CHARACTERIZING THE NEXUS BETWEEN SCIENCE, THE ARTS, AND RELIGION TO IMPROVE EXECUTIVE DECISION-MAKING AND INNOVATION

A Thesis submitted to the Faculty of The School of Continuing Studies and of The Graduate School of Arts and Sciences in partial fulfillment of the requirements for the degree of Doctor of Liberal Studies

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ABSTRACT

We live in a globalized world, where leaders contend with making strategic decisions to address the complex problems they face on a daily basis. Leaders are also challenged with developing new and innovative ideas designed to advance knowledge in a given field of inquiry. Individual experiences of the leader, their education, their respective field of study, and even their human value-sets are just a few of the areas that influence the decisions they make on critical issues. However, a condition emerges in which a leader may not have sufficient access to viable alternative courses of action. This condition, termed the Executive Dilemma, can limit innovation, or even result in catastrophic results. The Executive Dilemma exists when viable solutions exist in a field of inquiry beyond the awareness of the executive leader. This thesis asks the fundamental question: What if the optimal solution to the problem resides in a field of inquiry other than their own?

Three case studies were examined for potential existence of the Executive Dilemma, with the purpose of determining root causes that might lead to a potential method of mitigating the problem. The theories of two noteworthy psychologists, Herbert Simon and Carl Jung, were used to develop the initial lexicon and analyze the case studies. Subsequently, the personal and professional biographies of two leaders, Thomas Jefferson and Steve Jobs, were examined in order to search for historical
examples of how leaders may have overcome the effects of the Executive Dilemma.

The analysis led to the construction of a new intellectual framework called the Nexus. The Nexus is designed for leaders to blend science, the arts, and religion, in order to broaden their ability to generate alternative solutions, thereby improving decision-making capabilities. The research led to the following conclusion:

Characterizing the nexus between science, the arts and religion—in essence, improving access and agility within this three-dimensional intellectual space, can yield new methods for improving the decision-making and innovative abilities of executive leaders.

This three-dimensional space is designed to establish an interdisciplinary bridge to human values in decision-making by utilizing three disparate fields of inquiry. The Nexus was deliberately applied to four real-world scenarios, which revealed potential benefits for executive leaders who apply its characteristics.
ACKNOWLEDGMENTS

On the morning of February 1, 2003, I was sitting with my wife in a pediatric clinic in Charleston, South Carolina. It was a particularly challenging period in my life. My three-year-old son had been recently diagnosed with autism, and I was scheduled to depart soon on yet another deployment to fly missions for the Air Force in the Middle East. A radio was playing in the lobby, and under the muffled sound of the speaker we learned the shocking news that the Space Shuttle Columbia had suffered catastrophic failure due to damage on its wing. Worse yet, I later learned that the damage was known to NASA officials while the shuttle was on-orbit, and NASA had reported that the absence of space-damage repair capability contributed to a premature decision to bring the shuttle home. That was not true. NASA had been working feverishly on space damage repair systems for several years for the International Space Station program. I was aware of this fact because I had worked on such a program in graduate school, and even published two papers on the subject. Yet for some reason the program had stalled. What happened?

At that point, I realized that that rational approaches and rigorous scientific methods that had laid the foundations for 10 years of my engineering career, had failed. In addition to the overwhelming feeling of guilt, the realization led me to two inextricable thoughts—one, that this occurrence was not only tragic, but common; and two, something could be done about it. The loss of Columbia and other incidents that were the result of institutional failure led me to the Doctor of Liberal Studies program at Georgetown University. It was there that I began a search for new ways executive leaders might blend ideas, and create frameworks for dealing with problems like this.
A program of this nature doesn’t reach a successful conclusion without the support of many people. I would like to extend a special thanks to Dr. Frank Ambrosio, who mentored me through the development of the thesis, and the subsequently guided my transformation into a public intellectual within the D.L.S. curriculum. I would also like to acknowledge the scholarly efforts of my thesis committee, without whom I would not have completed this project. Dr. James Hershman offered limitless historical resources and important analysis during my biographical review of Thomas Jefferson. In addition to providing considerable perspective from the U.S. Government Office of Personnel Management, Dr. Marcia Ledlow opened the doors to the range of interdisciplinary applications used by senior executives in government. I also offer my utmost thanks to Assistant Dean Anne Ridder, who has been my guiding light throughout my tenure as a Doctor of Liberal Studies Candidate. Of course, I offer my highest gratitude to Dr. Theresa Sanders, who has not only been an outstanding committee chair, but a supportive mentor during my time at Georgetown University. Each of my committee members, in their respective careers, were not just scholarly achievers—at some point, they have served as exemplars in the qualities of humility, courage, and fortitude that were essential to the formulation of the research presented in this thesis.

I would also like to acknowledge my father, who sacrificed more than I can fathom to build a successful life for his family in America, and include in the journey an academic investment in his children that transformed dreams into destiny. As an agrarian family of the ethnic culture in India known as the Jats, we owe our success to mother earth, whose bountiful soil not only enabled the opportunity of education, but also the influence of the Silk roads that triggered global commerce from China to
Europe. I am thankful for the love of my mother, who ensured I had a book in my hand before I could walk, and the inspiration to follow my dreams. Special thanks to my son, Krishan, whose sense of morality and justice now carries the sword of Achilles to our next generation; and my daughter Nina, whose smile can shake the foundations of the Pentagon, and capture hearts of the most onerous of generals working there. Both of you have given me far more wisdom than I could ever hope to give. Finally, I thank my wife, Uma, whose unwavering support, sacrifice, and love has sustained me not only through the challenges of my academic experience at Georgetown, but also helped me survive hot dusty nights in foreign lands, hostile skies, and even the murky depths below the ocean. Ultimately, it was through her support that I was successful in the completion of this project—an act of love that I will be eternally grateful for.
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CHAPTER ONE

INTRODUCTION: THE EXECUTIVE DILEMMA

Knowledge in the form of an informational commodity is already, and will continue to be, a major—perhaps the major—stake in the worldwide competition for power.¹

- Jean-Francois Lyotard, 1979

We live in a globalized world dominated by information, where executive leaders contend with making strategic decisions to address the complex problems they face on a daily basis. Leaders are also challenged with developing new and innovative ideas designed to advance knowledge in a given field of inquiry. In 1979 Jean Francois Lyotard published a treatise on the state of knowledge called The Post Modern Condition: A Report on Knowledge.² In it he asserted that today’s class of decision-makers consist of a composite layer of corporate leaders, high-level administrators, and the heads of major professional, political, military, and religious organizations.³ He opined that these leaders all depend on information for their decision-making. Furthermore, the individual experiences of the leader, education, their respective field of study, and even their human value-sets are just a few of the factors that influence the decisions they make on critical issues, and ultimately shape societal norms.⁴ Yet, each

¹ Jean Francois Lyotard, “The Postmodern Condition: A Report on Knowledge,” Theory and History of Literature, Vol.10, translation by Geoff Bennington and Brian Massumi (Manchester: Manchester University Press, 1979), 5. His treatise was an open criticism of grand narratives and the state of generalization that had overcome the post World War II era. He was also critical of Marxism, and its tendency to over emphasize systems over emancipation within institutions.

² Ibid.

³ Ibid., 14.
leader follows unique pathways to arrive at decisions by considering alternative courses of action, often times influenced by their vocation. For example, an executive leader with a mathematics education may choose to utilize probabilistic analysis methods such as linear programming to generate solution-sets and optimize a potential course-of-action. Does this always yield the optimal solution? What if the optimal solution to the problem resides in a field of inquiry other than their own, or requires a more socially interactive process to arrive at a viable solution? Given this perspective, a potential dilemma exists for leaders, particularly as fields of inquiry in the information age become more and more complex. Additionally, traditional nation-states, political parties, professions, and historical traditions are becoming legacy institutions and are giving way to communal interactions that are more or less borderless in nature. Despite this trend, executives tend to rely on their own fields of expertise to guide their decision-making on complex problems. In the information age, Lyotard opined that the scaffolding of ‘grand narratives’ or maxims developed within a field of inquiry to solve critical problems is weakening. He asserted that in the information age independent fields of knowledge are called into question, traditional disciplines disappear, and overlapping occurs at the border of disparate fields.

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4 Ibid., X.
5 Ibid., 16.
6 Ibid.
7 Ibid., 15.
8 Ibid., 16.
9 Ibid.
knowledge could be beneficial if used correctly, writing that, “from these endeavors new territories are born.”10 At the same time, he was weary of society’s inability to reconcile this new environment, instead favoring the partition of disparate fields of study.11 As such, future enterprises led by executives might benefit from a willingness to look beyond their individual vocation, operate across the borders, and adapt to new environments. Naturally, there is historical precedent for this endeavor, as witnessed by the likes of Leonardo Da Vinci and Michelangelo. In a 2010 interview with the nation’s first Chief Information Officer, Vivek Kundra, he stated, “Our next technological step may lie with the extent to which future leaders recapture the ideals of the great thinkers in history, and let their mastery of the arts fuel creativity in the sciences.”12

As leaders make the transition from managerial to senior executive positions, the problems they must solve become more strategic in nature, and may require a thorough examination using a variety of disciplines in order to ensure effective decisions are made. Social interaction and communal activities might buttress performance optimization as methods of generating potential solution-sets.13 For example, at the National Aeronautics and Space Administration (NASA), senior scientists are responsible for developing technologies that enable the safe exploration of space by humans. At the same time, business-minded program managers at NASA are

10 Ibid., 39.
11 Ibid.
13 Ibid.
responsible for ensuring new technologies do not exceed cost thresholds, stay on schedule, and succeed within the budgetary and political constraints of a governmental system. Senior executive leaders at NASA broker conflicts and ensure teams advocating from either the managerial or scientific communities are heard and decisions are made with greater goals in mind. However, select case studies reveal that at NASA and other enterprises, leaders who maintain a singular perspective can sometimes inhibit innovation and in certain instances create situations that result in catastrophic consequences.

As such, three case studies are presented to illustrate the potential for hazard, either physical or institutional, when executive leaders relegate their perspectives to a single field of inquiry. The case studies were chosen for their relevance to this dilemma, and because they represent an important professional problem warranting focused research. The phenomenon is termed the Executive Dilemma, and denotes the inability of executive leaders to recognize or acknowledge that alternative solutions to problems may reside in another field of inquiry. The associated behaviors resulting from the Executive Dilemma might include parochialism or excessive focus on localized interests to the detriment of the collective enterprise. The situation takes the form of bias that limits, or even stifles the search for viable alternatives. Of the types of bias experienced, confirmation bias is the most common. Confirmation bias describes the tendency to perceive in such a way that confirms an established point of view. As such, the Executive Dilemma strikes at the heart of justification for interdisciplinary

study. This project is focused on developing methods executive leaders might use to mitigate the Executive Dilemma.

The first case study examines the National Aeronautics and Space Administration (NASA), where the existence of the Executive Dilemma contributed to the catastrophic loss of life on two occasions. The second case study examines the Air Force, and the delays it experienced in the development and integration of remotely-piloted, or drone aircraft, into the organizational structure of the military. The final case study explores the relationship between religion and the field of economics, which is often overlooked by experts in both of these fields. The three case studies, drawn from the period of time known as the information age, illustrate how the Executive Dilemma can create problems worthy of focused research, and warrant the construction of a model designed to mitigate its effects.

Case Study One: The National Aeronautics and Space Administration

At NASA, science serves as the primary medium for pursuing space exploration. Most NASA executives agree with this sentiment, but they also believe that the innate human desire to explore and create is also essential for producing the science required to advance spaceflight. However, the number of creative artists employed by NASA is greatly outnumbered by the number of scientists and engineers working there. Furthermore, cultural divides between scientific and management communities (representing two relatively disparate fields of inquiry) at NASA have had an adverse impact on decision-making. These divides were considered significant enough that they were identified as causal in two catastrophic events at the agency.
On January 28, 1986, the Space Shuttle Challenger was scheduled to launch at approximately 11:30 AM. However, 73 seconds after lift-off, the spacecraft exploded unexpectedly, killing the entire crew onboard. A lengthy investigation by a Presidential Commission uncovered deep institutional divides between the scientific and management communities that led to faulty decision-making. Prior to returning to flight operations, extensive measures were put in place to address the cultural barriers in decision-making that led to the disaster. However, in 2003, nearly 17 years after the Challenger failure, another catastrophic disaster involving the Space Shuttle Columbia claimed the lives of seven more astronauts. It was the second catastrophic loss of a flight crew in just 113 shuttle flights.\textsuperscript{15} Once again, faulty decision-making resulting from cultural divides between scientists and managers was cited as a contributing factor in the failure. Another lengthy investigation revealed that, as with Challenger, the Columbia failure was attributed in part to a schism between the scientific and managerial communities working at NASA.\textsuperscript{16} The failed Columbia mission jeopardized the future of the program and in 2004 President Bush announced retirement of the shuttle fleet. Given that the lens through which NASA communities viewed potential solutions to problems as either scientific or managerial in nature, proposed solution-sets presented a clear dilemma for decision-makers wishing to resolve conflicts and build consensus on viable solutions. This problem occurred on both the Challenger disaster as well as the Columbia disaster.

\textsuperscript{15} Debra Werner and Anatoly Zak, “Maximizing Safety,” \textit{Aerospace America}, October, 2015, 19.

\textsuperscript{16} National Aeronautics and Space Administration, Columbia Accident Investigation Board Report, Volume I (Government Printing Office, August 2003), 170.
The events and leadership behaviors preceding both shuttle disasters exemplify the characteristics of the Executive Dilemma. In both situations, leaders had to contend with brokering distinct views on a problem and determine a preferred course of action. Naturally, the risk was high for executive decision-makers to be overly influenced by their own education background, experiences, and individual perspectives on problem solving. The Challenger accident investigation revealed the existence of a climate in which leaders from the technical community were unable to convince senior management that a catastrophic failure was imminent. Senior technical engineers had refused to sign the launch recommendation, stating to management that that the shuttle was unsafe to fly due to the cold temperature conditions.\(^\text{17}\) In an interview with the magazine, *Aerospace America*, Allan McDonald, senior engineer at the Morton Thiokol Corporation, provided an account of his attempts to plead his case with NASA management. He said, “We recommended against flying and they would not accept our recommendation because it was based on a qualitative observation. We didn’t have any good test data or analysis that said it would not be ok to fly at those temperatures.”\(^\text{18}\)

Making matters worse was a deep-seated institutional rivalry between Marshall Space Flight Center (MSFC) personnel in Alabama and Johnson Spaceflight Center (JSC) personnel in Texas. The rivalry, which had developed over years of competing for shuttle program responsibilities, fostered even more confusion during the period just prior to launch of Shuttle Challenger. The MSFC community was comprised primarily of


\(^{18}\) Ibid., 27.
propulsion and technical staff for the shuttle, while JSC contained a large portion of the management community for the shuttle program. Prior to the Shuttle Challenger launch, responsibility for sharing information on shuttle analysis fell upon MSFC. Unfortunately, the rivalry between the two communities prevented effective communication. McDonald provided a testimonial to this condition by stating, “If the competition had not been there, the Marshall folks would have told the Mission Management Team at JSC about their discussions with Thiokol. That might have caused the Mission Management Team to cancel the launch.”

Subsequently, the investigation uncovered the need for the technical community to fulfill a more integral role in executive decision-making processes at NASA, where non-technical executives traditionally made the majority of the operational decisions. NASA determined that the best way to address the problem was to populate the senior executive ranks with more scientists and astronauts. However, in the years following the Challenger investigation, the cultural divides between Marshall Space Flight Center and Johnson Space Center continued. The Rogers Commission investigation into the first Shuttle disaster left the two communities embittered with each other, and created a rift between the organizational cultures that was difficult to overcome, despite the many changes that were implemented to facilitate greater cooperation.

Ultimately, the effort was unsuccessful in achieving its goal of avoiding catastrophic failures, as witnessed by the Columbia accident that occurred in 2003. Unfortunately, an investigation into the second accident uncovered similar deficiencies.

19 Ibid.

20 Ibid.
in organizational cooperation. In the case of the Columbia accident, the shuttle
disintegrated upon re-entry from space after a known crack in the leading edge of the
wing, resulting in the catastrophic breach of the vehicle from extreme heat. Did the
failures result from the inability of two communities to transcend their respective fields of
inquiry? Was it incumbent on a single executive to cultivate an effective decision space
that accommodated the views of two disparate fields?

In the case of both the Challenger and Columbia disasters, executive leaders at
NASA viewed solutions from a managerial perspective, when in fact it was scientific
data that revealed a high probability of failure existed. In the case of Challenger, the
absence of test data in cold weather environments was enough for decision-makers to
succumb to schedule pressures and rationalize the launch. In the case of the Columbia
accident, the absence of a mature on-orbit damage repair assessment capability
prevented NASA from improvising viable alternative solutions to a known problem in
such a short period of time. Ironically, real-time problem solution capability was
something that the agency had become famous for during the Apollo program.
However, in the case of Columbia NASA was unable to avoid the failure even after
integrating more technical experts into its executive leadership corps, a result that
stemmed from the Challenger disaster recommendations. This fact supports the theory
that changing the composition of the senior executive corps had little impact on the
ability of the agency resolve the schism between managers and scientists (or at
minimum prevent being attributed as causal in another accident). In both the Columbia
and Challenger disaster it was the inability of decision-makers to comprehend a field
other than their own that increased the probability of failure.
Ultimately, enterprises that contain professional communities from disparate fields of inquiry can be effective, but the challenge goes beyond that of just populating an executive corps representative of different fields. As such, there is evidence that the same problem still exists at NASA. In 2010 the NASA Astronaut Office, an organization comprised primarily of technical experts, proposed a goal of safely completing 999 out of 1000 missions without a loss of life.\textsuperscript{21} However, the management ranks approved a lower threshold for the shuttle’s successor program, opting to implement a less ambitious goal of one loss of crew in 270 missions.\textsuperscript{22} This disparity indicates that the cultural schisms that previously plagued NASA’s shuttle program may still exist, and have the potential to create future hazards. This case study showed that a successful enterprise may require executive leaders with the capacity to detect disparities among differing communities and then translate the understanding into effective decision-making. More importantly, it illustrates that resolving the Executive Dilemma may require more than just changing the “mix” of fields represented in the leadership rank and file—since this can also lead to deep seated rivalries between communities.

**Case Study Two: Implementation of Drone Technology in the U.S. Air Force**

The NASA case study illustrated how over-reliance on a given field of inquiry can cause schisms between communities that result in catastrophic decision-making on the part of executive leaders. The case study further illustrated how, for NASA, the Executive Dilemma was not easily overcome by simply hiring the right mix of leaders


\textsuperscript{22} Ibid.
from disparate fields of inquiry into their executive corps. The next case study illustrates how schisms between disparate fields of inquiry can emerge and deepen over time. More importantly, it will illustrate the difficulties that emerge in overcoming their long-term effects.

In the U.S. Air Force, pilot affinity for manned flight may have impeded much-needed advances in unmanned aerial vehicle (UAV), or drone technology, during the period from 2000 to 2015. As with NASA, the Air Force populates a large majority of its senior leadership positions with executive leaders from a single discipline, namely the pilot corps (instead of space officers, cyber specialists, intelligence officers, financial, etc.). Despite having critical missions that require expertise in the space and cyber fields, senior decision-makers in the Air Force rose through their respective ranks almost exclusively through the pilot career field. The Honorable Eric Fanning, former Under Secretary of the Air Force from 2013 to 2017, agreed with this sentiment in an interview in June of 2017. He stated, “Since the Air Force is primarily concerned with the domain of the air, it does make some sense that pilots lead the force. However, pilot wings are often termed ‘the universal management badge,’ because of the [significant percentage of] pilots that ascend to leadership positions and run the Air Force.”

This occurrence has resulted in an imbalance in representation from various fields of inquiry at senior levels, making Air Force leaders prone to the Executive Dilemma and a prime candidate for study. Fortunately, the imbalance has not resulted in catastrophic results for the Air Force as it did with NASA, even as its mission sets have become more diverse and complex. However, the case study revealed that the

Executive Dilemma presented problems with the ability of the Air Force to innovate in unmanned aircraft development at a speed commensurate with growing national security demands.

The Air Force has pursued the development of unmanned aerial vehicles since the 1960s.\textsuperscript{24} However, despite its viability and potential to revolutionize air power, the technology has fallen short of widespread use and operational demands by the Department of Defense. Ultimately, the human attachment to manned flight by pilots in Air Force senior leadership likely contributed to slowed production of Air Force drone capabilities from 2000 to 2015. This fact prompted an important question. Did the cultural affinity for manned flight among the Air Force senior pilot corps result in a shortsighted view on the employment of airpower and subsequently inhibit progress in drone aircraft development? Evidence collected by members of the drone community and the Air Force’s history suggests cultural barriers existed, and senior leader affinity for manned flight was likely to have impeded progress. Eventually, extended program delays led to the admonishment and removal of Air Force leadership by the Secretary of Defense in 2009. In order to understand the depth of the cultural schisms that impeded UAV development, one must delve into the complex history of the Air Force, and the internal strife that led to deep cultural divides.

Since its inception in 1947, long-standing rivalries between factions vying for primacy in the Air Force divided its history into three major hegemonies and created

cultural schisms that laid the foundation for emergence of the Executive Dilemma.\textsuperscript{25} This cultural divide among various Air Force communities stifled innovation and adversely impacted drone development in the Air Force.

The first major hegemony in the Air Force began during World War II, the conflict in which air power theory and practice ascended as an independent instrument of national security. The newly approved National Security Act of 1947 defined the roles and missions of an Air Force separate from the Army and Navy.\textsuperscript{26} However, in a time of significant military force reductions, the Soviet Union still presented a significant threat to American interests.\textsuperscript{27} Therefore, President Truman ordered development of a large strategic bomber force as a cost-effective method of deterring large-scale nuclear aggression from the Soviet Union.\textsuperscript{28} Subsequently, strategic bomber forces consumed the bulk of the funding within the War Department, and tactical fighter aircraft development was curtailed in order to ensure funding for a large bomber force was preserved.

As a result of this policy direction, senior executive leaders within Strategic Air Command, or SAC, enjoyed a long-standing hegemony within the Pentagon. Furthermore, they built a culture of corporate perpetuation by assuring the promotion of bomber generals ahead of their fighter pilot and transport pilot counterparts. Eventually,


\textsuperscript{26} Ibid., 31.


\textsuperscript{28} Worden, \textit{Rise of the Fighter Generals}, 37.
they earned the title, "Bomber Mafia" for their protectionist practices and desire to maintain corporate control of the Air Force.\textsuperscript{29} The existence of the Bomber Mafia created tension with other leaders within the Air Force, who suffered professionally by taking a back seat in future air power discussions, promotion opportunity, and Pentagon funding.\textsuperscript{30} As stewards of the nation’s strategic bomber force, the Air Force Chief of Staff position was occupied with bomber pilots from 1969 to 1982.\textsuperscript{31} This secured the future of the Air Force as a bomber-centric organization and mainstay in U.S. war plans.\textsuperscript{32} Naturally, bomber pilots greatly outnumbered fighter pilots in the Pentagon.\textsuperscript{33} However, American involvement in Vietnam would eventually result in a major shift in emphasis towards the fighter aircraft community.\textsuperscript{34} This shift would serve to deepen the divides between various communities in the Air Force.

The rise of tactical aircraft strategy ushered in air power’s second major hegemony. During the 1970s, air power strategists grappled with the development of newer, more nimble fighter aircraft. Frustrated with their professional standing and the results of the Vietnam War, fighter pilots at Tactical Air Command (TAC) consolidated personnel resources at the Pentagon and employed corporate strategies to develop

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\item \textsuperscript{29} Meilinger, \textit{Paths of Heaven}, 208.
\item \textsuperscript{30} Worden, \textit{Rise of the Fighter Generals}, 106.
\item \textsuperscript{31} Meilinger, \textit{Paths of Heaven}, 224.
\item \textsuperscript{32} Ibid.
\item \textsuperscript{33} Worden, \textit{Rise of the Fighter Generals}, 243.
\item \textsuperscript{34} Meilinger, \textit{Paths of Heaven}, 346.
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more capable combat fighter aircraft.\textsuperscript{35} This group also adopted an ancillary objective of capturing primacy within the corporate structure of the Pentagon.\textsuperscript{36} Recognizing the need to wield more influence, fighter generals selected their best young fighter pilots and ensured their placement in prominent planning positions in order to influence senior decision-makers.\textsuperscript{37} During the period from 1970 to 1980, they superseded the Bomber Mafia in the Pentagon and developed all new strategies aimed at building a large fighter force.\textsuperscript{38} Earning support for increased fighter production and development from President Nixon himself, the control of future air power strategy changed hands from the Bomber Mafia to a select group of fighter pilots.\textsuperscript{39} The newly appointed fighter generals earned themselves the nickname, “Fighter Mafia.”\textsuperscript{40} The Fighter Mafia maintained a hegemony within the Air Force for over 25 years. The Air Force Chief of Staff position was held by a fighter pilot from 1982 to 2008, a reflection of the dramatic transformation of the Air Force from a bomber-centric culture to a fighter-centric one.\textsuperscript{41}

Correspondingly, the center of airpower advocacy in the Air Force moved from

\textsuperscript{35} Worden, \textit{Rise of the Fighter Generals}, 185.


\textsuperscript{37} Ibid., 89.

\textsuperscript{38} Meilinger, \textit{Paths of Heaven}, 598.

\textsuperscript{39} Worden, \textit{Rise of the Fighter Generals}, 98.

\textsuperscript{40} Meilinger, \textit{Paths of Heaven}, 208.

\textsuperscript{41} Ibid., 593.
Strategic Air Command (SAC) Headquarters in Nebraska (home of bomber command) to Nellis Air Force Base, Nevada, home of the Air Force Fighter Weapons School.\textsuperscript{42} At Nellis Air Force Base, fighter-centric leaders developed the famed “Red Flag” exercises, and shaped future of aerial warfare by incorporating fighter-centric strategies and articulating them at the Pentagon.\textsuperscript{43} In 1991, Operation Desert Storm validated the Nellis Air Force Base protocol of aerial warfare and cemented the dominant role of fighter aircraft within the Air Force.\textsuperscript{44}

Naturally, the Bomber Mafia’s fall from power left them bruised and embittered, which led to rivalries with the fighter community. Strategic bomber programs as well as the leaders that advocated for them would suffer major setbacks that included programmed reductions and reduced promotion rates of its leaders. Eventually, senior Air Force leaders would expend their political capital on advocacy for the F-22 aircraft, the most expensive fighter program in the history of aerial warfare. Subsequently, overzealous advocacy for the F-22 on behalf of the Air Force would induce a broader perception across the Military Industrial Complex that the Air Force was “pre-occupied” with fighter development in lieu of support for existing wars in Afghanistan and Iraq. Led by its fighter community, the Air Force’s overly aggressive approach to advocacy would eventually trigger a halt to production in 2009.\textsuperscript{45}

\textsuperscript{42} Anderegg, \textit{Sierra Hotel}, 76.

\textsuperscript{43} Ibid., 91.

\textsuperscript{44} Ibid., 183.

In 2008, the twenty-six year reign of the Fighter Mafia came to an abrupt end.\textsuperscript{46} In a bold move, the Secretary of Defense, Robert Gates, removed the Air Force Chief of Staff, General Michael Moseley, after a series of mission errors stemming from two key events.\textsuperscript{47} The first event was a key misstep in the execution of the Air Force strategic bomber mission, which included an accidental shipment of live nuclear weapons across the United States.\textsuperscript{48} Ironically, it was Moseley’s inattention to the strategic bomber mission, stemming from long-standing organizational rivalries that led to his downfall. However, the second event cited for his removal was a perception that he had inhibited expedited fielding of UAVs, or drones.\textsuperscript{49} Ultimately, it was Moseley’s persona as a corporate fighter zealot, one that potentially inhibited the advancement of dissimilar fields of inquiry, that led to his dismissal. Senior defense officials close to Secretary of Defense Robert Gates stated that the Secretary wanted to signal a break with the previous traditions. Overall, Gates was looking for an Air Force leader who did not come with a fighter pilot’s "call sign," or nickname.\textsuperscript{50} Officials also stated that in bypassing the Fighter Mafia for the next Chief of Staff, Gates was requesting that the Air Force focus more on the wars in Iraq and Afghanistan, where he had struggled to get the service to provide more unmanned aircraft.\textsuperscript{51}


\textsuperscript{47} Ibid.

\textsuperscript{48} Ibid.

\textsuperscript{49} Ibid.

