and innovation simply passed them by too quickly?

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[53] W. Martin Davies, Marcia Devlin and Malcolm Tight, ed., "Interdisciplinary Higher Education," in *Interdisciplinary Higher Education: Perspectives and Practicalities*, ed. Martin Davies and Marcia Devlin, 1st ed. (Bingley: Emerald Group Publishing Limited, 2010), 5.

[54] John Henry Holland, "Studying Complex Adaptive Systems," *Journal of Systems Science and Complexity* 19, no. 1 (2006): 8.

[55] Clark and Rockefeller Foundation, *The Academic Profession: National, Disciplinary, and Institutional Settings*, 382.

Next, evaluating society, its complexities, and how it has evolved, may provide some clues as well. History is filled with scholarly and philosophical works that look to understand how and why societies thrive and why they fail. According to Joseph Tainter, "it has been argued that complexity is a primary factor linking problem solving to the success or collapse of societies and institutions."[56] Tainter argues that while individuals seem to be averse to complexity (e.g., the universally understood 'Keep it Simple' adage) because of the high individual cost (e.g., time, money, labor etc.), the value proposition in complexity is that "it has great utility in problem solving."[57] This connection between complexity and problem solving may define (or perhaps justify) the creation, or birth so to speak, of homeland security after 9/11. In a later work, Tainter suggested, "as the problems that institutions confront grow in size and complexity, problem solving grows more complex as well."[58] He references the growth, consolidation, and increases in regulation that followed 9/11 as "the immediate response to the attacks was to increase the complexity of public institutions, by establishing new agencies, absorbing existing agencies into the federal government, and exerting control over behavior from which a threat might emerge."[59]

Finally, it will be important to delve deeper into what specific criteria should be used to judge whether or not a field of study is an academic discipline or is emerging toward that potentially desirable state. It appears little formal theory exists in this arena, which creates opportunities and pitfalls. As such, the following chapter defines an analytical framework that can be used.

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[56] Joseph A. Tainter, "Problem Solving: Complexity, History, Sustainability," *Population and Environment: A Journal of Interdisciplinary Studies* 22, no. 1 (2000): 6.

[57] Ibid., 7.

[58] Robert Costanza, Lisa Graumlich, and W. L. Steffen, *Sustainability Or Collapse?: An Integrated History and Future of People on Earth* (Cambridge, MA: MIT Press in cooperation with Dahlem University Press, 2007), 70–71.

[59] Ibid.

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III. DEFINING THE ANALYTICAL FRAMEWORK

To understand better the complexities surrounding whether or not homeland security (or some variant label that may better quantify this field of study) is or is not an emerging academic discipline, it will be important to try to develop an analytical framework of components that may be common to all academic disciplines in some way, shape, or form. While it appears that 'no one size fits all' is the reality, it does appear as if all academic disciplines have shared structures, configurations, and composition. Furthermore, a fundamental relationship also appears between the emergence of academic disciplines and man's quest for knowledge based upon his discoveries, advancement, and significant societal events both positive and negative. While a great deal has been written over the ages about academic disciplines and their emergence, most is done retrospectively.

One of the most useful and extensive evaluations of the variations among academic disciplines was conducted by Braxton and Hargens. Their work focused on "analytic schemes for studying scholarly disciplines empirically."[60] They concluded that "differences among academic disciplines are profound and extensive,"[61] and "most of the disciplinary differences revealed by [their] survey are related to variation in levels of scholarly consensus."[62] Braxton and Hargens point out that "ironically, disciplinary boundaries themselves seem to have obscured some of the commonalities between the different frameworks that scholars have proposed."[63] Their research provides focus on the primary objective of this chapter, which is to define an analytical framework of characteristics that can be used to determine if a field of study is or will emerge as an academic discipline. It is less important to evaluate where a field of study may fit in the

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[60] John C. Smart, Association for Institutional Research and Association for the Study of Higher Education, *Higher Education: Handbook of Theory and Research, Volume XI* (New York: Agathon Press), published under the sponsorship of the Association for Institutional Research (AIR) and the Association for the Study of Higher Education (ASHE), 1996), 2.

[61] Ibid., 36.

[62] Ibid.

[63] Ibid., 37.

overall scope of disciplines for the purposes of classification, as Biglan's "hard-soft, pure-applied, and life-non-life" model[64] would provide. Likewise, it is somewhat obvious that consensus among faculty and scholars that a field is a discipline would be necessary to classify it as such. This research is more concerned with what disciplines share, as it will provide a better mode for analytic comparison, and ultimately, assist in determining whether homeland security is suitable for inclusion.

This chapter evaluates a wide spectrum of that scholarly work in an effort to define an analytical framework. The first section is based primarily on the works of Arthur King and John Brownell, Philip Phenix, Gerald Holton, Michael Polanyi, and Johann Murmman. These respected scholars each provided insight, imagination, and philosophical depth over the past five decades as to what characteristics academic disciplines share. As such, borrowing a term from symbolic logic, taking the *union* of these perspectives defines the framework used. The second section discusses the concept of interdisciplinarity, which is the noun form of the word interdisciplinary. The OED defines the adjective form of the word as "of or pertaining to two or more disciplines or branches of learning; contributing to or benefiting from two or more disciplines."[65] Joe Moran, in his highly respected and heavily cited work, *Interdisciplinarity*, outlines how this construct has shaped and divided knowledge into multiple disciplines over the past several centuries to create new forms of knowledge.[66] The tremendous value of his cumulative efforts are summarized within this section, as it sets the foundation for how most disciplines in recent history have emerged. The third section discusses the way new academic disciplines emerge through the concept of *legitimacy*. Karin Bump's in-depth doctoral dissertation provides the core aspect of this section, as she based her work on the

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[64] Biglan presented a three-dimensional perspective for classifying disciplines and fields of study in Anthony Biglan, "The Characteristics of Subject Matter in Different Academic Areas," *Journal of Applied Psychology* 57, no. 3 (June 1973): 195–203.

[65] OED, Oxford English Dictionary, "interdisciplinary, *adj*.," (n.d.), http://www.oed.com.libproxy.nps.edu/view/Entry/97720

[66] Joe Moran, *Interdisciplinarity*, 2nd ed. (London; New York: Routledge, 2010), 1–18.

established models put forth by Mark Suchman and Kenneth Boulding, both of whom are highly respected scholars cited for several decades across multiple disciplines and fields of study.

A. THE CHARACTERISTICS OF DISCIPLINES

When describing the characteristics of disciplines, King and Brownell put forward the perspective that areas of study are really a metaphor for "communities of scholars who share a domain of intellectual inquiry or discourse."[67] Furthermore, they espouse that "these societies of specialists are engaged in a variety of styles of human imagination in which the spirit of inquiry is applied to defined domains of human concern."[68] This perspective is an important observation because new disciplines emerge when "the body of intellectual discoursers in a field has one or more characteristic ways of knowing—of warranting knowledge—or it may share modes of inquiry from other disciplines."[69] The following 11 subsections describe the characteristics used as the framework for the case study-based approach of evaluating what defines an academic discipline.

1. Component 1—Community of Persons

King and Brownell suggest that a discipline is a community. By community, they are referring to a group of people (scholars in this case) that share a common intellectual commitment to making valuable contributions to human thought and human affairs.[70] Membership in the community, they point out, is not always obvious (e.g., it may be through a professional society, holding a teaching position specific to that discipline, possessing one or more terminal degrees in the field, etc.). However, members are conscious of the "brotherhood," and each has "a commitment to each other and to the guiding premises and lines of inquiry of the group."[71] Finally, like a work constantly in

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[67] Arthur R. King and John Arnold Brownell, *The Curriculum and the Disciplines of Knowledge; A Theory of Curriculum Practice* (R. E. Krieger, 1966), 68.

[68] Ibid.

[69] Ibid.

[70] Ibid.

[71] Ibid.

progress, "a discipline is a working flourishing establishment; hence it is in a state of continual change, sometimes dynamic, sometimes nearly static."[72] One final and very important point that King and Brownell make is that "if the community is to maintain itself, to expand its membership and its contribution to man, it must attract new members and move them quickly to positions as active discoursers."[73]

2. Component 2—An Expression of Human Imagination

As part of the second component of their characteristics of a discipline, King and Brownell share what they believe is human imagination and its relationship to knowledge. "Human imagination is the creation of novel mental images in a variety of forms; ideas, sentences, concepts, sequences, harmonies, rhythms, figures, among others."[74] In looking at the absence of imagination, King and Brownell point out that "the creative impulses of a discipline can never be said to be limited, yet a field may falter because of the paucity of generative ideas or conceptions."[75]

3. Component 3—A Domain

The next characteristic that King and Brownell mention is that of domain. The word *domain* is often times used metaphorically to represent geographic regions, territories, areas of influence, and even a virtual location or address on the Internet. Specifically as it relates to knowledge and its connectivity to a discipline, King and Brownell suggest, "the domain of a discipline is that natural phenomenon, process, material, social institution, or other aspect of man's concern on which the members of the discipline focus their attention."[76] It is interesting to note, however, that while the word domain connotes a region with boundaries, borders, restrictions, or some otherwise constricting margins, King and Brownell suggest the opposite. In fact, they describe

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[72] King and Brownell, *The Curriculum and the Disciplines of Knowledge; A Theory of Curriculum Practice*, 68.

[73] Ibid, 69.

[74] Ibid., 71.

[75] Ibid., 74.

[76] Ibid.

disciplines as not lending themselves to simple systems of classification. Instead, "each discipline has emerged from the undifferentiated field of prior human thought and proceeded to define and develop its realm, limited only by its ability to captivate human imagination, to produce viable conceptions, to gather adherents, and to marshal the acceptance and support of the university."[77] This concept of domain is essential because it carries with it both a passive perspective of thought and knowledge coupled with an active perspective of influence and action all brought together by the very participants in the discipline who choose to intentionally and unintentionally expand its boundary-less realm.

4. Component 4—A Tradition

King and Brownell next put forth the supposition that an academic discipline must have a tradition or history. Philip Phenix in his essay included in the Phi Delta Kappa Symposium on Educational Research in 1963, uses the analogy of biological evolution to describe the growth and development of an academic discipline:

> The history of thought makes it clear that new species of knowledge emerge from time to time as a result of structural mutations that prove viable. In recent times, with the rapid expansion of knowledge in all fields, many new disciplines have sprung up, and there is every reason to expect that these developments will continue at an accelerated pace.
>
> Furthermore, just as species in the world of living things may run their evolutionary course and disappear through maladaptation, so it is possible that disciplines that have been fruitful may gradually exhaust their possibilities of development within the total context of human inquiry at a particular stage of intellectual evolution.[78]

This supposition implies a level of growth, maturation, or ripening so to speak, which like an organism carries with it the concept of a birth, growth from simple to complex, and even death. Further borrowing from biology, the theories associated with organic evolution to define succinctly the progression of an academic discipline can be easily

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[77] King and Brownell, *The Curriculum and the Disciplines of Knowledge; A Theory of Curriculum Practice*, 74.

[78] Philip H. Phenix, "The Architectonics of Knowledge," in *Education and the Structure of Knowledge*, ed. Stanley Munson Elamm (Chicago: Rand McNally, 1964), 49.

applied. Its birth, growth, change, and progress mimic how organic evolution describes the way organisms develop and progress over time. Dating back to Darwin and his 1859 landmark work, *The Origin of Species*, the idea that natural variation exists among the population of a species shows that certain traits are inheritable, in this case from parent to offspring. While it may appear far outside the proverbial box to shadow the construct of organic evolution as it relates to academic disciplines, the fundamental properties easily describe how a discipline emerges, changes, and progresses over time. Virtually all of the same parallelized analogies can be drawn.

5. Component 5—Syntactical Structure—Mode of Inquiry

Gerald Holton in his original 1952 work *Introduction to Concepts and Theories in Physical Science* advocated for three interrelated elements of scientific thought.

> First of all there are the *concepts or constructs*, like velocity, mass, chemical element, etc.—the main ideas which the particular sciences use as vocabulary…Second, there are the *relationships between the concepts*. These relations may be simple factual observations, … or may be more general summaries of facts called laws, principles, and so forth, …or may even be larger systems relating to one another…Last, although we take it for granted, we must not forget at least to mention that part of science, which contains the *grammar* for expressing, verbally or mathematically, definitions of concepts and relationships between concepts, i.e., the logic of language itself.[79]

King and Brownell add the term *rhetoric* to Holton's three elements, as the "term suggests that discourse in a discipline has its preferred forms, its aesthetic qualities, and its sense of appropriateness, elegance, and beauty—its style."[80] Thus, they contend, "if a student or mature specialist [in an academic discipline] is to progress in his command of the field, he must develop fluency with the modes of inquiry in a field."[81] This viewpoint makes it possible to draw the conclusion that having rules (e.g., syntax) within a

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[79] Gerald James Holton and Stephen G. Brush, *Introduction to Concepts and Theories in Physical Science*, 2nd ed. rev., and with new material, ed. Stephen G. Brush (Reading: MA: Addison-Wesley Pub. Co, 1973), 220.

[80] King and Brownell, *The Curriculum and the Disciplines of Knowledge; A Theory of Curriculum Practice*, 79.

[81] Ibid.

discipline provides the policies and procedures by which discourse occurs that sets the stage for the next component, which is the conceptual structure or substance (e.g., the material that comprises a discipline).

6. Component 6—Conceptual Structure—Substance

King and Brownell state, quite succinctly, "the conceptual structure of any discipline is the full set of ideas in a discipline at any one time. Structures are dynamic patterns; they are [by their nature] developmental."[82] Taking this one step further, the conceptual structure of a discipline appears to denote the "origin of inquiry."[83] Further, King and Brownell point out, "investigators in a discipline do not work alone." They leverage the value inherent in the discourse-based goals and objectives their colleagues (within or outside their common community) have in an attempt to "construct better, more satisfactory models which do not have the same flaws,"[84] which is how disciplines evolve from a substantive nature. Clearly, as was foreshadowed previously, both syntactical structure and conceptual structure go hand-in-hand. King and Brownell conclude by suggesting that "in the pattern of existing concepts, laws, and theories of a discipline (its conceptual structure) and the mode of inquiry (its syntactical structure) the scholar finds his resources and guides for further intellectual exploration."[85]

7. Component 7—A Specialized Language or System of Symbols

Most disciplines have specialized languages or systems of symbols. Mathematics, for example, uses symbols to represent concepts. The $=$ (equal sign) represents numerical equality as in $x = 7$, where the value represented by the variable x is numerically equal to 7 at all times. The $>$ (greater-than sign) represents the concept that anything on the left side of the symbol is at all times greater in value than what appears on the right side of the symbol. As such, if $x > 7$ is written, at all times the value

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[82] King and Brownell, *The Curriculum and the Disciplines of Knowledge; A Theory of Curriculum Practice*, 81.

[83] Ibid., 82.

[84] Ibid., 83.

[85] Ibid., 84.

represented by the variable x is greater in some way, however small or large, than the value 7. Furthermore, it cannot be equal to 7 or any amount less than 7. As can be easily observed in the aforementioned examples, the use of mathematical symbols provide those within (and outside) the community with an "intellectual shorthand"[86] that simplifies communication. The key, however, is ensuring that the specialized language or system of symbols is understood by all who wish to (or need to) communicate, which is especially evident in disciplines in which the terminology, or jargon, is highly specialized or uncommon. It is not required for a discipline to have its own unique language or system of symbols, as it may borrow or share those from another discipline. Furthermore, as King and Brownell mention, a discipline may use ordinary language and general terminology, such as philosophy. However, they point out, those general terms often come "with highly specialized meanings."[87] The inclusion of this component, according to King and Brownell, is to "suggest that a very large part of joining a community of intellectual discourse is making 'second nature' the special language forms that it uses."[88]

8. Component 8—A Heritage of Literature and a Communications Network

Academic disciplines by their very nature produce materials that can take many forms. These "symbolic expressions of the membership"[89] are then made available to each member of the community (as well as those outside the community) to make the flow of discourse-based information "essential to the continuous activities of the field."[90] In addition to the ebb and flow of discourse-based communications, King and Brownell add membership in professional societies, "which has been a clearing house, a stimulus, and sometimes a funding agent for scholarship in the last few centuries."[91] The

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[86] King and Brownell, *The Curriculum and the Disciplines of Knowledge; A Theory of Curriculum Practice*, 84–85.

[87] Ibid., 85.

[88] Ibid., 86.

[89] Ibid.

[90] Ibid.

[91] Ibid., 87.

conclusion, according to King and Brownell, is that "a command of the materials of a discipline and participation in the [communications] network are hallmarks of membership in a community of learning."[92]

9. Component 9—A Valuable and Affective Stance

Having an emotional attachment to a focus of concern commonly affects an individual's mood, attitude, feeling, and disposition. This concept is defined within social psychology literature as *affective stance*,[93] which ties directly with King and Brownell's belief that "the fuel for the engine of intellect is that more potent and elusive stuff, the supranational capacity of man for emotion, for hope, for faith, for commitment, and for beauty."[94] Further, they posit, "the work of the intellectual community displays an emotional dynamism."[95] Michael Polanyi termed this phenomenon "intellectual passions," which he believed "perpetuate themselves by their fulfillment."[96] King and Brownell continue on this theme by suggesting, "each part of the pattern of activity in the life of the intellect is charged emotionally for the scholar who would hold a dream or vision that the principles of thought of the discipline will have wider application to human thought and human affairs."[97] Finally, they note that this excitement is "forged during the early studies in the discipline."[98]

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[92] King and Brownell, *The Curriculum and the Disciplines of Knowledge; A Theory of Curriculum Practice*, 87.

[93] Elinor Ochs, "Linguistic Resources for Socializing Humanity," in *Rethinking Linguistic Relativity*, ed. John Joseph Gumperz and Stephen C. Levinson (Cambridge; New York, NY, Cambridge University Press, 1996), 410.

[94] King and Brownell, *The Curriculum and the Disciplines of Knowledge; A Theory of Curriculum Practice*, 87.

[95] Ibid., 88.

[96] Michael Polanyi, *Personal Knowledge; Towards a Post-Critical Philosophy* (Chicago: University of Chicago Press, 1958), 183.

[97] King and Brownell, *The Curriculum and the Disciplines of Knowledge; a Theory of Curriculum Practice*, 89.

[98] Ibid., 90.

10. Component 10—An Instructive Community

As mentioned previously, Phenix suggests, "a discipline is knowledge organized for instruction."[99] As part of his theory, he put forth three qualities of disciplined knowledge, "all of which contribute to the availability of knowledge for instruction and thus provide measures for degree and quality of discipline."[100] The three qualities are *analytic simplification*, *synthetic coordination*, and *dynamism*. Analytic simplification, according to Phenix, is "a way of thinking which aims at ease of comprehension and reduction of complexity. For this reason all learning—all growth in understanding—takes place through the use of simplifying concepts."[101] "Contrary to the popular assumption," Phenix says, "knowledge does not become more and more complicated as one goes deeper into a discipline…the further one goes in it the more pervasive are the simplicities which analysis reveals."[102] When describing synthetic coordination, Phenix presents the following:

> Whatever is taught within a discipline framework draws strength and interest from its membership within a family of ideas. Each new idea is illuminated by ideas previously acquired. A discipline is a community of concepts. Just as human beings cannot thrive in isolation, but require the support of other persons in mutual association, so do isolated ideas wither and die, while ideas comprehended within the unity of a discipline tend to remain vivid and powerful within the understanding.[103]

This perspective is important, as it couples the organic evolutionary view of a discipline discussed earlier with the environment with which it thrives. Furthermore, it leads directly to the final quality, that of dynamism, which Phenix submits is meant to be "the power of leading on to further understanding."[104] He concludes his theory by once again drawing the analogy that a discipline is an organic structure when he proposes

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[99] Phenix, "The Use of the Disciplines As Curriculum Content," 273.

[100] Ibid., 275.

[101] Ibid., 276.

[102] Ibid.

[103] Ibid., 277.

[104] Ibid., 277–278.

> A discipline is a living body of knowledge, containing within itself a principle of growth. Its concepts do not merely simplify and coordinate; they also invite further analysis and synthesis. A discipline contains a *lure to discovery*. Its ideas excite the imagination to further exploration. Its concepts suggest new constructs which provide larger generalizations and reconstituted modes of coordination.[105]

11. Component 11—Projected Demand for the Discipline's Knowledge

Nearly all public, private, and academic organizations must continually grow and adapt to survive, accomplish their respective missions, and continue to produce desirable and worthwhile results. Those establishments that succeed typically do so because they are able to weather the storms brought on by the ever-shifting seas of change. Change may indeed be inevitable in virtually everything known, but anticipating it and having the wherewithal to adapt to it is what defines success. With this in mind, an intricately woven relationship exists among industry, the university, and the government. This complex and mutually connected construct, according to Johann Murmann, has created "a world that is increasingly becoming coevolutionary."[106] Since organizations are interconnected, these rapid environmental changes in essence cause a cyclic effect on each entity that recursively drives change. Murmann points to the biotech and nanotech industries as well-known examples of this coevolutionary phenomenon. "In both cases, new start-up firms sprang up and quickly focused on using the new scientific knowledge to develop products. The commercial applicability and demand for talent in turn influenced the direction of how universities developed the discipline of molecular biology and nanotechnology."[107]

In his discussion of the evolution of academic disciplines, Murmann suggests that each one "consists of a population of ideas that changes over time as scholars adopt new ideas and modify or drop existing ones."[108] In a second work, Murmann provides the linkage between the university (e.g., the academic disciplines) and industry, which

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[105] Phenix, "The Use of the Disciplines As Curriculum Content," 277–278.

[106] Johann Peter Murmann, "The Coevolution of Industries and Important Features of Their Environments," *Organization Science* (2011): 1.

[107] Ibid., 3.

[108] Ibid., 7.

supports his coevolution perspective. With the linkage between industry and the university established, Murmann points to the Bayh-Dole Act of 1980[109] to show the government's role in facilitating "the transfer of commercially useful knowledge from universities to industry."[110] He further contends, "every field of knowledge has problems to solve but whether the field has substantial funding (e.g., medicine) or little funding (e.g., philosophy) depends on whether society finds the problems important to solve and believes that spending money on these problems will yield some useful results even if they are far away as in basic research."[111] Interestingly, this position appears on its face to be in contrast to Polanyi's position discussed earlier wherein he suggested that the growth in an academic discipline was determined by the "intellectual passions" of its community members. In actuality, the two theories work in parallel and mutually support one another because it could easily be hypothesized that the drive and motivation found within an academic discipline's community (e.g., its passion as Polanyi put it) is really a manifestation of the drive for notoriety and funding, which usually comes from the government or private sector. To illustrate the relationship between academic and industrial complexes, Murmann proposes a model by which he takes on one side a strongest-to-weakest rank order of academic disciplines and on the other side a strongest-to-weakest rank order of industry. He recommends using "any plausible rank order," which for academic disciplines might be based upon items, such as "number of researchers, number of students, number of Ph.D. degrees, amount of money spent on research, number of publications, etc."[112] For the rank ordering of industry, Murmann

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[109] The Bayh-Dole Act of 1980 "was designed to facilitate the patenting of U.S. government funded inventions by universities, other non-profit entities and businesses. Under the Act, as amended in 1984, contracting universities, non-profits and businesses are more free to exclusively license patents on inventions." Knowledge Ecology International, "The Bayh-Dole Act of 1980," (n.d.), http://keionline.org/bayh-dole.

[110] Johann Peter Murmann, *The Co-Development of Industrial Sectors and Academic Disciplines* (UNSW Australian School of Business, 2012), 3.

[111] Ibid., 4.

[112] Ibid.

recommends using things, such as "value added of production, value of production, amount of profits, number of workers, etc."[113] The following figure depicts graphically what his quadrant-based topology would look like:

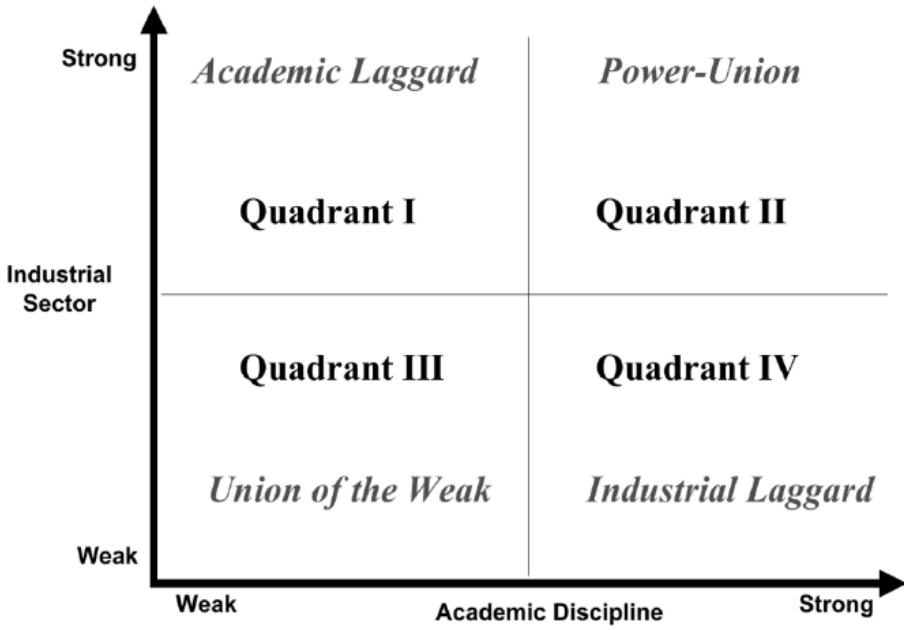

Figure 1. Typology of Academic Industrial (AI) Complexes[114]

In explaining the quadrants, Murmann says:

> Let us call an AI complex in Quadrant I (strong industrial sector but weak related academic discipline) *Academic Laggard*; an AI complex in Quadrant II (strong industrial sector and strong related academic discipline) *Power Union*; an AI complex in Quadrant III (weak industrial sector and weak related academic discipline) *Union of the Weak*; and an AI complex in Quadrant IV (weak industrial sector but strong related academic discipline) *Industrial Laggard.*[115]

While Murmann leverages his model to make a number of interesting and worthwhile predictions about social processes, national industries, and the co-specialization in particular academic disciplines, it is his model's assumptions that are

[113] Murmann, *The Co-Development of Industrial Sectors and Academic Disciplines*, 5.

[114] Ibid., 4.

[115] Ibid., 5.

core to this discussion, as they describe "the forces that shape the development of academic disciplines and industries."[116] Specifically, he lists the following eight assumptions.

1. Academic disciplines compete with one another for resources in the form of research support, infrastructure grants, the brightest students, and the brightest researchers.
2. Industries compete with one another to obtain the most favorable treatment from government in terms of taxes, subsidies, grants, rules, regulations, and support for infrastructure.
3. Industries make direct contributions to academic disciplines important to them and lobby governments to increase funding for such academic disciplines. The more profitable the industry, the higher are these contributions.
4. When their interests overlap, academics in particular disciplines and business people in particular industries will engage in joint lobbying efforts to advance the specific industry and specific academic discipline.
5. Academic researchers will engage in commercial ties when this allows them to increase the funding for their research efforts.
6. Students will select to study those academic disciplines that make it easy for them to find a job and receive good pay.
7. Entrepreneurs will enter and firms will expand in sectors that promise to be or are profitable.
8. Academically trained individuals prefer to start firms in industries closely related to their area of expertise.[117]

It logically follows then (in the absence of countervailing forces[118]) that the projections for the demand of a discipline's knowledge are tightly coupled with both governmental and private sector support and intervention. The cohesive and systematic forces among these three actors create a triad that can be illustrated as follows.

[116] Murmann, *The Co-Development of Industrial Sectors and Academic Disciplines*, 6.

[117] Ibid.

[118] Ibid., 19. Countervailing forces might include laws that prohibit arrangements between a university and the private sector, such as consulting, holding ownership interests, etc.

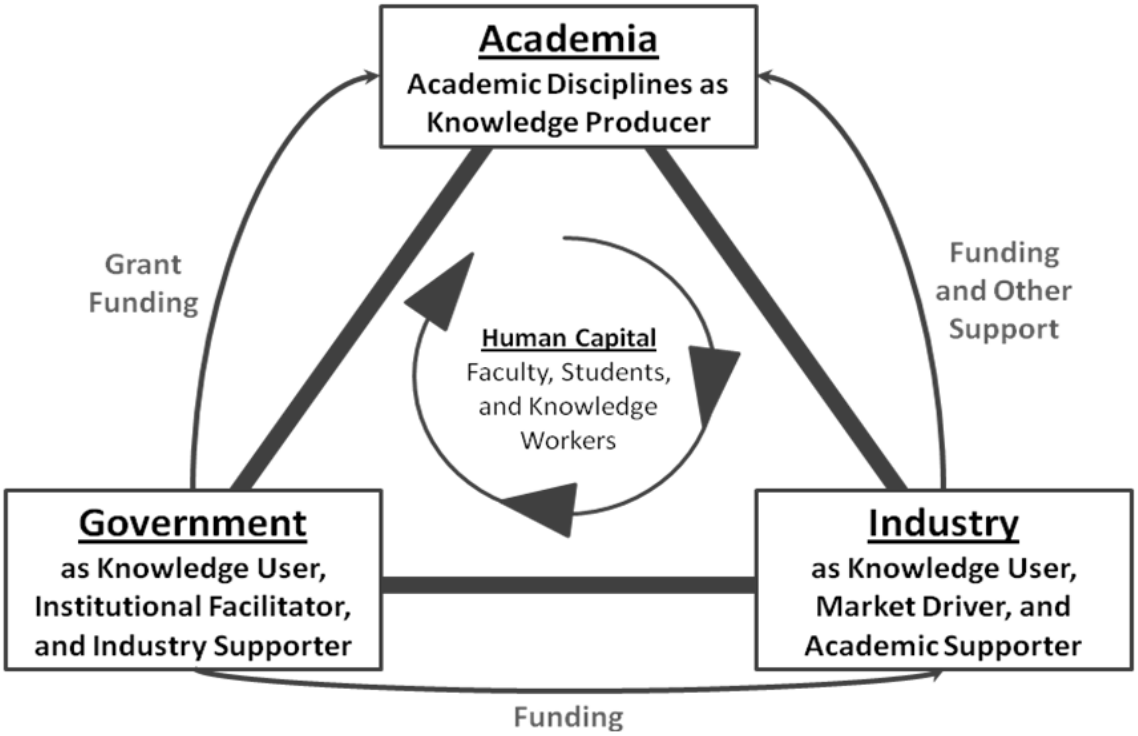

Figure 2. Academic-Industry-Government Triad

Clearly, it would be unfair to omit the impact of beneficial organizations, such as alumni associations, philanthropic groups, and individual donors who bequeath large sums of money to universities often with a certain implied focus because sometimes they come from the very pool of human capital at the center of the triad. Clearly, these can drive academic disciplines by providing funding for specific research, projects, and even laboratories or buildings. Despite all this, however, the overriding impact on the Academic-Industry-Government Triad is society, as it typically supplies the market forces that drive demand in areas, such as faculty research, student demand, industry product development, service offerings, hiring trends, government focus, intervention, and political pressures as shown graphically in Figure 5.