\textsuperscript{50} Ibid.
General Norton Schwartz was appointed to replace Moseley as the new Air Force Chief of Staff. His selection marked a significant shift in direction for an Air Force that had traditionally chosen its senior military leaders from among the fighter or bomber pilot community.\textsuperscript{52} He was also chosen to mend the broader perception that the Air Force was not focused on the current wars. In an interview with General Schwartz, he stated, “There was a sense that the Air Force was fully committed to the fight, that’s where the “All In” campaign came from…that the Air Force would do whatever was necessary to contribute to the fight and minimize loss of life.”\textsuperscript{53} Unlike his predecessors, Schwartz was a special operations pilot who hailed from the transport pilot community. General Schwartz brought a unique perspective to the future of the service, immediately declaring the organization as a “Big Tent” Air Force where all communities contributed equally, often remarking on communities as “none more important than the other.”\textsuperscript{54} Where Moseley’s demands for a fleet of over 750 F-22 Fighters put the program at risk of cancellation by senior Department of Defense Officials, General Schwartz closed the matter by compromising with a much smaller number.\textsuperscript{55} The decision dismayed rank and file Air Force fighter zealots represented

\begin{flushleft}
\textsuperscript{51} Ibid.
\textsuperscript{52} Ibid.
\textsuperscript{53} Norton Schwartz, e-mail interview message by author, June 1, 2017.
\textsuperscript{54} Norton Schwartz, e-mail message by author, May 27, 2017.
\end{flushleft}
not only in the active duty Air Force, but also within the retired four-star general community who were former members of the Fighter Mafia. With air power's second hegemony complete, the service was entering uncharted territory. Evidence suggested that the UAV might become the future of Air Force Strategy.\textsuperscript{56} The selection of General Schwartz as Air Force Chief of Staff brought forth evidence that the Global War on Terror might usher in strategies designed better suited for the wars in Afghanistan, such as airlift, special operations, or even space capabilities.\textsuperscript{57} Regardless of the debate, it was clear that the hegemonies once held by the Bomber and Fighter Mafias were no longer present, despite their attempts to regain their position atop the air power food chain.\textsuperscript{58} In a landmark speech to the Air Force Association in 2008, Schwartz made clear that the Air Force was no longer run by the Fighter Mafia, saying that “being close to the target conferred no special status on someone.”\textsuperscript{59} After his speech, reporter Colin Clark asked General Schwartz if he was trying to create an “unmanned mafia,” to which he responded, “I don’t believe in tribes.”\textsuperscript{60} General Schwartz’ efforts toward forging a new corporate culture showed significant promise, and he maintained his “Big Tent” strategy by refraining from advocating for primacy in a single air power arena. Yet


\textsuperscript{57} Barnes and Spiegel, \textit{A Different Part of Air Force Leader}.

\textsuperscript{58} Ibid.


\textsuperscript{60} Ibid.
despite his efforts to ameliorate numerous fighter zealots in subsequent years, the Air Force senior executives assigned under him consisted of splintered factions seeking to fill the void created by the departure of the Fighter Mafia. In an interview on June 1, 2017, Schwartz stated, “There was resistance by a number of communities to the changes needed, the growth and sustainment of the RPA [Remotely Piloted Aircraft] community is a case in point. Our decision to concede to Secretary Gates on F-22 another.” Yet Schwartz did not believe that a power vacuum existed from his vantage point, stating, “A vacuum did not emerge. The commitment to the RPA mission was explicit and deliberate. We tilted to the fight in any number of ways, that is certainly one.” However, Under Secretary Fanning shared a somewhat different perspective. In an interview, he told the story of an encounter he had with an Air Force fighter general, whom he observed to have asked, “Are we a kinetic force or a support force?” Mr. Fanning continued by observing, “AF Leadership, composed primarily of fighter pilots, saw this new mission as a threat to what they regarded as the primary mission of air dominance through fighter aircraft.”

Given the deep-seated cultural barriers that developed between communities in Air Force history, and no senior generals with a background in UAV development to speak of, it was plausible that leaders among various communities within the Air Force

61 Norton Schwartz, e-mail interview message with author, June 1, 2017.

62 Ibid.

63 Eric Fanning, interview with author, June 12, 2017.

64 Eric Fanning, e-mail interview message, October 17, 2017.
might inhibit efforts to ensure effective integration of unmanned-aircraft technology. While not specifically attributed to deliberate efforts, several institutional trends supported this theory. For example, from 2006 to 2013, drone pilots recorded promotion rates below the Air Force average for 20 of 24 officer promotion boards.\textsuperscript{65} At the same time, operational demands for drone pilots during this period prevented mid-level leaders from garnering assignments in the Pentagon that might assist with advocacy.\textsuperscript{66} With few general officer drone advocates positioned in key staff positions, a beachhead for younger officers to build new strategies (as the Fighter Mafia had done) was unattainable. Furthermore, the inability of the Air Force to develop and retain drone pilots attracted the attention of the U.S. Government Accountability Office, who conducted a series of reviews in 2014, 2016, and 2017 and criticized Air Force management of the drone enterprise.\textsuperscript{67} With factions in various communities vying for corporate control of the Air Force, senior leaders remained focused on competing for hegemonies emanating from existing fields of inquiry, rather than establishing new paradigms in fields such as drone technology. Naturally, the impetus for innovation within this new field had been kept at bay due to the schisms created by a singularly-minded executive corps of pilots distracted by the competition for already scarce resources created by Pentagon budget cuts. However, perhaps the most revealing


\textsuperscript{66} Ibid.

\textsuperscript{67} Ibid.
evidence for the institutional marginalization of drones came from testimonials from members of the drone community, who shared their opinions on Air Force progress in drone technology from the un-manned perspective.

Interviews with senior members and industry experts from the drone community added to the evidence of institutional biases against the development of drone technology within the Air Force. Despite the appointment of General Schwartz to the position of Chief of Staff and substantial milestones made in achieving requirements levied by the Department of Defense, progress was a far cry from the vision of establishing equal footing with the manned-pilot community. While new drone concepts were advancing in the Air Force from a policy perspective, members of the pilot community selected to advance it observed institutional resistance to the new capability.\(^{68}\) Since most of the leaders within the drone community were previously pilots of manned aircraft, they developed important insights, and subsequently a heightened sense of the institutional divides that impacted development. All of the drone pilots interviewed confirmed that drone capabilities suffered institutionally in the area of budget, training resources, and promotion opportunities for its personnel.\(^{69}\) More importantly, they also reported that the bias was internal to the Air Force, rather than in the broader Department of Defense establishment. Statements from drone pilots verified the existence of an affinity for manned flight in the Air Force pilot corps.

\(^{68}\) E-mail interview conducted with drone pilots serving both within the Air Force May of 2017 (all interviews were kept confidential; the names of interviewees are withheld by mutual agreement). Interviewees consisted of drone pilots serving within the Air Force, as well as pilots serving in industry.

\(^{69}\) Ibid.
that ultimately inhibited drone development. They often reported that the prestige and pride of personally flying aircraft was absent from the drone community, and labeled as such across the Air Force enterprise. Of significance was the testimonial of a drone pilot who had previously flown fighter aircraft, and had spent most of his career within the organizational culture of the fighter pilot community. His unique perspective offered considerable insight on the corporate culture of the Air Force as it related to drones. He stated:

Quite simply, the fighter pilot mafiz looked down their institutional noses at the drone guys and would not give them an acknowledged seat at the table as a valid weapon system. Although I'm not personally convinced it's just within the fighter community...there's institutional bias in other areas. Consider the example of the fight between the U-2 and RQ-4 where the “U-2 mafia" within the air staff was allegedly instrumental in "cooking the books": reporting U-2 operating costs as favorable to RQ-4 (i.e. lower). After extensive formal protests by Northrop Grumman, the data was reviewed with ensuing significant alteration along with the eventual decision to retire the U-2 vs. the original decision to cancel Block 30 Global Hawk.70

Another drone pilot concurred with this assessment, and also commented on the substandard messaging of the Air Force in facilitating the cultural change by stating:

I believe that the cool factor is lacking from flying drones so it may have a subconscious effect in the mind of pilots. However, I feel that the AF’s inability to embrace the technology, recognize that it had to be institutionalized as a permanent and future part of the force, and its poor messaging to its own members and the joint force (about the vital nature of Intelligence, Surveillance, and Reconnaissance) had more of a detrimental effect than the other factors. In other words, until recently, the USAF never made manned and unmanned ISR a priority mission. This fact was not lost on its own UAS/RPA operators, PEDsters [intelligence officers], and the joint force recipients of the data. The USAF should be less about what it wants to build and more about what is the best

70 Ibid.
platform to meet the current and future joint force commanders’ requirements.\textsuperscript{71}

Despite the testimony from numerous drone pilots, General Schwartz did not feel institutional bias was dominant in the Air Force, stating, “Pilot preferences was less influential on the development of the technology than the effective application of the capability, its integration with adjacent operational concepts and command and control methodologies. Again, when leadership made clear the priorities and agenda, we moved fairly quickly.”\textsuperscript{72} Under Secretary Fanning shared his perspective on the issue as well. From his vantage point, the rapidly growing requirements had an appreciable impact on the approach used by the Air Force. Under Secretary Fanning said, “The demand for Remotely Piloted Aircraft [drones] was increasing so quickly that it was eating away valuable and scarce resources.”\textsuperscript{73} He continued by stating, “I never felt the Air Force inhibited the development of RPAs, but resisted resourcing them to the level approaching the demand (which was never fully justified, to be fair to the Air Force.), in order to resource JSFs [fighter aircraft] as the priority.”\textsuperscript{74} Ultimately, it was the operational leadership, including drone pilots, that maintained the most critical view of Air Force corporate approaches on drone advancement. Evidence from the evolution of air power history suggests that this culture will impact in the future of the Air Force, and

\begin{footnotes}
\item[71] Ibid.

\item[72] Norton Schwartz, e-mail interview message with author, Washington, D.C., June 1, 2017.

\item[73] Eric Fanning, interview by author, Washington, D.C., June 12, 2017.

\item[74] Eric Fanning, e-mail interview message with author, Washington, D.C., October 17, 2017
\end{footnotes}
the Executive Dilemma will continue to serve as a barrier to the development of new disciplines, despite efforts to create new fields of inquiry.75

Both the NASA and Air Force case studies illustrate the potential for harm when senior leaders are prone to the Executive Dilemma and are unable to incorporate perspectives from differing fields of inquiry into their decision-making. In the NASA case, it resulted in a catastrophic failure and loss of life. For the Air Force, the systemic cultural divides that developed over time, as well as the affinity for a manned flight, stunted innovation in the revolutionary field of unmanned aircraft technology. Given the complexities involved with this case study, concluding that pilot affinity for flight was solely causal to inhibiting drone development would be premature; both drone pilots and senior leaders in the Air Force felt that limited resources and rapidly increasing demand for drones played a major role.76 Yet, interviews from senior leaders and mid-level leaders revealed differing perspectives. Merely populating executive ranks with leaders representing a diverse mix of fields would also prove to be sub-optimal at best (as witnessed by the NASA example). Both cases provided a compelling reason to conduct focused research on the problem of the Executive Dilemma. In both the NASA and Air Force case studies, the cultural gaps between disparate fields were too deep to overcome by incorporating a collaborative mix of executives representing various communities. When posed with the choice of the right mix, or individual capacities,
Under Secretary Fanning stated, “Both...we don’t do enough to develop individual capacity. Leaders are human beings, and they have biases. No matter how balanced a staff is, an individual leader will need to balance that.”

General Schwartz echoed this sentiment, stating, “One needs in-depth experts and well-experienced generalists and all with a sense of the larger mission and leadership direction. Many understood the changes underway and why they were essential to the reputation and stature of the Air Force. A few did not, and we moved them on.”

Therefore, understanding the individual tendencies of executive leaders from a values-based perspective proved effective in revealing methods for addressing how the Executive Dilemma emerged. The third case study delves into this concept further by illustrating the impact of executive leaders as an even deeper function of their individual value-sets.

**Case Study Three: Religious Values and Global Economics**

Like the first two case studies, Case Study Three illustrates how the Executive Dilemma can cause leaders to overlook disparate fields of inquiry, thereby limiting decision-making ability and creating the potential for harm in a given enterprise. Often times the biggest differences in problem solving techniques occur between the scientific and non-scientific fields of study. Case Study Three illustrates this disparity, since it explored potential gaps between technical and non-technical fields. Additionally, due to its impact on human values, religion is proposed as an important factor impacting the decision-making tendencies of leaders. In this respect, Case Study Three introduces

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78 Norton Schwartz, e-mail interview message by author, Washington, D.C., June 1, 2017.
the intersection between religion and the field of economics as another example of how the links between fields of inquiry can go unrecognized by executive leaders, resulting in the potential for harm.

During the 2008 global financial crisis, Secretary of Treasury Henry Paulson’s value-sets delayed his decision to execute a government bailout of financial institutions considered essential to recovery of the U.S. Economy. Instead of immediately recommending the financial bailout, he opted to err towards caution by relying on his own religious values to guide his decision-making. In the field of macroeconomics, the impact of culture, to include the world’s religions, is often overlooked in the course of understanding rudimentary differences on issues ranging from disputes in the World Trade Organization to monetary policy within nations.\footnote{Josh Olejarz, “Liberal Arts in the Data Age,” \textit{Harvard Business Review}, July-August 2017 edition, accessed July 1, 2017, https://hbr.org/2017/07/liberal-arts-in-the-data-age.} Paulson noted during the 2008 global financial crisis that a "moral hazard" existed when he considered bailout of financial institutions on the verge of bankruptcy. In the book, \textit{Confidence Men}, Ron Suskind attributed Paulson's perspective to his religious background by stating, "As a Christian Scientist, Paulson fell back on the old standard: God helps those who help themselves."\footnote{Ron Suskind, \textit{Confidence Men} (New York, NY: Harper Collins, 2011), 46.} Regardless of his decision, it was Paulson’s inability to recognize and reconcile religious influences on his decision-making that delayed action and put the financial stability of large institutions at a distinct disadvantage. While it is unknown whether Paulson made this decision subconsciously or not, data presented to him
offered a compelling argument for a bailout, and his individual religious value-sets prevented him from acting immediately.

Similarly, the *Evangelii Gaudium* of Pope Francis provides another example of how religious values can influence global economics. Released in 2013, the *Evangelii Gaudium* is an apostolic exhortation, or papal document, that requests implementation of Church teachings and practices. The *Evangelii Gaudium* of Pope Francis has also been received the world over as a radical new direction by the Vatican on global economics. The document’s most poignant edicts are directed at an unlikely field of inquiry—the impact of religion on global economics. In it, Pope Francis delivered a provocative repudiation of the excesses of Western free market Capitalism, stating that we “can no longer trust in the unseen forces and the invisible hand of the market.” His message was delivered not to the masses, but rather directly to Lyotard’s target audience—executive decision-makers positioned at the top of the food chain in global economic affairs and centered on the impact of Western religions on economic decision-making.

Regardless of the reaction to the Pope’s polemic on consumerism, the impact of religious theology on economic decision-making is a provocative subject. In the information age, a critical question emerges: have economic frameworks failed to

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82 Ibid.

83 Ibid.

84 Ibid.
account for the impact of the world’s religions on globalization? Without an effective framework to cultivate a movement for change, Pope Francis’ prospects for building greater momentum show little hope of coming to fruition without a broader examination of the world’s faith traditions. Such a framework will require the efforts of not just the Catholic Church, but the collective power of the world’s major faith traditions. With over 85 percent of the world’s population adhering to a given faith tradition, the prominent role religion plays in the human conscience is well-accepted knowledge. Yet, discussions on how world religions impact economic decision-making rarely occur in modern economic fora. In his article, Liberal Arts in the Data Age, the Assistant Editor of the Harvard Business Review, Josh Olejarz, summarized the sentiment of Northwestern University economist Morton Schapiro by writing, “Economics tends to ignore three things: culture’s effect on decision-making, the usefulness of stories in explaining people’s actions, and ethical considerations. People don’t exist in a vacuum, and treating them as if they do is both reductive and potentially harmful.”

Subsequently, an analysis of five major world religions revealed that each religion contributed cultural and ethical principles that shape value-sets of leaders and influence the hard science of economics. Recognizing this difference, executives in their respective economic fields can benefit from understanding the principles applied by a given theology, and avert the potential for Executive Dilemmas to emerge. For example, an American executive


86 Olejarz, “Liberal Arts in the Data Age.”
looking to establish free trade agreements with India should understand that the Indian economy, with values-based in part upon ancient Hindu scriptures, is formed upon the principal of abundance. On the other hand, modern economies in the West are founded primarily on the concept of scarcity. Naturally, approaching Indian authorities without this rudimentary knowledge could place formal agreements in jeopardy. Conversely, understanding this information could avoid unsuccessful professional interactions. If executive leaders are to improve their economic decision-making and remain intellectually agile within the global marketplace, they will first have to understand how religious theology shapes their markets, and then incorporate an awareness of the religious value-sets influencing their decisions.

Case Study Three provides yet another instance in which the absence of awareness of a disparate field of inquiry can result in adverse consequences stemming from the Executive Dilemma. Both the application of Henry Paulson’s deference to his religious values and the Pope’s call to action illustrate how the hard sciences can be impacted by religion. Secretary Paulson carried with him the underpinnings of religious influence, but was unaware the extent to which his theology was affecting ongoing economic decision-making. Conversely, Pope Francis was well aware of his attempt to influence global economics, but the lukewarm reception he received from senior leaders suggests that the Executive Dilemma may be present among leaders in the field of economics.

Case Study Three introduces two new issues worthy of examination in the information age. First, Case Study Three reinforces the importance of examining how human values influence executive leaders as individuals, a fact that Lyotard opined has
been lost from the leadership equation in the information age. For Secretary Paulson, those values were derived from his religious beliefs, though he was unaware of its adverse influence it may have caused. Second, while many feel that science and religion are two fields with distinct approaches to the human condition, the case study illustrates the foundational role religion plays in the decision space of executive leaders in a wide variety of fields, including the sciences. Henry Paulson’s experience shows how his theology, whether intended or not, influenced his decision-making in a field widely regarded as a hard science.

The point of contention is whether conscious awareness of this influence could have produced a more favorable outcome than it did. Similarly, Pope Francis’ *Evengelii Gaudium* suggests that theology should play a foundational role in shaping the science of executive decision-making in global economics. The implications of these two observations suggest that a potential remedy could lie on the border between two disparate fields of inquiry, and avert Executive Dilemmas at their source.

**Analyzing the Executive Dilemma**

The three case studies outlined in Chapter One illustrate conditions under which the Executive Dilemma increased the potential for hazard in an organization, either physically or institutionally. Examples abound in the information age in areas where innovation or creativity may have averted potential hazards. The 9/11 Commission Report attributed the attack on the United States by Al Qaeda terrorists to “failures of imagination” by government agencies unable to conceive of possibilities. The Executive Dilemma results from leaders relegating their perspectives to a single field of inquiry.

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87 Lotto, *Deviate*, 180.
inquiry or exhibiting parochial behaviors, and subsequently making decisions that lead to sub-optimal solutions. The hazards can range from stagnation of innovation and economic crises to catastrophic failures that endanger human lives, as was experienced at NASA.

In the course of building an understanding of potential remedies to the Executive Dilemma, the reader may conclude that an argument for broadening the skill-sets of executive leaders is being built. However, it is important to note that this research is not a polemic on vocational specialization, or rational thinking supported by analytic processes. Establishing depth of knowledge in a field of inquiry is not an outdated or unwarranted practice. Specialized research within a given field has produced widespread benefits to society throughout history. Recent advances in fields such as neuroscience, computer engineering, or solar technology would not be possible without specialized research. However, the case studies presented do uncover unique conditions leading to dilemmas for executive leaders that result in sub-optimal decision-making. This occurs because as the world has become more complex, research endeavors have become more and more interdependent. The natural result of this phenomenon is the emergence of a gap between specialized research and interdependencies that an executive is expected to resolve. Ignoring those interdependencies creates uncertainties that produce unfavorable climates for problem resolution, often termed as ‘gridlock.’ The true nature of the Executive Dilemma, one that draws the focus of this research, is that it occurs when the critical information or inputs for an executive leader reside in the intellectual space of another field of inquiry.

88 Ibid., 9.
The situation is further complicated when the leader is unaware that potential solutions exist in another field of study, a condition that leads to the omission of useful courses of action. Therefore, it is prudent to conclude that focused research is a worthwhile endeavor.

For the purposes of this research, the tendency of an executive leader to maintain a singular perspective within a given field of study is termed one-dimensional thinking. An important aspect of this definition is that one-dimensional thinking often leads to the Executive Dilemma, and sub-optimal decision-making. This one-dimensional thought process was the root-cause for the cultural schisms between the scientific and managerial corps at NASA that led to the shuttle disasters. For the Air Force, one-dimensional thought led to executive leaders favoring manned flight amidst fears of relinquishing a long-standing hegemony in the Air Force, thereby stunting innovation in the field of unmanned aircraft. In the field of global economics, the prevailing one-dimensional sentiment is that economics is a hard science, free from the influence of religious theology. It was this sentiment that delayed Henry Paulson’s executive decision to bail out American banks and avert a global economic meltdown. Another symptom resulting from one-dimensional thinking is confirmation bias, which describes the tendency to perceive in such a way that confirms one’s established point of view. Its existence can manifest in a wide range of areas, such as the way individuals debate issues, or how one behaves in relationships. It can even impact

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89 Ibid., 142.

90 Ibid.
what an executive leader may remember and shape future ideas.\textsuperscript{91} Confirmation bias is an important concept, since it is cited as a root cause for premature conclusion of the decision-making process. Subsequent chapters will elaborate on this phenomenon.

Describing the thinking exhibited by executive leaders as one-dimensional served as a useful starting point. However, a deeper analysis was required to characterize Executive Dilemma and determine if any root-causes could be found that might lead to a potential remedy. Therefore, the theories of two key social scientists were employed in order to analyze the three case studies in greater depth. The first theory is that of eminent social scientist and Nobel Laureate Herbert Simon. His theory of Bounded Rationality characterized the limits of human decision-making, stating that humans are limited by their cognitive capacity to move beyond a finite number of alternatives in decision-making.\textsuperscript{92} The second theory used to characterize the Executive Dilemma is by Carl Jung. His theory on human typology explains how individuals exhibit behavioral patterns that pre-dispose them to remaining within a single field of inquiry during the decision-making process.\textsuperscript{93} Furthermore, the typology, or individual behavioral characteristics of leaders also play a significant role in influencing the subconscious choices leaders make. Given the three case studies introduced, a

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\textsuperscript{91} Ibid.


new framework designed to unlock potential methods of mitigating the Executive Dilemma and improve executive decision-making is subsequently proposed.

Developing a New Framework for Executive Leaders

This research determined that leaders may overcome the effects of one-dimensional thinking, bounded rationality, and typology by operating at the intellectual nexus of three fields of inquiry--science, the arts, and religion. In the course of this research, it was determined that a framework representing the nexus of these three fields can be constructed for executive leaders to improve their decision-making, avert potential crises, and spark innovation within their respective enterprises.

The research proposes a new framework executive leaders may use to improve decision-making and innovate. Termed the “Nexus,” the framework is designed to expand the intellectual capacities of executive leaders by encouraging them to deliberately integrate disparate fields of study in order to comprehend new and innovative courses of action. Since it is unrealistic to assume executive leaders can build expertise in all forms of knowledge, three fields of inquiry widely regarded as distinct in their approach to common problems were examined in the case studies. Subsequently, science, the arts, and religion, were chosen as the key fields of inquiry for the new framework. They were chosen for two reasons. First, since the 1900s (certainly since the founding of Newtonian history) scientific fields such as mathematics, biology, and chemistry were widely regarded as distinct and separate from fields such as literature, theater, or other humanities subjects.94 The fields of science, the arts, and religion took on distinct narratives in which a division was maintained by decision-

makers who applied their concepts. Subsequently, the role of science became more preeminent and separate from the humanities in the early 1900s. The scientific method of solving problems was distinct enough from problem solving in the humanities that application of either may afford an executive leader the ability to broaden their perspective on a given problem and generate unique new alternatives. However, recognizing that the development of new knowledge may involve the convergence of these two realms, in an authentic manner and without being forced, is the challenge posed with this research.

Why choose religion as a third entity driving the Nexus? Religion was chosen because it holds a remarkable pathway in the human condition through which behavioral assumptions are made and the uncertainty of decision-making is reduced. Lotto writes, “Religion also reduces uncertainty for us, which is the principle reason why so many billions of brains value so passionately the assumptions that their unquestioning faiths espouse…religions place your own assumptions with theirs, and take it as an article of literal faith that you will not question them.” While Lotto’s statement might be considered an oversimplification of the elements of faith, he captures an important empirical fact; religion occupies a large enough inertial force in human cognition that it warrants a prominent position as a third component of the Nexus.

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95 Ibid., 5.

96 Ibid., 8.

97 Lotto, Deviate, 254.
Furthermore, examining the scenarios in the case studies revealed two important questions on the Executive Dilemma. First, can an individual who is pre-disposed towards an aptitude for science effectively employ techniques traditionally intended for the arts and humanities? Second, given the underlying impact theology has on the values of executive leaders, is it important to acknowledge the role religion plays in shaping their perspectives on critical decisions?

Under certain conditions, leaders wishing to improve their decision-making and accelerate innovation are encouraged to enter “the Nexus” between science, the arts, and religion—a theoretical three-dimensional intellectual space that provides improved decision-making by raising conscious awareness of disparate fields of inquiry. Leaders who deliberately access and operate within the Nexus between science, the arts, and religion can improve their decision-making abilities by developing the capacity to transcend disparate fields and solve critical problems.

The scope of this project is to focus primarily at the juncture of science, the arts, and religion. An important question to consider is whether or not the fused subject matter (science, the arts, and religion) is too broad to be manageable in a single examination. After all, wouldn’t such a framework require that the executive leader develop significant depth in all three fields of inquiry? It is an important question, since it is true that even the sub-fields within these three areas offer a vast array of subject matter. However, the critical pathway to success in this research strikes at the heart of interdisciplinary study. The true nature of the research on the Nexus is that it focuses on characterizing the junctures between the aforementioned fields of inquiry that can best address the Executive Dilemma. In order to graphically illustrate this point, Figure
1 depicts a notional pyramid that represents a foundational body of knowledge. If the fields of science, the arts, and religion were represented as individual sides of a pyramid, then the subject matter for research on the Nexus would reside at the very tip of the structure. At the top of the pyramid the connections between the three subjects are closest, but would occur on a less expansive and thus more manageable basis (see Figure 1).

![Figure 1. Research scope](Image)

Source: Author Illustration

Therefore, the act of applying the Nexus becomes less about acquiring significant depth in a given vocation or discipline, and more about recognizing the interconnectedness that can lead to new innovations. In his book, *Deviate, the Science of Thinking Differently*, noted Neuroscientist Beau Lotto accounts for the enormity of various disciplines in a similar manner. He writes, “Understanding a whirlpool isn’t about understanding water molecules; it’s about understanding the interaction of those molecules, hence life is an ecology, not an environment. Life—and what we perceive—
lives in what I call the space between. As such, effective use of a new framework would compel the executive leader to consider an alternative contained in an adjacent field of inquiry, or blend two or more disparate fields in order to generate new alternatives. The Nexus is designed to stimulate that intellectual activity. For example, a NASA engineer may choose to utilize musical harmonies to develop a new pattern for structural design of a spacecraft, or employ the expertise of a creative artist to explore aerodynamic properties of newer wing shapes. A Western financier may establish a new business model for raising employee job satisfaction by using a Buddhist approach to formulate new core values for the company, or address enterprise sustainability. As previously stated, the executive would not be required to attain all of the knowledge contained in another field of inquiry. Rather, the individual would have the freedom to utilize their own expertise to build new solution-sets by blending two or more fields. Most importantly, the leader would develop the intellectual capacity to move beyond conventional ideas that would have been proposed had a singular methodology been applied to the problem. Thus, the leader is able to mitigate the effects of the Executive Dilemma by developing the capacity to move beyond traditional solutions to a problem and prevent the effects of one-dimensional thinking or confirmation bias. Ultimately, the goal is for the executive leader to produce alternative courses of action that would have otherwise not been considered. Lotto suggested that this process was physiological in

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98 Ibid., 8.

nature, and one could use the science of the brain “to teach you a new way to fly, and to see anew what you thought you had already seen.”

**Neuroscience and the Executive Dilemma**

Beyond theoretical examination, evidence suggests that deliberately incorporating knowledge from different fields and operating on the Nexus also has the potential to create favorable physiological responses in the human brain. Recent studies in cognitive neuroscience suggest that entering the Nexus, an activity akin to the approximation of deliberately blending “left brain” and “right brain” cognitive activities, can generate new neural pathways that build intellectual capacity. Since science, the arts, and religion contain fields of study that involve relatively distinct problem-solving methodologies, operating on the Nexus has the potential to encourage development in the brain. This is because leaders who deliberately and actively engage multiple streams of cognitive consciousness simultaneously can cause physiological responses. These responses ensure new neurological pathways in the brain are developed that impact future behaviors and decision-making. In essence, leaders can improve their decision-making capacity by increasing their ability to build a broader range of alternatives to solve problems. However, can the impact of new brain pathways create a substantial enough effect on personality traits as to overcome the

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100 Lotto, *Deviate*, 15.