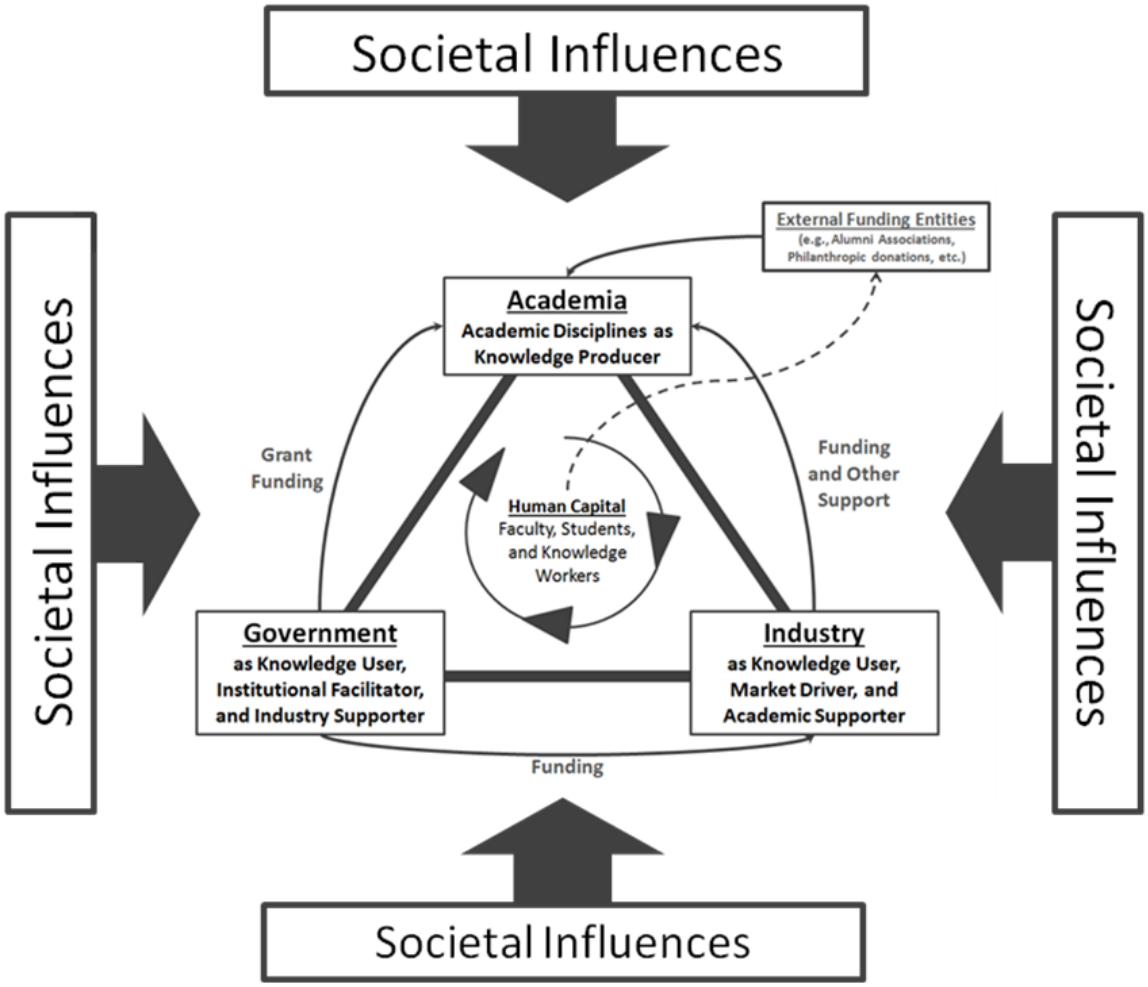

Figure 3. Societal Influences on the Academic-Industry-Government Triad

B. INTERDISCIPLINARITY

Before effective data collection can begin in an effort to breakdown the disciplines to be used as case studies adequately, it is important to take a moment to delve further into the scientific orientation of an academic discipline. This approach is necessary to establish a standard frame of reference and common terminology because in the aggregate, "each discipline has particular methods and techniques that are appropriate to study their area of interest."[119] This viewpoint is important because new disciplines can emerge when the pool of combined disciplinary attributes mix together. Unlike a

[119] Michel Modo and Ian Kinchin, "A Conceptual Framework for Interdisciplinary Curriculum Design: A Case Study in Neuroscience," *The Journal of Undergraduate Neuroscience Education* 10, no. 1 (2011): A71–A79.

physical reaction in chemistry in which only the appearance of the molecules change (e.g., water turning to ice when frozen), a chemical reaction is more likely between the components of different disciplines when mixed together, which in turn, produces a new academic solution.

According to Moran, "the idea of shaping knowledge into disciplines can be traced as far back as Greek philosophy."[120] He does a wonderful job detailing the historical evolution of the disciplines by recounting how Aristotle "organized different subjects into a hierarchy, according to whether they were theoretical, practical, or productive."[121] Looking back at Aristotle's enduring work, *Metaphysics*, Aristotle postulated at the end of Book I, Part 1:

> …that all men suppose what is called Wisdom to deal with the first causes and the principles of things; so that, as has been said before, the man of experience is thought to be wiser than the possessors of any sense-perception whatever, the artist wiser than the men of experience, the masterworker than the mechanic, and the theoretical kinds of knowledge to be more of the nature of Wisdom than the productive. Clearly then Wisdom is knowledge about certain principles and causes.[122]

From this statement, it can be gleaned that Aristotle was advocating that the three disciplinary areas Moran highlighted (e.g., theoretical, practical, and productive) are ordered such that those subjects in the theoretical domain were of the highest order, followed by those in the practical domain, leaving the productive subjects at the bottom. Aristotle defined the highest order group in Part 7 of Book XI when he wrote "evidently, then, there are three kinds of theoretical sciences-physics, mathematics, theology. The class of theoretical sciences is the best, and of these themselves the last named is best; for it deals with the highest of existing things..."[123] Furthermore, Aristotle says, "physics deals with the things that have a principle of movement in themselves; mathematics is theoretical, and is a science that deals with things that are at rest, but its subjects cannot

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[120] Moran, *Interdisciplinarity*, 3.

[121] Ibid.

[122] Aristotle, "Metaphysics, Book 1, Part 1," trans., W. D. Ross, *The Internet Classics Archive*, (n.d.), http://classics.mit.edu/Aristotle/metaphysics.1.i.html.

[123] Ibid.

exist apart."[124] Besides drawing the conclusion that physics and mathematics are theoretical disciplines, it is interesting to note that Aristotle mentions that these two "subjects cannot exist apart,"[125] which tends to suggest that interdependency exists between the two disciplines.

Moran summarizes the remaining two subjects (e.g., the practical and productive) and suggests that ethics and politics fall under the practical subjects, and fine arts, poetics, and engineering fall under the productive subjects.[126] Lastly, Moran points out that Aristotle "positioned philosophy as the universal field of inquiry which brought together all the different branches of learning, a notion of unity in difference which also influenced the formation of the disciplines within the modern university."[127] "This notion of philosophy as undisciplined knowledge," Moran concludes, "is retained today in the name of the higher degree of Doctor of Philosophy (the PhD), which is gained through the completion of a research dissertation in any subject."[128] This reality brings to light an interesting question that is likely beyond the scope of this thesis, but if philosophy is considered undisciplined knowledge, could it not be inferred that building a philosophical foundation around what might be an up-and-coming academic discipline justify its emergence? If so, then it begs the question, what does it take to justify building the philosophical foundation around a particular field of study? Moreover, who decides that it is justified? Is it academia, industry, the government? Perhaps, society itself drives the need—a topic that is considered later.

Moving forward, Moran points out that the interchangeability of science and philosophy as terms endured for centuries, and it was not until the 1830s that "the term 'science' started to refer specifically to the natural sciences and to be distinguished clearly from philosophy in both academic and general usage."[129] Moran continues by

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[124] Aristotle, "Metaphysics, Book 1, Part 1."

[125] Ibid.

[126] Moran, *Interdisciplinarity*, 3–4.

[127] Ibid., 4.

[128] Ibid., 8.

[129] Ibid., 10.

describing that the "clearly defined methods and procedures of the sciences…was a powerful factor in the development of new social science and humanities disciplines such as politics, economics, sociology, English, and the modern languages in the late nineteenth and early twentieth centuries."[130] This description is important, as it begins to illustrate how new disciplines emerge from parent disciplines just as large conglomerates spin off subsidiaries. The obvious connotation being that the child discipline will mature, potentially interact with other disciplines, and possibly spawn new disciplines as well.

In progressing into the early to mid-1900s, Moran notes that "the success of the disciplines depended partly on their external recognition by government and business as a form of accreditation for future careers: two of their chief functions were to prepare people for professions that required particular kinds of expertise, and to give these new professions legitimacy and status by providing them with academic credentials."[131] This assertion is a very important aspect of the evolution of academic disciplines because it not only links them to government and industry, which coincides with the Academic-Industry-Government Triad defined in the previous section, but it also establishes an interdependent relationship between academic disciplines and their legitimacy, which is discussed further in the next section.

Moran also talks about the impact of internal and external forces on academic disciplines. Specifically, he suggests that

> the nature of the university as a relatively closed institution contributed to the consolidation of the disciplines. The emergence of a new academic subject has always depended partly on internal factors: on elite universities recognizing it through the creation of separate departments, sufficient students and lecturers being recruited to study and teach it, learned societies and journals forming around it, and recognized career structures developing, usually based on the acquisition of a Ph.D. in that subject. Moreover, since disciplines were influenced by such institutional factors, they tended, like many institutions, to reproduce themselves and become self-perpetuating.[132]

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[130] Moran, *Interdisciplinarity*, 11.

[131] Ibid., 13.

[132] Ibid.

This analysis perfectly supports the analytical framework defined earlier. Furthermore, it postulates the respective need for (and value of) PhD-based curriculum as a component of an emerging academic discipline. Finally, Moran takes the position that "interdisciplinarity approaches often draw attention, either implicitly or explicitly, to the fact that what is studied and taught within universities is always a political question."[133] This position lends creditability to the notion that institutions of higher learning are in and of themselves businesses. As such, the decisions they make are often based upon outside influences, most notably of which is funding that can be in the form of governmental grants, private industry donations or career support, or even philanthropic-minded individuals or groups with the financial wherewithal to influence academic research, course offerings, or disciplinary objectives.

Jeffery Lipshaw, an associate professor at Suffolk University Law School, describes interdisciplinarity as it relates to the legal field. He describes it as a "continuum between abiding strict disciplinary boundaries and certifications, at one end, and freewheeling interdisciplinary thought on the other."[134] Lipshaw sees each end of the scale having plusses and minuses. He suggests, "the downside of interdisciplinary work is dilettantism, but the upside is infusion of new thought and creativity as well as the exposure of new audiences to the insights of the respective contributing disciplines."[135] Lipshaw then suggests, "the upside of working within a traditionally established discipline is rigor and depth, but the downside is insularity, stultification, and the trap of the Kuhnian paradigm."[136] Lipshaw's reference to Kuhn opens the door for some additional discussion.

Thomas Kuhn's *The Structure of Scientific Revolutions* is often considered ground-breaking, as Kuhn introduced the idea in 1962 that scientific fields periodically experience paradigm shifts whereby new conventions, new ideas, and new methods can

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[133] Moran, *Interdisciplinarity*, 16–17.

[134] Jeffrey M. Lipshaw, "The Venn Diagram of Business Lawyering Judgments: Toward a Theory of Practical Metadisciplinarity," *Seton Hall Law Review* 41, no. 1 (February 11, 2010): 34.

[135] Ibid., 34–35.

[136] Ibid., 35.

emerge creating new directions of study, new communities of scholars, and likewise, new knowledge. While Kuhn was a physicist by education and focused on areas of scientific knowledge, his concept of paradigms and the reasons for their shifts easily apply across other disciplines as well. In his essay, "The Route to Normal Science," Kuhn suggests two reasons for paradigm shifts within scientific disciplines. First, they occur when the achievement in a particular discipline is "sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity."[137] Second, Kuhn indicates that the achievement should be "sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve."[138] Looking at homeland security, it could be concluded that no need exists for knowledge expansion, as other academic disciplines provide adequate mechanisms to innovate new solutions. However, this viewpoint may be a "trap" as Lipshaw suggested because it would be a fallacy to assume that other disciplines will necessarily innovate new knowledge without some impetus. To avoid the possibility of cyclic reasoning, only look at the changing landscape to see that as the environment changes, the paradigm shifts as well. As the paradigm shifts, academia, industry, and the government begin looking at ways to address the change. In doing so, they become exposed to the shaping of a new field, thus satisfying the need Kuhn suggested of having achievement be open-ended so that practitioners have new problems to solve that could not have been solved given the previous constraints of their mindset and limited discipline-specific academic tools. Lastly, Eckberg and Hill, in writing about paradigms, propose that they are "unified bodies of belief shared by a cohesive community."[139] As the homeland security community grows, the interaction of the components of the triad will each apply to the other and create a self-perpetuating machine that will drive the need for new knowledge, but more importantly, it will drive the need for the new discipline.

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[137] Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1970), 10.

[138] Ibid.

[139] Douglas Lee Eckberg and Lester Hill Jr., "The Paradigm Concept and Sociology: A Critical Review," *American Sociological Review* 44, no. 6 (December 1979): 932.

To complete this section and as a point of reference, value can be gained in describing other terms used to describe disciplines. The following table provides an overview of terms and definitions used to classify academic disciplines as taken from Modo and Kinchin's article entitled, "A Conceptual Framework for Interdisciplinary Curriculum Design: A Case Study in Neuroscience:"[140]

Table 2. An Overview of Definitions Used to Classify Scientific Orientation based on Rosenfield[141] and Stokols et al.[142]

Scientific Orientation	**Definition**
Uni-disciplinarity	A single discipline works together to address a common problem.
Cross-disciplinarity	More than one discipline work side-by-side on related problems without involving each other to solve their problems. There is no attempt at discourse with other disciplines and practitioners are confined within their discipline.
Multi-disciplinarity	More than one discipline work independently on a common problem. There is little commonality in terminology and methodology to address the common problem. Practitioners will only work within their discipline, but recognize that there are different facets to a common problem.
Trans-disciplinarity	More than one discipline work together on a common problem with some overlap in methodology and terminology. Some integration between disciplines occurs that lead to common concepts, potentially new models and theories, but there is no complete overlap. Practitioners still feel mostly confined to their traditional disciplines.
Inter-disciplinarity	More than one discipline work integrally on common problems. Disciplines are synthesized and extend discipline-specific theories and concepts with potentially novel methodology that is relevant to all involved disciplines. Practitioners feel at ease in all the involved disciplines.

While other terms are beginning to surface such as "endo-disciplinarity," "exo-disciplinarity," and "pluri-disciplinarity," the acceptance of these terms throughout

[140] Modo and Kinchin, "A Conceptual Framework for Interdisciplinary Curriculum Design: A Case Study in Neuroscience," A71–A79.

[141] P. L. Rosenfield, "The Potential of Transdisciplinary Research for Sustaining and Extending Linkages between the Health and Social Sciences," *Social Science and Medicine* 35, no. 11 (December 1992): 1343–1357.

[142] Daniel Stokols, Kara L. Hall, Brandie K. Taylor, and Richard P. Moser, "The Science of Team Science: Overview of the Field and Introduction to the Supplement," *Am J Prev Med* 35 (2008): S77–S89.

academia is currently insufficient to expend significant effort attempting to define them formally other than to define the prefixes and draw a reasonable conclusion as to what is intended by the use of these terms. The prefix "endo" means "internal; within."[143] The prefix "exo" means "external; from outside."[144] The prefix "pluri" comes from the Latin 'plur' meaning "more."[145] Thus, it can be concluded that endodisciplinarity suggests aspects of a discipline found from within an existing discipline. Exodisciplinarity suggests aspects of a discipline found from outside an existing discipline. Pluridisciplinarity, which is used a bit more frequently, simply suggests aspects of a discipline found from more than one other discipline. Davies and Devlin suggest, "this variant requires two or more disciplines to combine their expertise to jointly address an area of common concern."[146] Further, they posit, "pluridisciplinarity is often seen in areas of study where the topic under investigation is too complex for a single discipline to address. Examples include the AIDS pandemic and climate change."[147] While in several pieces of literature this term has been used interchangeably with the more widely accepted term interdisciplinarity, Davies and Devlin assert that the use of tools and techniques in pluridisciplinarity-based research does not create new disciplinary perspectives or "provide insight in a *novel* way."[148]

Finally, one term has been used quite frequently within the literature to describe curriculum and the interaction among disciplines, metadisciplinary. One of the better descriptions of this term comes from Alexander Werth, in his *Journal of the National Collegiate Honors Council* article entitled, "Unity in Diversity: The Virtues of a Metadisciplinary Perspective in Liberal Arts Education," in which he says,

> Educators often speak of interdisciplinary or multidisciplinary emphases that combine traditional disciplines of scholarship and teaching. Such an emphasis might lead students to learn not merely about political science,

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[143] Oxford Dictionaries, "endo," (n.d.), http://oxforddictionaries.com/definition/english/endo-?q=endo.

[144] Oxford Dictionaries, "exo," (n.d.), http://oxforddictionaries.com/definition/english/exo-?q=exo.

[145] Oxford Dictionaries, "pluri," (n.d.), http://oxforddictionaries.com/definition/english/pluri-?q=pluri.

[146] Davies, Devlin and Tight, ed., "Interdisciplinary Higher Education," 13.

[147] Ibid.

[148] Ibid., 14.

> for example, but about political science in conjunction with history or philosophy. However, by metadisciplinary I am referring to a larger curricular focus that transcends or supersedes traditional disciplinary boundaries to create a truly holistic, systemic, integrative worldview uncluttered by familiar limits and barriers. Instead of merely linking two or more customary fields together at their margins, a metadisciplinary focus reveals that all such fields are fundamentally related in numerous significant ways, both theoretically and practically. Such a focus demonstrates that no one can legitimately study political science without due consideration of history or philosophy. The real world is not neatly divided into separate realms (of economics, politics, etc.), so why should education be? In sum, a metadisciplinary curriculum is one in which traditional fields must be viewed together, as corequisites. One could study only elephant ears or tusks, but one must see these as components of a coherent, unified whole.[149]

Werth's perspective is valuable because it brings to light the holistic approach to interdisciplinary-based curriculum, in which the whole is indeed greater than the sum of its parts. The combination and interaction among disciplines develop new and more significant properties, much like a mixture created from individual chemicals to form a new compound. Graphically, Mackinnon, Rifkin, Hine, and Barnard provide an easy-to-understand illustration of the distinctions between different disciplinarity terms:

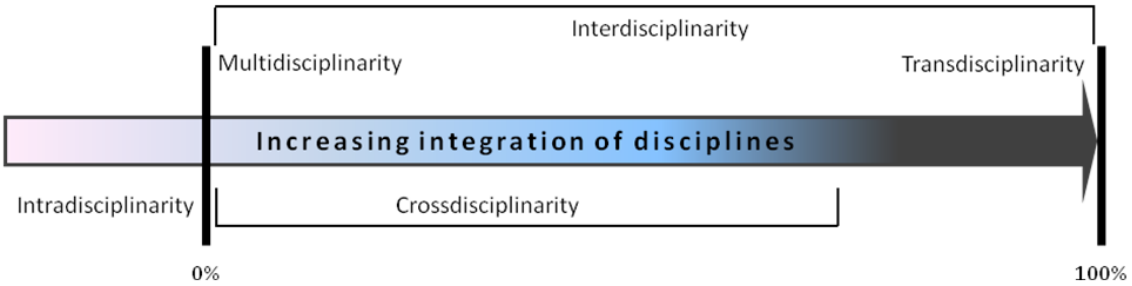

Figure 4. Distinctions between Different Disciplinarity Terms Based on Current Literature[150]

[149] Alexander Werth, *Unity in Diversity: The Virtues of a Metadisciplinary Perspective in Liberal Arts Education* (The Free Library, 2003), 2, http://www.thefreelibrary.com/Unity%20in%20Diversity:%20the%20Virtues%20of%20a%20Metadisciplinary%20Perspective%20in...-a0165362478.

[150] Davies, Devlin and Tight, ed., "Interdisciplinary Higher Education," 42.

C. LEGITIMACY

The academic landscape is densely populated with disciplines, and fields of study emerge whenever a basis of interest exists on the part of the academy, industry, or the government. While the growing complexities of society continue to be a powerful driving force, one question that often arises is what makes a field of study, or an academic discipline for that matter, legitimate? Conversely, what about legitimacy impacts an emerging discipline? Karin Bump, in her doctoral dissertation entitled "On The Fence of Legitimacy: A Framework for Understanding and Assessing the Legitimacy of New Academic Disciplines in U.S. Higher Education," set out "to develop a clearer understanding of the way new disciplines become established within a sociological framework of legitimacy."[151]

Bump's extensive research on the concept of legitimacy is based upon the merging of two models, the first developed by Kenneth Boulding and the second by Mark Suchman. The goal of her research was to "provide insight into legitimacy for those involved with new disciplines of study."[152] Bump points out that "there is a distinction between past and present emergence [of academic disciplines]; the new specialized disciplines of study readily emerge today align more directly with career preparation than did the traditional liberal arts and social science degrees of the past."[153] This position, she describes, could be due to the fact that universities are business entities and will follow the money flow (e.g., student tuition, private sector support, and governmental grants), all of which help to corroborate the academic-industry-government triad described earlier.

While the conclusion that a number of these internal and external forces drive the emergence of academic disciplines can be easily drawn, Bump is quick to note that it "does not, on its own, appear to indicate the Academy's acceptance of it as a legitimate area of study."[154] What then does (or would) lead academia toward acceptance of an

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[151] Karin D. Bump, "On the Fence of Legitimacy; A Framework for Understanding and Assessing the Legitimacy of New Academic Disciplines in U.S. Higher Education" (PhD dissertation, University at Albany, State University of New York, 2009), ii.

[152] Ibid., 4.

[153] Ibid., 8.

[154] Ibid.

emerging academic discipline? Looking at the first of the two models of legitimacy that Bump referenced, Kenneth Boulding, suggests that legitimacy is a "wide range of social phenomena, all of which center around the concept of acceptance by an institution or organization as right, proper, and justified and acceptable."[155] Mark Suchman, the second of the two models of legitimacy that Bump evaluated, defines legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions."[156]

Taking these two models and focusing on the core, which appears to be 'valuable, proper, justifiable, and within some system of norms,' Bump concludes that "views of discipline legitimacy are linked to the ways a discipline is seen by its audience as aligning with socially constructed norms at a particular institution."[157] This conclusion directly supports the proposal that societal influences are multifaceted and affect academia, industry, government, and the human capital at the center of all three. Specifically, however, the way an institution of higher learning accepts or rejects an emerging discipline is clearly affected by the faculty, and to a degree administrators, as Bump points out, "faculty construct their norms of how the [emerging] discipline should operate based on what they have been directly exposed to and this lends to a tendency for faculty, more than administrators, to discount and/or view with suspicion those that are perceived as different."[158] In the final analysis, Bump suggests that while a number of factors add to the "strength of legitimacy and where a discipline lands" on her "Fence of Legitimacy," the "positive fiscal outcomes" and the "socially constructed norms held within the culture of each institution" are the biggest driving forces.[159]

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[155] Kenneth E. Boulding, "The Legitimacy of Economics," *Western Economic Journal* 5 (September 1967): 1.

[156] Mark C. Suchman, "Managing Legitimacy: Strategic and Institutional Approaches," *Academy of Management. The Academy of Management Review* 20, no. 3 (July 1995): 574.

[157] Bump, "On the Fence of Legitimacy; a Framework for Understanding and Assessing the Legitimacy of New Academic Disciplines in U.S. Higher Education," 192.

[158] Ibid., 213.

[159] Ibid., 232.

D. COMBINING IT ALL TOGETHER IN A COMPLEX ENVIRONMENT

Having defined the useful components of a framework and looking at the concepts of interdisciplinarity and legitimacy, it is important to understand how these fit together within a rapidly changing complex environment. In July 2011, Professor Klaus Schwab, the executive chairman of the World Economic Forum pointed out,

> Over half of the scientists and engineers who have ever lived are alive today. China adds about 6.5m graduates every year, half of them engineers and scientists. It is not only the sheer number of 'innovators' who will push the boundaries of science, technology and ultimately life-change but also the greater degree of interconnectivity which accelerates the generation of knowledge and creates a much more entrepreneurial environment for innovation and change.[160]

This aspect of rapid knowledge growth will demand new ways of evaluating and dealing with change. Professor Schwab suggests that the accelerating evolution of technology will create a new "dimension of innovation,"[161] which, according to him, will further explore, "the essence of human nature, the relation between moral reasoning and moral intuition, and the underpinning of modern institutions"[162] and will "likely intensify conflicts in values and undermine the establishment of shared values for the new reality."[163] The complexity inherent in all this, according to Schwab, is that power shifts that will occur due to the growth and expansion of non-Western economies "will fundamentally change our lifestyles."[164] Schwab indicates that these "are creating a completely new world in which the mastering of complexities will be the key challenge."[165] To best deal with this increasingly complex environment and move away from what Schwab calls an "urgency-driven risk management"[166] approach to a more

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[160] Klaus Schwab, "Co-Operation Is the Only Means of Survival in This Age of Complexity," July 10, 2011, http://www.telegraph.co.uk/finance/comment/8628701/Co-operation-is-the-only-means-of-survival-in-this-Age-of-Complexity.html.

[161] Ibid.

[162] Ibid.

[163] Ibid.

[164] Ibid.

[165] Ibid.

[166] Ibid.

collaborative one "aimed at strengthening our risk resilience,"[167] it is clearly necessary to expand man's knowledgebase and problem-solving abilities. Furthermore, a focus on society's long-term prosperity should also be included. At the risk of coining a new term, this concept (e.g., prosperity in a complex environment) might be called dealing with "prosplexity."[168]

Thus, to cope with prosplexity, an interconnected economy, profound unconventional threats, rapid technological innovation, environmental concerns, and increasing demands for energy, have not simply changed the terms of the multivariable equation, but rather these issues have changed the method by which solutions themselves can be generated. Traditional problem solving techniques no longer satisfy the demand, as the time available to provide solutions to these newly created dilemmas has been reduced by an order of magnitude. The necessity to advance human knowledge makes it important to recognize that whether or not something is formally accepted by the academy as an academic discipline may not really matter in the whole scope of life. Rather than the end justifying the means, or homeland security being accepted as an academic discipline justifying its existence and further study, the means may in fact justify the end. In other words, the need for expanded knowledge, the development of highly capable problem solvers and scholars already interconnected and focused on the same domain and shared set of values, beliefs, traditions, and overall affective stance, may provide the legitimacy necessary to solidify the interdisciplinary aspects of homeland security; thus, validating it as an academic discipline.

The next chapter compares, using a case study approach, several other academic disciplines and fields of study to determine how they "fit" into the analytical model. A scoring mechanism is defined that provides a weighted tally and basis for comparison against emerging fields of study to ascertain if they satisfy the necessary requirements for inclusion as an academic discipline.

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[167] Schwab, "Co-Operation Is the Only Means of Survival in This Age of Complexity."

[168] Term originated by Michael D. Falkow, January 23, 2013.

IV. RESEARCH METHODS AND DATA COLLECTION

If the literature review is analogous to an academic treasure hunt, perhaps research might be viewed as an excavation of knowledge—a careful journey searching for facts through objective, systematic, and scientific methods in the hope of finding a solution to a problem. James Madia, in his September 2011 thesis entitled, "Homeland Security Organizations: Design Contingencies in Complex Environments," aptly points out that "qualitative social research can at times be chaotic, and organizing that chaos becomes the journey through which the researcher must travel."[169] Often during the proverbial digging process, the researcher may appear to grope endlessly in the dark for long periods of time until reaching something solid with the hope it is a chest of intellectual treasures. Regardless of the outcome of the many digs that occur, several things are certain. First, the excavator/researcher cannot allow rumors, opinions, or hearsay to derail the quest. Second, the excavator/researcher cannot allow preconceived notions to interfere with the process, which can lead to confirmation bias and spoil the value of the effort or unfairly guide it toward a desired conclusion. Third, and most importantly, the excavator/researcher cannot lose the passion for digging. Regardless of the number of false positives, digging must continue, as sooner or later, that exciting, euphoria-generating "thump" will be heard.

A number of benefits occur to performing high-quality, in-depth research besides the obvious advancement of human knowledge. If done correctly, the researcher develops (or improves) critical thinking skills, which leads to more disciplined and objective thought processes. When done repeatedly, it creates an iterative cycle of enrichment that generates a true win-win-win scenario among the researcher, the body of knowledge, and the readers/future researchers. Finally, the value and importance of high-quality research cannot be discussed without highlighting the ethical considerations that must be constantly upheld. While it is more than simply giving credit where credit is due, properly citing references promotes and enhances the process because it establishes a

[169] James D. Madia, "Homeland Security Organizations: Design Contingencies in Complex Environments" (master's thesis, Naval Postgraduate School, 2011), 73.

framework for proper discourse and allows future researchers to replicate findings. Using the treasure hunt analogy once more, it is important to leave a trail behind and give credit to any helpers along the way.

Looking specifically at a specific research method to be employed, and in the absence of a simple equation, the case study research method is likely the best approach. In his widely cited work, *Case Study Research: Design and Methods*, Robert K. Yin points out that "the case study method allows investigators to retain the holistic and meaningful characteristics of real-life events—such as individual life cycles, small group behavior, organizational and managerial processes, neighborhood change, school performance, international relations, and the maturation of industries."[170] Furthermore, Yin defines the scope of a case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context; especially when the boundaries between phenomenon and context are not clearly evident."[171] Given the complexities of academic disciplines, using the case study research methodology to evaluate existing fields of study widely accepted as academic disciplines may help to provide a baseline for comparison as to where homeland security is currently situated in its evolutionary lifecycle.

Z. Yang et al. point out that "each data collection method has its advantages and disadvantages."[172] As such, data collection for this thesis involved leveraging the extensive research accomplished in Chapter III, which explored the areas of academic disciplines, including how they originated often from interdisciplinary beginnings, how they have developed, the framework-based components they all appear to share, the concept of legitimacy, and the overall impact of the academia-industry-government triad and the societal influences that impact that ecosystem. As the components of the framework are evaluated on their own respective merit, several interesting observations surface. First, some components appear to be weighted more heavily than others when

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[170] Yin, *Case Study Research: Design and Methods*, 14.

[171] Ibid., 18.

[172] Zhilin Yang, Xuehua Wang, and Chenting Su, "A Review of Research Methodologies in International Business," *International Business Review* 15 (2006): 603.

compared and contrasted against one another. Second, while disciplinary overlap may occur (e.g., mathematics and physics), a level of uniqueness to each discipline results. As such, the score that each component might receive for a given discipline will likely differ. Third, each of the components of the framework appears to have some relative merit, and as such, would be non-zero.

The best method for obtaining significantly sufficient and valuable data to support this framework and potentially create as close to a mathematical model as possible may be found in gathering data specifically centered around each component of the framework from a gross cross-section of virtually every doctoral-granting academic institution. Examples might include the following.

1. **Community of Persons:** Number of professional and academic societies that exist in each discipline, number of faculty each institution has who teach in the specific discipline, the number of degrees conferred in that area each year, etc.
2. **Expression of Human Imagination:** Number of new discoveries made, number of peer-reviewed articles published that posit new ideas or perspectives, etc.
3. **Domain:** Similarity among institutional focus, analogous requirements of the curriculum, etc.
4. **Tradition:** Duration of existence (e.g., from the time it became a field of study, an academic department, a school within a college, or college within a university, etc.). Also, duration of existence for professional and academic societies, peer-reviewed journals, etc.
5. **Syntactical Structure—Mode of Inquiry:** Unique constructs that differentiate the discipline from others, etc.
6. **Conceptual Structure—Substance:** Specific forms, methods, policies, procedures, etc.
7. **Specialized Language or System of Symbols:** Specific nomenclature, taxonomy, language, acronyms, or ways of categorization.
8. **Heritage of Literature—Communications Network:** Number of professional, peer-reviewed journals, other types of journals, magazines, or periodicals, etc.
9. **Valuable and Affective Stance:** Number of graduates who stay in the field, become faculty, continue research, etc.

10. **Instructive Community:** Number of tenured faculty, growth rate, etc.

11. **Projected Demand of the Discipline's Knowledge:** Amount of financial aid awarded to new students, career prospect for graduates, number/amount of government and industry grants, enrollment statistics for new students entering the discipline, etc.

While such an endeavor might be near impossible and while some of the data gathered would clearly be subjective in nature, the statistical value and relevance of such data elements would be instructive as it could provide a snapshot of the current position of every broad field of knowledge relative to the entire domain of human thought. Various evaluative techniques could then be employed using such a superlative data set to create a normalized percentage that could allow for the classification of whether or not a knowledge area is an academic discipline (or is emerging toward it) based upon its relative relationship to the whole. A simplified quintile-based system, for example, could be employed based upon the normalized percentage rank as determined from the data. Graphically, it may look something like the following figure.