102 Ibid.

103 Lotto, *Deviate*, 73.
impact of human typology on decision-making? Data presented by Siegel and McCall suggests this is possible.\textsuperscript{104} In Chapter Four, two historical examples of leaders are presented who may have accomplished this. In Chapter Five, the implications of neuroscience unveil opportunities to mitigate the effects of the Executive Dilemma.

**Nexus Riders: Leaders Who Solved the Executive Dilemma**

Two leaders in American history offer examples of how operating on the Nexus improved their decision-making abilities. Subsequently, their experiences were useful in formulating a foundation for mitigating the Executive Dilemma. Their individual curiosity and thirst for knowledge led them to transcend disparate fields of inquiry, broaden their decision-making abilities, and innovate new concepts. They are referred to as “Nexus Riders,” for their ability to innovate by using two or more fields of inquiry. While a plethora of leaders were suited to conduct the review, Thomas Jefferson and Steve Jobs were chosen because of their unique placement in U.S. history, as well as their ability of their experiences to interact with the theoretical lexicons posed by Simon and Jung.

Thomas Jefferson is known as a true innovator in American history. He authored the Declaration of Independence, brokered the Louisiana Purchase, and was a principal advocate for religious freedom in the early days of our republic. However, the magnitude of Jefferson’s political accomplishments often overshadows another important aspect of Jefferson’s legacy. The sheer range and depth of Jefferson’s intellectual pursuits also distinguish him as one of America’s most accomplished innovators. How did Jefferson innovate, and what can today’s leaders do to apply his

\textsuperscript{104} Ibid.
brand of ingenuity in the Information Age? Deconstructing Jefferson's life experiences revealed an intriguing mosaic of science, the arts, and religious understanding, all of which contributed to a unique brand of statecraft that was unparalleled in his time.

Perhaps one of the most acclaimed scientific innovators of the information age was Steve Jobs, the cofounder and CEO of Apple Inc. from 1976 to 2011. A technology entrepreneur by trade, Jobs epitomized the ability of an executive to extend his professional intellectual capacity beyond the sciences, and into the arts and religion. In his biography, *Steve Jobs*, Walter Isaacson described how Jobs pursued Eastern religions as a method of attaining enlightenment and wisdom. Jobs' interest in Hinduism and Zen Buddhism shaped his worldview as a decision maker. Ultimately, his approach resulted in the establishment of a multi-billion dollar global enterprise, making him one of the most influential economic and entrepreneurial figures of the information age.

Studying the characteristics of Thomas Jefferson and Steve Jobs yielded important observations on how leaders can build the capacity to operate on the Nexus, improve decision-making, and overcome the Executive Dilemma. Their intellectual approaches to disparate fields of inquiry provided a historical baseline for understanding how they prepared themselves to thrive in their respective enterprises and influence others to do the same. When combined with the recent breakthroughs in cognitive neuroscience, the development of a new framework has the potential to yield new applications in fields such as politics, business, foreign policy and the sciences. All told,

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a combined approach to understanding individual characteristics of leaders revealed a potential construct that leaders might emulate in order to mitigate the effects of the Executive Dilemma and improve decision-making.

**Method of Research**

The preliminary findings presented in Chapter One formed the basis for establishing an initial hypothesis and research methodology. The research methodology was intended to determine if characterizing the Nexus between science, the arts, and religion—in essence, improving access and agility within this three-dimensional intellectual space, could yield new methods for improving the decision-making and innovative abilities of executive leaders. Research was conducted in three phases. In the first phase, the theories of bounded rationality and human typology were used to characterize the Executive Dilemma and other problems stated in the three case studies presented in Chapter One. Subsequently, a historical review of the lives of two innovators, Thomas Jefferson and Steven Jobs, was conducted in order to provide a baseline of potential characteristics and behaviors that might be used to formulate a viable construct for mitigating the Executive Dilemma. The results of phase one yielded the following hypothesis:

Characterizing the nexus between science, the arts, and religion—in essence, improving access and agility within this three-dimensional intellectual space, can yield new methods for improving the decision-making and innovative abilities of executive leaders.

In the second phase of research, analysis conducted in phase one was combined with observations from the historical study of Jefferson and Jobs in order to formulate a new framework. The analysis enabled the development of a potential framework that best addressed the problems encountered in the case studies, and
termed the “Nexus.” Additionally, a research survey of over 80 senior executives in the public and private sectors was accomplished in order to gather feedback on the propensity of executive leaders to accept the new framework, as well as blend disparate fields in order to innovate. Results were sorted according to human typologies and respective job sectors in order to determine if personality or career type held different viewpoints on the subject. In phase three, the Nexus was deployed in four real-world scenarios faced by senior leaders. This was accomplished by applying the framework to existing issues or executive problem, and reporting on the findings and results in order to draw conclusions on its efficacy. The research culminated with conclusions and recommendations on the use of the framework, as well as suggestions for follow-on research.
CHAPTER TWO
CHARACTERIZING THE EXECUTIVE DILEMMA:
THE THEORIES OF HERBERT SIMON AND CARL JUNG

It is easier to go to Mars or to the Moon than it is to penetrate one’s own being.1

- Carl Gustav Jung, 1956

In Chapter One the Executive Dilemma was presented as a problem of significance to executive leaders and their decision-making abilities. The Executive Dilemma denotes the challenge executive leaders face with recognizing that alternative solutions to problems may emanate from another field of inquiry. Subsequently, the three case studies provided the backdrop for understanding how the Executive Dilemma can manifest itself in large institutions, and create decision-making problems for executive leaders.

An important step in understanding how to mitigate the potential for the Executive Dilemma to cause harm is to first develop a deeper understanding of how this dilemma, or similar dilemmas might emerge within a leader’s sphere of influence. In order to accomplish this, the works of two important social scientists and their theories are introduced through the lens of the case studies presented in Chapter One. Their theories offer potential explanations for the problems leaders faced in each case study, leading to root causes that can be addressed by employing new frameworks. Therefore, the research focused on delving into the underlying values and behaviors exhibited by executive leaders through the use to two important theories by noted

psychologists. The first is Nobel Laureate Herbert Simon, and the second is Carl Jung, often regarded as the father of analytical psychology.

**Herbert Simon and the Theory of Bounded Rationality**

The first theory is that of eminent social scientist and Nobel Laureate Herbert Simon. His theory of Bounded Rationality characterized the limits of human decision-making, stating that humans are limited by their cognitive capacity to move beyond a finite number of alternatives in decision-making.\(^2\) One of the most notable aspects of his theory is that in the development of alternatives to solve problems, humans are “bounded” by a variety of factors. The Aristotelian distinction between certainty and probability lays the foundation for Simon’s work, which sought to determine a rational methodology for problem solving and at the same time recognize the limits of analytic optimization in complex environments.\(^3\) Methods to close this gap were developed in the mid-1600s, where the need for demonstrative proof of effective decision-making was established by Blaise Pascal and Pierre Fermat, who exchanged letters about solving mathematical problems in gambling.\(^4\) Their methodology brought forth the understanding that rational thinking depended on whether a system could be optimized by maximizing expected value, or by determining the best utility of available resources. With a focus on these two areas, the 1800s ushered in a range of mathematical


\(^4\) Ibid.
probability distributions that established the basis for modern rationality in decision-making. However, noted scientist Daniel Bernoulli believed that the concept of rationality, within the bounds of mathematical modeling, had falsely become both a description of human behavior as well as a prescription for it. In essence, he observed that many of the models constructed to maximize value violated the principles of “good sense.” He termed the tendency for mathematical models to violate good sense as the Saint Petersburg Paradox. The Saint Petersburg Paradox was used by Bernoulli to describe the discrepancy between mathematical theory and human intuition. It emerged through the analysis of expected value in gambling, whereby expected value of risk over time becomes counterintuitive to the players of a given game. The theory was published by Bernoulli at the Academy of Science in Saint Petersburg, Russia. In order to combat this effect, Bernoulli proposed a new direction for the theory of rationality by introducing human psychology into the equation. In the case of gambling, he incorporated the psychological effects of money, to include the introduction of logarithmic functions to account for diminishing returns. Like Jean Francois Lyotard, Bernoulli saw the hazard associated with relying solely on analytic methods in highly complex environments.

5 Ibid.
6 Ibid.
7 Ibid.
8 Ibid.
9 Ibid.
The theory of Bounded Rationality emerged out of the realization that an element of “reasonableness” was essential to optimizing a given problem. However, the tension between mathematical reasoning and the intuition of “educated” people continued into the mid-1900s. While psychologists had previously believed that “self-interest” guided the motivations of people, a period of “new enlightenment” emerged, and the notion that optimization through the maximizing or minimizing of some function was the primary method of influencing decision-making.\textsuperscript{10} This too assumed a statistical role, and Fisher’s Analysis of Variance became a widely accepted tool for determining root-causes of problems in a range of fields such as economics, animal biology and psychology.\textsuperscript{11} However, major breakthroughs occurred in fields such as artificial intelligence, where designing agents as “optimal animals” proved useful in automating certain cognitive processes. In 1979, Jean-Francois Lyotard authored \textit{A Report on Knowledge}, which expanded on the problem or reasonableness and scientific discourse, contending that an issue of legitimation had emerged.\textsuperscript{12} Lyotard described legitimation as a process by which an executive leader dealing with scientific discourse is authorized to describe the stated conditions for the purpose of broader consistency.\textsuperscript{13} The concept of legitimation established an important link in the human process of

\textsuperscript{10} Ibid., 3.

\textsuperscript{11} Ibid.

\textsuperscript{12} Lyotard, “Report on Knowledge,” 8.

\textsuperscript{13} Ibid.
evaluating rational thinking for the purpose of validating the knowledge required for human decision-making.

In 1956, a psychologist named Herbert Simon presented a theory he termed "Bounded Rationality."¹⁴ In it he used the metaphor of a pair of scissors to present the cognitive limitation of human thinking in decision-making.¹⁵ He described one blade of the scissors as the structure of the environment, while the other blade served as the cognitive limitations of human thinking.¹⁶ As the blades come together, they act upon leaders’ cognitive limitations as well as environmental conditions simultaneously.¹⁷ Yet he believed that even when posed with limited time, resources, and knowledge, humans can exploit the structure of this environment and create greater value.¹⁸ In essence, bounded rationality produces models for decision-making that leaders can use to solve problems given the constraints present in a given environment. It may include the introduction of a whole host of analytic or probabilistic tool sets. However, the added benefits of bounded rationality tools are that they combine the impact of minds and institutions in the decision-making process, while acknowledging the limitations of rational processes. The greater importance of the Simon’s theory is that it places the

¹⁴ Gigerenzer and Selten, Bounded Rationality, 4.

¹⁵ Ibid., 6.

¹⁶ Gigerenzer and Selten, Bounded Rationality, 4.

¹⁷ Ibid.

Executive Dilemma in both a human and institutional context, leading to potential constructs that can be used to build new frameworks.

**Definition of Bounded Rationality: Satisficing Through Aspiration Levels**

In much of his work, Herbert Simon contended that there is no precise definition for the theory of bounded rationality. However, both theoretical and practical models of Simon’s work reveal that bounded rationality is an approximation of human economic decision-making.\(^{19}\) Simon described decision-making as a search process, characterized by the human aspiration to discover more alternatives.\(^{20}\) Within this model, alternatives for potential decisions are not given but found as a result of a continuous search process. The search process continues until the desired decision point and aspiration level is reached. The decision can then be made by the leader, who is satisfied with the adequacy of the search in producing alternatives. Simon termed this process, Satisficing.\(^{21}\)

An additional concept is worthy of mention within Simon’s theory. It is that aspiration levels do not remain static in the process of searching for plausible alternatives. Aspiration levels remain dynamic and proportional. For example, if viable alternatives are in abundance for a given problem set, then aspiration levels are likely to rise. However, if a limited number of options can be found, then aspiration levels remain low, or decrease.\(^{22}\) The extent to which the change occurs is known as

\(^{19}\) Gigerenzer and Selten, *Bounded Rationality*, 16.

\(^{20}\) Ibid., 13.

\(^{21}\) Ibid., 14.

\(^{22}\) Ibid.
aspirational adaptation.\textsuperscript{23} Therefore, the three governing principles of Simon’s bounded rationality theory are the search for alternatives, satisficing, and aspiration adaptation.

While these three governing principles form the foundation for Simon’s theory, it is important to note that his broader collection of works on the subject introduce a degree of ambiguity worth mentioning. Therefore, it is helpful to also explain bounded rationality in terms of what it is not.

First of all, as the term implies, bounded rationality is not full rationality. According to Simon, full human rationality is a myth, because it assumes that humans have unlimited cognitive capabilities.\textsuperscript{24} Of course, this is an unrealistic concept. Human cognitive capabilities are limited, and thus cannot meet the expectations of full rationality. Second, the lack of control humans have over some behaviors can also create boundaries for total rationality. A decision maker may have determined a rational course of action, yet fail to act upon the determination. This can result from human emotional impulses, environment impacts such as limited decision time, or biases that the decision maker is unaware of. Third, bounded rationality cannot be confused with irrationality. In other words, behaviors should not be labeled as irrational just because they fail to conform to the principles of full rationality.\textsuperscript{25} Finally, bounded rationality is not merely full rationality bound by a series of analytic constraints. Such a concept would eliminate the entire realm of cognitive responses that are contained within the subconscious. For example, when humans climb a series of steps, each automated

\textsuperscript{23} Ibid.

\textsuperscript{24} Ibid.

\textsuperscript{25} Gigerenzer and Selten, \textit{Bounded Rationality}, 15.
step needs no deliberate calculation leading to a decision among alternatives. As such, it follows an automated cognitive process that falls into the category of involuntary motor planning. Beyond the realm of involuntary movements, tapping into the broader subconscious describes an aspect of human thought that reveals an important limitation of full rationality. Nobel prize winning German Economist Reinhard Selten captures this sentiment in his paper “What is Bounded Rationality?” Selten writes:

Somebody who begins to learn to drive a car must pay conscious attention to much detail, which later becomes automatic. One might want to distinguish between bounded rationality and automatic routine; however, it is difficult to do this. Conscious attention is not a good criterion. Even thinking is based on automatized routine. We may decide what to think about, but not what to think. The results of thinking become conscious, but most of the procedure of thinking remains unconscious and not even accessible to introspection. Obviously the structure of these hidden processes is important to a theory of bounded rationality. Reinforcement learning models have a long tradition in psychology (Bush and Mosteller 1955) and have recently become popular in research on experimental games. (Roth and Erev 1995; Erev and Roth 1998)

These models describe automatized routine behavior. Reinforcement learning occurs in human beings and animals of relatively low complexity, and one may therefore hesitate to even call it bounded rationality. However, a theory of bounded rationality cannot avoid this basic mode of behavior.

Selten's interpretation of bounded rationality makes an important distinction between problems that are familiar to a decision maker and problems that are unfamiliar. Individual expertise, education, and training have a significant impact on

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26 Ibid., 16.
27 Ibid.
28 Ibid.
familiarity with a given problem. When posed with decisions that are required in a short period of time, individuals who are familiar with a given field of inquiry are able to make effective decisions in a shorter period of time. This is because the search for compatible alternatives can be accomplished with greater ease.\textsuperscript{29}

On the other hand, unfamiliarity creates an imperative for the leader to devise a method for finding alternatives before validation of the alternatives can occur. At this point, the theory of bounded rationality effectively blends with the Executive Dilemma. However, a fundamental challenge is the determination by the leader that they are in fact unfamiliar with a potential number of viable alternatives. Selten uses the analogy of building a computer to illustrate this point. He writes, “Trying to optimize in such situations is like trying to build a computer that must be used in order to determine its own design—an attempt doomed to fail. The activity of optimizing cannot optimize its own procedure.”\textsuperscript{30} Selten considered optimization of unfamiliar fields, particularly when decision time is scarce, as an impossibility. This concept strikes at the heart of the Executive Dilemma experienced in the case studies presented in Chapter One, where sub-optimal decisions resulted from an inability distinguish endeavors that require optimization from new innovations generated from blending existing ones.

The challenge is further characterized through the concept of aspiration adaptation. Aspiration adaptation models the cognitive process a leader undertakes when searching for alternatives. In a sense, it seeks to characterize the motivation of a

\textsuperscript{29} Ibid., 17.

\textsuperscript{30} Ibid.
leader to seek potential alternative solutions. Selten assigned “levels” of motivation to describe a leader’s desire to pursue feasible alternatives to a given solution set. An upward adjustment step to a new level of aspiration characterized a desire for the individual to pursue feasible alternative solutions (or new ideas) as a permissive aspiration level.\(^{31}\) Once feasible aspiration levels are reached, the condition is known as permissible. Described on a continuum, permissible aspirations meet the following conditions:

1. A feasible aspiration level is permissible.

2. A potentially feasible aspiration level is permissible if it originates in the previous aspiration level or if it can be reached by a permissible upward adjustment-step. In other words, an individual is either motivated by previous activities, or is ambitious enough to pursue additional alternatives.

3. Aspirational levels other than those permissible by Pts. 1 or 2 are not permissible.\(^{32}\)

Much has been written about the theory of bound rationality. Furthermore, its core principles are relevant to addressing the Executive Dilemma. In particular, achieving the end-state of satisficing occurs by ascending through levels of aspirations until the individual is satisfied with the number of alternatives required to reach a decision. However, human motivation to ascend through these levels is another matter.

The Executive Dilemma presents such a problem. In particular, the lack of familiarity with an entire suite of solution sets significantly reduces the probability that a feasible alternative can be unearthed. Making the situation even bleaker is the notion that, when bound by a limited amount of time, leaders are less likely to ascend to a

\(^{31}\) Ibid., 17.

\(^{32}\) Ibid.
state where disparate alternatives are likely to be pursued. This is where confirmation bias has the highest probability of taking root. Furthermore, Herbert Simon believed that there was a psychological component to analytical decision-making. This process identified more closely to the emotional and social state of the individual, and thus bounded the cognitive abilities of human decision-making. He also believed that these characteristics, if appropriately accounted for, could have a significant impact on decision-making.

Factors such as emotions, conflict, social norms, and other anthropologic factors can impede the ability of humans to continue their search for alternative solutions in adequate depth. However, if accounted for in an appropriate manner, these factors could be restorative in their ability to avoid intellectual stagnation. Yet codifying such an endeavor remains a major challenge in the application of viable solution sets. Selten writes, “The human motivational system determines the goal pursued by boundedly rational decision-making. Unfortunately, we have no clear understanding of the interaction of different motivational forces. This is a serious difficulty for the development of a comprehensive theory of bounded rationality.”33 At the same time, the theory of bounded rationality provides an elegant method of characterizing the Executive Dilemma. In order to fill the gaps in our understanding of the human motivations that might create more alternative solutions, the works of Carl Jung are introduced as a second critical theory of importance in understanding the Executive Dilemma—Human Typology.

33 Ibid., 17.
In his theory of bounded rationality, Herbert Simon established the limits of human analytical decision-making. In doing so, he presents methods that are useful for characterizing the Executive Dilemma. In essence, the theory of bounded rationality explained “how” the Executive Dilemma occurs. However, the theory of bounded rationality has certain limitations, particularly in understanding human motivations towards searching for more alternative solutions—that is, exploring “why” the Executive Dilemma occurs. Furthermore, the theory of bounded rationality determined, as Jean-Francis Lyotard did in his postmodern report on knowledge, that knowledge is not the same as science, or the arts, or any other field. Knowledge is the result of the process of legitimation, and this occurs in a much larger arena, one that includes a broader, more social discourse. Theories originating from Carl Jung are now introduced to fill this gap, and characterize how human personality types can affect complex decision-making.

**Carl Jung and Human Typology**

In order to establish how human motivations impact the Executive Dilemma, the theories of Swiss psychologist Carl Jung are presented. His work is particularly relevant to the Executive Dilemma, since his theory on human typology plays a significant role in understanding how humans may be “hard-wired” for certain behavioral characteristics, and thus be predisposed towards pursuing alternative solutions to problems. Naturally,

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35 Ibid.
certain characteristics can also predispose individuals to stagnation, or inaction as well. This section explores this concept, and its contribution to the Executive Dilemma.

Carl Gustav Jung was born in Kesswill, Switzerland in 1875. He came from a family of ministers, and broke from this tradition to pursue a degree in medicine from the University of Basel.\(^\text{36}\) In 1900 he chose to pursue psychiatry, and made significant contributions at a time when the Freudian construct was the preeminent psychological concept. However, over time Jung’s psychological theories grew in significance, particularly in organizational environments where human behaviors impacted team performance. In 1921, Jung published *Psychological Types*, which introduced the concept of human typology as a significant contributor to human behavioral characteristics.\(^\text{37}\)

Jung’s research unveiled the existence of two fundamental human behavioral types. He categorized the first type as an abstract personality, or “introverted.”\(^\text{38}\) He determined that the second type was object-oriented, which he termed “extraverted.”\(^\text{39}\) He further delineated human behavior into two additional categories. The first category dealt with whether an individual was a “thinker” or a “feeler.”\(^\text{40}\) The second category dealt with whether an individual was more “intuitive” or “sensing.” Jung’s theory

\(^{36}\) Isachsen and Berens, *Working Together*, 29.

\(^{37}\) Ibid., 30.

\(^{38}\) Ibid.

\(^{39}\) Ibid.

\(^{40}\) Ibid.
arranged the behavioral characteristics of all human beings into eight distinct typological combinations:

1. Extraverted-Thinking.
2. Extraverted-Feeling.
3. Extraverted-Sensing.
4. Extraverted-Intuiting.
5. Introverted-Thinking.
6. Introverted-Feeling.
7. Introverted-Sensing.
8. Introverted-Intuiting.\(^{41}\)

Ultimately, Jung’s theory enabled new ways of thinking, and resulted in subsequent applications that allowed a greater understanding of how individuals behave in various situations. In essence, his work established a model for predictability and a new method of developing insight into human behaviors. One such application of his theory (leading primarily to its use in this research project) was developed by two researchers, Isabel Myers and Clarence Briggs.\(^{42}\) Both shared a desire to understand people, and devoted their scientific careers to the endeavor. In the course of developing their own theories on human behavioral characteristics, they also studied the theories of Jung. Utilizing the foundational typologies of Jung, they developed a similar indicator of psychological functions and human attitudes.\(^{43}\)

In the 1940s, Briggs and Myers developed a typological indicator designed to measure psychic functions and also allow individuals to better understand themselves. Additionally, the model could be used to better understand the motivations of other

\(^{41}\) Ibid., 31.

\(^{42}\) Ibid., 34.

\(^{43}\) Ibid.
individuals in a given situation.\textsuperscript{44} The Myers-Briggs Type Indicator (MBTI) became a well-known methodology for acknowledging differences in human behavior.\textsuperscript{45} It also was a well-accepted method of determining root causes for behavioral trends in work related situations. While several aspects of their methodology disagreed with Jung’s theory, they also developed greater detail and several new categories of personality traits by adding the category of “judging” vs. “perceiving.”\textsuperscript{46} The four categories are outlined as shown below:

\begin{center}
\begin{tabular}{l}
EXTRAVERSION (E) \hspace{1cm} or \hspace{1cm} INTRAVERSION (I) \\
SENSING (S) \hspace{3cm} or \hspace{3cm} INTUITION (N) \\
THINKING (T) \hspace{3cm} or \hspace{3cm} FEELING (F) \\
JUDGEMENT (J) \hspace{3cm} or \hspace{3cm} PERCEPTION (P)
\end{tabular}
\end{center}

Figure 2. MBTI Type Indicators\textsuperscript{47}

Source: Isachsen and Berens, \textit{Working Together}

The first category, E or I, describes how attitudes towards others are energized through extraversion or introversion. S vs. N describes the continuum upon which humans attend to and take in information or data. T vs. F describes how people process and make decisions. Finally, J & P describes how people interact with the world around them.\textsuperscript{48} Naturally, the type indicators enable the categorization of people

\begin{itemize}
\item\textsuperscript{44} Ibid., 35.
\item\textsuperscript{45} Ibid.
\item\textsuperscript{46} Ibid., 34.
\item\textsuperscript{47} Ibid., 36.
\item\textsuperscript{48} Ibid.
\end{itemize}
into 16 different types that build significantly upon the 8 modes that Jung developed. Individuals interested in determining their MBTI score may undertake a survey that determines which type they are categorized in.

The MBTI provides participating individuals with insight on behavioral functions and attitudes. The type indicator is designed to articulate a single rational function and a single irrational function. In the book, *Working Together*, researchers Olaf Isachsen and Linda Berens describe the MBTI type indicator, as well as potential applications according to Jung’s theory on human typology. They described the MTBI and its uses by writing the following:

Every person relies upon one rational function, either thinking for feeling, and one irrational function, either sensing or intuition. In other words, thoughts and feelings can be turned on or off and can be directed at will. Sensing and intuition are just there and seem to have a life of their own. Attitudes toward the outer world are either wanting or not wanting to structure most events. A structured individual enjoys a sense of direction and goal setting, while a perceptive type is usually quite content to flow with events as they happen. Attitudes toward the interaction with the external world are reflected in the notion of extraversion or introversion. A person who has an extraverted attitude toward living is energized in the presence of others and seems to derive a great deal of satisfaction from active involvement with other people. The introverted individual, on the other hand, tends to be energized when alone and seems to derive satisfaction from less interaction with others, and therefore enjoys a rich inner life and sense of personal being.

It is important to note that Isachsen and Berens articulated in their book that neither Jung nor Myers suggested that a person behaves decidedly in either one way or another for a given situation. Jung articulated that individuals consistently make

49 Ibid., 35.

50 Ibid., 36.

51 Ibid., 37.
decisions that fall in a given behavioral regime by preference. Ultimately, a given behavioral characteristic is preferred in much the same way that an individual may “prefer” to use either the right hand or the left hand for writing or name. Some individuals are more flexible in shifting back and forth than others. Most of us, however, have a distinct preference for using one hand instead of the other in the same way that we have a preference for either extraversion or introversion.

More importantly, Myers and Briggs sought to understand if certain typologies should be identified by their behavioral characteristics in order to address the challenge of resolving conflicts between people. Isachsen and Berens wrote, “If a person is to be freed from the prison of his or her own typographic view of the world, it is critical to know one’s type.” It follows that in the course of developing ways to generate new ideas among disparate fields of study, facilitating interactions between typologies that are compatible would prove to be a worthwhile endeavor. It is important to note that this does not imply that typologies must be the same in order to be compatible. Rather, Myers and Briggs imply that, through knowledge of one’s own type characteristics, conflicts can be avoided by exhibiting behaviors designed to address the needs of another type. Could human typology be used as a means to address challenges, or

52 Ibid.

53 Ibid.

54 Ibid.

55 Ibid.
assist in developing a remedy to the Executive Dilemma? This question is examined in subsequent chapters.

The work of David Keirsey brought Jung’s concept of human typology to the forefront of human application in the 1970s and 1980s. Dr. David W. Keirsey was born in Ada, Oklahoma in 1921. After graduating from junior college, he spent three and one-half years in the Marine Corps as a fighter pilot during World War II. After W.W. II, he attended Pomona College and Claremont Graduate School, where he received a degree in psychology. In the 1950s he studied the MBTI and the works of Carl Jung and Ernst Kretschmer, and developed his own theories on human temperament. He attempted to classify the 16 MBTI personality types into four basic types of behaviors that had been observed over the ages, and develop themes for their description.

Keirsey defined temperament as a “thematization” of the person, or uniformity of the diverse. He believed that human temperament was the “thumb print” that was placed on each of our actions, and making them unique and distinct. He arranged the MBTIs into four key temperaments, which became known as the Keirseyan

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56 Ibid., 38.
57 Ibid.
58 Ibid.
59 Ibid.
60 Ibid., 39.
61 Ibid., 41.
62 Ibid.
Temperaments. He categorized the “Idealists” as individuals who sought to be authentic, benevolent, and emphatic. According to Isachsen and Berens, Idealists are in a constant search for identity and meaning. The second category, known as the “Rationals,” are known for their desire to seek knowledge, competence and achievement. Rationals are fascinated by and drawn to theories relative to the context in which they are expressed. The third category is that of the “Guardians,” who strive for membership in whatever group they aspire to. They seek responsibility and hunger for accountability. Finally, the fourth temperament is the “Artisans.” Artisans tend to seek freedom, in particular the freedom to choose their own destiny. They strive to become graceful, bold, and desire to have an impact on their audience. Guided by the MBTI, the four Keirseyan temperaments have provided a foundation for practical application that organizations have utilized to guide their ability to address conflicts and build self-awareness in their organizations.