Figure 5. Quintile-based Breakdown of Academic Disciplines

This simple quintile system divides 100% into five quintiles, in which the first quintile would tend to indicate that a field does not exhibit sufficient weight to express itself as a valid academic discipline. The second quintile tends to indicate some possibility for emergence might exist, but further development, ripening, or a significant trigger event would be necessary to push it higher up the scale. The third quintile tends to indicate that the discipline is currently a valid academic discipline that may be able to sustain itself provided positive external factors continue to apply and no major countervailing forces impact its continued applicability. The fourth quintile tends to indicate an academic discipline that is maturing and establishing a solid base for continued growth. The fifth quintile tends to indicate a full-fledged academic discipline that not only has the power to sustain itself, but also the depth and breadth to become a

parent discipline and provide interdisciplinary aspects of itself to other disciplines in the future.

Due to their organic evolutionary nature, it is likely that disciplines can migrate up (or down) the scale based upon where they stand relative to their overall lifecycle. Furthermore, it is conceivable that even full-fledged disciplines could eventually become extinct. While clearly beyond the scope of this thesis, it is worth noting that just as languages have disappeared from human existence, it is conceivable that the number of students choosing to pursue continued studies in a particular field could deteriorate so significantly that universities find it difficult (if not financially impossible) to continue making them available. This situation, in turn, would lead to evolutionary stagnation of the discipline and the eventual disappearance of it altogether because scholars would no longer be available to teach it. While it could be argued that the body of knowledge created by a discipline's forebears would always exist and make it available for future generations to learn and study, society's complex adaptive nature and the parallel pursuit of expanding knowledge in new and more exciting areas could leave less popular disciplines behind. The resultant decay and decomposition of these less-desirable disciplines may be predictable with this framework as a move toward a zero value of one of the components would be a clear indicator of the discipline's impending decline. This area should be a topic for future research, as it ties together the current university as an institution and the continual development and modification of a discipline's curriculum, which itself is part of a complex adaptive system.

Thus far, it appears that the closest research study both in depth and breadth to the one hypothesized above is the 2011 comprehensive study published by the National Academies Press entitled, "A Data-Based Assessment of Research-Doctorate Programs in the United States."[173] Using data collected from the 2005–2006 academic year, "this assessment from the National Research Council offers an unprecedented collection of

[173] The National Academies Press (www.nap.edu) was created by the National Academy of Sciences to publish reports of the National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council, all operating under a charter granted by the Congress of the United States. The National Academies Press, "About the National Academies Press," (n.d.), http://www.nap.edu/content/help/about.html.

data on over 5,000 doctoral programs in 62 fields at 212 universities in the United States -- including information on faculty research productivity, institutional support for students, and the diversity of faculty and students, among many other characteristics."[174] The following table lists the 20 characteristics provided by the assessment.

Table 3. Assessment Characteristics Captured in "A Data-Based Assessment of Research-Doctorate Programs in the United States" published by the National Academies Press[175]

1. Publications per allocated faculty member
2. Citations per publication
3. Percent faculty with grants
4. Awards per allocated faculty member
5. Percent interdisciplinary faculty
6. Percent non-Asian minority faculty
7. Percent female faculty
8. Average GRE scores
9. Percent 1st-yr. students with full support
10. Percent 1st-yr. students with external funding
11. Percent non-Asian minority students
12. Percent female students
13. Percent international students
14. Average PhDs, 2002 to 2006
15. Average completion percentage
16. Median time to degree
17. Percent students with academic plans
18. Student work space
19. Student health insurance
20. Number of student activities offered

According to the report brief, "the data were collected from academic year 2005–2006 through questionnaires sent to those identified as doctoral faculty by their institutions, as well as through questionnaires sent to the heads of doctoral programs, administrators, and students. Information on characteristics such as publications and citations came from public sources and uses a considerably longer timeframe."[176] Furthermore, "the assessment offers data on some characteristics not incorporated in the illustrative rankings, such as the percent of program faculty who are tenured and the percent of students employed as research or teaching assistants."[177] Finally, one of the most useful aspects of this comprehensive assessment is that the actual data values

[174] National Academy of Sciences, "A Data-Based Assessment of Research-Doctorate Programs in the United States," 2010, http://www.nap.edu/rdp/docs/report_brief.pdf.

[175] Ibid.

[176] Ibid.

[177] Ibid.

collected are provided in a Microsoft Excel spreadsheet to allow anyone to evaluate, mine, and synthesize the data.[178]

In looking at the various data collected, several items match closely or somewhat closely to several of the 11 framework components. Although somewhat subjective, they are utilized to assess aspects of the case study disciplines quantitatively. These attributes coupled with subjective weights and measures based upon individual levels of intensity placed upon each component in terms of how often it is referenced within the literature or how valuable it appears to be when balanced against the whole are also used. Furthermore, as mentioned earlier, it appears that components of the framework may have the same relative weight as other components. Finally, it is possible that future research could effectively leverage a number of quantitative-based survey questions in an effort to substantiate these subjective claims. For the purposes of this analysis, however, a conceptual quantitative measure is captured, compared against a baseline, and then processed through a series of weighted calculations, as it may lend itself to understanding better the framework and how disciplines may fit within it.

A. QUANTITATIVE WEIGHTING OF COMPONENTS

Taking the 11 analytical framework components detailed in Chapter III and assigning each an independently weighted value between 1 and 10, with 1 representing the lowest weight possible and 10 representing the highest weight possible, an attempt can be made to describe each component's relative significance quantitatively within the architecture of the framework, which is referred to as the Discipline Specific Weighted Value (DSWV). While these values are subjective, they are based upon a perceived level of operational and functional significance for that component within the overall framework. The next step is to assign a representative score for each framework component as it relates to the discipline at the current time. This score is referred to as the Discipline Specific Score (DSS), and ranges between 1 and 100. Next, the DSS is multiplied by the DSWV to obtain a weighted score for that framework component. This

[178] The National Academies, "Excel Data Table," April 29, 2011, http://researchdocs.nas.edu/ResDocTableWin_4–29–11.xls. (Mac versions also available).

value is referred to as the Discipline Specific Weighted Score (DSWS). Finally, a normalized percentage for the discipline is obtained by taking the sum of the DSWS values for each framework component and dividing it by the Discipline Component Factor (DCF), which consists of the average of the 11 DSWVs times the maximum DSWS possible of 1000 (e.g., a DSWV of 10 and a DSS of 100). This value is referred to as the Discipline Normalized Percentage (DNP). Taking the DNP and plotting it on the quintile-based graph described earlier can determine quantitatively where a discipline may be in its evolution.

The following formula illustrates these steps algebraically.

Step 1:

$$\textit{Discipline Specific Weighted Score} = \left(\text{Discipline Specific Weighted Value} \times \text{Discipline Specific Score}\right)$$

More simply put,

$$DSWS = \text{DSWV x DSS}$$

Step 2:

$$\textit{Discipline Component Factor} = \left(\sum_{n=1}^{11}\left(\text{DSWV}_n\right) \div 11\right) \times 1000$$

More simply put,

$$DCF = \left(\sum_{n=1}^{11}\left(\text{DSWV}_n\right) \div 11\right) \times 1000$$

Step 3:

$$\textit{Discipline Normalized Percentage} = \left(\sum_{n=1}^{11}\left(\text{DSWS}_n\right)\right) \div \text{DCF}$$

More simply put,

$$DNP = \left(\sum_{n=1}^{11}\left(\text{DSWS}_n\right)\right) \div \text{DCF}$$

The following table depicts a hypothetical academic discipline called Widgetology in which the values used are completely arbitrary and shown only to illustrate the quantitative methods being employed:

Table 4. Quantitative Weighting—Widgetology

	Analytical Framework Component	Discipline Specific Weighted Value (DSWV)	Discipline Specific Score (DSS)	Discipline Specific Weighted Score (DSWS)
1.	Community of Persons	6	54	324
2.	Expression of Human Imagination	4	96	384
3.	Domain	8	68	544
4.	Tradition	4	65	260
5.	Syntactical Structure—Mode of Inquiry	7	56	392
6.	Conceptual Structure—Substance	7	52	364
7.	Specialized Language or System of Symbols	4	35	140
8.	Heritage of Literature—Communications Network	8	48	384
9.	Valuable and Affective Stance	6	49	294
10.	Instructive Community	6	29	174
11.	Projected Demand of the Discipline's Knowledge	8	24	192
	AVERAGE	**6.18**	**SUM**	**3452**

$$DNP\left(\sum_{n=1}^{11}(\mathrm{DSWS}_n)\right)\div \mathrm{DCF}=3452\div(6.18\times1000)=55.84\%$$

A value of 55.84% for the DNP places this discipline here on the quintile system.

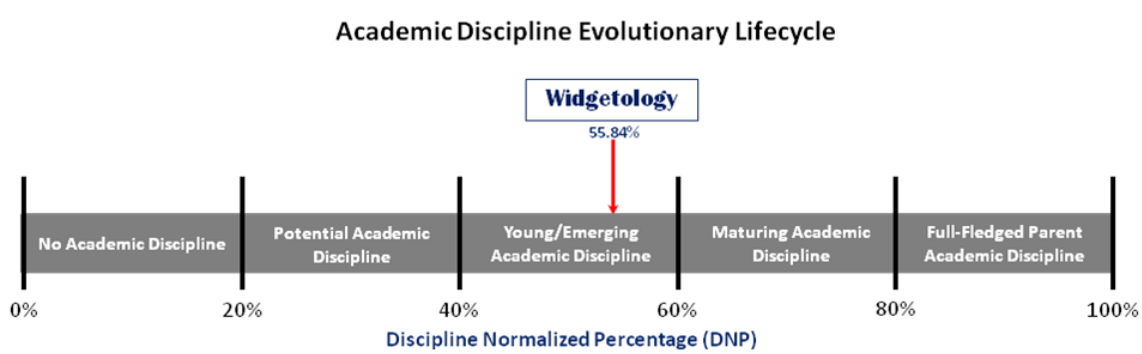

Figure 6. Academic Discipline Evolutionary Lifecycle—Widgetology

The following section briefly describes each case study discipline and then applies the quantitative weighting to determine each respective DNP.

B. CASE STUDIES

For this thesis, four specific case studies representing a cross-section of fields are evaluated. Three illustrate fields of study that have emerged as academic disciplines and are widely accepted by academia. In addition, they appear on the surface to be related in one way or another to homeland security and include public administration, international relations, and computer science. Since value exists in not only comparing something that may fit the mold so to speak, the fourth case study focuses on a field of study that has not (yet) emerged as an academic discipline, or that of construction economics, in an effort to determine if any aspects of homeland security may in fact prevent it from emerging as an academic discipline. This negative logic-based evaluation may also yield areas for further exploration or refinement of homeland security should it become apparent that it may not be on the road toward becoming a bona fide academic discipline. It should be noted that recovery from a large-scale or regional disaster includes, in large part, areas covered in construction economics (or building economics, as it is also referred). Much like the three academic disciplines mentioned previously, construction economics, at least on the surface, has some connectivity to the field of homeland security.

Each case study begins with a brief research-based summary and then utilizes the quantitative weighting of the components of the analytical framework developed in the previous section in an effort to create a normalized apples-to-apples comparison. Again, while the scores may be somewhat subjective, the value of the model is still solid. Finally, the case study disciplines are in order from oldest to newest in terms of when they were recognized by the academy as being disciplines (for those that have been).

1. Case Study 1—Public Administration

According to Larry Kirkhart in his paper entitled, “Public Administration and Selected Developments in Social Science,” the field of “Public Administration was not represented by independent schools until 1927 and 1928 when Syracuse University and

the University of Southern California established special programs."[179] He further points out, "although *Public Administration* was published in Britain as early as 1923, it was not until 1939 that a comparable journal, *Public Administration Review*, was produced in the United States."[180] In addition, Robert Golembiewski points out in *Public Administration as a Developing Discipline* that "the fractioning off of ASPA [American Society for Public Administration], of course, was a by-product of the excitement of the development of 'big government' in Roosevelt's New Deal, as well as an expression of the development of the felt needs of the burgeoning graduates and faulty of suddenly virile programs in public administration."[181] Finally, Golembiewski summarizes the discipline with the following quote.

> To simply, somewhat, public administration as a field was a child of the Great Depression, a field that quickly peaked and remained stable for several decades. As on consequence, relatively junior people—both scholars and practitioners—had early moved into senior positions and stayed there. By the late 1960s, major retirements were impending just as the demand for training in public administration and law enforcement escalated. This proved a heady combination and added impetus to the need to stake out new conceptual territory, and the earlier, the better.[182]

These perspectives clearly support the academic-industry-government triad, and it portrays an interesting parallel to homeland security given the massive governmental changes and demand for education and training post 9/11. The question for those in the homeland security enterprise is will it be stainable, or will it wane? Will future generations look to their forebears and charge them with failure to provide for their destiny? Time will indeed help make that determination, but given that the speed at which society moves, it is unlikely that anyone has decades to wait.

For the purposes of evaluating public administration, the related areas of public policy and public affairs are also included as they are were combined in the National

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[179] Marini, *Toward a New Public Administration; the Minnowbrook Perspective*, 129.

[180] Ibid.

[181] Robert T. Golembiewski, *Public Administration as a Developing Discipline 1, Perspectives on Past and Present* (New York: Dekker, 1977), 23.

[182] Ibid., 129.

Academies Press report. As such, the following table represents the public administration academic discipline in accordance with the quantitative weighting of the components of the analytical framework.

Table 5. Quantitative Weighting—Public Administration

	Analytical Framework Component	Discipline Specific Weighted Value (DSWV)	Discipline Specific Score (DSS)	Discipline Specific Weighted Score (DSWS)
1.	Community of Persons	7	74	518
2.	Expression of Human Imagination	6	35	210
3.	Domain	8	78	624
4.	Tradition	5	69	345
5.	Syntactical Structure—Mode of Inquiry	7	65	455
6.	Conceptual Structure—Substance	7	71	497
7.	Specialized Language or System of Symbols	3	25	75
8.	Heritage of Literature—Communications Network	6	68	408
9.	Valuable and Affective Stance	6	81	486
10.	Instructive Community	7	68	476
11.	Projected Demand of the Discipline's Knowledge	8	72	576
	AVERAGE	**6.36**	**SUM**	**4670**

$$DNP = \left(\sum_{n=1}^{11} \left(\mathrm{DSWS}_n \right) \right) \div \mathrm{DCF} = 4670 \div \left(6.36 \times 1000 \right) = 73.39\%$$

A value of 73.39% for the DNP places this discipline here on the quintile system.

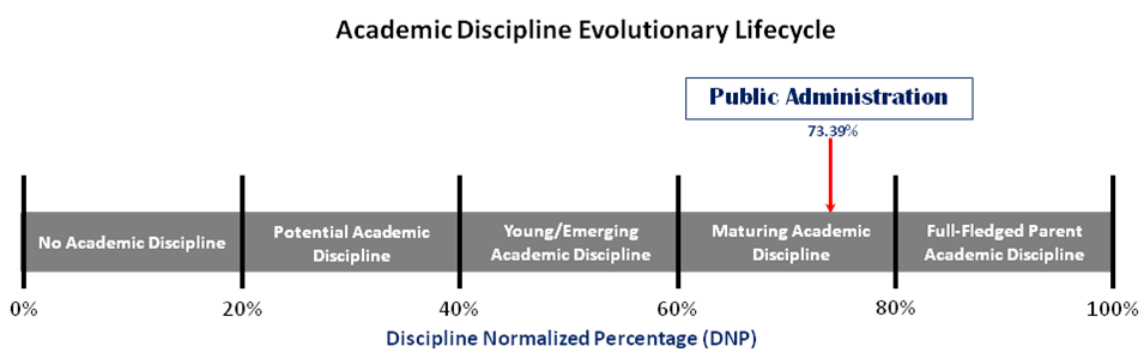

Figure 7. Quintile-based Representation of Public Administration

2. Case Study 2—International Relations

International relations, like public administration, is a relatively new discipline tracing its birth to World War I and the Peace Treaty of Versailles.[183] Olson and Onuf in their paper entitled, "The Growth of a Discipline: Reviewed," assert that "what must never be forgotten in assessing the emergence of International Relations is that it grew out of a fervent desire to understand and therefore to find ways to control world politics in order to prevent future wars."[184] In a later work, Olson, along with A. J. R. Groom, discuss how external forces drove the development of international relations as an academic discipline.[185] This development is summarily important because it supports the earlier claim made that disciplines often emerge due to external factors, events, or responses to them, which is right in line with the academia-industry-government triad proposed earlier. Interestingly, and along this triad-based theme, Schmidt points out, "there is often a great lag between the external event and the discipline's reaction to it, and the academic response to a significant event is very often a multifarious one."[186] He cites as an example, "the varied academic response of international relations to the collapse of the Soviet Union and the confrontational bi-polar world order."[187]

Schmidt concludes by referencing the ongoing debate as to whether or not international relations is in fact a distinct discipline. He posits, "while the interdisciplinary character of international relations is often the major point of contention in the 'debate' as to whether it qualifies as a discipline, it is important to not get caught up in this fruitless semantic discussion. It is apparent that despite ambiguities about its boundaries, international relations has a distinct professional academic identity with identifiable discourse."[188] This perspective addresses a chief argument that opponents to

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[183] Brian C. Schmidt, "The Historiography of Academic International Relations," *Review of International Studies* 20, no. 4 (October 1994): 361.

[184] Steve Smith, *International Relations: British and American Perspectives* (Oxford, UK; New York, NY: B. Blackwell in Association with the British International Studies Association, 1985), 12.

[185] William C. Olson and A. J. R. Groom, *International Relations Then and Now: Origins and Trends in Interpretation* (London: Harper Collins Academic, 1991), 137.

[186] Schmidt, "The Historiography of Academic International Relations," 364.

[187] Ibid.

[188] Ibid., 365.

homeland security being an identifiable discipline have held. While homeland security may be interdisciplinary, it clearly has a developing professional academic identity and an identifiable discourse.

The following table represents the breakdown of international relations using the quantitative weighting of the components of the analytical framework.

Table 6. Quantitative Weighting—International Relations

	Analytical Framework Component	**Discipline Specific Weighted Value (DSWV)**	**Discipline Specific Score (DSS)**	**Discipline Specific Weighted Score (DSWS)**
1.	Community of Persons	5	65	325
2.	Expression of Human Imagination	4	45	180
3.	Domain	6	42	252
4.	Tradition	4	54	216
5.	Syntactical Structure—Mode of Inquiry	6	61	366
6.	Conceptual Structure—Substance	6	58	348
7.	Specialized Language or System of Symbols	2	20	40
8.	Heritage of Literature—Communications Network	6	57	342
9.	Valuable and Affective Stance	6	72	432
10.	Instructive Community	7	61	427
11.	Projected Demand of the Discipline's Knowledge	7	58	406
	AVERAGE	**5.36**	**SUM**	**3334**

$$DNP = \left(\sum_{n=1}^{11} \left(\mathrm{DSWS}_n \right) \right) \div \mathrm{DCF} = 3334 \div \left(5.36 \times 1000 \right) = 62.16\%$$

A value of 62.16% for the DNP places this discipline here on the quintile system.

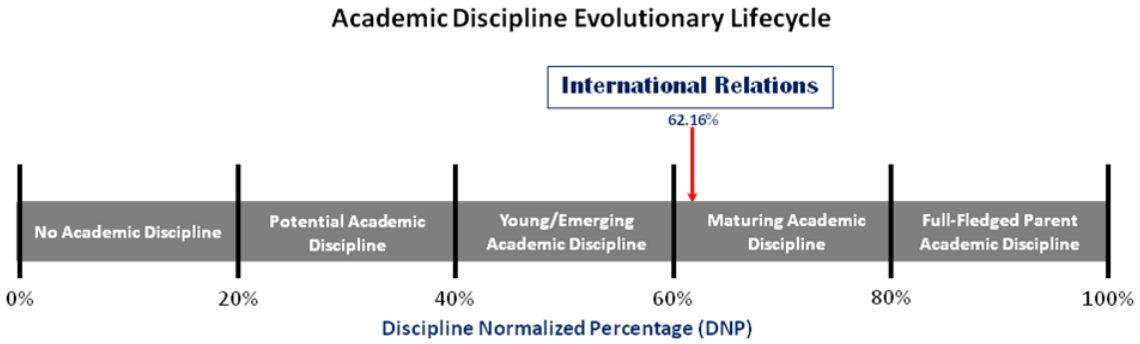

Figure 8. Quintile-based Representation of International Relations

3. Case Study 3—Computer Science

Computer Science, like public administration and international relations, is also a relatively new discipline having been "born in the early 1940s with the joining together of algorithm theory, mathematical logic, and the invention of the stored-program electronic computer."[189] Furthermore, according to Denning et al., "computer science and engineering is the systematic study of algorithmic processes that describe and transform information: their theory, analysis, design, efficiency, implementation, and application."[190]

Denning et al. point out that the growth of computer science from its birth in the 1940s until the 1980s saw nine major subareas develop.[191]

1. Algorithm and data structures
2. Programming languages
3. Architecture
4. Numerical and symbolic computation
5. Operating systems
6. Software methodology and engineering

[189] Peter J. Denning and Association for Computing Machinery, Task Force on the Core of Computer Science, *Computing As a Discipline* (New York, NY: ACM, 1988), A–I–1.

[190] Ibid.

[191] Ibid., A–I–3.

7. Databases and information retrieval
8. Artificial intelligence and robotics
9. Human-computer communication

Having direct personal knowledge and experience in this academic discipline (e.g., the author of this thesis studied computer science in both undergraduate school and graduate school), it is very clear the discipline is not only interdisciplinary, but it also evolved rapidly due to the advent of the computer and the associated technology revolution. Funding from the industry and government areas of the academic-industry-government triad is still strong today. Furthermore, the demand for the discipline's knowledge continues to get stronger. An interesting observation about this discipline is that it appears different from many others. Those who study computer science are not necessarily destined to stay in the computer science field. In actuality, computer scientists find themselves in virtually every segment and discipline because the technology age set the stage for it, and society demanded it. It is far easier for a computer scientist to learn aspects of a business process than it is for a business process expert to learn computer science. The same can be said for virtually every area and industry (e.g., finance, law, government, manufacturing, etc.).

The following represents the breakdown of computer science using the quantitative weighting of the components of the analytical framework.

Table 7. Quantitative Weighting—Computer Science

	Analytical Framework Component	Discipline Specific Weighted Value (DSWV)	Discipline Specific Score (DSS)	Discipline Specific Weighted Score (DSWS)
1.	Community of Persons	8	74	592
2.	Expression of Human Imagination	8	87	696
3.	Domain	8	78	624
4.	Tradition	3	50	150
5.	Syntactical Structure—Mode of Inquiry	8	82	656
6.	Conceptual Structure—Substance	8	78	624
7.	Specialized Language or System of Symbols	9	91	819
8.	Heritage of Literature—Communications Network	7	62	434
9.	Valuable and Affective Stance	7	82	574
10.	Instructive Community	8	79	632
11.	Projected Demand of the Discipline's Knowledge	10	90	900
	AVERAGE	**7.64**	**SUM**	**6701**

$$DNP = \left(\sum_{n=1}^{11} \left(\mathrm{DSWS}_n \right) \right) \div \mathrm{DCF} = 6701 \div \left(7.64 \times 1000 \right) = 87.75\%$$

A value of 87.75% for the DNP places this discipline here on the quintile system.

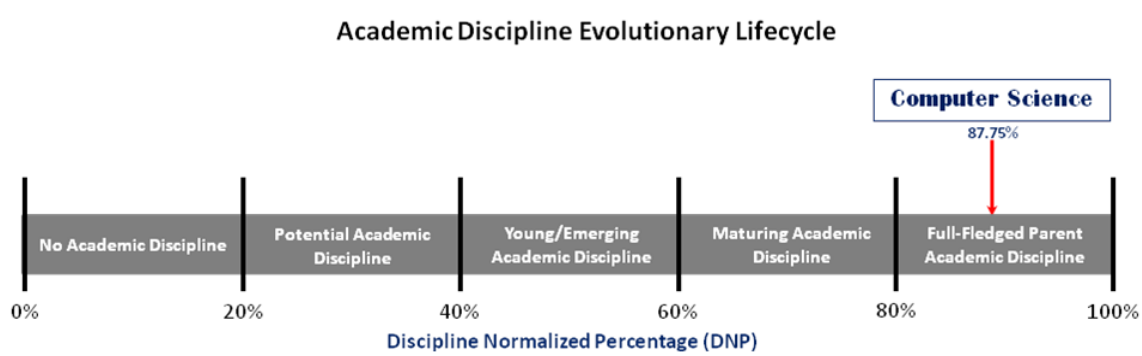

Figure 9. Quintile-based Representation of Computer Science

4. Case Study 4—Construction Economics

Construction economics, the last of the four case studies to be evaluated, is a relatively new field of study that has recently emerged. According to George Ofori,

"construction economics aims to improve the efficiency of an industry which contributes over half of the capital formation of every country."[192] Ofori did an excellent job in 1994 of comparing the fledgling field of study to several of the framework components, as he took the lead from King and Brownell's 1966 book that formed the basis of the analytical framework used in this thesis. In his conclusion, Ofori says, "construction economics cannot be described as a bona fide academic discipline. It lacks a clear indication of its main concerns and contents and a coherent theory."[193] Furthermore, he posits, "given the present state of affairs, waiting for a discipline to emerge is inappropriate."[194]

The position Ofori took was bold and decisive, and it leads people to ask why? Was there no catalyst, outside force, or trigger event to drive the field's growth? Nine years later, Danny Meyers reviewed Ofori's contribution by looking at what transpired during that time period. Meyers noted that "according to Ofori there would have been little consensus when the first Earth Summit was held in Rio during 1992—when sustainable construction was not even on the agenda. Ten years later, there was still no consensus, but sustainable construction had gained a sufficiently high profile to be discussed at the Earth Summit in Johannesburg in 2002."[195] Furthermore, Meyers concludes with a plea so to speak that the academic community surrounding this field of study "urgently review what they do, begin to support the sustainability agenda and hopefully become a little less disparate in the proceedings!"[196] This statement tends to suggest that without a significant push, external factors, or some other outside force, academia is unlikely to respond. For this reason, it appears that Ofori was correct, and construction economics as a discipline is still merely lukewarm.

The following represents the breakdown of construction economics using the quantitative weighting of the components of the analytical framework.

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[192] George Ofori, "Establishing Construction Economics as an Academic Discipline," *Construction Management & Economics* 12, no. 4 (July 1994): 295.

[193] Ibid., 304.

[194] Ibid.

[195] Danny Myers, "The Future of Construction Economics as an Academic Discipline," *Construction Management & Economics* 21, no. 2 (February 2003): 106.

[196] Ibid.

Table 8. Quantitative Weighting—Construction Economics

	Analytical Framework Component	Discipline Specific Weighted Value (DSWV)	Discipline Specific Score (DSS)	Discipline Specific Weighted Score (DSWS)
1.	Community of Persons	6	15	90
2.	Expression of Human Imagination	3	19	57
3.	Domain	8	18	144
4.	Tradition	3	7	21
5.	Syntactical Structure—Mode of Inquiry	7	11	77
6.	Conceptual Structure—Substance	7	10	70
7.	Specialized Language or System of Symbols	2	12	24
8.	Heritage of Literature—Communications Network	6	7	42
9.	Valuable and Affective Stance	7	12	84
10.	Instructive Community	8	9	72
11.	Projected Demand of the Discipline's Knowledge	8	19	152
	AVERAGE	**5.91**	**SUM**	**833**

$$DNP\left(\sum_{n=1}^{11}\left(\mathrm{DSWS}_n\right)\right)\div \mathrm{DCF}=833\div\left(5.391\times 1000\right)=14.10\%$$

A value of 14.10% for the DNP places this discipline here on the quintile system.

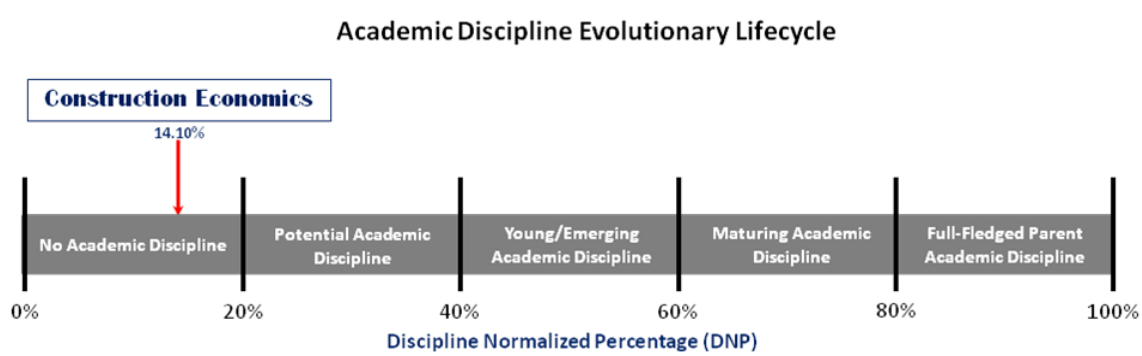

Figure 10. Quintile-based Representation of Construction Economics

C. BASELINE REFERENCES AND SUMMARY OF RESULTS

It may be useful to see where several baseline academic disciplines might be relative to the case study disciplines. Few would argue that mathematics, physics,

medicine, and law are academic disciplines. The following tables illustrate how they might score in terms of their analytical framework components and discipline normalized percentages.

1. Mathematics

Table 9. Quantitative Weighting—Mathematics

	Analytical Framework Component	Discipline Specific Weighted Value (DSWV)	Discipline Specific Score (DSS)	Discipline Specific Weighted Score (DSWS)
1.	Community of Persons	8	84	672
2.	Expression of Human Imagination	8	90	720
3.	Domain	9	85	765
4.	Tradition	9	89	801
5.	Syntactical Structure—Mode of Inquiry	9	88	792
6.	Conceptual Structure—Substance	9	89	801
7.	Specialized Language or System of Symbols	10	99	990
8.	Heritage of Literature—Communications Network	9	87	783
9.	Valuable and Affective Stance	7	78	546
10.	Instructive Community	10	83	830
11.	Projected Demand of the Discipline's Knowledge	7	86	602
		AVERAGE **8.64**	**SUM**	**8302**

$$DNP = \left(\sum_{n=1}^{11} \left(\mathrm{DSWS}_n \right) \right) \div \mathrm{DCF} = 8302 \div \left(8.64 \times 1000 \right) = 96.13\%$$

2. Physics

Table 10. Quantitative Weighting—Physics

	Analytical Framework Component	Discipline Specific Weighted Value (DSWV)	Discipline Specific Score (DSS)	Discipline Specific Weighted Score (DSWS)
1.	Community of Persons	6	74	444
2.	Expression of Human Imagination	8	91	728
3.	Domain	9	85	765
4.	Tradition	8	84	672
5.	Syntactical Structure—Mode of Inquiry	9	90	810
6.	Conceptual Structure—Substance	9	89	801
7.	Specialized Language or System of Symbols	10	97	970
8.	Heritage of Literature—Communications Network	9	85	765
9.	Valuable and Affective Stance	7	78	546
10.	Instructive Community	10	83	830
11.	Projected Demand of the Discipline's Knowledge	7	79	553
	AVERAGE	**8.36**	**SUM**	**7884**

$$DNP = \left(\sum_{n=1}^{11} \left(\mathrm{DSWS_n} \right) \right) \div \mathrm{DCF} = 7884 \div \left(8.36 \times 1000 \right) = 94.27\%$$

3. Medicine

Table 11. Quantitative Weighting—Medicine

	Analytical Framework Component	Discipline Specific Weighted Value (DSWV)	Discipline Specific Score (DSS)	Discipline Specific Weighted Score (DSWS)
1.	Community of Persons	8	81	648
2.	Expression of Human Imagination	6	82	492
3.	Domain	9	88	792
4.	Tradition	8	82	656
5.	Syntactical Structure—Mode of Inquiry	7	82	574
6.	Conceptual Structure—Substance	7	84	588
7.	Specialized Language or System of Symbols	10	95	950
8.	Heritage of Literature—Communications Network	9	90	810
9.	Valuable and Affective Stance	7	84	588
10.	Instructive Community	10	88	880
11.	Projected Demand of the Discipline's Knowledge	8	84	672
	AVERAGE	**8.09**	**SUM**	**7650**

$$DNP = \left(\sum_{n=1}^{11} \left(\mathrm{DSWS}_n \right) \right) \div \mathrm{DCF} = 7650 \div \left(8.09 \times 1000 \right) = 94.55\%$$

4. Law

Table 12. Quantitative Weighting—Law

	Analytical Framework Component	Discipline Specific Weighted Value (DSWV)	Discipline Specific Score (DSS)	Discipline Specific Weighted Score (DSWS)
1.	Community of Persons	8	85	680
2.	Expression of Human Imagination	6	72	432
3.	Domain	9	86	774
4.	Tradition	8	84	672
5.	Syntactical Structure—Mode of Inquiry	7	78	546
6.	Conceptual Structure—Substance	7	79	553
7.	Specialized Language or System of Symbols	9	91	819
8.	Heritage of Literature—Communications Network	8	86	688
9.	Valuable and Affective Stance	7	82	574
10.	Instructive Community	10	89	890
11.	Projected Demand of the Discipline's Knowledge	8	90	720
	AVERAGE	**7.91**	**SUM**	**7348**

$$DNP = \left(\sum_{n=1}^{11} \left(\mathrm{DSWS}_n \right) \right) \div \mathrm{DCF} = 7348 \div \left(7.91 \times 1000 \right) = 92.91\%$$

The following figure depicts where these four baseline disciplines (e.g., mathematics, physics, medicine, and law) fall on the Academic Discipline Evolutionary Lifecycle quintile graph.