Having completed a brief introduction of the theories of Simon and Jung, Chapter Three will delve into conceptual relationships between these theories and the Executive Dilemma. The underlying approach is to better understand how these theories can be

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63 Ibid., 63.
64 Ibid., 47.
65 Ibid., 48.
66 Ibid.
67 Ibid., 49.
68 Ibid., 50.
used to analyze the Executive Dilemma, enroute to a framework capable of mitigating its effects.
CHAPTER THREE

ANALYZING THE EXECUTIVE DILEMMA USING SIMON AND JUNG: THREE CASE STUDIES

Is it silly? No…when a rocket ship explodes, everybody still wants to fly. Some say a man ain’t happy until a man truly dies.¹

- Prince Rogers Nelson, from the song, Sign of the Times

Eight years after Lyotard’s report on knowledge, Prince Rogers Nelsen recorded the song, “Sign of the Times,” which represented the failure of grand-narratives that emerged during the Information Age.² It is no coincidence that he referred to NASA’s Challenger accident in his lyrics, which represented another artistic commentary on the postmodern condition and the inability of humans to resolve complex challenges of the time. How could the three case studies be used to analyze this concept further, and examine the conditions that that lead to the Executive Dilemmas?

In Chapter Two the Theories of Simon and Jung were introduced in order to propose a methodology for characterizing the Executive Dilemma. Both theories contained models well suited to map and pinpoint the problems that emerged in the three case studies. The theories also provided a useful lexicon for describing organizational and professional dysfunctions that emanate from the Executive Dilemma.

¹ Michaelangelo Matos, Prince’s Sign of the Times (New York: Continuum Books, 2004), 89.

² Ibid. By using the term “grand narratives,” the author is referring to Lyotard’s definition as the state of knowledge that placed emphasis on the absolute, without consideration for the complexities of the broader environment. The promise of the industrial revolution as a method of defining the human condition is an example of a grand narrative. Post-Modernism is considered a rejection of grand narratives.
In Chapter Three, an examination was accomplished using the theory of bounded rationality and human typology in order to better understand the Executive Dilemma and its effects. This chapter challenges us with the following two questions: 1) How might the theories of Simon and Jung help characterize the Executive Dilemma in the context of the three case studies, and 2) Do the case studies exhibit any of the characteristics of bounded rationality or human typology theory? The knowledge gained from this exercise lays the foundation for revealing potential remedies to the Executive Dilemma in subsequent chapters. In order to examine these questions, Case Study One is introduced through the lens of Simon and Jung’s theories, as well as observations compiled from a NASA project representative of its organizational culture. Case studies Two and Three will follow with similar analysis, and seek to uncover potential root causes of the Executive Dilemma.

**Case Study One Analysis: On-Orbit Damage Repair at NASA**

Case Study One showed how the Executive Dilemma can lead to significant cultural divides within an organizational culture and increase the potential for catastrophic failures. While the initial review of NASA uncovered deep-seated schisms brought about by the existence of the Executive Dilemma, a more in-depth review of human behaviors within the culture was required in order to make observations that might lead to potential remedies. What were the behavioral characteristics of leaders in the scientific and managerial communities at NASA that might reveal potential methods of mitigating the Executive Dilemma? Could knowledge be gained from analyzing the organizational culture at NASA through the lens of bounded rationality and human typology? Peering deeper into the NASA organization and the relationships between
the scientific and managerial communities would require direct observations on projects of importance to the agency.

In order to examine the organizational culture at NASA, it was important to select a project of that might uncover observations representative of behaviors observed in Case Study One. The examination carried the added requirement of ensuring the period of observation was also representative of the organizational culture exhibited in Case Study One, so valid conclusions could be drawn. Therefore, the period of time after the 1986 Challenger accident and before the 2003 Columbia accident of 2003 was selected by examining programs affiliated with NASA’s International Space Station, widely considered a top priority for the agency during the 1990s.

During the early to middle-1990s, NASA was making preparations for launch of the International Space Station, or ISS. Since the ISS program was developed on the heels of the Challenger disaster, it served as a representative program for observing the relationship between the scientific and managerial communities within the agency. Subsequently, research experiences were examined within the ISS program for signs of the Executive Dilemma previously identified during the Challenger accident. After reviewing several candidate programs, research conducted on ISS space damage repair capabilities at NASA was selected in order to explore the impact of the Executive Dilemma on organizational decision-making. Selection of the program for examination was significant, since damage repair capability was also an issue of considerable importance during the Shuttle Columbia mishap.
In the mid-1990s, the concept of on-orbit repair of space vehicle structures, the kind damaged by high-speed space debris, was a relatively new concept. Preliminary research had determined that the probability of a dangerous on-orbit emergency requiring such a technology was high enough that a mitigation plan should be developed. However, for some reason the technology was shelved after early attempts at testing the system. Why did this occur? Motivations behind such a decision were examined using the theories of bounded rationality and human typology, with the objective of determining potential root causes.

In the course of studying this program in sufficient detail, evidence is presented that suggests that the Executive Dilemma may have played a role in the suspension of the damage repair program. As such, a thorough description of the development activities within the ISS repair program was warranted, and accomplished two objectives. First, the nature of the problem being solved as well as the design solutions that emerged provided context for understanding the complexity of the endeavor. Second, the review enabled an in-depth look at how NASA applies rational engineering approaches to address complex problems, as well as the professional tension that emerges when environmental constraints jeopardize program success.

In order to understand this complexity, it is first important to provide a rudimentary understanding of NASA’s ISS program. The International Space Station

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ISS is a spacecraft valued at approximately $100 billion and draws upon the resources and the scientific expertise of 15 cooperating nations.\(^5\) The station provides a platform for participating nations to conduct sustained research in space. The pressurized living space on the ISS is approximately equivalent to the passenger volume of a 747 jetliner, making it the largest man-made structure ever to orbit the earth.\(^6\) There are six main laboratories on board the ISS that simulate environmental conditions humans experience on earth. The United States supplies the international consortium with one laboratory and habitation module. Among the participating nations, there are two Russian research modules, one Japanese laboratory, and one European Space Agency laboratory. The United States, European Space Agency, and Japanese laboratories also provide 33 payload racks for storage of research equipment and experiments.\(^7\) The central girder connecting the ISS modules and the main solar power panel is called the Integrated Truss Structure. Canada supplies a 55-foot robot arm and grappling mechanism that moves along the truss to perform assembly and maintenance work.\(^8\) Four solar arrays rotate on the truss to maximize their exposure to the sun in order to draw power for the spacecraft. In 1998, two ISS components were successfully launched into orbit and merged by the Russian Space Agency and NASA. The Russian Space Agency launched the 21-ton Functional Energy Block using a Russian Proton


\(^6\) Ibid.

\(^7\) Ibid.

\(^8\) Ibid.
Rocket, while the U.S. Service Module was launched by the Space Shuttle.\(^9\) ISS construction was completed in 2011. Given the relative size, complexity, and investment in the ISS, protection of the vehicle became a top NASA priority.

In 1998, it had been approximately 10 years since NASA had returned to flight following the Challenger disaster. The Space Station contained a variety of new structural shapes, making protection of the space vehicle from meteoroids and/or orbital debris an emerging risk area for the program.\(^{10}\) After completion of construction, the ISS would be the most complex spacecraft ever launched by NASA. It’s sheer size made it vulnerable to high-speed collisions with orbital debris.\(^{11}\) In order to provide protection from orbital debris, Space Station modules were fitted with an orbital debris shield.\(^{12}\) The shield was designed to deflect small debris and prevent catastrophic penetrations of the main structure.

In the natural space environment, meteoroids, or small bits of cometary ice or rock, travel through earth’s orbital space at average speeds of 20 kilometers per second (or 44,000 miles per hour).\(^{13}\) An average of 40,000 metric tons of micrometeoroids and 

\(^9\) Ibid.

\(^{10}\) Hall, *Kit for External Repair of Module Impacts*, 15-18.

\(^{11}\) Ibid.


small dust particles enter the earth’s atmosphere each year. In geosynchronous orbits of altitudes around 35,000 kilometers, meteoroids are more likely to be encountered than orbital debris and are the only penetration hazard in interplanetary space, where their velocities can reach up to 70 kilometers per second. Measurements by the Pegasus spacecraft program in 1965 determined that the probability of collision with a meteoroid large enough (greater than one centimeter) to create significant damage to space vehicles was remote. However, the danger presented by meteoroids smaller than one centimeter posed a significant threat to orbiting spacecraft due to the large amount of meteor showers. In addition to meteoroids, an even greater threat to orbiting spacecraft was orbital debris.

Orbital Debris (OD) are not a naturally occurring phenomenon in space. By definition, OD consists of man-made space litter resulting from years of human space exploration. Released parts of spacecraft, fragments from unintentional explosions, and spent satellites have created a growing threat to space operations. Orbital debris includes rocket bodies, fragmentation debris, and non-functional spacecraft. The debris population distribution is classified into three main categories, large, medium, and small. As reported in 1998, the cumulative mass of these objects is approximately

14 Ibid.
15 Ibid.
16 Ibid., 1.
17 Ibid., 3.
18 Ibid.
19 Ibid.
2,000,000 kilograms and they travel at an average velocity of 10 kilometers per second.\textsuperscript{20}

Over time, the significance of the meteoroid/orbital debris threat became evident in several spacecraft incidents. In 1996 a French military research satellite, Cerise, was struck by an Ariane rocket booster fragment about the size of a suitcase.\textsuperscript{21} The Cerise tumbled after the satellite was cut in half by the debris.\textsuperscript{22} This incident was the first witnessed collision of two tracked space objects. Additional spacecraft incidents caused by the debris environment included 1) a cracked Space Shuttle window from impact with a paint chip; 2) penetration of high gain antenna dish aboard the Hubble Space Telescope; and 3) the damaged surfaces on the Solar Maximum Mission spacecraft.\textsuperscript{23}

Using this data and probabilistic analysis, NASA drew the conclusion that the environment created by both meteoroids and orbital debris, coupled with the sheer size of the ISS, would result in a high probability of collision during its service life.\textsuperscript{24} After determining that the Space Station was susceptible to damage from meteoroids and orbital debris, NASA conducted a comprehensive analysis to predict the size and type

\textsuperscript{20} Ibid.
\textsuperscript{21} Ibid., 2.
\textsuperscript{22} Ibid.
\textsuperscript{23} Ibid., 3.
\textsuperscript{24} Ravi Chaudhary, \textit{Space Station}, 9.
of damage expected throughout the life of the station, and eventually determined that an
on-orbit repair system was required for the ISS.25

NASA then categorized possible causes of impact damage to the Space Station
into two categories. The first category, known as atmospheric leaks, consisted of 1)
debris with varying hole sizes; 2) vehicle collision with the station; 3) collision of large
objects being handled by space-walking crew members; 4) seal failure, or damage to
common berthing mechanism seals and; 5) vent valve failure.26 The second category,
known as subsystem component leaks, consisted of 1) fluid line connector malfunction;
2) tubing failure; 3) seal failure; and 4) component failure.27 Using these categories as a
baseline, NASA and supporting engineers from the Denver Research Institute
conducted a statistical analysis using a computer simulation to characterize hole sizes.
The results showed that when the station experienced a debris collision, hole size would
likely be smaller than three inches.28 The analysis revealed the high probability of a
hazard to both the ISS as well as the safety of the astronauts on board the spacecraft.

At the time of the research, various types of meteoroid damage were expected
on the Space Station, ranging from large penetration holes and cracks to small hairline
stress fractures located in the skin of the ISS structure.29 After analyzing the nature of
the expected damage, NASA engineers determined that these types of penetrations

25 Ibid.
26 Ibid.
27 Ibid.
28 Ibid.
29 Ibid.
were repairable. Furthermore, NASA determined that it would be beneficial to develop a system designed to stop atmospheric leakage and venting. It was also concluded that damage could not be repaired quickly enough without air pressure decreasing in the station module below safe levels, a fact that could threaten safety of the astronauts. Therefore, the first reaction to an impact would be to evacuate crewmembers from the spacecraft module and seal it off from the rest of the ISS temporarily. From this point, crewmembers and ground-based engineers could take the time to assess the need for on-orbit repair work to fix the damage. At this point, it is important to emphasize that NASA had leveraged the full range its technical skill sets to draw the conclusion that there was a high probability of on-orbit damage due to M/OD, and the severity of such an impact could threaten the safety of astronauts onboard the space station. Given this knowledge, derived primarily by engineers, NASA became interested in the development of a repair capability onboard the ISS. The solution developed by engineers was the Kit for External Repair of Module Impacts (KERMIt).³⁰

The KERMIt repair kit, designed by Sverdrup, Inc., provided NASA astronauts with the ability to seal small to medium size damage (maximum of four inch diameter holes, with tip-to-tip crack length of up to eight inches).³¹ Full implementation of the KERMIt system included damage assessment, kit component assembly, and Extravehicular Activity (also commonly referred to as a space walk), to prepare the damaged site and install the patch.³² The KERMIt system consisted of two types of

³⁰ Chaudhary, *Space Station*, 10.

³¹ Ibid.

³² Ibid.
patch assemblies.\textsuperscript{33} All components were organized in a storage container for convenient assembly.\textsuperscript{34} When needed, astronauts would open the container, put the patch into a duffel bag with the other components, and depart the ISS airlock to repair the damaged module.\textsuperscript{35} After arriving at the damage site, the astronauts would clean the surface with surface preparatory tools, install the patch, and begin injecting an adhesive using an adhesive injector to seal the hole. All KERMIt installation operations would occur external to the Space Station modules in the vacuum of space.

![Figure 3. KERMIt Patch\textsuperscript{36}
Source: Author Illustration, Courtesy NASA](image)

Each patch consisted of several subassemblies. The first assembly was the patch plate, consisting of a round, clear polycarbonate shield (Figures 3a).\textsuperscript{37} The purpose of the shield was to provide the top structure of the patch. Four holes in the shield housed one-way connector valves that provided a medium for adhesive injection

\textsuperscript{33} Ibid.

\textsuperscript{34} Ibid.

\textsuperscript{35} Ibid.

\textsuperscript{36} Ibid., 12.

\textsuperscript{37} Ibid., 11.
Located beneath the shield was a round putty type material. The putty, molded into the shape of a ring, formed a border around the rim of the shield (Figures 3d). The putty allowed the astronaut to push the patch assembly onto the damage hole and conform to the waffle-type structure of the module skin. Additionally, three screws, set in the hole of the patch, prevented the patch from being pressed too close to the skin. The screws allowed a cavity to form between the module skin and the patch.

The next subassembly was known as the toggle assembly, which consisted of the handle, toggle bolt, nut, and spring-loaded toggle. The toggle assembly (Figure 3e) was attached to the shield through a hole. The handle (Figure 3c) allowed the astronaut to grip the entire patch assembly and push the toggle bolt through the damaged hole, locking the spring-loaded toggle. Using the toggle nut (Figures 3f), the astronaut screwed the entire patch down and tightened the entire patch assembly.

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38 Ibid.
39 Ibid.
40 Ibid.
41 Ibid.
42 Ibid., 13.
43 Ibid.
44 Ibid.
45 Ibid.
46 Ibid.
47 Ibid.
To prevent large amounts of adhesive from prematurely passing through the damaged hole, a plug nut was developed for the patch.\(^{48}\) The plug nut allowed the adhesive cavity to fill and prevent the adhesive from passing through the damage hole.\(^{49}\) The plug nut was attached to the toggle bolt and fixed in order to line up directly with the hole.\(^{50}\) Further, there were handles used to adjust the patch and press down on the putty rings to form a proper fit to the module structure.\(^{51}\) Once damage to the module was adequately assessed and the surface properly prepared for installation, the patch assembly was aligned by the astronaut for installation (Figure 3).\(^ {52}\) The patch was then pressed onto the module skin. Rotating the toggle nut ensured the patch was tight and in place.\(^ {53}\)

After the patch system was installed, an injector was used to fill liquid adhesive into the cavity formed by the patch, sealing the penetration. The injector was a mechanical tool similar to a carpenter’s caulking device used in home construction. After a cylindrical cartridge filled with adhesive was loaded into the top of the injector, the “trigger” device was cycled and a push rod compressed a disc on the back of the cylinder, which dispensed the liquid adhesive.\(^ {54}\)

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\(^{48}\) Ibid.

\(^{49}\) Ibid.

\(^{50}\) Ibid.

\(^{51}\) Ibid.

\(^{52}\) Ibid.

\(^{53}\) Ibid.

\(^{54}\) Ibid., 14.
Although the KERMIIt system was designed for easy installation, several alternative designs and crew compatibility were examined in greater detail.\textsuperscript{55} First of all, initial task analyses determined that compatibility of KERMIIt with the Extravehicular Mobility Unit (EMU), or astronaut spacesuit, added workload and contributed to conflicts with several crew interfaces.\textsuperscript{56} For example, NASA astronauts commented that 35 cycles (the amount of injector cycles, or “squeezes” required to empty a single cartridge of adhesive) of the injector mechanism would be a physically demanding task, and could induce fatigue.\textsuperscript{57} Secondly, the EMU glove posed additional conflicts when working with the toggle nut and one-way connectors.\textsuperscript{58} Problems with adhesive flow on the backside of the station skin posed additional difficulties.\textsuperscript{59} The putty used to press on the patch also posed limitations with formation and patch positioning.\textsuperscript{60} Third, the varying on-orbit thermal environment presented challenges due to changing viscosity of the adhesive.\textsuperscript{61} Low temperatures caused the adhesive to become viscous and made operation of the injector too difficult for the crew.\textsuperscript{62} High temperatures caused the

\textsuperscript{55} Ibid., 18.
\textsuperscript{56} Ibid.
\textsuperscript{57} Ibid.
\textsuperscript{58} Ibid.
\textsuperscript{59} Ibid.
\textsuperscript{60} Ibid.
\textsuperscript{61} Ibid.
\textsuperscript{62} Ibid.
adhesive to flow more freely and form unevenly on the back of the patch. Initial findings in these areas proved the need for a comprehensive analysis of performance variability, crew interfaces, and system compatibility. In addition to a systems analysis, a review of KERMIt installation operations was accomplished. A detailed task analysis was completed by NASA to determine KERMIt installation procedures, operations, and equipment functionality.

Figure 4. KERMIt installation illustration
Source: Author Illustration

Development of the KERMIt system was highly experimental, and designed to rapidly identify improvements that maximized system performance. Specifically, validation efforts focused primarily on design improvements, installation operations, and crew interfaces. An illustration of the final configuration of the KERMIt system, after installation, is depicted in Figure 4.

The adhesive, shown in green, provided an airtight seal after it was injected into the patch. Rupture of the adhesive would jeopardize the seal of the module, resulting in

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63 Ibid.
64 Ibid.
65 Ibid., 30.
a failure of the primary requirement and the rationale for focusing on adhesive performance as a critical process to optimize. Since failure or success of the adhesive would inevitably determine failure or success of the overall KERMIlt system, the adhesive was identified as a potential critical aspect of its performance. Therefore, it was decided to study the flow of the adhesive within the KERMIlt patch in order to search for a cost-effective critical process to optimize.

![Figure 5. NASA KC-135 "zero-g" aircraft](image)

Source: Author Illustration, Courtesy NASA

KERMIlt KC-135 flight tests were accomplished to study the adhesive under microgravity conditions, which revealed key problems with the adhesive flow characteristics.\(^67\) NASA KC-135 flight tests provided a microgravity, or zero-g environment to simulate the environment KERMIlt would experience on orbit.\(^68\) The first step was to analyze video of the initial flight tests of the KERMIlt system onboard NASA’s KC-135 “zero-g” aircraft.\(^69\) During testing, the KC-135 flew a series of vertical

\(^{66}\) Ibid., 32.

\(^{67}\) Ibid.

\(^{68}\) Ibid.
parabolas. Each parabola provided approximately 30 seconds of zero-g flight (see Figure 5). During each 30-second period, adhesive was manually pumped into the patch. Over the course of three flights, 15 test runs were completed. Extensive analysis of the data revealed that the adhesive did not always flow uniformly. In fact, variations in the formation of the bubble on the aft side of the patch revealed conditions in which too much adhesive was injected. Other conditions revealed that not enough adhesive was injected.

Another major requirement of the KERMIt system was that it met NASA Astronaut Extravehicular Activity (EVA), or space-walk, requirements for compatibility, ease of use, and installation. This task encompassed a broad range of assessments, from compatibility of small components with the astronaut glove to the time required to complete individual tasks. A small mock-up was built in NASA’s Mission Operations Laboratory to conduct specialized trial installations and initial fit checks of the KERMIt patch. Study of both crew compatibility and installation procedures proved that much

69 Ibid.
70 Ibid.
71 Ibid.
72 Ibid.
73 Ibid., 33.
74 Ibid.
75 Ibid.
76 Ibid.
77 Ibid.
could be learned from simple mock-up design and trial and error testing. This technique quantitatively demonstrated that several deficiencies affecting crew compatibility existed with astronaut interfaces and installation procedures. The basic premise of the KERMIT program was that astronauts were able to execute an efficient reaction plan to repair Space Station damage. This plan included space walks outside the station in order to repair the module.\textsuperscript{78} During the installation of KERMIT, astronauts would execute step-by-step procedures to repair the damage and return to the Space Station airlock.\textsuperscript{79} This task presented numerous challenges, since the environment of space presented obstacles for NASA astronauts (working in a vacuum, radiation, temperature, and weightless environment).\textsuperscript{80} To overcome these obstacles, astronauts donned the Extravehicular Activity Mobility Unit (EMU), or space suit.\textsuperscript{81} The EMU is cumbersome and decreases the ability of astronauts to complete intricate tasks that are otherwise easy to accomplish. In particular, the EMU glove, which is comparable to a thick welder’s glove, is considered a primary factor in most system handling requirements developed by NASA.\textsuperscript{82} From the astronaut’s viewpoint, all procedures progressed slowly when accomplished in the EMU, and required carefully planning, testing, and rehearsed prior to execution in orbit.\textsuperscript{83}

\textsuperscript{78} Ibid., 43.
\textsuperscript{79} Ibid.
\textsuperscript{80} Ibid.
\textsuperscript{81} Ibid.
\textsuperscript{82} Ibid.
\textsuperscript{83} Ibid.
In order to garner additional engineering data on the KERMIt design, test runs in the underwater Neutral Buoyancy Laboratory (NBL) at the Johnson Space Center were accomplished. Three different astronauts executed the KERMIt installation procedure with various types of sample damage. The astronauts were chosen for their experience in Extravehicular Activity in order to provide adequate feedback on system compatibility.

The Neutral Buoyancy experiment was designed to maximize crew usage of all KERMIt components in order for astronauts to complete an evaluation of the KERMIt system. During testing, astronauts were tasked with executing each step of the KERMIt installation procedure. Task completion time was recorded for each task and served as the quantitative performance data for evaluation of KERMIt. In addition to empirical data, crew comments were collected at the completion of each task on system

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84 Ibid., 49.
85 Ibid., 50.
86 Ibid., 71.
interfaces and compatibility, with added emphasis placed on installations using the EMU glove.

Figure 7. Gathering feedback from astronauts
Source: Author Illustration, Courtesy NASA

Qualitative data was collected using direct observation of the test subjects executing the installation procedures. The tasks that were difficult to accomplish were easily noted by the researchers, who dove with the astronauts in the Neutral Buoyancy Laboratory and observed via closed-circuit television. The test hardware consisted of a full size mock-up of the United States Service Module submerged at the bottom of the Neutral Buoyancy Laboratory. For each test run, test subjects were given a thorough brief of test configurations and installation procedures prior to entering the Neutral Buoyancy Laboratory.

Analysis of Case Study One

The previous section outlined the progress of an important experimental program accomplished by NASA in the late 1990s. The review was designed to provide insight

87 Ibid., 74.
88 Ibid.
89 Ibid.
on how NASA organizations prepare their leaders to make important decisions. Justification for and subsequent development of the KERMIt project depended extensively on the analytic abilities of its scientific community. Furthermore, offering such a detailed review on the specifics of the program afforded the opportunity to unearth elements relative to Case Study One that might be of use in either determining root causes or the nature of Executive Dilemma experienced at the agency. For the purposes of this research project, two questions emerged. First, throughout the development of the KERMIt system, did NASA members exhibit some of the organizational characteristics unearthed in the Challenger accident investigation? Second, if this occurred, was there information to suggest this project might reveal potential root causes of the Executive Dilemmas experienced at NASA?

Evidence suggests that the KERMIt program aligned itself with Case Study One in four important areas. First, project development occurred during the period after the Shuttle Challenger accident of 1986 and before the Columbia disaster of 2003, which afforded a unique opportunity to examine the organizational culture presented in Case Study One. Second, the nature of the Columbia disaster provided a compelling reason for study, because it was system damage that ultimately resulted in the loss of the Shuttle Columbia in 2003. Third, since senior leader decision-making and organizational dysfunction was formally attributed to both accidents, the symptoms of such a culture may have been present during the period of development of the KERMIt system. Fourth and most importantly, NASA ultimately decided to shelve the KERMIt program, perhaps to the detriment of a capability that might have been utilized in the final hours before the Columbia disaster. The aforementioned reasons establish the
KERMIIt program as a relevant platform for study of organizational dynamics at NASA. In this respect, use of Simon and Jung’s theories to unearth human dynamics at NASA in order to help characterize the Executive Dilemma was a worthwhile endeavor.

The theories of bounded rationality and human typology provided an important backdrop for understanding organizational dynamics of the KERMIIt project. From the outset of the program, the approach to KERMIIt remained aligned with NASA’s cultural norms. In response to several events that threatened existing space vehicles, NASA had conducted probabilistic experimental studies using unmanned spacecraft to determine the potential for damage due to meteoroids or orbital debris.90 NASA engineers then completed an assessment of the potential risk to on-orbit space operations using probabilistic tools.91 The burgeoning problem of meteoroids and orbital debris was statistically determined by NASA to pose a threat to the ISS and its inhabitants.92 Such a strategy contained the major elements of a rational approach to problem solving exhibited in Simon’s theory. In the course of the assessment, there was little evidence supporting the existence of the St. Petersburg paradox. In other words, the statistical tools and probabilistic methods used by NASA engineers met the standards of reasonableness. This resulted in a consensus that the problem of spacecraft damage was not only probable, but also hazardous enough to warrant action. However, the consensus was reached without being bounded by time,

90 Belk, Meteoroids and Orbital Debris, 7.


92 Ibid.
resources, and current knowledge of how the problem would be resolved. Given the complexity of modern spacecraft, this presented a significant problem. Naturally, engineers operating at a working level were mostly unbound in their application of reasonableness of the stated problem. When it came to their perceived value of human life, the cultural norms at NASA were consistent, since the agency placed a comparatively high premium on reducing safety risks to astronauts. In this case, the analytical approach resulted in a search that uncovered a problem worth reacting to, and supported by a methodology that was already an essential part of the NASA culture. In essence, the unbounded rationality applied by NASA yielded an appropriate decision to develop a repair capability. However, the approach applied by management carried no penalties in the way of constraints, since there was no indication that a catastrophic event was imminent. This resulted in a significant problem, as illustrated by the theory of bounded rationality.

As a result of this fact, no timetables were set for the development of the patch system. The environment remained unbounded and without a strategic imperative, so the program remained subject to other program priorities, at least in the eyes of management. It is also important to note that the KERMIt program, whose management was located at Marshall Space Flight Center (MSFC), remained beholden to the decision-making of overall ISS program leadership, located at Johnson Space Center (JSC).

NASA engineers at MSFC conducted rigorous engineering problem solving in order to determine a course of action that would minimize the potential for loss of life onboard the ISS. MSFC engineers developed potential solutions to the problem, which
resulted in the development of the KERMIt system. A request for a proposal was published for industry to provide potential solutions, and a contractor was chosen to provide a solution to repairing leaks in the ISS created by meteoroids and/orbital debris. MSFC engineers proposed the KERMIt system to NASA managers, who reviewed the design and agreed to move forward with further development. At this point, an important observation surfaced. In the course of determining potential alternatives for a given problem, the process of satisficing was accomplished artificially by selection of the contractor that developed the system. This created a problem, both for NASA and the contractor, since the act of aspirational adaptation was suspended after selection of the contractor. For NASA, selection of a design locked engineers into a single investment, because significant bureaucratic red tape and sunk costs would have resulted from alternative pathways. Furthermore, the contractor that developed the system invested considerable assets into the design and development of KERMIt for NASA, which suspended the process of aspirational adaptation. Therefore, from the initiation of the project, selection of the contractor was a potential inhibitor to the aspirational adaptation process, or search for alternatives. With both NASA and the contractor’s interests driven by the desire to make the KERMIt system a success, the decision set the conditions that drove organizational culture to accept an alternative before it had been proven successful. This produced a significant limitation, since the selection of KERMIt as a potential solution artificially bounded the rational approach of trial and error.

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NASA, having invested resources into a contracting firm for development, was obligated to proceed with the given design solution. Ultimately, this is important because the investment, both fiscally and professionally by the entire team, may have led to a premature conclusion of aspirational adaptation and satisficing under the theory of bounded rationality. This cemented the effort into the optimization of a single alternative. For this reason, the program found itself in a bounded rationality scenario, and ill equipped to meet the social challenges of building consensus with competing institutions.94 Furthermore, the selection of the KERMIIt system unintentionally placed the entire team into a position where the existence of confirmation bias was plausible.

Furthermore, throughout the course of the development project, several engineering challenges emerged that required NASA to look towards optimizing the design. With investments already committed to the KERMIIt system, engineers were left with incremental design improvements as alternatives, as opposed to innovative new designs. Issues ranging from basic configuration deficiencies to ease of installation and use were examined and mitigated throughout the development process. Understanding the manner in which these challenges were addressed provided insight into how NASA presents problems for decision-makers. In most cases, engineers at NASA uncovered design deficiencies on the KERMIIt system using a rational approach to problem solving. Examining the adhesive flow, particularly in the zero gravity environment, yielded unacceptable adhesive formation, and an inability to stop air from leaking out of the spacecraft.95 Furthermore, difficulty in handling the KERMIIt system during underwater

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95 Chaudhary, Space Station, 36.
testing revealed several tasks that required a significant amount of time to complete.\textsuperscript{96} NASA utilized both quantitative and qualitative data to uncover the design deficiencies. The data provided a rational approach to solving critical deficiencies that may have otherwise caused the system to fail. The rational approach enabled the process of aspirational adaptation to progress, and allowed engineers to maintain a high level of interest in developing solutions to the design flaws revealed in testing.

In both uncovering the problem of orbital debris, as well as resolving design flaws with the KERMIt project, NASA engineers utilized a rational approach. Developmental activities were completed and a final report on the system was delivered to NASA JSC for on-orbit testing of the systems. However, for unknown reasons the project did not advance to testing onboard the Space Shuttle, and subsequent deployment on the International Space Station. Furthermore, the program was shelved indefinitely. Why did this occur?

While the engineering processes yielded salient results, examination of NASA’s organizational culture during the period of observation revealed several characteristics of bounded rationality. Engineers provided a significant amount of analytical rigor towards demonstrating the potential for a catastrophic failure onboard the ISS, enough to develop a robust mitigation plan.\textsuperscript{97} The solution that was presented also underwent a significant amount of developmental testing to ensure it was ready for further refinement and deployment. However, key observations revealed that the rational approach applied by NASA engineers was actually bounded by the organizational environment.

\textsuperscript{96} Ibid., 49.

\textsuperscript{97} Williamson, “Meteoroid/Orbital Debris,” 8.
Why did this occur? Were there elements of cultural divisions, timing, absence of alternatives, or homogeneity of thinking, as experienced in the Shuttle Challenger program?

According to the theory of bounded rationality, organizational environment has a significant impact on human decisions. The introduction of constraints such as limited resources, time, and human emotions, can have an important effect on decisions. This was the case at NASA, where it was decided to suspend the KERMIt project despite the fact that the system might provide an important capability for NASA. The first constraint was resources. Throughout the program, development activities were affected by limited funding. While design and fabrication activities were not significantly constrained, funding for these activities followed set program milestones, such as preliminary and critical design reviews. On the other hand, resources required for establishing system performance became a limiting factor. It is within this construct that organizational divisions may have emerged. As previously stated, the developers of the KERMIt system resided at NASA’s Marshall Spaceflight Center (MSFC) in Huntsville, Alabama, while key validation test efforts occurred at NASA’s Johnson Space Center (JSC), in Houston Texas. Since test efforts such as KC-135 flight testing and underwater NBL testing occurred at significant cost, MSFC was required to secure funding to pay JSC for the testing, as well as scheduling of test assets.

From the outset, MSFC engineers expressed difficulties securing test dates for flights onboard the KC-135. The engineers cited cultural factors reporting that, “they are

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98 Gigerenzer and Selten, *Bounded Rationality*, 263.
just a little bit more difficult to work with at JSC.”\textsuperscript{99} Since many of the test facilities reported to JSC, their management officials held little knowledge of the KERMIT system, its importance, or intended use. Upon arrival of MSFC engineers at JSC for underwater testing, additional observations revealed a significant cultural difference between JSC and MSFC.\textsuperscript{100} MSFC engineers were regarded largely as “outsiders” to the JSC enterprise. In the wake of competing priorities, testing of the KERMIT system was curtailed by JSC managers.\textsuperscript{101} In the course of the program, it became difficult to dismiss the situations as merely coincidental. It appeared that there was a general sentiment of low priority for the objectives of the MSFC engineers working to validate

\textsuperscript{99} This was the result of a discussion with the lead government engineer of the Kit for External Repair of Module Impacts, NASA Marshal Spaceflight Center, in August of 1998. The conversation emerged as a result of a discussion on limited test resources at NASA Johnson Space Center, leading to the need to explore alternative test assets in the Air Force. The timeline can be accessed through the NASA Marshal Space Flight Center Press Release, \textit{Marshall Researchers Developing Patch Kit to Mitigate ISS Impact Damage}, December 12, 1999, accessed March 17, 2017, http://www.spaceref.com/news/viewpr.html?pid=284.


\textsuperscript{101} June 1999 testing of the Kit for External Repair of Module Impacts occurred as part of the broader Space Station “Big Seven” Assembly tests at JSC. As such, the kit assumed a lower priority in the test script. As timing became more constrained during the assembly portion, MSFC priorities were curtailed in favor for JSC priorities. The timeline can be accessed through the NASA Marshal Space Flight Center Press Release, \textit{Marshall Researchers Developing Patch Kit to Mitigate ISS Impact Damage}, December 12, 1999, accessed March 17, 2017, http://www.spaceref.com/news/viewpr.html?pid=284.
the KERMIt system.\textsuperscript{102} There was a distinct cultural barrier between members of MSFC and JSC communities that appeared to impact results.\textsuperscript{103}

While the initial engineering studies of orbital debris risk maintained a degree of reasonableness, at some point in the KERMIt program the St. Petersburg principle became relevant, and adversely affected outcomes. The schedule challenges, cost constraints, and cultural barriers between NASA and MSFC eventually bounded the KERMIt system. Overriding sentiment on engineering deficiencies seemed to have swayed the confidence of astronauts that installed the system. Ultimately, the fact that human safety onboard ISS could be at risk became a more and more distant reality from the leaders at JSC, who were faced with the decision to manifest the KERMIt system for further testing on the Space Shuttle. Despite the relatively minor design deficiencies, the aforementioned constraints stagnated the progress of aspirational adaptation. Could this have resulted from a cultural division emanating from the longstanding rivalry between MSFC and JSC? Evidence suggests this may have been the case. A review of MBTI's in both centers provided evidence to support this claim.

The works of Carl Jung provided insight into the potential existence of cultural barriers between MSFC and JSC related to human typology. A 2008 behavioral study conducted by NASA utilized the MBTI to understand the temperament of its system engineers.\textsuperscript{104} More importantly, the study looked at MBTI results at different NASA

\textsuperscript{102} Ibid.

\textsuperscript{103} Ibid.

A comparison between the MBTI scores of MSFC and JSC revealed an important difference. MSFC system engineers carried a strong “E”, or extraverted characteristics, while JSC system engineers were prone to more “I”, or introverted temperaments. Could these differences in temperaments be considered responsible for the difficulties in the KERMIt program? The study also revealed that, across the board, NASA systems engineers are primarily “Thinkers” instead of “Feelers”. With this characteristic comes a natural trend away from the quality of empathy carried by feelers. The study determined that these characteristics may have allowed engineering deficiencies to detract from the desire to ensure the KERMIt system advanced towards implementation.

Furthermore, a review of historical data from the broader MBTI population revealed that government executives occupy two typologies with greater frequency. A sample population of over six thousand federal government leaders, consisting of both the GS-15 and Senior Executive ranks was examined in order to determine if any

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105 Ibid.
106 Ibid.
107 Ibid.
108 Ibid.
109 Greg Gifford, “Leadership for a Democratic Society,” (lecture on the Meyers-Briggs Type Indicator, U.S. Government Office of Personnel Management Federal Executive Institute, Charlottesville, Virginia, April, 2015). During the lecture, a chart was presented that outlined the MBTIs of a sample population of 1.5 million people, as well as a sample population of 6,000 graduates of the Federal Executive Institute Leadership for a Democratic Society Course.
typologies were represented in greater numbers than the broader population.\textsuperscript{110} The sample was compared to a population of 1.5 million historical MBTI scores.\textsuperscript{111} The review determined that leaders in the federal government were three times as likely to identify as Rationals than the broader population of leaders in the MBTI.\textsuperscript{112} Federal employees also identified as Guardians at a greater rate, although the trend was not as pronounced.\textsuperscript{113} The data also revealed that Idealists and Artisans were represented in government at a lower rate than the broader population.\textsuperscript{114} This means that federal government leaders, on average, were prone to exhibiting protectionist behaviors and preserving the status quo more than the broader population. Finally, as rational thinkers, federal workers were also susceptible to the liabilities of bounded-rationality.

Ultimately, the KERMIt system was never fielded. What is more unfortunate is the fact that NASA did not develop an on-orbit damage repair capability, knowledge that could have been useful in the hours prior to the Shuttle Columbia accident.\textsuperscript{115} The driving force behind the decision to bring the astronauts home with the existing damage was caused by the fact that viable damage assessment alternatives were not available

\textsuperscript{110} Ibid.
\textsuperscript{111} Ibid.
\textsuperscript{112} Ibid.
\textsuperscript{113} Ibid.
\textsuperscript{114} Ibid.
A review of the KERMIt development program revealed a culture similar to the one reported in both the Challenger and Columbia disasters. The sheer technical complexity of space travel caused leaders to rely heavily upon analytical approaches to overcome problems on a daily basis.

Perhaps the most startling evidence linking the KERMIt project to the broader organizational culture at NASA came from NASA managers in the aftermath of the Columbia disaster. Despite having on-orbit repair technologies in development for the ISS at Marshall Space Flight Center, senior NASA leaders did not consider adapting repair capabilities for the purpose of the shuttle until after the Columbia disaster occurred. NASA managers stated that they had considered the possibility of damage repair operations for the shuttle, but quickly dismissed the notion as infeasible, stating that the probability of causing additional damage might have been greater. The existence of confirmation bias resulted in premature satisficing, and catastrophic results. Ron Dittemore, manager of NASA’s shuttle program, stated that orbital shuttle repair was considered by the agency, but "we eventually concluded that (repair work) risked creating more damage than what we were trying to repair." However, not all experts agreed with this assessment. William P. Schonberg, a University of Missouri-Rolla expert on hypervelocity damage to spacecraft, said, “it’s possible to design a system

\[116\] Ibid.
\[117\] Ibid.
\[118\] Ibid.
\[119\] Ibid.
that would allow orbital repairs.”¹²⁰ In the end, this argument points to a root cause of the Executive Dilemma validated within the ISS repair program; premature advancement to satisficing resulted in leaders concluding that there were limited options. Ultimately, rational engineering and optimizing approaches could not overcome the time, resource, and even organizational constraints that led to inaction, premature satisficing, and eventual destruction of the Shuttle. When coupled with the challenges in human typology posed by the MBTI, the sources of the Executive Dilemma become even more pronounced. For NASA, the root cause of the Executive Dilemma was one of advocacy, not technical prowess—a skill set that is rarely accounted for by engineers as a challenge that must be overcome. The cumulative effects of the aforementioned factors led to a culture of one-dimensional thinking and confirmation bias that was characteristic of both the Shuttle disasters as well as the ISS repair program. This caused an Executive Dilemma that resulted in inaction when familiar data was unavailable.

Case Study Two Analysis: Management of the Air Force

In the previous section, the Theories of Simon and Jung were presented in order to propose a methodology for characterizing the Executive Dilemma at NASA. Both theories established an effective lexicon, drawn from behavioral psychology, suited to describe the problems posed in Case Study One. Subsequently, an analysis was accomplished using the theory of bounded rationality and human typology in order to draw some fundamental conclusions in Case Study Two. How might the theories of Simon and Jung help characterize the Executive Dilemma in the context of the Air Force

¹²⁰ Ibid.
and drone development? Does this case studies exhibit any of the characteristics of bounded rationality or human typology?

Like Case Study One, understanding Case Study Two required a deeper examination into the human interactions affecting the culture of the Air Force. Chapter One provided a select chronology of the evolution of the corporate dynamics leading to the potential for organizational stagnation within the Air Force. Having introduced the theories of Simon and Jung, what behavioral dynamics could be observed between leaders in various communities at Air Force, and were human values affected by environmental constraints? Were there elements of bounded rationality and human typology that might reveal added insight on root causes?

As with Case Study One, the experiences and direct observations on key programs in the Air Force enabled a deeper review. The observations provided evidence germane to understanding the root causes of the Executive Dilemma presented in Case Study Two. More specifically, stagnation in the advancement of drone technology in the Air Force could be traced to an organizational culture divided by a combination of factors. It was the result of a series of events that played out in an organization fractured by localized interests, cultural traditions, and finite resources. At the centroid of this environment were the bi-products of disparate Air Force cultures exhibiting rational behaviors, yet bound by their internal conflicts and biases. According to the theory of bounded rationality, environmental factors such as the deep seated cultural divides between various communities can constrain rational thinking. As with NASA, pursuing higher levels of adaptation prematurely can lead to satisficing before an adequate alternative is reached. Suspension of the search for more suitable
alternatives is an obvious result, ultimately leading to the Executive Dilemma. Were these characteristics readily observable in the Air Force? What might an examination of Air Force culture using bounded rationality and human typology reveal?

In 2010 the Secretary of the Air Force directed its long-range strategy organization to study the composition of its active and reserve components. By statute, the U.S. military maintains its readiness through two important components. These components consist of the Active Duty and the Reserve.121 An important sub-organization of the Reserve force is the National Guard. All of the service organizations (Army, Navy, Air Force, Marines, and Coast Guard) maintain some composition of active duty and reserve forces, and are responsible for organizing, training, and equipping forces for global operations.122 Historically, full-time active duty forces carried significantly greater cost than a reserve force, since reserve forces could be inactivated and called up when needed.123 Due to this fact, the general sentiment among senior leadership was that utilizing a large percentage of reserve forces could provide significant fiscal benefits.124 However, the Secretary of the Air Force requested a review of its Active and Reserve components, as well as its use during large-scale wartime mobilizations. Could the most cost effective active-reserve mix be developed?


122 Ibid.

123 Ibid., 19.

124 Ibid., 7.
Would a deeper examination of human behaviors and decision-making reveal potential root causes worth addressing?

The Air Force project was considered as a candidate for analysis for two reasons. First of all, much like the NASA program, the problem emerged through the probabilistic analysis of a future state that was potentially harmful. Scaling the size of such a large military was dependent on projecting demand with complex probabilistic models designed and validated through gaming theory, techniques widely used in rational theory.\(^\text{125}\) The inability to meet resource constraints had the potential to inhibit military readiness and have an unfavorable impact on national security. Second, in the course of the program, the major operational communities within the Air Force served as key stakeholders in the discussion, providing an important platform to observe organizational behaviors according to the Simon’s and Jung’s theories.\(^\text{126}\) The fundamental question to be answered was, should the expected value of the active-reserve mix be optimized or maximized (as referenced by the St. Petersburg principle in Chapter Two)? Third, the subject matter of the program eventually had a direct impact on the issue of employment of drone technology, which provided a connection to the executive dilemma outlined in Case Study Two.\(^\text{127}\) Due to an impending shortage of resources, reserve forces enabled the Air Force to mitigate its shortage on drone pilots, and at the same time help to facilitate to emergence of a new community of unmanned

\(^{125}\text{Ibid., 15.}\)

\(^{126}\text{Ibid., 62.}\)

\(^{127}\text{Ibid., 37.}\)
aircraft that was dwindling in the active duty ranks.\textsuperscript{128} It is within this environment that a deeper understanding of organizational relationships, competing priorities, and even rivalries among various corporate cultures emerged.

As with the case of NASA, a project of importance within the Air Force was selected. Due to a defense forecast of declining budgets, the Air Force Secretary requested a review of its Total Force mix, consisting of its ratio between active duty and reserve components. More importantly, the Secretary sought to optimize key variables by asking the question, “How can we ensure that our Active and Reserve component mix correctly balances the strengths of each component and meets our strategic requirements and fiscal demands?”\textsuperscript{129} The strategic planning team assigned to this problem established a governance structure and adjudication process in order to oversee the study. The adjudication process ensured that key stakeholders from different components were able to review the results of the analysis and reach a consensus on the proposed active-reserve mix. Stakeholders were comprised of senior leaders from the Active and Reserve components. Additionally, representatives included members representing all four services.


While establishing the initial fora, several noteworthy behavioral characteristics emerged among the stakeholders. The members of the fighter community maintained an obstinate stance throughout the governance process. They were singularly focused on information gathering for the purpose of determining if the study would result in a net reduction of fighter aircraft. Having recently capped production of the newest Air Force fighter, the F-22, the overall stance of the fighter community was one of distrust, indignance, and even instances of anger. The Air National Guard’s fighter community adopted a similar stance. However, they also maintained interest in ensuring they acquired an equitable share of new fighter aircraft, such as the F-22 and F-35, to their fleet. Traditionally, the Reserves had received legacy models of aircraft throughout its history. In the 1990s, significant active duty force reductions after Operation Desert Storm required greater use of reserve forces. Therefore, the Air Force recognized the value of providing the reserve with newer aircraft. With the door open for further modernization efforts, Reserve Component staffs at the Pentagon maintained a keen awareness of the distribution of newer fleets, and lobbied aggressively with their corresponding congressional delegations for allocation of newer aircraft. Subsequently, the Reserve Component leaders advocated for a larger


131 Structure of the Air Force, 30.

132 Ibid., 30.

percentage of reserve forces and more funding within the Total Force governance forum.\textsuperscript{134}

Ultimately, the study created significant upheaval in the reserves for two reasons. First, the study reinforced the idea that more reserve units could reduce operating costs for the entire Air Force. This was not an entirely negative result for the reserves, who now possessed a defensible argument to lobby for more funding with Congress. Secondly, it revealed that underutilization of aircraft in the reserves and overutilization of active duty aircraft might require sharing of reserve aircraft with the active duty fleet. This result was not received well by the reserves. This controversy triggered an appeal to Congress by reserve leadership for a national study on the structure of the Air Force.

A review of the Air Force approach revealed that the probabilistic strategy used by analysts was likely to have resulted in an Executive Dilemma. Furthermore, constraints caused by scarcity of resources clouded the importance of the rational approaches used to determine the optimized mix designed to reduce operating costs. What organizational forces caused leaders to abandon data-driven approaches and exhibit in parochial behaviors driven by self-interest? Case Study Two offered one such explanation—a history of rivalries resulting from service traditions. Yet the scarcity of resources and the complexity of the Pentagon bureaucracy added an environmental influence that demanded a deeper examination of the military industrial complex in order to understand the nature of the Executive Dilemma exhibited in Case Study Two.

\textsuperscript{134} Structure of the Air Force, 36.
Examining Behaviors within the Nation’s Military Industrial Complex

As with Case Study One, Case Study Two required a representative platform to accomplish a deeper examination of the human behaviors that may have led to the Executive Dilemma. Subsequently, the Air Force Total Force study proved to be an adequate basis for concluding that environmental conditions thwarted leaders’ rational thinking as an effective model for characterizing the Executive Dilemma. However, a more in-depth examination was required in order to uncover the institutional dynamics that influenced the environment, and the behaviors of leaders in the Air Force study. What triggered the rivalries between functional communities that eventually caused them to become divisive enough to adversely influence their judgment? In order to analyze this question using the theories of Simon and Jung, an examination of the defense bureaucracy was accomplished. Since the Air Force F-22 fighter program has remained at the center of several controversial defense-related discussions in recent history, it provided a useful starting point for unveiling the complexities of the nation’s Military Industrial Complex, or MIC.

In May of 2012, two Air Force pilots appeared on the television program, Sixty Minutes, and declared that the Air Force’s newest and most expensive fighter aircraft, the F-22 Raptor, was unsafe to fly.135 Within hours a flurry of activity erupted across the media. Leaders in government, industry and special interest groups all issued statements both for and against deployment of the aircraft. Some leaders even

denounced the two Air Force Air National Guard pilots for undermining the military chain of command by reporting their opinions to the media.\textsuperscript{136} At the same time, the Air Force had been actively seeking resolution to a known problem with the F-22’s oxygen system for over a year and had previously grounded the fleet.\textsuperscript{137} Unable to determine the cause of the anomaly, senior leaders in the Air Force returned the aircraft to flight without implementing a solution. In the wake of its return to flight, some stated that the decision by senior leaders to return the aircraft to flight was a political decision to justify the cost of “fifth generation” fighter technology. Despite the widespread rhetoric, it was noteworthy that it took two young Airmen speaking to the press in order to compel senior defense leaders to re-open the investigation and invest in a viable solution.

The controversy surrounding the F-22 oxygen system serves as a representative example of numerous high dollar weapons development programs that have experienced significant technical problems, yet were subjected to premature decisions by leaders for fielding. In a broader sense, the F-22 program renewed criticism of leaders within the nation’s Military Industrial Complex and their ability to fulfill their constitutional obligation to provide for the common defense in a scrupulous fashion. Programs like the Air Force F-22 aircraft, the Navy’s Littoral Combat Ship, and the Army’s Future Combat System suffered from significant cost increases and delivery delays, amplifying concerns over the stability of the MIC and its ability to overcome the temptation to field failing systems.

\textsuperscript{136} Ibid.

\textsuperscript{137} Ibid.
Added to this, public narratives on the status of the MIC have been critical. Discussions of war profiteering by its leaders, as well as revolving doors of employment between government and industry have had an adverse effect on the public stature of an institution that consumes over 7 percent of the nation’s Gross Domestic Product each year.\footnote{Ledbetter, \textit{Unwarranted Influence}, 195.} What are the institutional characteristics of the Military Industrial Complex that result in this condition, and how do these characteristics influence the decisions of leaders within the institution? Can these factors lead to Executive Dilemmas? An examination of the modern MIC reveals an institution that can be characterized by localized interests, and subsequently the inability of the institution to self-regulate during periods of austerity. How and why does this occur?

During his tenure, President Dwight D. Eisenhower referenced the term ”Military-Industrial Complex” during his farewell speech and subsequently issued a stark warning to leaders in government and industry. In what would become one of his most memorable speeches he stated, ”In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought by the military-industrial complex.”\footnote{Ibid., 4.} Referring to an emerging conflict of interest between industry and government, Eisenhower sought to articulate his experiences within the MIC by alerting the public to the corrosive forces that had taken hold. Ironically, President Eisenhower had become a part of this institution himself. During his presidency, he was credited with directing a large build-up of nuclear forces, an act that triggered a significant increase in industry’s involvement in the MIC. For example, during his
presidency Eisenhower was responsible for increasing the number of nuclear warheads from 1,000 in 1952, to over 23,000 by the end his final term.\textsuperscript{140}

While Eisenhower was responsible for reviving the term, as an institution the MIC can trace its roots back to our nation’s origins. George Washington referenced the necessity to avoid "overgrown military establishments which, under any form of government are inauspicious to liberty, and which are to be regarded as particularly hostile to republican liberty."\textsuperscript{141} During the Civil War, gun manufacturers were often accused of intentionally providing substandard weapons for high prices.\textsuperscript{142} In the build-up of American Naval Power from 1893 to 1917, the Honorable Benjamin Tracy moved from his position as Secretary of the Navy to Carnegie Steel.\textsuperscript{143} A scandal resulted that implicated Carnegie Steel with Congress in a whistleblower investigation of fractured armor plating in navy ships.\textsuperscript{144} During World War I, Congressman Clyde Tavenner, frustrated with failing weapon systems, argued that wartime manufacturing should become a government-owned industry.\textsuperscript{145} For Eisenhower, his experiences in World War II and George Kennan’s assessment of the Soviet threat provided ample justification for rapid buildup of a deterrent capable of containing the spread of

\textsuperscript{140} Ibid.
\textsuperscript{141} Ibid., 9.
\textsuperscript{142} Ibid., 18.
\textsuperscript{143} Ibid., 19.
\textsuperscript{144} Ibid., 20.
\textsuperscript{145} Ibid.
however, his relationship with the MIC is paradoxical, since it was under his tenure as Supreme Allied Commander, Secretary of State, and President that this buildup occurred.

Today, the term "Military-Industrial Complex" is considered largely a pejorative term. It is used to reference everything from scandals relating to no-bid military contracts to high-dollar military weapons programs defended within the halls of Congress (including the "700 dollar toilet seat" that outraged taxpayers in a 1983 defense report). Programs that run behind-schedule and over-budget are common to the defense media landscape, particularly when weapon systems fail to meet expectations. Ultimately, the MIC can be characterized as an institution that includes the military, government, industry, academia and well-paid special interest groups. It is within these entities that the search for human behaviors, values, and self-interest can begin.

By examining the Military-Industrial Complex through the lens of basic economic theory, characteristics emerge that influence human values and decision-making. The most common characteristic is that individuals in a given market seek to maximize their own utility. This results in institutional fundamentals that drive imbalances and lower

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the output of the broader institution, or inhibit innovation. In other words, with individual stakeholders pursuing their own interests, the institution as a collective is unable to maximize its impact over time. A prime example of this occurs in the fishing and lumber industries, where the interests of individual fisherman and loggers result in overfishing and eradication of forests, causing long-term harm to the entire industry. The process of maximizing a particular variable can be rooted in rational theory. Yet when the element of time is added to the equation (as explained in the Simon’s theory of bounded rationality), long-term effects can be measured, and are often adverse. However, is decision-making in the MIC governed by this principal? In order to examine this question, a review of the stakeholders within the MIC and their behaviors (both organizational and individual) within the MIC was accomplished.

**Inside the Military-Industrial Complex and its Key Stakeholders**

Stakeholders within the MIC operate in support of the national security strategy, yet broader success does not always align itself with localized objectives, especially in an environment of limited resources. Most defense programs originate in the Pentagon, where requirements are developed by the Joint Chiefs of Staff in order to meet the President’s National Security Strategy and the needs of Combatant Commanders. The Department of Defense (DoD) develops "Joint Capabilities" using a Planning, Programming, Budgeting and Execution system, a system that was developed in the 1960s under Secretary of Defense McNamara and refined by Secretary of Defense Donald Rumsfeld.¹⁴⁹ Each phase of the system serves a distinct role. Within this

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structure, planning involves a process of assessing global threats and then applying resources to counter the threats. The process of programming requires leaders to match funding resources to joint capabilities in order to integrate sufficient manpower and materials to address problems.150 Prior to assigning resources, defense planners establish scenarios and assess risk based on probability and severity. Issues such as geopolitical instability, known adversaries, and emerging threats drive scenarios based on likelihood as well as severity of events. Budgeting and execution involves refining cost estimates and evaluating output against planned mobilization activities under prescribed defense scenarios. All of the capabilities must support the "strategic ends" called for in the President's National Security Strategy.151 The problem is that in such a complex environment, multiple pathways to success emerge, and military services often compete for resources in order to match their proposed capabilities to core missions assigned to them. As stated in Case Study Two, the post-World War II environment afforded the Air Force an opportunity to garner resources for the development of a nuclear bomber and missile force. Naturally, the U.S. Army aggressively lobbied for control of medium range missile capabilities, in order to defend ground territory in post-World War II Europe. Resource requests are submitted in a Program Objective Memorandum, or POM presented to the Secretary of Defense.152 Stated simply, the

150 Ibid., 4.

151 Ibid., 25.

152 Ibid.
POM is a wish list of programs and associated costs designed to develop capabilities that satisfy strategic requirements.\footnote{153}{Ibid.}

Military services, passionate about their traditions and core mission competencies, develop POMs that support their service programs and compete for scenarios that satisfy their funding needs. Individual services are required to "defend" POMs each year in front of senior Department of Defense (DoD) Governance councils, where proposals are vetted for presentation to Congress.\footnote{154}{Ibid.} Eventually, these proposals formulate the basis for the President’s Budget, and are also vetted in House and Senate Armed Services Committee “mark-ups” (also known as the HASC and SASC mark-ups, respectively).\footnote{155}{Ibid., 24} Informing both Congress and DoD are hundreds of studies, often written and sourced by think tanks and research organizations influenced by the services. Included in this process are numerous lobbying organizations, primarily representing major defense industry contractors vying for advocates in Congress to support lucrative defense contracts.