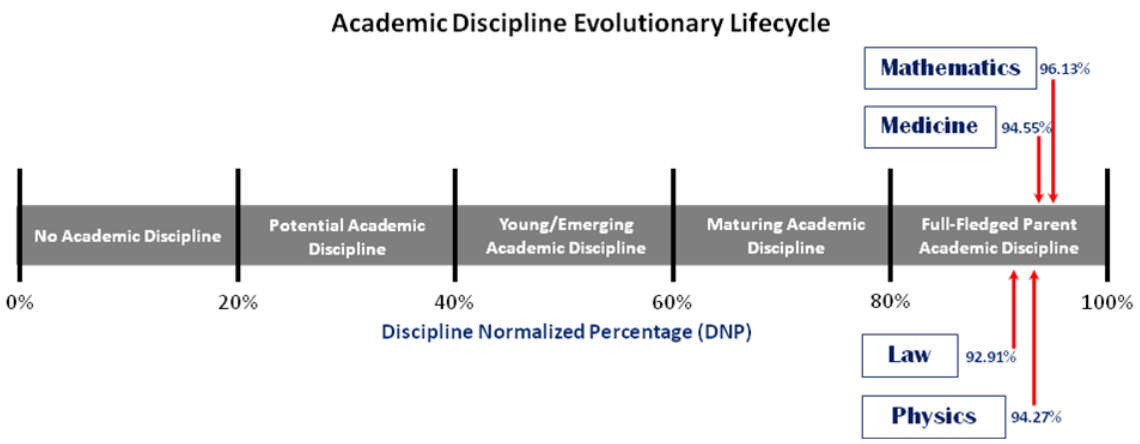

Figure 11. Quintile-based Representation of Four Base Disciplines

The following figure summarizes where the case study disciplines (e.g., public administration, international relations, computer science, and construction economics) and the four baseline disciplines (e.g., mathematics, physics, medicine, and law) fall on the Academic Discipline Evolutionary Lifecycle quintile graph.

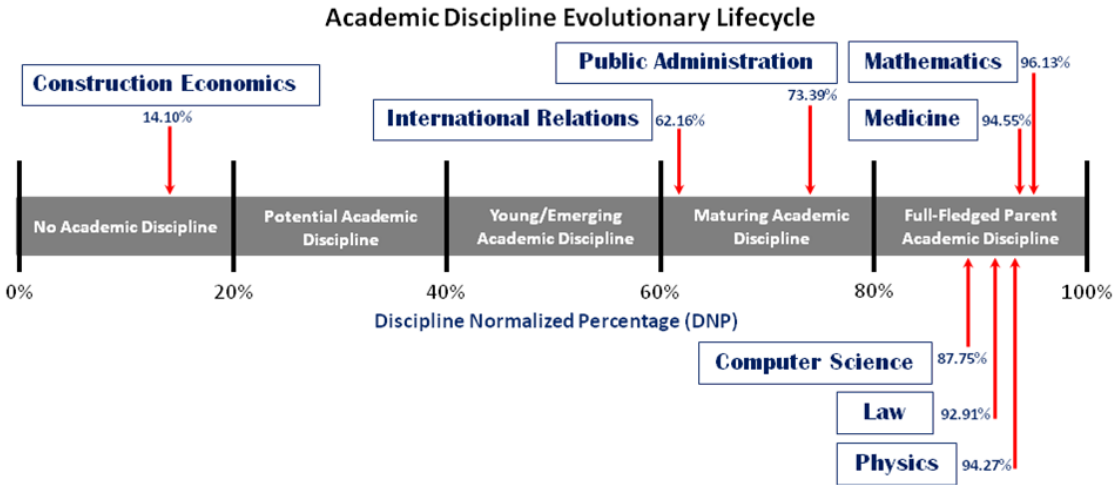

Figure 12. Quintile-based Representation of All Referenced Disciplines

V. ANALYSIS

The synthesis of knowledge can be a complicated process. It represents a strategically iterative cycle involving the acquisition, accumulation, evaluation, utilization, and creation of new knowledge. The primary objective of this chapter is to analyze, evaluate, and synthesize the results obtained from the case study research accomplished in the previous chapter. Before beginning that process, however, it is important first to establish validity and reliability in the approach used. Louise Kidder in her work entitled, *Research Methods in Social Relations*, outlines four tests that should be conducted to assist in this endeavor to include: construct validity, internal validity, external validity, and reliability.[197]

Construct validity, as Yin points out, is often problematic for case study-based researchers because the operational set of measures can be subjective rather than objective.[198] In this case, the operational set of measures by which the case studies were aligned were the characteristics of disciplines as outlined by King and Brownell and others and included no subjectivity. With regard to internal validity, which deals primarily with cause and effect-based studies, the evaluation of other academic disciplines (or fields of study) are descriptive and exploratory in nature, and are not intrinsically related to whether or not homeland security may or may not be an emerging academic discipline. As such, no applicability of this causal-based validity measure applies. External validity, which as Yin points out, focuses on "knowing whether [or not] a study's findings are generalizable beyond the immediate case study,"[199] was considered in two distinct regards. First, this research involved four case studies rather than one. Second, no attempt is being made to create any statistical generalization (e.g., go from these few samples to the entire universe). Rather, this research seeks to provide an analytical generalization, which Yin indicates occurs when the investigator strives "to

[197] Louise H. Kidder, *Research Methods in Social Relations*, 4th ed. (New York; Montréal: Holt, Rinehart and Winston, 1981), 7–8.

[198] Yin, *Case Study Research: Design and Methods*, 37.

[199] Ibid., 38–39.

generalize a particular set of results to some broader theory."[200] This perspective is the key focus of this analysis, as it is both not practical and outside the scope of this thesis to attempt replication across other fields of study that may or may not be emerging as academic disciplines. However, future researchers may wish to leverage this effort, as it does provide a valid way of synthesizing knowledge. The final test is that of reliability. The objective of reliability, according to Yin, "is to be sure that if a later investigator followed exactly the same procedures" as the current investigator, he or she "should arrive at the same findings and conclusions."[201]

With respect to this research, each of the four case studies was evaluated using the analytical framework outlined in Chapter III. While the passage of time should not influence the available data, the operational process undertaken can be easily replicated going forward. Furthermore, the use of multiple case studies serves to extend the credibility of the assertion, which Yin suggests, is because it leverages replication logic and is analogous to a scientist conducting multiple experiments rather than using sampling logic that Yin corresponds with having multiple subjects in a single experiment.[202]

Clearly, each of the first three academic disciplines (e.g., public administration, internationals relations, and computer science) satisfied the quantitative weighting-based evaluation and received DNP above 60%, as expected. The fourth case study discipline (or field of study in this case), construction economics, did not, as its DNP was 14.10%. This result was no surprise. So, what of homeland security? How does it fare?

A. HOMELAND SECURITY AS A DISCIPLINE

The following represents the breakdown of homeland security using the quantitative weighting of the components of the analytical framework.

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[200] Yin, *Case Study Research: Design and Methods*, 39.

[201] Ibid., 40.

[202] Ibid., 48.

Table 13. Quantitative Weighting—Homeland Security

	Analytical Framework Component	Discipline Specific Weighted Value (DSWV)	Discipline Specific Score (DSS)	Discipline Specific Weighted Score (DSWS)
1.	Community of Persons	6	25	150
2.	Expression of Human Imagination	8	42	336
3.	Domain	8	34	272
4.	Tradition	4	10	40
5.	Syntactical Structure—Mode of Inquiry	6	32	192
6.	Conceptual Structure—Substance	6	34	204
7.	Specialized Language or System of Symbols	3	30	90
8.	Heritage of Literature—Communications Network	6	38	228
9.	Valuable and Affective Stance	8	40	320
10.	Instructive Community	6	31	186
11.	Projected Demand of the Discipline's Knowledge	10	65	650
	AVERAGE	**6.45**	**SUM**	**2668**

$$DNP = \left(\sum_{n=1}^{11} \left(\mathrm{DSWS}_n \right) \right) \div \mathrm{DCF} = 2668 \div \left(6.45 \times 1000 \right) = 41.34\%$$

A value of 41.34% for DNP puts homeland security just over the threshold of a young/emerging academic discipline.

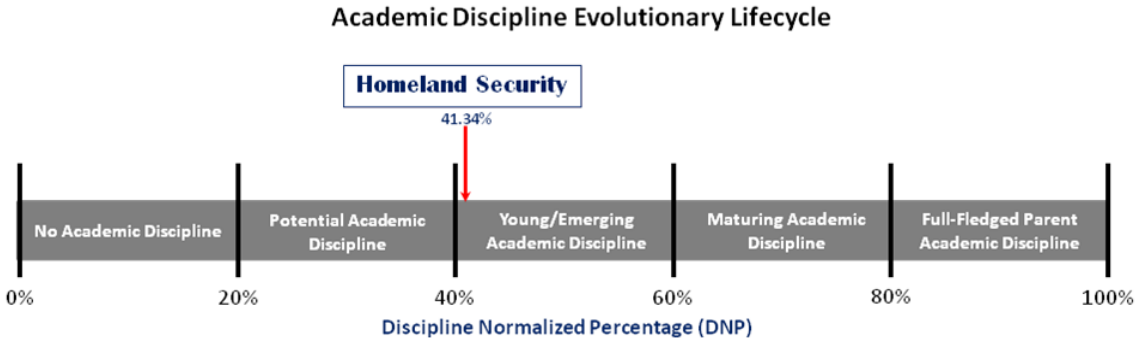

Figure 13. Quintile-based Representation of Homeland Security

Given the high values for framework components 2 and 11 (e.g., expression of human imagination and projected demand of the discipline's knowledge), homeland security will likely continue to increase its DSS going forward, which will prolong its evolution toward a maturing academic discipline.

B. THE FUTURE AS A DISCIPLINE

Given the rapid changes society continues to experience in practically every conceivable arena, the ability to adapt to these changes touches virtually all academic disciplines in one way or another, as knowledge attainment is necessary for the continuation of the species. Without it, stagnation would occur. Likewise, virtually all public, private, and academic organizations must continually grow and adapt to survive, accomplish their respective missions, and continue to produce desirable and worthwhile output. Those establishments that succeed typically do so because they are able to weather the storms brought on by the ever-shifting seas of change. While change may indeed be inevitable in nearly everything known today, anticipating it and having the wherewithal to adapt to it are what defines success. Recognizing the need to adapt is an essential first step, and developing a comprehensive, well-designed strategy to accomplish it is a strong second step. However, one thing is inherently missing. To create a valuable forward-looking strategy, it is necessary to make assumptions of what will be. Most often, history, previous performance, and past practices are used to develop models, trends, and simulations, and then with the help of some predictive or prospective analysis, an attempt is made to anticipate the next phase or significant paradigm shift.

Alexander King in his essay, "The Future As a Discipline and the Future of the Disciplines," presented as part of the Ciba Foundation Symposium 36, summarizes this point very well when he discusses this distinguishing feature of mankind and his preoccupation with the thinking about the future. King says, "What is new is the present recognition of the need to probe more systematically and rationally into the trends of present events, to foresee as far as possible the consequences of such trends, to see difficulties ahead, and to make a deliberate attempt to shape the future in accordance with

evolving human needs."[203] King further suggests, "the degree of uncertainty about forecasts of the future varies greatly from field to field." King uses technology as an example, suggesting that even though it is possible to sometimes predict in the short term what may come, "even here the uncertainties are very great."[204] Unfortunately, regardless of how well it may be possible to predict what will come next, the element of the unknown can still overpower the best laid plans and forecasts. While hindsight may indeed be 20–20, foresight is really anyone's guess. With guesses and speculation come inherent risk, but a world without risk would inhibit knowledge discovery, innovation, and growth. Predicting forthcoming societal situations or postulating future scenarios can in and of themselves be agents of change. For example, getting society to fear that the protective abilities of the earth's ozone were in danger sparked a worldwide change in the use of chlorofluorocarbons (CFCs) as a propellant in aerosol cans. Referring to this, former Secretary General of the United Nations said, "perhaps the single most successful international agreement to date has been the Montreal Protocol."[205]

Looking at the study of the future as a potential discipline, King first points out that "the universities are essential innovators in society through the development of new concepts and methods of thought, they can hardly avoid taking up the challenge of exploration of the future which is being forced upon us by the exigencies of our times, and which in many ways is a consequence of scientific discovery as well as of the technology which has been built upon it, stemming from earlier innovations of academia."[206] He then breaks down what he thinks are primary component disciplines that would be involved. King suggests there is "a need for a basic statistical and mathematical competence; they require sound input from economics, sociology, and

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[203] G. E. W. Wolstenholme, Maeve O'Connor, and Ciba Foundation, *The Future As an Academic Discipline* (Amsterdam; New York: Elsevier; American Elsevier, 1975), 36.

[204] Ibid., 39.

[205] The Ozone Hole, "The Montreal Protocol on Substances that Deplete the Ozone Layer," (n.d.), http://www.theozonehole.com/montreal.htm. For more information on the Montreal Protocol, visit United Nations Environment Programme, Ozone Secretariat, "Montreal Protocol on Substances that Deplete the Ozone Layer," (n.d.), http://ozone.unep.org/new_site/en/Treaties/treaty_text.php?treatyID=2.

[206] Wolstenholme, O'Connor, and Ciba Foundation, *The Future As an Academic Discipline*, 43–44.

psychology; at times they require the help of the computer; they have elements of cybernetics and systems analysis; they require deep political insights."[207] With this in mind, King believes that

> the time is ripe for the classification of the sciences to be reassessed, with the structural and conceptual consequences which this would entail. The growing understanding of the linkages and interactions of the problems facing society, as well as the linkages and interactions between diverse fields of learning and approaches to the discovery of new knowledge, suggests the need to adopt a holistic and dynamic approach: in some sense a return to the reality of the unity of all knowledge.[208]

While little may be available to support the future as an emerging academic discipline, it may be worthwhile to merge it with homeland security, as the holistic perspective parallels the study of homeland security and its emergence as an academic discipline charting the course for what is necessary going forward.

[207] Wolstenholme, O'Connor, and Ciba Foundation, *The Future As an Academic Discipline*, 44.

[208] Ibid., 46.

VI. CONCLUSIONS

A. FINDINGS AND RECOMMENDATIONS

Academic disciplines are philosophical structures that have been created to house areas of knowledge. Over the centuries, the great philosophers looked for ways to define and categorize knowledge as society continually evolved. As new knowledge was discovered, it was the role of academia to try to classify, organize, and expand this new wisdom. By creating a self-perpetuating system in which students of the disciplines would evolve into scholars advancing the knowledge bases along the way, they themselves became the agents of change. However, as man and society in general became more complex, the organic evolution of knowledge began to demand faster and more deliberate change, which manifested itself in the birth of new academic disciplines that academia had to seize quickly to try to keep pace.