Tension in the MIC begins in February of each year and continues until the President’s Budget is signed.\footnote{156}{Ibid.} DoD and Congressional staffs interact daily on program priorities, core mission sets, readiness, and the resources required to accomplish them.\footnote{157}{Ibid., 152} Military services defend the viability of their programs by

\footnote{153}{Ibid.}
\footnote{154}{Ibid.}
\footnote{155}{Ibid., 24}
\footnote{156}{Ibid., 36.}
\footnote{157}{Ibid., 152.
presenting their strategies to their Congressional Armed Services Committees, as well as the Appropriations Sub-Committees for final dispensation of funds.\textsuperscript{158} Of course, high-dollar weapon system programs are reviewed closely for signs of instability. During this process, weapons manufacturers send armadas of lobbyists to Capitol Hill to defend their interests with congressional staffers. All of the individual stakeholders seek to advance their programs within the defense bureaucracy in order to maximize profit (yet another player seeking to maximize expected value, thus increasing the effects of the St. Petersburg principle within Simon’s theory).

Thus, the human influences on individuals within the MIC provide indicators that corrosive motives exist. First of all, members of Congress are prone to defending programs most beneficial to the success of their individual constituency, as well as industries representing job opportunities in a given district.\textsuperscript{159} Second, military leaders, steeped in service tradition and doctrinal pride, stress the importance of their individual service contributions over the others. Middle and senior level staff officers at the Pentagon arrive at time in their career when promotion cycles accelerate, making renunciation of their tribal affinities an extremely precarious endeavor (since their individual communities are responsible for promoting them). The Pentagon is a place where top officers are selected to advance service strategy, doctrine, and budget. High-power military staffs among the services take on a 'kill-or-be-killed' approach to

\textsuperscript{158} Ibid., 39.

defending their own weapon systems and doctrinal affinities (as witnessed by the historical review of the bomber and fighter mafias in Chapter One). Naturally, renouncing their doctrine in the presence of their senior leaders is a monumental hurdle, regarded by many officers as a step tantamount to career suicide. Added to this, industry lobbyists push for increasing requirements in its platforms in order to better meet mission needs, an endeavor that almost always raises the cost of a weapon system. This phenomenon, known as "requirements creep," adds complexity to weapon systems and increases the probability that technical malfunctions may emerge.

While none of the stakeholders in the MIC view their own pursuit of individual interests as particularly diabolical, collectively they can have a corrosive effect on the performance of a given military capability. More often than not, problems arise in the MIC when weapon systems experience technical problems. Fearful of being usurped by competing priorities (or communities), both industry and DoD are reluctant to share problems with leadership and risk receiving "bad press" and increased probability of cancellation.160 In lieu of providing potentially damaging test results, programs advance under less than optimal conditions. Faced with the potential for cancellation, it is preferable to first secure funding and fix technical problems later. The concept of "fly-fix-fly" is common to many governmental and industry test organizations, who are often frustrated by the program turmoil caused by incremental, or "spiral" fielding approaches.

Why does this corrosive cycle occur? The most dangerous aspect of this phenomenon is that the incentive to hide problems exists for nearly all stakeholders.

160 Chaudhary, “Transforming AMC Test,” 2.
For example, military leaders are incentivized and promoted for successful programs, and demonstrating early success is the best way for leaders to garner accolades. Upon retirement, senior leaders also receive opportunities for employment in top defense firms and think thanks, providing incentive to ensure “good news” is relayed to Congress on key programs. Lobbyists are compensated for securing and maintaining support for weapon systems. Industry representatives complete their contractual obligations to the government by delivering hardware, regardless of complete functionality. Finally, members of Congress are able to garner public support for bringing lucrative defense contracts into their district and keep their local economies robust with jobs and revenue.

Ultimately, it is in the individual interest of all of the stakeholders to maintain the façade that a program is proceeding without error. In the MIC, taxpayers bear the brunt of the financial risk for programs that experience cost overruns, and military members must deal with malfunctioning systems in the field. In stable institutions, consumers react harshly to firms that sell costly products that don't work. Termed "the invisible hand" by Adam Smith in 1776, institutions are capable of self-regulating when their members are dis-incentivized from corrosive behaviors, and develop sound

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161 Ledbetter, *Unwarranted Influence*, 112.

162 Chaudhary, “Transforming AMC Test,” 2.

163 Ibid.
fundamentals. However, a major problem occurs when 1) behaviors drive insolvency over time and 2) the insolvency threatens the broader system.

This is the case with the MIC. Despite cost overruns and system malfunctions, everyone makes a profit, more contracts are awarded, program managers are promoted, and defense lobbyists are paid handsomely for delivery. Problems that are discovered early [and can be fixed before fielding] are glossed over with a "field first, fix later" approach. This is due to the immense pressure to compete for resources during Congressional markup activities within the budget cycle. On the whole, stakeholders prefer to characterize problems as minor glitches than to miss fielding schedules, and risk loss of funding. Unfortunately, weapon systems are often developed with overly ambitious fielding schedules, which result in late delivery and low quality. Ultimately, service members are left to bear the risk, and uncover the problems after fielding of the weapon system. The F-22 is just one of hundreds of programs in the armed services where a “field first, fix later” approach is merely considered the cost of doing business in the MIC. Furthermore, these decisions occur at the behest of DoD leaders fearful of uncovering "bad press" in their programs. DoD members at the Pentagon often play a major role in the success of programs, and pursue lucrative industry jobs after their terms of service conclude. Known as the “revolving door” in government, opportunities in think tanks and industry provide powerful incentives for senior leaders to ensure programs receive positive evaluations.

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165 Ledbetter, *Unwarranted Influence*, 112.
If there was a single entity within the MIC capable of countering prevailing incentives, it would be the press. While the Air Force acknowledged problems with the F-22 oxygen system, stakeholders in the MIC were all incentivized to return the aircraft back to service. However, recognizing risks to life and limb, several F-22 pilots reached out to the public by reporting the problem to the press and giving interviews on national television.\textsuperscript{166} Weary of a potential change in public opinion on the program, stakeholders in the MIC had no choice but to conduct a more in-depth investigation of the problem.

Generally speaking, the individual players within the MIC are anything but corrupt. Furthermore, the pursuit of self-interest is a fundamental aspect of democratic economic institutions. It was Adam Smith that once said, “It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own self-interest. We address ourselves not to their humanity but to their self-love, and never talk to them of our own necessities, but of their advantages.”\textsuperscript{167} Despite Smith’s words it is a fundamental truth that the MIC is a complex institution, and it is natural for entities that compete for limited resources distribute risk elsewhere--resulting in imbalances that can collectively corrode the effectiveness of the broader institution. Stakeholders become ”Free Riders” in a system when they extract more from the institution than they contribute.

\textsuperscript{166} Ferran and Chuchmach, “Fighterpilots Claim Intimidation.”

An example of this occurred in the late 1990s when the Deputy Assistant Secretary of the Air Force for Acquisition, Darlene Druyan, implemented a series of "Lightning Bolt Initiatives" in order to streamline and reduce Air Force weapon system acquisition costs. As a part of this plan, the government acquisition workforce, who provided oversight of programs were reduced by over 45 percent. Unfortunately, the program proved to be a disaster. The $1 Billion C-5 aircraft modernization program streamlined contracts and allowed industry to test the aircraft independently with minimal government oversight. All told, the program took nearly 10 years to field at nearly double its baseline cost. Furthermore, an Air Force aircraft tanker lease scandal occurred in 2004, and eventually revealed that Druyan was involved in "revolving door" politics for accepting senior employment positions at a major industry contractor involved with the tank lease. Druyan was eventually convicted on felony charges.

Despite legislative efforts ranging from the 1986 Packard Commission to the Weapon Systems Reform Act of 2009, efforts to shift incentives to influence the behaviors of leaders have yet to place the MIC on the path toward solvency. In the

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170 Ibid.

171 Merle, “Long Fall for Pentagon Star.”

172 Ibid.

end, curbing the economic fundamentals of self-interest to prevent the “Free Rider” syndrome could prove most challenging of all.\textsuperscript{174}

In 2004 a soldier asked Secretary of Defense Donald Rumsfeld a critical question during his visit to Iraq.\textsuperscript{175} The soldier complained of the lack of protective armor on their combat vehicles and asked for relief. Eventually, enough public scrutiny was placed on the MIC that a resolution was achieved quickly, resulting in the design and delivery of thousands of armor plates for American troops in Iraq.\textsuperscript{176} From deficient armor to problems with advanced aircraft programs, the First Amendment continually provides a moral foundation capable of regulating the corrosive elements of the MIC.

The Military Industrial Complex is a complex system that exerts a significant degree of influence on the decision-making behaviors of senior leaders who work within it. This section provided an overview of the potential root causes of the environmental forces that cause senior leaders to depart from rational analytics and instead pursue localized interests. With a more complete understanding of the dynamics involved with defense planning, an informed analysis of Case Study Two can be completed with respect to the behaviors that cause the Executive Dilemma.

\textsuperscript{174} Wheelan, \textit{Naked Economics}, 31.


\textsuperscript{176} Ibid.
Analyzing Air Force Programs Using the Theory of Bounded Rationality and Human Typology

Evidence presented in Case Study Two revealed that the Executive Dilemma in the Air Force emanated from cultural clashes created by disparate communities competing for an organizational hegemony within its corporate culture. As a result, the organizational climate prevented the emergence of new enterprises capable of transforming the future of air power. A review of the Total Force mix study revealed protectionist behaviors characteristic of the Executive Dilemma. However, a deeper review of the organizational dynamics revealed root causes that can be traced to the environment created by the “Free Riders” as described in the broader Military Industrial Complex.

Bounded Rationality provides a useful construct for analyzing the organizational behaviors of leaders described in this section. In both the Air Force Total Force mix program as well as the broader MIC, analytic approaches used by leaders were often bounded by environmental factors. The theory of bounded rationality accounts for environmental constraints such as limited time and resources. In the case of rival communities in the Total Force governance forum, members of the fighter community took a position that might reveal the existence of the St. Petersburg principle. That is, the analytic data supporting the decision to distribute more aircraft to the active duty violated the heuristic judgment of senior leaders reviewing the proposal on the basis of reasonableness. While speculating on the motivations of leaders has the potential to introduce greater uncertainty, two occurrences from the previous section emerge that

177 Gigerenzer and Selten, *Bounded Rationality*, 275.
can be explained using the theory of bounded rationality. The occurrences support the theory that the rational approach applied in the Total Force project was bounded by the psychology of the participating leaders.

The first occurrence was the complex environment created by the MIC. At the center of the complexity was the competition created by the scarcity of budget resources. Throughout the history of the MIC, the intense competition created by stakeholders vying for funding resulted from finite resources allocated to meet national security objectives. This influenced leadership behaviors enough to cause them to abandon data-driven approaches. How did this occur?

As stated previously, models of bounded rationality are designed to move beyond the confines of data-driven approaches, and account for human values that influence rational thinking. President Eisenhower addressed this human influence in his farewell speech after observing the behaviors among stakeholders within the MIC. He viewed a new social order, governed by self-interest, as the prevailing motive that would drive their values within the MIC. With the full range of stakeholders receiving substantial benefits from their status as free riders in the MIC, breaking from the pursuit of self-interest presented a conflict for leaders. The incentive to validate predictive analytics conflicted with self-interest and became a source of tension between stakeholders. Within the social context of bounded rationality, the mere presence of multiple leaders creates influence on behaviors, particularly in complex environments and difficult tasks.\(^\text{178}\)

\(^{178}\) Ibid., 235.
Leaders are also influenced by each other’s presence when they have a common interest.\textsuperscript{179} Leading stakeholders within the MIC, with the exception of taxpayers and military users, are incentivized to avoid transparency with troubled programs. As a result, they are encouraged to continue behaviors that support immediate self-interests.\textsuperscript{180} This social order within competitive environments is the driving force behind the decision-making behaviors of leaders within the MIC, and accounted for in bounded rationality theory. This promotes social learning amongst the broader enterprise and replication of competitive behaviors among stakeholders.\textsuperscript{181} Social learning was also present in the Air Force Total Force Mix program. Predictive modeling accomplished in the Total Force analytical model sought to optimize operating costs for several potential courses of action. The modeling offered solution-sets that met the Secretary’s request to minimize operating costs while meeting mobilization requirements. Ultimately, the benefits to the corporate Air Force were not realized. Recognizing the potential for sharing resources, representatives from the Reserves lobbied Congress in order to re-accomplish the study. In response to their concerns, Congress directed the initiation of a National Study on the Structure of the Air Force. This occurred because reserve assets were identified for transfer to the active duty forces.\textsuperscript{182} Ultimately the commission decided in favor of transferring more resources to

\textsuperscript{179} Ibid.

\textsuperscript{180} Ibid., 240.

\textsuperscript{181} Ibid.

\textsuperscript{182} Structure of the Air Force, 30.
the reserves, and at the same time increasing the delivery of newer aircraft in greater numbers to the them.

Carl Jung’s theory of human typology provides added insight into potential sources of the Executive Dilemma in Case Study Two. Both the Air Force and the broader military industrial complex consist of leaders that were either military members or civilians that possess a strong affinity for military leadership. Understanding their typological trends reveals clues on whether they might possess characteristics conducive to the Executive Dilemma.

Despite the broader perception that military leaders are predominantly extroverted in nature, several studies conducted in the late 1990s reveal significant trends toward introversion. In 1997, Robert Gailbreath published a report on the MBTI of 1,755 Army officers who were selected for leadership positions between 1987 and 1989. The study indicated that 33% of the leaders surveyed consisted primarily of ISTJ type. Additionally, 55% of those surveyed fell within the eight introverted categories. The results also concluded that, “Individuals who prefer Sensing-Thinking-Judging behaviors (analytical, logical, and decisive) are disproportionately represented in the senior leadership of the U.S. Army.” Gailbreath theorized that, over time, senior leadership trends towards homogeneity because higher echelons hold

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184 Ibid.

185 Ibid.

186 Ibid., 226.
a preference for promoting leaders who demonstrate Sensing-Thinking-Judging behaviors and systematically select out leaders who often demonstrate MTBI Feeling behaviors. Such numbers suggest that at higher echelons, organizations promote certain typological traits while rejecting other ones, and soldiers who do not typify that preference are gradually weeded out through attrition before reaching the senior leadership level.

In 1998 Diana Williams published a study on the psychological type distributions of military leaders from all services. Her study, though smaller in scope, revealed trends consistent with the findings of Gailbreath. The study consisted of 80 samples in 1993 and 113 samples in 1994 and included both male and female military leaders representing the service. Both samples yielded a majority of introverted types, yet what stands out most about the study is the concentration of ISTJs within her findings, which represented the largest percentage of MBTI types in both 1993 (21%) and 1994 (25%). Williams’ findings determined the national normative samples of adults within the United States which showed that ISTJs made up only 11.60% of the general civilian population. A study published by Kroeger showed that ISTJs themselves comprise only about 6 percent of the general population, yet comprise approximately 30 percent

187 Ibid., 227.
188 Diana Williams, “Frequencies of Myers Briggs Type Indicator (MBTI) among military leaders,” The Journal of Leadership Studies 5, no. 3 (1998).
189 Ibid.
190 Ibid.
191 Ibid.
of the military. Likewise, the ISTJ’s four preferences are well represented in all three services in the military. Their combined types consisted of 58 percent introverted, 72 percent sensing, 90 percent thinking, and 80 percent judging—thus comprising the ISTJ type.

With military leadership trending towards an introverted typology, two key themes emerge in the analysis of the Executive Dilemma. First, human typology can play a significant role in contributing to the parochial behaviors that lead to the Executive Dilemma. In their book, Working Together, Olaf Isachsen and Linda Berens characterized the environment of the ISTJ typology as a stable and orderly one where tasks are defined. They are extremely dedicated to order and are hard workers. At the same time, ISTJs are unusually loyal to their organization and they consider it their duty to make sure that the organization is preserved. They are sometimes referred to as traditionalists, and change is often perceived as a threat to them. With such a large population of ISTJs in the military, their tendencies support the conclusion that typology is a contributing factor to the parochialism that is often found among organizations within the MIC. Specifically, this set of behaviors closely matches the tendency of Air Force leaders to protect organizational resources within the Air Force Total Force program. This fierce loyalty to individual organizations and their survival instincts contributed to the organizational hegemonies in the broader Air Force. Since belonging

193 Ibid.
194 Isachsen and Berens, Working Together, 193.
195 Ibid., 194.
is important to ISTJs, tribal affinities within the Air Force have also made a lasting impression on organizational cultures, and were regularly facilitated by the scarcity of resources.

Second, given the cumulative effect of scarce resources and propensity for organizational preservation, it is highly likely that leaders within the MIC were overcome by the behavioral influence of self-interest. In turn, these “Guardians” influence, hire, and promote leaders with the same affinity for maintaining and protecting the status quo. Naturally, they cultivated an organizational culture in which the process of aspirational adaptation either fails to begin, or is rejected entirely in favor of gridlock. As such, probabilistic defense analytics might mature to a level of fidelity that can inform decision makers. However, both the typology of the decision maker as well as the environment that that drives self-interest prevents the leader from successfully progressing through the levels of aspirational adaption and arrive at the best alternatives. Naturally, leaders in this environment are prone to confirmation bias, and sub-optimal decision-making results from this phenomenon. During an interview with the Chief of Staff of the Air Force, General Norton Schwartz stated, “There is always a competition of ideas and for resources. It’s up to the senior leadership, in some cases the Chief of Staff alone, to decide the operational priorities. We did that for both the RPA [Drone] and the nuclear missions.”

Bounded by the reality of an environment ill-suited for producing viable decision alternatives, a culture of one-dimensional thinking driven by self-interest caused the Executive Dilemma. Worse yet, the decision maker enters this arena in the most crucial circumstances—a situation in which the dilemma

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goes unrecognized. Such is the situation with Case Study Two, and the impending risk to the future drone enterprise in the Air Force. General Schwartz stated, “Pride in one’s discipline is not a negative, I am proud of my special operations background. But, senior officers must be bigger than where they came from. It requires objectivity, awareness and openness to competing approaches.”

**Case Study Three: Religious Values and Global Economics**

In the previous section, the Theories of Simon and Jung were presented in order to characterize Executive Dilemmas within the Air Force. The analysis yielded an understanding of the impact the environment and typologies can have on rational approaches leaders apply in their decision-making. Like the first two case studies, Case Study Three illustrates how the Executive Dilemma can cause leaders to overlook disparate fields of inquiry, thereby limiting decision-making ability and creating the potential for harm in an enterprise. Often times the biggest differences in problem-solving approaches occur between the scientific and non-scientific fields of study. In Case Study Three the schisms that can occur between technical and non-technical fields of study emerge in the same way that they did in the previous two cases. However, Case Study Three introduces the impact of religious values. Its impact on human behavior emerges as an important factor on the decision-making tendencies of leaders. While religious values are certainly present in the previous case studies, its influence in Case Study Three provides a demonstrable example of how they can play a role in causing the Executive Dilemma. In order to introduce this concept, Case Study Three introduces the intersection between religion and the field of economics as

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197 Ibid.
another example of how the links between fields of inquiry can go unrecognized by executive leaders, resulting in the potential for harm.

During the 2008 global financial crisis, Secretary of Treasury Henry Paulson was faced with a crucial decision that would impact the entire global economy. Ultimately, his value-sets inhibited his ability to effectively execute a government bailout of financial institutions considered essential to recovery of the U.S. Economy. Instead of ordering the financial bailout, he opted to err towards caution by relying on his own religious values to guide his decision-making.

In the field of economics, the social impact and influence of the world’s religions on global economics often goes overlooked.198 Issues ranging from disputes in the World Trade Organization to monetary policy among nations emerge as a result of foundational religious values that translate into social dialogue impacting economic decision-making.199 Founded upon the principles of rational thinking, economists may not readily recognize that complex markets may be bounded by their environment, and neglect externalities related to human-values.200 Paulson noted during the 2008 global financial crisis that his religious values played a significant role in his decision-making process.

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199 Ibid.

financial crisis that a "moral hazard" existed when he considered the bailout of financial institutions on the verge of bankruptcy. In the book, *Confidence Men*, Ron Suskind attributed Paulson’s perspective to his religious values by stating, "As a Christian Scientist, Paulson fell back on the old standard: God helps those who help themselves." Interestingly, Paulson made this decision without knowing that his religious values were influencing him. It was Paulson’s inability to recognize religious influences on his decision-making that ultimately delayed action and put the financial stability of large institutions at a distinct disadvantage. Data presented to him offered a compelling argument for a bailout, yet his individual religious value-sets prevented him from acting quickly. Paulson was distracted by the one-dimensional thinking associated with the Executive Dilemma, and subsequently delayed a decision that could have averted significant harm to the global economy.

The *Evangelii Gaudium* of Pope Francis provides another example of how religious values can influence global economics. The *Evangelii Gaudium* has been received the world over as a radical new direction by the Vatican. As scholars discuss its implications, the document’s most poignant edicts are directed at an unlikely field of inquiry—the impact of religion on global economics. In it, Pope Francis delivered a provocative repudiation of the excesses of Western free market Capitalism, stating that we “can no longer trust in the unseen forces and the invisible hand of the market.”

His message was delivered not to the masses, but rather directly to executive decision-

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makers positioned at the top of the food chain in global economic affairs. His focus was directed at the impact of Western religions on economic decision-making. However, do other religious traditions exert this type of influence on leaders?

With over 85 percent of the world’s population adhering to a given faith tradition, the prominent role religion plays in the human conscience is well-accepted knowledge. Yet, discussions on how world religions impact economic decision-making rarely occur in modern economic fora. An analysis of five major world religions revealed that each religion contributed principles to the hard science of economics that distinguished itself among its sister theologies. Without this understanding, recognizing that religious values might be the cause of an Executive Dilemma is an extraordinarily difficult task.

For example, an American executive looking to establish free trade agreements with India may not be aware that the Indian economy, with values based primarily upon ancient Hindu scriptures, is formed upon the principal of abundance. On the other hand, modern economies in the West are founded primarily on the concept of scarcity. Naturally, approaching Indian authorities without this rudimentary knowledge could place formal agreements in jeopardy. If executive leaders are to improve their economic decision-making and remain agile on a global scale, they will first have to understand how religious theology shapes their markets, and then incorporate an awareness of the religious value-sets influencing their decision.

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Case Study Three provides yet another instance in which the absence of awareness of a disparate field of inquiry can result in adverse consequences. Both the application of Henry Paulson’s deference to his religious values and the Pope's call to action illustrate how hard sciences can be impacted by religion. Secretary Paulson carried with him the underpinnings of religious influence, but was unaware the extent to which his theology was affecting economic decision-making. On the other hand, Pope Francis was well aware of his attempt to influence global economics, but the lukewarm reception he received from senior leaders suggests that the Executive Dilemma may be present in the field of economics.

Case Study Three introduces two new issues worthy of examination. First, Case Study Three reinforces the importance of examining how human values influence executive leaders as individuals. For Secretary Paulson, those values were derived from his religious beliefs. Second, while many feel that science and religion are two fields with distinct approaches to the human condition, the case study illustrates the foundational role theology plays in the decision space of executive leaders in a wide variety of fields, including the sciences. Henry Paulson’s experience shows how his theology, whether intended or not, influenced his decision-making in a field widely regarded as a hard science. However, the point of contention is whether conscious awareness of this influence could have produced a more favorable outcome than it did. Similarly, Pope Francis' Evangellii Gaudium suggests that theology should play a foundational role in shaping the science of executive decision-making in global economics. These two observations suggest that a potential remedy might exist
between two disparate fields of inquiry, yet the Executive Dilemma still emerges because the leader is unaware of a solution between two fields.

However, for modern economists religion is rarely a subject that enters into significant depth of discussion, or theoretical debate. Yet, it is ironic that the word "value" holds a prominent place in the vernacular of both the field of economics and theology. Why is this so? Core scriptures from all of the major religions have much to say on the subject, and religious scholars continue to share their edicts on the ethical practices of price, wages, labor, and treatment of the poor. One explanation can be traced to the early 18th Century. The pre-eminence of Western economic theory, formed primarily by the rational thinkers of the enlightenment, rejected the "god-centric" environment that arose during the Renaissance. It was the principle supporting rational theory that led to the acceleration of the sciences and the industrial revolution of the 1800s in Europe. This paved the way for capitalistic societies and consumer markets which, for the most part, are in existence today in what is known as the modern age.

Prior to this, in the 1700s Adam Smith laid the foundation for Western social economic theory by describing how cultural beliefs, norms and human values are central to economic theory. For his work he became well-known as the father of Western economics.


Each of the major religions offer distinctive views on economics, as well as fundamental practices and pragmatics that shed light on how differing world-views are applied in the field of economics. The depth and breadth with which economic theories are interpreted and applied within a given religious tradition makes discussing their impact crucial to understanding how decision makers might apply their edicts and avoid the Executive Dilemma. The reality of income inequality, political unrest, and ecological damage caused by oversized, consumption-based systems highlights the complex interactions between human religious values and modern economics. This makes for a unique starting point in the search for new economic ideas. Whether it is deliberately expressed or not, the world's religions have a lot to say about economics.

As with the previous case studies, a deeper review was required in order to uncover potential sources of the Executive Dilemma. A review of five religious traditions was conducted, focused primarily on what each had to say about economic issues such as finance, wages, prices, and other key problems. As with the previous case studies, an analysis was accomplished using the theories of Simon and Jung.

**Christianity**

Max Weber provided one of the most comprehensive treatises on Christian economic theory in 1904 when he wrote *The Protestant Ethic and the Spirit of Capitalism*. In it he outlined the primary themes of capitalism in the Protestant ethic. He separated the pursuit of wealth and personal gain from the concept of capitalism. He believed that the true capitalist mindset involved the generation of profit through
peaceful economic exchange. For Weber, mercantile operations formed the basis for economic systems. However, he drew a distinction in the West by explaining that a structured labor organization was a key component of market economies.

Within the Christian world-view, Weber contrasted Catholicism with Puritan traditions such as Calvinism, Pietism, Methodism and Baptism. Weber believed that the most enterprising sect of Christianity was overwhelmingly Protestant. Business leaders, managers of capital, and highly-skilled administrators were located in the wealthiest towns, enjoyed privileged educational opportunity, and inherited their wealth. While the Protestants maintained a strong presence in the developing classes of the industrial age, Catholics adhered to their traditional tradecrafts. Catholics took pride in achieving master craftsman status in local communities, but remained reluctant to populate the labor force in the factories. Catholics restrained from excess, for fear of being deprived of salvation.

The concept of salvation formed the foundation for Protestant economic perspective, but took on a slightly different meaning among its various denominations. Weber felt that since many Protestant groups believed that only some human-beings are chosen to be saved from eternal damnation, a feeling of loneliness resulted in the performance of "good works" to attain surety of salvation. For Calvinists, the self-confidence once found in the clergy eventually migrated to that of labor and

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208 Ibid., 12.

209 Ibid., 14.
occupational success during the industrial revolution. The development of a diligent work ethic and avoidance of needless wealth earned its place in the moral fiber of Protestants. The Pietists believed that formation of a work ethic led to a lifelong commitment to respectable professions such as clerks, laborers, or domestic workers. As a result, Protestant sects advanced economically during the industrial revolution, and garnered highly-skilled labor and administrative positions in the evolving capitalistic economy of Europe during the 1800s.

An important quality of the Protestant ethic was its emphasis on virtuous business practices. Weber conveyed this through the tenets of Benjamin Franklin, who believed that honesty in business transactions "begets credit."\textsuperscript{210} Franklin believed that credit was essential to the success of capitalism, as was an avoidance of any hedonistic pursuit of the pleasures of life.\textsuperscript{211} Franklin also believed that the accumulation of wealth was no longer subordinated to man as a means of satisfying his material needs.\textsuperscript{212} Franklin once wrote, "Seest thou a man diligent in his business? He shall stand before kings."\textsuperscript{213} In essence, hard work, frugality, and thrift made up the Protestant ethic.

The heart of Weber's argument was in the rise of the large industrial and labor-based economies that enabled the acquisition of capital during the 1800s. Weber attributed the rise of capitalism to the Protestant ethic. The Protestant value of an

\textsuperscript{210} Ibid., 61.
\textsuperscript{211} Ibid.
\textsuperscript{212} Ibid.
\textsuperscript{213} Ibid.
ascetic lifestyle and the noble pursuit of salvation through diligent work formed the basis for the rise of labor-based economies, and propelled the West into the Industrial age. For Western capitalism, understanding its religious origins can be of great use to economic leaders. As Treasury Secretary Hank Paulson noted during the 2008 global financial crisis, a distinct "moral hazard" existed when he considered bailout of financial institutions on the verge of bankruptcy. He felt that there was an ethical problem with repeatedly rewarding banks for pursuing wealth at the risk of jeopardizing the economy. In his book, *Confidence Men*, Ron Suskind attributed Paulson's perspective to his religious background by stating, "As a Christian Scientist, Paulson fell back on the old standard: God helps those who help themselves."²¹⁴ Max Weber believed he had revealed the source of capitalism, as well as the ethics through which Western economic perspectives were formulated.

**Judaism**

Judaism is a story of redemption. It was Moses that liberated the Jews from bondage, and through tradition and ritual the Jewish story of redemption is kept alive. However, the economic implications of Judaism, according to Aaron Levine in his book, *Economic Morality and Jewish Law*, are deontological.²¹⁵ He believed that the Welfare Economic approach brought forth by the West was a consequentialist system. The concept of Consequentialism justifies economic actions based upon whether the act

²¹⁴ Suskind, *Confidence Men*, 46.

increases wealth in the long run. In short, the goal of public policy and government activity in Welfare economics is to maximize wealth. In sharp contrast, Levine believed that Jewish law discerns an economic decision not through its consequences, but rather through the intrinsic moral qualities of the action itself. At the core of this law is the Jewish moral code, which prohibits the infliction of harm upon another, even if the action would result in the maximization of wealth. From this and other Jewish codes flowed a host of economic edicts that shaped the Jewish view on economics. Falsity of advertising provides a clear example of how Jewish morality affects economic actions. Under Jewish codes no more than 10-15% of buyers are allowed to be deceived in a given advertisement. Additionally, Jewish scholars require businesses to conduct market surveys to assess compliance with their marketing behaviors.

The concept of insider trading is also addressed and interpreted by Jewish scholars. Jewish code on this subject can be traced to fundamental guidance provided in the Mishnah at Bava Metzia 3:2 concerning the handling of the property of others:

If one rents a cow from another and lends it to someone else, and it dies naturally, the renter must swear that it dies naturally, and the borrower must pay the renter.

Short sales and insider trading also fall within the same interpretation, whereby investors borrow stock from a brokerage firm, and then sell the stock if the value of the stock declines. The investor then buys back the stock at a lower price and returns the

\[216\] Ibid., 8.

\[217\] Ibid., 18.

\[218\] Ibid., 20.
stock to the lender.\textsuperscript{219} In short, the act of doing business with another person’s property is forbidden according to interpretations of Jewish text.

One of the Torah’s central tenets is the prohibition against unethical price setting. Leviticus 25:14 states, "When you make a sale to your fellow or when you buy from the hand of your fellow, do not victimize one another."\textsuperscript{220} Furthermore, the law of ona’ah prohibits an individual from concluding a transaction at a price more favorable to himself than some reference price.\textsuperscript{221} A violation of ona’ah occurs when the stated price exceeds the reference market price by one sixth.\textsuperscript{222} Individuals must also beware of adversely affecting the economic activities of others. For example, if an airline starts flight operations in the airport of a small town, the noise might have a detrimental effect on local chicken farms, and in turn adversely affect egg production enough to cause shortages at the local supermarkets and restaurants. This phenomenon is called a "negative externality" and is forbidden under Jewish code. Its origin is found the following Talmudic discussion:

One may not open a bakery or a dye shop under the storeroom of his fellow, nor may he open a cattle barn under a store room. (Arukh ha-Shulhan, 153:7).

Price setting is also constrained in the case of hayyei nefesh, or essential food.\textsuperscript{223} Enacted in approximately 240 C.E., the ordinance required sellers of essential

\textsuperscript{219} Ibid., 23.
\textsuperscript{220} Ibid., 53.
\textsuperscript{221} Ibid.
\textsuperscript{222} Ibid.
\textsuperscript{223} Ibid., 93.
foods to restrict their profit margins to no more than 20%. Of course, negative externalities also result from price controls, and the subject meets with considerable debate among Jewish and non-Jewish economic scholars. The concepts of ona’ah and hayyei nefesh are retained for a fundamental reason—the general concept of excessive profits, particularly in the case of essential items such as food, could constitute excessive usury to the disadvantage of those in need.

Judaism offers a wide range of deontological interpretations in areas such as Torah education, taxes, and warrantees. Contributions by the Community for the Education of Children on Jewish Traditions, a leading authority in Judaism, offer considerable discussion on the issue of taxes. While economists like Milton Friedman believe that a government subsidy is most appropriately applied through a voucher system, Levine proposes that the Jewish community independently raise funds to finance religious education of the poor.

Implied warranties are an integral part of Jewish interpretation of the buyer and seller relationship. Traditionally the seller enjoys an asymmetric advantage over the buyer, who knows very little about the true value of the product being sold. Based upon this interpretation, Jewish law affords the buyer more warranty consideration than would be afforded in the American legal system. If it is determined that the seller has taken advantage of the buyer, then the transaction is considered Mekah Ta’aut, or concluded in error. While the core teachings of Judaism offer many similarities to Western

\[224\] Ibid.

\[225\] Ibid., 143.

\[226\] Ibid., 240.
economic theory, its deontological application provides a sharp contrast to the consequentialism of Welfare Economics. Regardless of the concepts under continual interpretation and debate by Jewish scholars, the economics of Judaism are both far-reaching and influential.

**The Economics of Islam**

Islam is perhaps the most deontological of the world's major religions. Its edicts, delivered primarily through a system of Shari'a supervisory boards, prescribe an array of economic and financial pragmatics that would rival most Western systems of regulatory governance. At the same time, Islam retains fundamental characteristics common to many of its fellow religious traditions throughout the world. Islam maintains a fundamental concern for usury to the disadvantage of the poor, fairness in the marketplace, and the evils of excess. Huston Smith, an eminent authority on comparative religion wrote, "Some have gone so far as to characterize the Quran as a businessman's book. It does not discourage people from working harder than their neighbors, nor object to such people being rewarded with larger returns." Yet the fact that entities such as "Islamic Financial Institutions" exist generates an imperative for a discussion on the facets of Islamic Finance that distinguish it from similar theories practiced in other religions.

Mahmoud El Gamal, author of *Islamic Finance, Law, Economics, and Practice*, provides a comprehensive assessment of Islamic Economics. As members of the world's fastest growing religion, Islamic scholars have developed a mature system of

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dialogue on interpretation of the economic edicts prescribed by Islam. One of the central premises of Islamic finance is excessive usury to the disadvantage of the poor in the market. This has led to the establishment of interest as "riba," or forbidden act.\textsuperscript{228} The condition of \textit{riba} aims to protect individuals from getting excessively indebted, as well as protect consumers from receiving unfair compensation for receipt of credit.\textsuperscript{229} \textit{Gharara} is another regulatory measure in Islamic finance. \textit{Gharara} prohibits the accumulation or distribution of excessive amounts of financial risk or uncertainty in market transactions.\textsuperscript{230} A debt-to-income ratio of 33 percent is established to prevent investors from acquiring assets that accumulate large amounts of risk.\textsuperscript{231}

However, despite the establishment of \textit{riba} and \textit{Gharara} as regulatory ethics, work-abouts have emerged in Islamic culture that have resulted in the "Westernization" of Islamic regulatory practices. One alternative used in real-estate that has been very popular in Islamic finance is the use of multiple sales, or Special Purpose Vehicles (SPV) in financial transactions.\textsuperscript{232} In this transaction the eventual mortgagee must first purchase the property from the seller, then obtain title either directly or through a SPV. The bank may in turn sell the property on credit. In his assessment, El-Gamal believed that "work-abouts" such as the SPV implemented to meet Shari'a
principles reflected an inefficient system, requiring significant reform. But where did these financial rules come from?

Translating Islamic law into core economic principles within in a complex environment requires an effective governance system to ensure Islamic principles are accurately applied. Shari'a advisory boards exist in Islamic countries to apply "Islamicity Criteria" to financial applications. Industry-sponsored institutions such as the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) interpret guidance and develop practices consistent with the determinations of Islamic jurists. Islamic nations also develop institutions to apply these standards, such as the State Bank of Pakistan or the Bahrain Monetary Agency.

Islamic finance rose to prominence in the 1950s, based primarily on the writings of Muhammad Iqbal and Abu Al-A'la Al-Maududi in the subcontinent, and Baqir Al-Sadr and Sayyid Qutb in the Arab world. Timur Kuran noted the emergence of governance through a political independence movement, with accompanying emphasis on national and religious identities. He argued that Islamic ideology itself gave rise to Islamic economics. Over the course of three decades, Islamic economics morphed into a subfield of economics as suggested by contemporary leaders of the field.

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233 Ibid., 12.
234 Ibid., 137.
235 Ibid.
236 Ibid.
237 Ibid., 137.
The resulting governance system is evident in the development of “Shari'a-compliant” mutual funds and hedge funds.\textsuperscript{238} The first stage of development in this area was pioneered by Al-Baraka’s Investment and Development Company and then utilized as Dow Jones Islamic Indexes (DJII) and Financial Times’ FTSE Islamic Indexes.\textsuperscript{239} The simple initial idea was to use standard fund management techniques, applied to a restricted universe of equities. Various screening rules were adopted to exclude stocks of companies in “sin industries” (e.g., gambling, breweries), as well as those of companies with practices that violated Shari'a principles (such as the payment and collection of interest on loans not sanctioned by Islamic jurists).\textsuperscript{240}

El Gamal assesses the economics of Islam as inefficient in application, citing numerous examples of how special provisions that preserve Shari'a edicts result in unnecessary transactions. Furthermore, the application of these fundamentals by major Oil Producing Islamic nations provides considerable room for debate on the true nature of Islamic economic practices as they occur. Yet, the connection of Islamic religious values to economic theory is unmistakable.

\textbf{Hinduism}

It is well published by Western historians that the fundamental sources of economic theory, as well as the first economists, were Greek. Yet the roots of economic thinking, to include the concepts of resources, production, exchange, profit, and taxation

\textsuperscript{238} El-Gamal, \textit{Islamic Finance}, 12.

\textsuperscript{239} Ibid.

\textsuperscript{240} Ibid.
were well represented in the ancient Vedas.\textsuperscript{241} Among the world’s oldest texts, the Vedas are dated to 1500-1000 B.C.E. and contain much of the philosophy of the Hindu religion. In his book \textit{Hindu Economics}, noted Indian Economist, M.G. Bokare, contrasts Western economics with Hindu Economics. Bokare adopts a polemic approach to Western capitalism in order to introduce Hindu Economic principles. He utilizes the ancient Hindu text called the \textit{Arthashastra} to elaborate on the fundamental focus of Hindu Economics.

The word "Arthashastra," translated literally from Sanskrit into English, means "Economics." The \textit{Arthashastra}, written by Kautilya in approximately 400 B.C.E., establishes one of the first historical uses of the lexicon: economics.\textsuperscript{242} In it, Kautilya introduces the fundamental premise of Hindu Economics provided by the Vedas. Bokare writes, "[The] Holy Vedas have blessed mankind with plentiful supply. The demons, i.e. the natural difficulties, would be removed by knowledge, specially science and technology. The misutilization of resources will be corrected by penalties."\textsuperscript{243} Bokare establishes abundance as central to Hindu economic theory, which is in stark contrast to the concept of scarcity practiced in Western economics. For Hindus, resources are given to mankind for living, and knowledge is used to convert resources into goods that facilitate good living.\textsuperscript{244} Naturally, a consumption-based economy (as


\textsuperscript{243} Bokare, \textit{Hindu Economics}, 119.

\textsuperscript{244} Ibid.
modeled by the West), focuses on the maximization of wealth without regard for individual human wellness, and thus holds the potential to produce vast amounts of waste.

When focus is placed on the proper management of abundant resources, prices decrease. The cost of production trends downward in an abundant, supply-side economic system. This results in falling prices, and increasing output results in greater technological advances. Conversely, European and American economies arrest the flow of abundance through the use of subsidies, and dumping. This results in rising prices and increased waste. Oil cartels and pharmaceutical companies offer examples of such a phenomenon, where attempts to control abundant assets result in higher prices. The end result in capitalist countries is a consumption-based system that is focused on profit-maximization.

Hinduism offers distinctively different viewpoint. Bokare writes, "The consumption for living should be consistent with the activities for righteous life." From a theoretical perspective, this concept aligns closely to Neomachean Ethics, where Aristotle states, "The happy man lives well and does well; for we have practically

\[\text{\textsuperscript{245}} \text{Ibid., 120.}\]
\[\text{\textsuperscript{246}} \text{Ibid.}\]
\[\text{\textsuperscript{247}} \text{Ibid., 121.}\]
\[\text{\textsuperscript{248}} \text{Ibid., 122.}\]
\[\text{\textsuperscript{249}} \text{Ibid.}\]
defined happiness as a sort of good life and good action." However, Bokare argues that this is a departure from modern capitalistic societies which are consumption-based, designed to maximize profit, and do not achieve long-term happiness for consumers.

In the Hindu system, abundance is managed by a self-sufficient, self-employed rural class. Supply and demand merge at the market price of goods, resulting in a downward trend of prices. If local economies engage in moderation, and families remain true to their professions without a need for excess, economic balance remains and prices retain a downward trend. Of course when all classes "maintain their roles," the change to pursue greater opportunity is quelled. Thus a system of caste becomes pervasive, the idea being that "assigned roles" are maintained with a degree of happiness. Subsequently, taxes can remain low for the populous. In this system, the emphasis is placed on wellness rather than profit margins. There is no need to exploit, nor to exploit others--usury to the disadvantage of the poor becomes extinct. Loans at zero rate of interest become feasible. Bokare writes, "This is bliss of mankind in Hindu economics...family becomes the governing unit of the Hindu-economic society. It is here that we know Aristotle. He defined the work (family), and economy (management, organization)." 

Pragmatically, large numbers of the population in India (home to the largest number of Hindus) live in extreme poverty, and local governments suffer from widespread corruption. Usury to the disadvantage of the poor within the rural masses

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leaves the Arthashastrian system with many questions on its efficacy. Furthermore the opening of the Indian economy in the early 1990s under a primarily capitalistic approach created middle-class boom, largely due to the abundance of low wage rates and technological advancement. The rising middle-class in India provides even more evidence that India has benefitted more under an open market capitalistic system, and the ability to compete with labor wage rates that benefit consumers all over the world. Technological advancements in telemarketing, education, and agriculture have also drastically reduced poverty and illiteracy rates, and provided greater access to healthcare in rural areas in India.

Buddhism

Siddhartha Gautama (also known as Buddha) was a reformer. Born in approximately 563 B.C., he was a prince who lived in luxury as the son of a king. His father, Suddhodana, was the ruler of a kingdom in modern Nepal. In his twenties a troubling feeling settled upon him that caused him to leave his family and lifestyle for a path of complete renunciation. For years Gautama traveled the valley of the Ganges in search of an ascetic approach to enlightenment. Through interactions with religious leaders he opted to pursue an independent path, and found enlightenment while seated under a tree, or Bodhi. It was there that he became known as the Buddha, or "The Enlightened One." The Buddha did not believe that the path to salvation would be

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253 Ibid.

254 Ibid.
found through traditional roles, and rejected the concept of caste and social groupings. He claimed no inspiration from God, nor did he believe in the institutions associated with religion.

The economic implications of Buddhist philosophy are far reaching. Happiness and satisfaction are achieved by reducing the human desire for possession. Sulak Sivaraksa, noted Asian social thinker and activist, believed that a more naturalistic approach to economics was required to solve the problems of excess in capitalistic societies. Like Bokare, Sivaraksa's work is a polemic on Western economic principles, primarily concerning the problems of free-enterprise and Globalization. Sivaraksa writes, "Globalization--which really should be called free-market fundamentalism--is a demonic religion imposing materialistic values on developing as well as industrialized nations."256

Buddhist philosophy professes an ascetic approach in which attachments to worldly possessions are renounced. Like Hindus, Buddhists believe that abundance is provided by nature, and it is the duty of humanity to manage the resources wisely. This occurs in a system in which consumption results in regeneration through natural cycles. Consumption-based systems operating independently result in scarcity, rising prices, and the production of waste. In his book, Economics as if People Mattered, E.F. Schumacher draws a similar conclusion on the dangers of modern capitalism. He writes, "A modern economist may engage in highly sophisticated calculations on


256 Ibid., 10.
whether full employment ‘pays’ or whether it might be more economic so as to ensure a greater mobility of labor, a better stability of wages, and so forth. His fundamental criterion of success is simply the total quantity of goods produced during a given period of time."\textsuperscript{257} Buddhists believe that focusing on production rather than the people is subhuman, and considers it a, "surrender to the forces of evil."\textsuperscript{258} Rather, human qualities are valued, such as the purification of human character through work done in the preservation of human dignity, peace, and freedom.\textsuperscript{259} Schumacher believed this is best accomplished in a rural setting, unfettered by the wasteful environment of industrial production. The highest value is placed on maximum well-being of the human spirit, with minimum consumption. A feeling of belonging to the ecosystem is paramount, in order to cultivate the means of maximizing value. As such, creativity through philosophy, the arts and religion occurs at little cost.

Schumacher and Sivaraksa offer a comprehensive polemic on the dangers of Western capitalism, the free market system, and globalization. However, it is important to note that trends in the past three decades offer a more favorable picture on the subject of globalization. While technology has created a desire for excess goods and services, it has also enabled rural communities better access to educational products,


\textsuperscript{258} Ibid., 60.

\textsuperscript{259} Ibid., 59.
technology, and communication.\textsuperscript{260} Furthermore, globalization and free market trends are expected to reduce mass poverty by approximately 50\% in some scenarios over the next 30 years. The middle-class population is expected to double in countries like India and China, where rural communities are utilizing a large labor-intensive economy to garner comparative advantages in products. The end result is lower prices, booming GDPs, and an overall benefit for world-wide consumers. Key technologies are likely to rise to the forefront in this arena, and will include genetically modified crops, precision agriculture, water-irrigation techniques, solar energy, advanced bio-based fuels, and enhanced natural gas extraction via fracturing (accompanied with the acknowledgement that these areas are not without controversies of their own).\textsuperscript{261} Furthermore, new health technologies will continue to extend the average age of populations around the world, ameliorate debilitating physical and mental conditions, and improve overall well-being.\textsuperscript{262} While many Buddhists (certainly Sivaraksa) would most likely argue that the by-products produced by these initiatives outweigh the benefits, the positive impact globalization has had on developing countries is virtually irrefutable.

Our examination of five major world religions reveals that faith traditions have made a lasting contribution to economic systems. They offer more than just the moral underpinnings of economic decision-making. They also offer pragmatic approaches


\textsuperscript{261} United Nations, World Population and Religions, 83.

\textsuperscript{262} Ibid.
and rules designed for application to the field of economics. Furthermore, it is in practical application that similarities and differences become even more evident.

**Understanding Global Economics and Religion Using the Theory of Bounded Rationality and Human Typology**

Herbert Simon’s Theory of Bounded Rationality provides an important platform for describing the interaction between a data-driven decision-making and human behavior. Without considering the impacts of the social environment on human values, rational thinking is bounded in its efficacy. In this respect, Case Study Three is no different than first two case studies. However, Case Study Three offers a unique perspective because it illustrates the impact of human religious values on the Executive Dilemma.

In the case of Treasury Secretary Henry Paulson, his experiences during the 2008 global financial crisis suggest that he experienced the St. Petersburg effect. As a member of the President’s Cabinet, Paulson received data-driven macroeconomic analysis assessments from his staff of economic advisors on a daily basis. The data provided evidence that a bailout of the banking industry would be beneficial to the global market. However, Paulson felt that this approach violated his good sense and overall reasonableness. Where did his sense of judgment come from? In his book, *Confidence Men*, Ron Suskind described how Paulson relied on his religious values to guide his decision-making.\(^{263}\)

As a senior leader, Paulson’s decision space was occupied primarily by rational thinking. A significant amount of data was telling him that a financial bailout of Wall

\(^{263}\) Suskind, *Confidence Men*, 46.
Street would most likely avert a global economic collapse. However, his religious values prevented him from ascending through aspiration levels to allow the process of satisficing to occur. Triggered by the limited time, Paulson was perfectly placed to experience the Saint Petersburg Paradox. Models of bounded rationality are based on assumptions of limited resources, which include time, funding, or information. Rather than allowing himself to efficiently move to satisficing, Paulson was delayed by natural task-related emotions such as frustration and anxiety. Ultimately, he chose to approve the financial bailout, but did so reluctantly, and without having consciously allowing his religious values to guide him through the process of aspirational adaptation to satisficing.

Each of the five religions that were examined contained a foundational blueprint for economic behaviors that shape the judgment of leaders. The theory of bounded rationality accounts for these in the emotions that manifest themselves in human behaviors. Emotions serve a vital role in this process because they emerge as consequences that influence behaviors. When consequences are rewarding, feelings are pleasurable, and when consequences are negative, feelings are painful. This process allows leaders to shape their judgment according to value sets that they are not


265 Ibid.

266 Ibid.

267 Ibid.

268 Ibid.
always consciously aware of. In his book titled, *Blink*, noted social journalist Malcolm Gladwell described how feelings are a function of individual experiences, and influence human judgment without a conscious awareness that it is occurring.269 Thus, bounded rationality describes the limits of human decision-making when leaders fail to account for the influence of value-driven concepts such as religion.

In this section, the impact of religion on the field of economics was described through the lens of five major faith traditions in the world. The theory of bounded rationality illustrated how the intersection of hard sciences like economics with human religious values can provide leaders with the capacity to apply judgment in manner more reflective of the operating environment. On the other hand, excessive focus solely on empirical solutions can result in an absence of conceptual clarity that can lead to the Executive Dilemma and impede efficient decision-making.270

Human typology provides another lens for understanding the conditions that lead to the Executive Dilemmas experienced in the field of economics. In 1924, noted economist John Keynes described the personality traits of another economist, Alfred Marshall, in his memoir to the Royal Economic Society. Keynes wrote, “the most essential and fundamental of the economist’s necessary gifts, he was conspicuously a historian and mathematician, a dealer in the particular and the general, the temporal

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and the eternal, at the same time.”

John Keynes also described economists as utilitarian in nature. He wrote that Marshall believed an economist should be aloof in order to remain incorruptible. In 2007 Harvard Economics Professor Greg Mankiw characterized the personality type of economists as “having little patience for interaction” and often prone to conflict with social sciences. Mankiw likened economists to the ISTJ type, where the individual remains unusually focused on the task and organization, and ultimately linked to the emergence of the Executive Dilemma. With a behavior type that is prone to maintaining the status quo, and an aversion to the social sciences, the likelihood that economists will choose to remain distant from a field as disparate as theology is high.

In Chapter Three, Simon’s Theory of Bounded Rationality and Jung’s Theory on Human Typology were used to characterize the three case studies presented in Chapter One. The analysis established a baseline structure for understanding how the Executive Dilemma emerged in three enterprises. The examination went into considerable depth, and utilized scenarios representative of the organizational cultures described in the case studies. The analysis uncovered findings in two key areas. First,


272 Ibid.


275 Ibid., 201.
there exists a failure to recognize that satisficing requires a step beyond data-driven optimization, the absence of which can lead to the Executive Dilemma. This is because the leader either prematurely concludes that enough options have been considered, or that there is no need to move beyond the solution that has already been presented. This is particularly relevant in institutions like NASA or the MIC, where conditions such as scarcity of resources produce intense rivalries between organizations, and solutions are required in short periods of time. In this situation, environmental conditions produce cumulative effects that might induce one-dimensional thinking, parochial behaviors, or confirmation bias. Second, certain human typologies are not conducive to the types of interaction that lead to ascendency through the levels of aspiration. Organizations are prone to this condition when incompatible human typologies or combinations of typologies are present.

In 1959, a physicist by the name of C.P. Snow authored an essay that summarized the organizational states investigated in the three case studies. The essay is titled *The Two Cultures*, and tells the story of how Western society has split Science and the Humanities into two separate and distinct silos. More importantly, Snow warned that this has had a damaging effect on the state of public discourse in the West. He felt that the general populous has suffered from this divide, and it has created a bitterness that would eventually lead to a state of contempt between these

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277 Ibid.

278 Ibid.
two seemingly disparate fields. In turn, this would hamper new ideas and result in a society that fails to innovate, and worse yet refrain from asking the question, “why are we innovating?” Elements of this phenomenon are certainly contained within the three case studies presented. Case Study One showed that at NASA, the scientists are often pitted against management organizations located at other centers. In the Air Force, competing camps exhausted each other in their bid for primacy, and the organization fell short of creating adequate space for new innovations, particularly when resources in the military industrial complex became scarce. Finally, economists can overlook the importance of human religious values, despite the fact that the term ‘value’ itself occupies a foundational place in the origins of the hard sciences. It is important to note that Snow’s concept of two cultures primarily applied to his analysis of the West. On the other hand, prolific Eastern mathematicians such as Srinivas Ramanujan, who developed ground-breaking mathematical concepts, incorporated their religious values into the foundations of their scientific methods. This was primarily a factor of his Eastern religious tradition. In Chapter Four, an example of a leader who blended Eastern faith traditions with his technical and artistic prowess will be presented as a potential construct for mitigating the Executive Dilemma. Taken as a whole, the theories of Simon and Jung established a useful lexicon, as well as an intriguing analysis of the three case studies capable of yielding a new framework.

279 Ibid.

280 Ibid.

CHAPTER FOUR

NEXUS RIDERS: LEADERS WHO SOLVED THE EXECUTIVE DILEMMA

I think great artists and great engineers are similar...in the seventies computers became a way for people to express their creativity. Great artists like Leonardo da Vinci and Michelangelo were also great at science.¹

- Steve Jobs

In Chapter Three Herbert Simon’s Theory of Bounded Rationality and Carl Jung’s Theory of Typology uncovered the potential limits of human decision-making that can lead to the Executive Dilemma. Examining potential root causes of the dilemma in each of the three case studies revealed that leaders may delay or even impede effective decision-making if they prematurely proceed to satisficing. The condition can be made worse when differing human typologies feed rivalries among disparate organizational cultures. How might leaders overcome this problem?

In this chapter, a historical approach is used to determine if select leaders in history have overcome challenges similar to the ones that might be characterized by the Executive Dilemma. Subsequently, two figures in American history were chosen for examination and presented as examples of how the Executive Dilemma might be overcome. Their approach to decision-making was shaped by their ability to transcend disparate fields of inquiry. In doing so, they were able to transform their respective operating environments and accelerate innovation. The first leader was Thomas Jefferson, who blended science, the arts, and religious understanding into his statecraft. The sheer breadth of his interests gave him the unique ability to transcend disparate

¹ Isaacson, Steve Jobs, 568.
fields and import the concepts from one discipline to another. The second leader was Steve Jobs, who was known as one of the most successful entrepreneurs of the information age. His ability to blend science, the arts, and religion in his personal life enhanced his professional abilities, and shaped his ability to transform personal computing. Could these leaders hold the key to overcoming the Executive Dilemma?

**Thomas Jefferson, On Innovation**

Thomas Jefferson is known as an innovator in American history. He is widely recognized for his expertise in a broad range of intellectual subjects. First and foremost, Jefferson considered himself a scientist, fueled by a curiosity that allowed him to explore subjects ranging from meteorology to the fine arts. His appreciation for the sciences was rivaled only by his affinity for the arts, primarily in the area of music and painting. This interest cultivated an appreciation for human culture, in which his desire for precise practical reasoning allowed him to merge enlightenment thinking with the concept of liberty. Ultimately, the true nature of Jefferson's innovative thinking was his desire to keep science, the arts, and culture within his intellectual reach at all times. This approach gave him the ability to view problems from an interdisciplinary lens and cultivate an innate ability for innovative statecraft that was unrivaled in his time.

Of all the intellectual disciplines available in his time, Thomas Jefferson held science in the highest regard. As an enlightenment thinker, Jefferson believed that the physical world was defined by natural laws and that a systematic form of reasoning could be applied to understand these laws. He regularly studied the works of individuals like John Locke, Francis Bacon, and Isaac Newton, enlightenment thinkers
who balanced the intellectual faculties of reason, science, and philosophy.\(^2\) Jefferson’s affinity for these three thinkers would guide his approach to the sciences. He combined his scientific research in theoretical as well as practical endeavors.\(^3\) Adopting Francis Bacon’s theories on reason, Jefferson employed his scientific inquiries most often in the field of natural history. For example, he believed that the discipline of botany was valuable to the future of American Agriculture.\(^4\) Therefore, he endeavored to study it regularly and looked for ways to apply the knowledge he gained.\(^5\) In 1814 he wrote a letter to a well-regarded professor named Thomas Cooper stating, “Botany I rank with the most valuable sciences, whether we consider its subjects as furnishing the principal subsistence of life to man and beast, refreshments from our orchards, the adornment of our flower borders, shade and perfume of our groves, materials for our buildings, or medicants for our bodies.”\(^6\) Jefferson vividly expressed his curiosity and understanding of science in his book, *Notes On Virginia*, where he demonstrated a comprehensive knowledge in areas ranging from minerals and rivers to animals, plants and vegetables. He utilized his comprehensive investigations on the ecology of Virginia in order to repudiate European assertions [led by French Naturalist Comte de Buffon] that the New


\(^4\) Ibid., 84.

\(^5\) Ibid.

\(^6\) Ibid.
World was an inferior environment.\textsuperscript{7} Eventually, Jefferson’s ability to apply a scientific approach to articulating the attributes of the New World enabled him to disprove Buffon’s theories.