Over the past 150 years or so, the number of disciplines began to multiply rapidly in an effort to try to accommodate the needs of industry, government, and society in general. The mutually inclusive nature of the triad among academia, industry, and the government saw a paradigm shift occur in academia. The institutions that once focused on educating only the elite and wealthy members of society began to focus more on responding to the demands of industry and government and their associated funding than it did on pure knowledge growth, which resulted in disciplines emerging from other disciplines as they shared various components of themselves and created overlapping schemas. These newborn interdisciplinary disciplines began their own evolutionary lifecycle independent of their parent disciplines. In many cases, the changes in society that originally caused their existence began hyper-accelerating, which in turn, fueled the discipline's growth. This recursive process resulted in even more pressure to respond on the academic institutions.

Sometimes, the changes in society were so dramatic that industry or government response was profound. In the case of the Great Depression, the economic crisis triggered a reaction by the government to focus on public administration and public policy, which

launched public administration as an academic discipline. World War I saw the disappearance of the laissez-faire, isolationist mentality that gave birth to international relations as an academic discipline. Technology innovation that spurred the advent of electronic calculating devices leading up to computing devices in the 1940s unleashed the technology revolution. Industry and government responded with enormous sums of money, and once again, academia reacted by building curricula around computer science as an academic discipline.

Still society demanded more, and as academia tried diligently to respond, other disciplines began to emerge that were offshoots of the newly emerging disciplines. The biotech and nanotech industries are good examples. Even they are mixing with medicine. Soon *meditech* or *nanomed* may emerge as disciplines. Regardless of the areas of knowledge that surface, one thing appears certain. Academia is almost always in the reactive mode. Perhaps this state is normal, or perhaps it is not. Either way, the philosophical walls associated with formal academic disciplines are coming down.

On September 11, 2001, another trigger event occurred. This time, it was massive and all-encompassing. Sadly, terrorism existed prior to 9/11, but most of society was blind to it because it was not something in the forefront of anyone's mind. Perhaps it is possible to thank the current media establishment and the technology available, but the response to the terror attacks, however, was nothing short of monumental. The government's epic response was also vast and far-reaching. In the decade since 9/11, more than $630 billion has been spent on what is currently called homeland security. Industry responded, and so did academia. However, is homeland security an emerging academic discipline, or is it simply a conglomeration or concentration of already established academic disciplines (e.g., political science, international relations, criminal justice, etc.)? William Pelfrey, one of the most noted scholars and researchers in homeland security and curriculum development, addressed this issue when he assessed other established and more mature disciplines and compared them to homeland security education. Specifically, he said, "it appears that established programs in other fields and disciplines **do not** offer the requisite objectives and capabilities of homeland security

education"[209] (emphasis added). Furthermore, Pelfrey's beliefs that "abandoning homeland security education would widely miss the mark" and "it would, therefore, be a mistake not to continue that instruction" are both significantly supportive of the theme throughout this thesis that a need exists to continue building the discipline.[210]

As such, looking once again at the results obtained through the quantitative weighting model for homeland security, an important observation comes to light. The DSS for components 2 and 11 (e.g., expression of human imagination and projected demand of the discipline's knowledge) are the highest scoring components. Since these two components have correspondingly high DSWV (e.g., both 8 out of 10), the resultant DSWS is much higher, which provides a sufficient "boost" to the DNP (e.g., a value of 41.34%) that pushes it just over the threshold of a young/emerging academic discipline.

Table 14. Quantitative Weighting—Homeland Security

	Analytical Framework Component	**Discipline Specific Weighted Value (DSWV)**	**Discipline Specific Score (DSS)**	**Discipline Specific Weighted Score (DSWS)**
1.	Community of Persons	6	25	150
2.	Expression of Human Imagination	8	42	336
3.	Domain	8	34	272
4.	Tradition	4	10	40
5.	Syntactical Structure—Mode of Inquiry	6	32	192
6.	Conceptual Structure—Substance	6	34	204
7.	Specialized Language or System of Symbols	3	30	90
8.	Heritage of Literature—Communications Network	6	38	228
9.	Valuable and Affective Stance	8	40	320
10.	Instructive Community	6	31	186
11.	Projected Demand of the Discipline's Knowledge	10	65	650
	AVERAGE	**6.45**	**SUM**	**2668**

[209] William V. Pelfrey and William D. Kelley, "Homeland Security Education: A Way Forward," *Homeland Security Affairs* 9, art. 3 (February 2013): 5, http://www.hsaj.org/?article=9.1.3.

[210] Ibid., 6.

$$DNP = \left(\sum_{n=1}^{11} \left(\mathrm{DSWS}_n \right) \right) \div \mathrm{DCF} = 2668 \div \left(6.45 \times 1000 \right) = 41.34\%$$

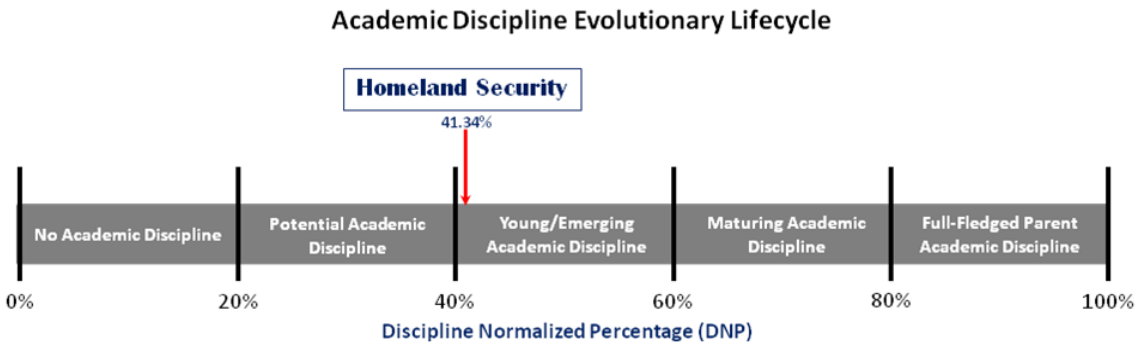

Figure 14. Quintile-based Representation of Homeland Security

Providing some justification for these values is not difficult because according to Pelfrey, "most people seem to realize these activities [e.g., prevention, preparedness, response, mitigation, recovery, and consequence management—all of which are within the homeland security enterprise] significantly contribute to the quality of life or lack thereof in our communities, today and in the future."[211] This statement supports the premise that society will continue to generate a sustained demand for homeland security-based knowledge that focuses on resilience and prosperity-related aspects of life. Clearly, however, the debate is still ongoing. Pelfrey answers the question as to whether or not homeland security should be considered an academic discipline by concluding it is "too immature and amorphous, with its educational goals in dispute, to merit proceeding vigorously in the development of new programs beyond those providing the knowledge and capabilities needed by those leaders already in defined homeland security roles and key public safety positions."[212] This well-respected opinion may be somewhat limited because it does not consider all of the components of the framework, their different weighting values, and the interaction of external factors on the discipline.

[211] Pelfrey and Kelley, "Homeland Security Education: A Way Forward," 1.

[212] Ibid., 8.

Therefore, while the proof and validity that homeland security is a maturing academic discipline may require additional time or incubation, the answer today is actually quite simple. Society must survive, and it must prosper. To do so in an increasingly complex world, it must develop and grow the knowledgebase, which requires the education and training of scholars and practitioner problem-solvers. Pelfrey again supports this claim when he posits, "education intends to enhance the performance of strategic, complex cognitive tasks, such as planning, coordination, and achievement of consensus."[213] This community of like-minded people shares the passion for delivering prosperity in a complex environment, and by focusing on *prosplexity* (as the author calls it), it will, in turn, demand that academia create the appropriate curriculum and educate the masses that must not only continue, but must also step up to the next level to include PhD-level studies. In other words, the discipline must prevail, and it must thrive.

Many suggest that homeland security is simply a fad that will gradually dissipate over time. The evidence does not support this nearsighted claim either. Recurrent funding, constant job prospects, sustained technology growth, continuing threats (both natural and manmade) all set the stage for maintainability. Like the colors of the American flag, the colors of homeland security will not fade away. As such, the need to have scholars and problem solvers establish interdisciplinary, collaborative relationships now, not later, are all reasons academia should embrace the call to duty with open arms, as it is mutually beneficial. Pelfrey's recommendation that "at this stage in the development of 'homeland security education' a wiser approach would be to capitalize upon the development of homeland security imperatives and research within existing disciplines, thus building a firm foundation for a more mature discipline of homeland security"[214] is again limited in scope because the way interdisciplinary disciplines emerge is through the collective integration and interaction of existing disciplines, which provides the necessary legitimacy and establishes the credibility of this emerging discipline.

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[213] Pelfrey and Kelley, "Homeland Security Education: A Way Forward," 1.

[214] Ibid., 8.

Some suggest that homeland security is localized to the United States, and as such, little interest globally exists, which could not be further from the truth. Virtually every society deals with natural disasters in one way, shape, or form. Furthermore, while terrorists have focused their ire on western cultures, nothing prevents them from focusing their discontent and irrationally violent behavior throughout the world. In fact, many countries, such as Israel, the United Kingdom, Spain, Russia, Japan, and others, deal with virtually of the same homeland security-related issues as the United States. As James Beckman points out, "sadly and unfortunately, many other countries have a much longer history of dealing with terrorism, a history that extends well before September 11, 2001."[215] Thus, while the educational packaging may be different, the content is very similar because, as Beckman emphasizes, "other countries have also had to deal with questions on how best to protect its citizenry and detect, thwart, capture, and punish terrorists and other criminals bent on committing crimes against the State (such as terrorism, treason, sedition, espionage, mutiny, insurrection, among other things)."[216] Finally, individual societies are growing more and more globalized, as the interconnectivity and dividing lines between cultures, economies, and governments are becoming increasingly blurred.

Next, some say that homeland security is too broad and not well defined, which is the same failed argument that people had with public administration. The dynamics of the emerging discipline will necessitate the use of *chicken wire* (e.g., a flexible containment field) to fence in the discipline because the ebb and flow of a growing knowledgebase will help define the boundaries going forward to include the increase in peer-reviewed journals and communication networks connecting together the far-reaching and increasing nodes of the homeland security community.

Finally, an argument against the label itself has arisen (e.g., homeland security), as some say it focuses too much attention on law enforcement, counterterrorism, and protecting the homeland, which is a hollow argument, and it borders on an *ad hominem*

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[215] James Beckman, *Comparative Legal Approaches to Homeland Security and Anti-Terrorism* (Aldershot, England; Burlington, VT: Ashgate Publishing Group, 2007), 2, http://site.ebrary.com/id/10211178.

[216] Ibid., 3.

fallacy. Attacking the name of the discipline does nothing to advance the argument against its creation or evolution. If society in general chooses not to like the label, the label will evolve with the discipline—just as alchemy eventually became chemistry and medicine. Regardless, what society is witnessing currently is the emergence of an academic discipline. To deny it is simply to remain stationary while the complex and ever-changing world moves forward at lightning speed and leaves society behind to wonder "what if."

B. LIMITATIONS AND NEED FOR FUTURE RESEARCH

In any study or research endeavor, a finite amount of time and effort can be spent addressing, investigating, evaluating, and examining the primary and secondary questions. While this academic journey clearly generated many new and exciting avenues to traverse, realistic limitations prevented the ability to delve further into certain areas. Some of these additional areas of related interest include investigating the opinions, attitudes, and views of existing faculty, administrators, graduates, and students (including prospective students) at institutions where homeland security education is currently offered. After ascertaining what type of curriculum is offered, the breakdown of the faculty who teach it, and the students enrolled (or were enrolled) in those institutions, questions could include 1) what factors led to the course offerings, 2) what obstacles (if any) were encountered, 3) what plans exist or might exist for future course offerings, degree programs, etc., 4) how funding, student enrollment, government, and industry impacted scholarly research in the area, and 5) what career prospects exist for exiting graduates. Next, questions directed toward individual and institutional acceptance as an academic discipline (e.g., its legitimacy) could also be posed. Finally, a survey could include questions directed at the institutional plans if any for building an academic department or even a PhD program for those institutions that offer doctoral programs and querying the recent graduates in an effort to determine their level of interest in pursuing advanced degree programs including a potential PhD in homeland security (or some variant label).

Following through on the concern that homeland security is not a worthwhile label, Sheldon Greaves, the Chief Academic Officer and co-founder of Henley-Putnam University, proposed the label "Strategic Security" in place of homeland security in an article he wrote for the *Journal of Strategic Security*. In his article entitled, "Strategic Security as a New Academic Discipline," Greaves infers that the mission of DHS and the definition it provides for homeland security inhibit its ability to emerge as an academic discipline. He thinks the term strategic security would provide additional "latitude to create a clearly defined standard of education and training that will better prepare those professionals who must face the next challengers to our nation's security."[217] While this perspective has merit, Greaves' focus appears to be on "prevention of national security incidents and the deterrence of threats."[218] This perspective omits the fundamental component of prosperity, which is a requirement contained within the homeland security enterprise. Therefore, if the word "homeland" is debilitating, restrictive, limiting, or even too broad, further research into the best term should be accomplished. In any case, adding the word "prosperity" to any label may be justified. Perhaps strategic security and prosperity or human security and prosperity may win out over homeland security and prosperity. Time will surely tell.

C. FINAL CONCLUDING REMARKS

This nation's security is dependent upon many complex, intricate, and tightly coupled components focused on maintaining the survival and prosperity of this great nation and way of life. These multifaceted elements include successful foreign policy and international relations, maintaining a strong and prepared military and defense apparatus, implementing resilient civil defense and emergency preparedness measures, and leveraging valuable intelligence services and instruments to detect and defeat espionage, cyber warfare, and prospective acts of terrorism both internally and externally. While each of these are pedantically intertwined, defining what is contained within the realm of homeland security nearly 12 years after 9/11 has become more than just a philosophical

[217] Sheldon Greaves, "Strategic Security as a New Academic Discipline," *Journal of Strategic Security* 1, no. 1 (2008): 18.

[218] Ibid., 16.

quandary. It has become a growing debate that involves multiple competing actors on a stage on which it is not about winning or losing; it is about whether or not it is possible to adapt effectively to the surrounding complex environment by producing competent problem solvers in an age in which the problems are wicked and the solutions require innovative strategies that necessitate knowledge, experience, and insight from multiple academic arenas.

The objectives of this research were two-fold. First, the question of whether or not homeland security (or some variant label) is an emerging academic discipline was posed. Based upon the findings of this research, which compared homeland security to other more seasoned academic disciplines, it appears sufficient "thrust" is built into the rapidly developing paradigm to allow (and justify) escape from the gravitational forces that often ground other fields of study as they attempt to break free. The significant issues facing society, and specifically the current way of life (all of which appear to remain for the long term), pave the way for academia and its institutions of higher learning to advance the discipline to the next level, grow its community of scholars, and produce highly competent problems solvers. Rather than argue and debate whether or not affective value exists in continuing to move homeland security forward as an academic discipline, it may be better served to look at the alternative and then make the choice. Will other disciplines provide sufficient cover? Will there be enough focus? Or, will a scramble occur in the proverbial eleventh hour to gather problem solvers from various disciplines that will waste time and energy establishing the necessary collaboration, agreeing to a common nomenclature, and putting forth the knowledge growth that could have already been put in motion. The question to ask then is what will the future hold if this course is taken instead?

The second objective of this research emerged from within the academic journey itself. Establishing a structural framework by which fields of study can be judged, reviewed, or evaluated that considers more than just the sociological or epistemological structures that have long been debated is a victory in its own right. Why? The overriding goal of knowledge expansion requires that the scholar take what was established during

one snapshot in time, mix in what has changed (or simply became known) in the current timeframe, potentially make predictions of the future, and then move forward. Future researchers can build upon this work hopefully by taking it to the next level.

Final thought: Homeland security and its emergence as an academic discipline is simply a response to the dynamism of the complexities of society and the institutions within it. For decades (or perhaps centuries), scholars have attempted to define and describe ways to deal with the rapid changes occurring all around them. The speed at which change occurs is awe inspiring to say the least, and its acceleration will likely continue. Many scenario planners, soothsayers, science fiction writers, and fortunetellers attempt to forecast what life will be like in the future. While relevant to a degree, it is not the end result that matters; rather, it is the time between the years, the journey so to speak, that really matters most. To be equipped for this journey, models, methods for analysis, philosophies, educational institutions, and mankind must be prepared. Man's survival and prosperity depend on it.

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