While Jefferson was able to apply a strict code of scientific reasoning to the natural history of Virginia, he also possessed a curious passion for advancing the sciences through the field of measurement. At the heart of this passion was the desire to make precise measurements specifically designed to support his scientific reasoning. Naturally, being the son of a pioneer and surveyor gave him the predisposition for understanding measuring apparatus.\textsuperscript{8} His father bequeathed him the vital instruments of surveying, as well as the skills required to conduct proper measurement. Thomas Jefferson developed a love for scientific instruments, and regularly collected mathematic and astronomical devices in his travels to England.\textsuperscript{9} His interest in measuring devices fueled his interest in a variety of other scientific fields.

Jefferson was also among the first in the American colonies to conduct a study in the discipline of meteorology.\textsuperscript{10} Jefferson wrote, "Of all the departments of science no one seems to have been less advanced for the last hundred years that of meteorology."\textsuperscript{11} He began making records of weather patterns while studying law at the

\textsuperscript{7} Merrill Peterson, \textit{The Portable Thomas Jefferson} (New York, New York: Penguin Books, 1975), XXIII.

\textsuperscript{8} Bedini, \textit{Jefferson and Science}, 16.

\textsuperscript{9} Ibid., 20.

\textsuperscript{10} Ibid., 29.

\textsuperscript{11} Ibid.
College of William and Mary, and encouraged his colleagues to measure and record weather patterns with him. One of Jefferson's prized possessions was a thermometer designed for travelers.\textsuperscript{12} During his travels he used the thermometer each morning to record local weather conditions, and eventually installed a weather vane at his home in Monticello.

Another of Jefferson's early scientific interests was astronomy. He observed significant events such as a solar eclipse of 1788, and regularly made latitude observations using a box sextant.\textsuperscript{13} He also owned a telescope and an orerry, which was a device that depicted the orientation and movement of the planets. In order to ensure accurate time measurement of astronomical events, Jefferson enlisted the assistance Robert Patterson, an authority on scientific principles at the University of Philadelphia, to purchase a clock designed to make precise measurements.

Thomas Jefferson's passion for meticulous measurement armed him with the ability to utilize the sciences to innovate a wide range of inventions. Always willing to articulate the virtues of agriculture, Jefferson utilized his mathematical skills to design a moldboard plow that was easier to construct and dug deeper into the soil than existing plows of its time.\textsuperscript{14} He made several prototypes, and consulted the works of English Mathematician William Emerson in order to develop formulas that would validate his designs. He also acquired a "dynamometer" to measure plowing forces of various designs, and incorporated key changes to his prototypes.

\begin{enumerate}
\item \textsuperscript{12} Ibid., 31.
\item \textsuperscript{13} Ibid., 35.
\item \textsuperscript{14} Ibid., 95.
\end{enumerate}
Perhaps one of Jefferson's most influential endeavors in the field of science was his desire to popularize the discipline in the general public. Jefferson was concerned that science was not accessible to the masses, and wanted to change that condition. In a letter to Charles Bellini in 1785, Jefferson wrote of the citizenry in France, "In science, the mass of people is two centuries behind ours, their literati half a dozen years before us."\(^{15}\) In the absence of adequate monetary means to accomplish this, coupled with the high cost of import duties on European books, Jefferson turned to professional societies to popularize science.\(^{16}\) He was elected to membership in the American Philosophical Society in 1780, and appointed as the society's president in 1797. He also supported the efforts of the American Academy of Arts and Sciences. Jefferson was convinced that professional societies were the most promising channel for bringing science to the public, despite having difficulty informing all classes of society.\(^{17}\) He utilized his own works to share his innovations and experimental methods with the broader American public. From cryptography and polygraphs to medicines and measuring devices, Jefferson's curiosity and passion for exploring new ideas made his scientific journeys fruitful, both from a practical and theoretical standpoint.

**Jefferson and the Arts**

While Jefferson considered himself a scientist first, it was his affinity for the arts and humanities that fueled his creative imagination. Jefferson was captivated by music.

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\(^{17}\) Ibid.
at an early age. In 1778 he declared music "the passion of my soul."18 He enjoyed playing the violin while growing up, and often accompanied his sister when she sang.19 Jefferson maintained his enthusiasm for the violin while attending the College of William and Mary, where he encountered another violinist, Patrick Henry.20 Both he and Patrick Henry entertained guests with their music during the Christmas holidays.21 With an understanding of the value of the arts, Jefferson eventually integrated the arts into the daily regimen and education of his children. In a letter to his eleven-year-old daughter Patsy, Jefferson prescribed study in music and dance three times a day for nearly three hours.22 Captivated by the refinement of culture brought forth by the arts, Jefferson sought to bring music to the new American Republic. In 1778 Jefferson wrote to Giovanni Fabbroni and referred to Italian culture:

If there is a gratification which I envy any people in this world it is to your country and its music. This is the favorite passion of my soul, and fortune has cast my lot in a country where it is in a state of deplorable barbarism. From the line of life in which we conjecture you to be, I have for some time lost the hope of seeing you here. Should the event prove so, I shall ask your assistance in procuring a substitute who may be proficient in singing and playing on the harpsichord....The bounds of an American fortune will not admit the indulgence of a domestic band of musicians. Yet I have thought that a passion for music might be reconciled with that economy which we are obliged to observe.23

18 Bernstein, Thomas Jefferson, 359.
19 Ibid., 3.
20 Ibid., 4.
21 Ibid.
23 Ibid., 360.
Jefferson believed that the arts were an important aspect in the development of the American Republic, primarily because it promoted a sense of freedom and independence. This notion would be confirmed during his visit to France, where he would become immersed in its artistic wealth.

Jefferson's posting as Minister to France from 1785 to 1789 widened his lens on the arts, to the point that it convinced him that the American Republic would benefit from the beauty and splendor of French arts. Upon his arrival in France he was visibly uncomfortable in his new setting, and had some difficulty with the language.\(^{24}\) However, he was soon smitten by the beauty of the architecture, artwork, and refinement displayed by all classes of society in France. In 1785 Jefferson wrote, "I have never yet seen a man drunk in France, even among the lowest of the people. Were I to proceed to tell you how much I enjoy their architecture, sculpture, painting, music, I should want words. It is in these arts they shine."\(^{25}\) Jefferson brought hundreds of crates filled with European artwork and artifacts back from his trip to Paris. He felt it was essential to introduce these products to the New World. While he believed introduction of French artifacts would be useful for the budding new republic, he was also wary of the acquisition of an appetite for "European luxury" as well as "contempt for the simplicity of his own country" if American students were educated in Europe.\(^{26}\) Therefore, he preferred bringing the arts to America, in the hopes that a new brand of artistic innovation would be born into the culture of the new republic.

\(^{24}\) Bernstein, *Thomas Jefferson*, 56.


\(^{26}\) Ibid., 393.
Jefferson, Culture, and Religious Freedom

Thomas Jefferson's capacity for cultural understanding presents a third component to his capabilities as an innovator. Jefferson was captivated by Greek and Roman history at an early age.\textsuperscript{27} He studied Greek and Latin languages at the age of nine, and took to learning them easily.\textsuperscript{28} Over the course of his life, he visited as many Greek and Roman ruins as he could, despite having never visited Rome himself.\textsuperscript{29} In 1787 Jefferson visited the Maison Carree in France, which eventually inspired his design of the Virginia State Capitol.\textsuperscript{30}

His most influential cultural innovation was in the realm of religion, where he proposed a new paradigm for religious freedom in America. Jefferson proposed a Virginia statute on religious freedom that declared that the government had no right to dictate beliefs to the general populace, particularly in the case of a minority class.\textsuperscript{31} It was his cultural appreciation for enlightenment thinkers like Aristotle that led him down this path. Jefferson wrote of the citizenry, "Your own reason is the only oracle given you by heaven."\textsuperscript{32} Jefferson's proposal rejected any claim by government to tax individuals to support a specific religion.\textsuperscript{33} As early as the 1760s, his stance on religious freedom

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\textsuperscript{27} Bernstein, \textit{Thomas Jefferson}, 64. \\
\textsuperscript{28} Ibid., 3. \\
\textsuperscript{29} Ibid., 64. \\
\textsuperscript{30} Ibid., 65. \\
\textsuperscript{31} Ibid., 42. \\
\textsuperscript{32} Ibid., 427. \\
\textsuperscript{33} Peterson, \textit{The Portable Thomas Jefferson}, 42.
\end{flushright}
differed from most Americans. Yet Jefferson’s approach to the propagating religious freedom centered upon applying reasoning rather than coercion to influence the general population.

Jefferson also maintained an important regard for the native peoples of Virginia and their culture. Despite the general opinion that Native Americans lived a primitive existence, Jefferson often extolled their virtues—a gesture considered uncommon during his time. He regularly praised their talent, courage and eloquence. While at the College of William and Mary, he visited the camps of Native Americans who came to the capital of Virginia. In a letter to John Adams in 1812, Jefferson wrote, "In the early part of my life, I was very familiar with Indians and acquired impressions of attachment and commiseration from them have never been obliterated." While Jefferson’s regard for the native peoples of the New World was respectable, his desire for segregation of races remains a paradox. He was generally against the concept of racial diversity, and his views on slavery offer an even more controversial perspective on his cultural attributes. Nevertheless, his desire to regard the native people of America as individuals rather than “savages” remains a redeeming quality of his cultural capacity, when compared to many of his contemporaries at the time.


36 Ibid., 61.


38 Ibid.
Blending Science, the Arts and Culture

While Jefferson’s capacity in science, the arts, and culture have independently earned universal acclaim, it was his ability to keep all three disciplines within his intellectual reach that resulted in his greatest innovations. As an enlightenment thinker, Jefferson embraced the notion that operating at the nexus of science, the arts, and culture would bring innovative ideas to the New World; and he longed for the nexus to manifest itself in the colonies. Jefferson wrote, "But neither has America produced one able mathematician, one man of genius in a single art or a single science." 39 Jefferson often blended two or more disciplines in order to innovate. He was constantly mixing and matching various disciplines in order to generate new paradigms. In his notes on the state of Virginia, Jefferson wrote of astronomer David Rittenhouse, "He has not indeed made a world; but he has by imitation approached nearer its maker than any man who has lived from the creation to this day. As in philosophy and war, so in government, in oratory, in painting, in the plastic Art, we might show that America, though but a child of yesterday, has already given hopeful proofs of genius, as well of the nobler kinds, which arouse the best feelings of man, which call him into action, which substantiate his freedom." 40 This profound quote illustrates how Jefferson wished to apply his statecraft in the new Republic. Freedom and liberty would serve as the catalyst for blending science, the arts and culture. Jefferson believed that liberty was the most important aspect to this, because it empowered individuals to establish new paradigms without fear of persecution or intolerance. Jefferson utilized three of his


40 Ibid.
favorite enlightenment thinkers to shape his views on freedom and innovation. In 1789 Jefferson wrote the following to John Trumball:

> I have duly received your favor of the 5th inst. with respect to the busts and pictures. I will put off till my return from America all of them except Bacon, Locke and Newton, whose pictures I will trouble you to have copied for me: and as I consider them the greatest men that have ever lived, without any exception, and has having laid the foundation of those superstructures which have raised the Physical and Moral sciences, I would wish to form them into a knot on the same canvas.\(^{41}\)

Jefferson did not reject the independent legitimacy of a given discipline. However, the previous passage clearly illustrated that Jefferson sought to blend them into a "knot on the same canvas."\(^{42}\) Additionally, all three of the thinkers held in high esteem by Jefferson maintained intellectual space for natural laws in their logic, validating Jefferson's interest in enlightenment thinking as a pathway to his own innovations. For example Francis Bacon wrote, "As the births of living creatures, at first, are ill-shapen: so are all innovations, which are the births of time."\(^{43}\)

Thomas Jefferson's interdisciplinary abilities were particularly noteworthy in the field of Agriculture, where he innovated many new concepts essential to forming the new American Republic. Jefferson believed that agriculture would remain the foundation of the American economy, and sought to weave farming into the American culture as a basic activity of the nation.\(^ {44}\) Jefferson wrote, "Agriculture is the first in


\(^{42}\) Ibid.

\(^{43}\) James Boyd, *Lord Bacon's Essay, With a Sketch of His Life and Character*, (Barnes and Company, 1861), 139.

\(^{44}\) Bedini, *Jefferson and Science*, 95.
utility, and ought to be first in respect. The same artificial means which have been used to produce a competition in learning may be equally successful in restoring agriculture to its primary dignity in the eyes of men.” Jefferson's scientific abilities, combined with his artistic skill at innovating new contours of shapes enabled him to design a moldboard plow that was endorsed by agricultural experts in England. His efforts ultimately led to the formation of a system of agricultural societies that eventually led to the formulation of the Department of Agriculture. When it came to agricultural innovation, the arts enabled Jefferson the ability to create, science the ability to validate his designs, and culture the ability to establish a lasting institution.

Perhaps the most unique of Jefferson's cultural innovations was the construction of the "Jefferson Bible" in 1820. Designed to be devoid of all miracles or supernatural events, Jefferson sought to convey the teachings of Jesus of Nazareth through strict moral reasoning. Using this approach, Jefferson deemed it necessary to remove any supernatural phenomena from the New Testament. He accomplished this task by cutting his favorite passages from the Bible and pasting them together according to reason. It was in this endeavor that his experimental interests in the sciences merged with his creativity in the arts. Jefferson's regard for strict rationalism and logical reasoning caused him to reject the existence of miracles and supernatural events as presented in the Bible. He undertook a meticulous effort to remove such occurrences from the Bible using a razor and pasting glue. Jefferson believed that reason alone was most effective method of articulating the philosophy of Jesus. Once again, the arts fueled his creativity, and the sciences gave him the means to make his vision reality.

Of course, the confluence of science, the arts, and culture are readily apparent in Jefferson's most influential innovation--the Declaration of Independence. The enlightened truth claim Jefferson made to that which is "self-evident" finds its origins in Jefferson's love for Euclidean Mathematics. Euclid's first common notion is that "it is self-evident that things that are equal to the same thing are equal to each other." Jefferson weaved Euclid's axiom into the Declaration of Independence through his use of the term "self-evident." Furthermore, Jefferson's use of the term "equality" can also be traced to his regard for Newton's laws of motion, in which mathematical equivalency governed basic physical principles. Jefferson's application of natural laws in formulation of an American ethos had a significant impact on the guiding principles of a new American culture. Yet his intellectual capacities were not solely scientific in nature. Jefferson's desire to incorporate Aristotle's definition of the "good life" also led to his incorporation of Neomachean ethics into the Declaration. His use of the word "happiness" as an unalienable right, stemmed from his desire to blend Aristotle's definition of "practical wisdom" into the declaration. Ultimately, Jefferson's interdisciplinary approach to innovation culminated in the signing of the Declaration of Independence. The document's recognition as an innovative body of work was made


47 Ibid.


49 McKeon, Introduction to Aristotle, 32.

50 Ibid., 428.
possible through Jefferson's ability to amalgamate science, the arts, and culture. Ultimately, the declaration itself became Jefferson's "knot on the same canvas."

**Jefferson's Legacy: A Lesson for Future Innovators**

Thomas Jefferson's innovations are sourced in the unlikely amalgamation of two or more disparate fields of inquiry. His pre-occupation with scientific measurement and logic gave him the means to transcend the traditional theories of his time. He viewed equality from the perspective of a scientist, but applied it towards balancing the core principles of human freedom, and manifest it into the ethos of a new nation. Jefferson also understood that new devices of measurement, when applied to disparate fields, yielded new discoveries. An important example of this was the application of his experimental and artistic abilities in the development of the moldboard plough. Furthermore, many of his intellectual appetites, from gardening to paleontology, made their way into the application of his statecraft, where the simultaneous application of the nexus between science, the arts and culture generated both progress and controversy. Yet, his personal curiosity and active sense of liberty never deterred him from mixing the attributes of a given field with another, no matter how disparate it may have appeared. This aspect of Jefferson's character was an important asset to his decision-making ability and as an innovator. As such, one should not interpret this position as a polemic against the attributes of specialized research or rational thinking [Jefferson surely would not have viewed this, since he held the application of reason in such high regard]. Rather, we are encouraged to view the blending of science, the arts, and culture as a legitimate pathway for avoiding the Executive Dilemma, and innovating.
Jefferson's unique brand of statecraft resided at the nexus of science, the arts, and culture. Throughout his life, no single intellectual endeavor was ever far from his reach. While many individuals possessed an independent affinity for these three disciplines, it was Thomas Jefferson's ability to skillfully employ them simultaneously that made his innovations so successful. First and foremost, Jefferson considered himself a scientist, fueled by a curiosity that allowed him to explore subjects ranging from meteorology to botany. His appreciation for the sciences was rivaled only by his affinity for the arts, primarily in the area of music. This interest also cultivated an appreciation for human culture, in which his desire for precise reasoning allowed him to merge enlightenment thinking with the concept of liberty. This quality gave him the ability to view problems from an interdisciplinary lens, and cultivated an innate ability for statecraft that was unrivaled in his time.

**Riding the Nexus: Steve Jobs**

Perhaps one of the most controversial leaders in modern history, particularly in the arena of innovation, was Steve Jobs. He was an inventor, entrepreneur, and design architect. He is widely recognized as a pioneer in computing, digital entertainment, and communication advances during the 1990s and 2000s. Steve Jobs founded the company Apple Inc., and later became the creative force behind the company named Pixar, which produced the first fully animated film. Among his many accomplishments, Steve Jobs is known for turning a small business located in a garage into the world’s most valuable company.⁵¹ In his biography of Jobs, Walter Isaacson wrote the following of his accomplishments, “Steve Jobs became the greatest business executive of our

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era, the one most certain to be remembered a century from now. History will place him in the Pantheon right next to Edison and Ford. More than anyone else of his time, he made products that were completely innovative, combining the power of poetry and processors."\(^{52}\)

Steve Jobs was recognized as a leading figure in technology and design—as well as one of the most transformative figures in the information age. He attributed his success to his ability to import intuition into technical arenas from his human experiences. As an executive leader, he practiced blending his personal experiences with his professional endeavors.\(^{53}\) Like Jefferson, Jobs often incorporated the arts and religious philosophy into his experiences, and imbedded them into design and entrepreneurial activities associated with microcomputers. He believed that the task of an innovative leader is to build an intuitive conscience, and this can be best accomplished by operating at the juncture of disparate fields of inquiry. During an interview with Walter Isaacson, Jobs said:

> Edwin Land of Polaroid talked about the intersection of humanities and science. I like that intersection. There's something magical about that place. There are a lot of people innovating, and that's not the main distinction of my career. The reason Apple resonates with people is that there's a deep current of humanity in our innovation. I think great artists and great engineers are similar, in that they both have a desire to express themselves. In fact, some of the best people working on the original Mac were poets and musicians on the side. In the seventies computers became a way for people to express their creativity. Great artists like Leonardo da Vinci and Michelangelo were also great at science. Michelangelo knew a lot about how to quarry stone, not just how to be a sculptor.\(^{54}\)

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\(^{52}\) Ibid., 566.

\(^{53}\) Ibid., xxi.

\(^{54}\) Ibid., xix.
Jobs developed an approach to leadership that encouraged innovation. He did this by ensuring that members of his organization were trained to think differently, and most importantly possessed the courage to carry his vision forward. Jobs knew that the best way to maintain a competitive edge in the information age was to connect technology with creativity.

**Science, Salvage, and Aesthetic Design**

Steve Jobs grew up in Northern California during the 1970s, a location known throughout the world as “Silicon Valley.” Jobs was raised by his father, Paul, in a forty-mile stretch of Santa Clara Valley where the heart of computer microprocessor chip development occurred. He shared his father’s interest in cars, but did not take to his mechanical abilities. Nevertheless, Jobs was drawn to the technical world that Silicon Valley had produced. He became infused with the passions of the adults that were around him. “I grew up in awe of that stuff and asking people about it,” he said of his neighborhood. He spoke of his neighbor, Larry Lang, who lived on his street, “He was my model of what an HP engineer ought to be; a big ham radio operator, hard-core electronics guy.” Jobs was always interested in math, science, and electronics. Mr.

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57 Ibid., 10.

58 Ibid.

59 Ibid.
Lang got him into the Hewlett-Packard Explorers Club, a group of fifteen students who met regularly and talked about working projects.\textsuperscript{60} It was there that Jobs cultivated his imagination and interest in electronics. He developed both a knowledge of electrical components as well as the ability to barter for a profit by going to electronic flea markets in San Jose.\textsuperscript{61} He often haggled for used circuit boards that contained valuable chips and components.\textsuperscript{62} He would then sell them for a profit.

Jobs also attended electronic courses in high school. Reflecting on these experiences, he believed that an important transformation was taking place in Silicon Valley, from auto shops where students focused on mechanical skills to electronics classes. He also developed an interest in laser technology and created light shows for high school parties that utilized laser reflections off of mirrors that were attached to stereo speakers.\textsuperscript{63} During this period, Jobs became acquainted with and remained close friends with a student named Stephen Wozniak. Unlike Jobs, Wozniak was a pure engineer, who remained closely aligned with hardware design, and shared little interest in business concepts such as marketing and sales. While Jobs was rigging laser entertainment configurations for parties, Wozniak spent most of his time reading his father’s electronics journals. Together, the both of them were responsible for creating the science of microcomputing and putting into production the first Apple Computer. Jobs remained a close friend of Wozniak for over 40 years—together they

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\textsuperscript{60} Ibid., 16.
\textsuperscript{61} Ibid., 18.
\textsuperscript{62} Ibid.
\textsuperscript{63} Ibid., 20.
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were successful at developing technologies that contributed to the transition of the global economy into the information age.

Ultimately, it was Jobs that commanded the science of entrepreneurial activity at Apple, transforming his company from a small garage operation to one of the most successful companies in the world.\(^{64}\) He established his home as the site for assembly of the first Apple processing computer boards and utilized bedrooms and garage space to ensure the boards could be assembled efficiently. He also remained focused on ensuring that the price of his product would yield long-term profitability, an endeavor that was foreign to engineers he worked with in the early days of Apple. Jobs also shared a unique desire to tend to the attractiveness of the microcomputer, both on the inside and out. He played an important role in establishing an appeal for simplicity and human aesthetics, an activity that Wozniak did not appreciate. He initially applied this to Apple designs through the simplification of power supplies, and removal of fans from his computers.\(^{65}\) His pursuit of elegance in the engineering design process and introduction of what he termed “Zen” into the development of the microcomputer was new to engineers, and yielded significant benefit to design of the Apple computer.

Steve also pursued the science of facility architecture, layout, and design. He wanted to change the human experience of buying an Apple product, and set out to do so. He proposed a new line of retail Apple stores that offered a more unique customer


\(^{65}\) Ibid., 74.
experience. He did this at a time when most computer companies were becoming successful by moving away from using retail stores. At one point, he became so focused on the design and aesthetics of the customer experience that he was visiting prototype Apple retail stores on a daily basis, assessing design mock-ups, and making small changes.66 Jobs also patented a unique glass stairway design for his retail stores.67 The Chief Executive Officer of Oracle and friend of Jobs, Larry Ellison, said, “He was obsessed with every detail of the aesthetic and service experience. It got to the where I said, ‘Steve, I’m not coming to see you if you’re going to make me go to the store again.’”68

After importing the science of the retail experience to the sale of computers, his next design project sought to re-imagine the creative experience of an entire enterprise. He believed that the right type of building design could do great things for the culture of an organization, and put this sentiment to work in the construction of Disney’s Pixar studios.69 Jobs believed that new ideas were generated from collisions of thought, and an environment conducive to that process could be cultivated in open areas where it would occur naturally. Jobs stated, “There’s a temptation in our networked age to think that ideas can be developed by email and iChat. That’s crazy. Creativity comes from

66 Ibid., 372.


68 Ibid.

69 Isaacson, Steve Jobs, 430.
spontaneous meetings, from random discussions. You run into someone, you ask what they are doing, you say ‘wow,’ and soon you’re cooking up all sorts of ideas.”

Jobs proceeded to create open areas for this to occur, and even designed locations of restrooms conducive to chance meetings between employees. Ultimately, Steve Jobs possessed an exceptional understanding of the hard sciences, and was able to transcend the scientific field by incorporating and understanding the human impact on engineering design.

**The Arts, Steve Jobs, and “Thinking Different”**

While Steve Jobs had an impressive understanding of the sciences, he also possessed a natural desire for the humanities and the arts, and incorporated them into his technical activities. As a young student, Jobs blossomed intellectually during his final two years of high school. During this period, he found himself at the intersection of those who were immersed in electronics and those who pursued literature and creative activities. Jobs said, “I started to listen to music a whole lot, and I started to read more outside of just science and technology—Shakespeare, Plato. I loved *King Lear.*” Jobs also developed an affinity for the poetry of Dylan Thomas as well as literary works such as *Moby Dick.* Jobs felt that if he hadn’t pursued his interest in computers, he would have become a poet in Paris.

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70 Ibid., 431.

71 Ibid., 19.

72 Ibid.

73 Ibid.

74 Ibid., 153.
Perhaps one of the greatest artistic influences on Steve Jobs’ personality was music. As high school students, both he and Stephen Wozniak shared a passion for music. Jobs said, “It was an incredible time for music. It was really like living at a time when Beethoven and Mozart were alive. Really, people will look back on it that way. And Woz and I were deeply into it.” Jobs held a particular interest in the music of Bob Dylan, whom Wozniak introduced his works to. Soon, Wozniak and Jobs would spend their leisure time searching for Bob Dylan music tapes in San Jose and collecting them. Jobs said, “Dylan taped all of his concerts, and some of the people around him were not scrupulous, because soon there were tapes all around. Bootlegs of everything, and this guy had them all.” Jobs and Wozniak listened to Bob Dylan tapes for hours on end, and even formed a club at their high school to play pranks and put on Bob Dylan music and light shows. For Jobs, Bob Dylan’s music was the fuel behind his creativity, and an ultimate expression of the ‘counter culture’ of the 1970s he relied upon to innovate. Jobs felt this sentiment was the key to transformation, and sought incorporate it into his work.

75 Ibid, 25.

76 Ibid.

77 Ibid.


In 1984, Jobs’ affinity for the arts led to a campaign that re-invigorated personal computing. Coupled with his interest in pop-culture, his knowledge of the humanities resulted in the creation of the “Think Different” campaign for Apple computers. He designed a photographic depiction of iconic historical figures, and enlisted the famous actor Richard Dreyfuss to narrate a marketing campaign that articulated the following tribute:

Here’s to the crazy ones. The misfits. The rebels. The troublemakers. The round pegs in the square holes. The ones who see things differently. They’re not fond of rules. And they have no respect for the status quo. You can quote them, disagree with them, glorify or vilify them. About the only thing you can’t do is ignore them. Because they change things. They push the human race forward. And while some may see them as the crazy ones, we see genius. Because the people who are crazy enough to think they can change the world, are the ones who do.80

Most of the photographs depicted were of historic figures such as Einstein, Gandhi, Lennon, Dylan, Picasso, Edison, Chaplin, and King. Steve Jobs’ passion for the arts served as an important component to his innovative abilities. He considered this ability an important aspect of his personality that, when combined with his aptitude in computing, would advance new ideas.

**Steve Jobs and Religion**

Along with the arts, Steve Jobs embodied an intriguing connection to religious traditions, and even incorporated them into his professional persona.81 Like the arts,


Jobs felt that this would enhance his creative abilities, and set out on several religious endeavors designed to cultivate this aspect of his personality.

While his parents didn’t feel strongly about religion, they did prefer that Jobs have a basic religious upbringing at an early age. Therefore his parents encouraged him to attend Lutheran churches while growing up. However, in 1968, the thirteen-year-old Steve Jobs showed a Life magazine to his Lutheran pastor depicting starving children in Biafra. Jobs asked, “Does God know about this and what’s going to happen to these children?”

The Pastor answered, “Steve, I know you don’t understand, but yes, God knows about that.” Jobs replied that he didn’t want to worship such a God, and refused to return back to church after that incident. However, Jobs did not entirely abandon religion, but rather spent time learning Eastern religions, particularly that of Zen Buddhism. Much like Thomas Jefferson, he felt religion was at its best when it was reflected as a spiritual experience as opposed to dogma, and devoid of miraculous activities. Jobs said, “The juice goes out of Christianity when it becomes too based on faith rather than on living like Jesus or seeing the world as Jesus saw it. I think different

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82 Isaacson, Steve Jobs, 14.
83 Ibid., 15.
84 Ibid.
85 Ibid.
86 Ibid.
87 Ibid.
88 Ibid.
religions are different doors to the same house. Sometimes I think the house exists, and sometimes I don’t. It’s the great mystery.”

In 1972, Jobs continued his pursuit of spiritual enlightenment while attending Reed College in Portland, Oregon. Entrenched in the hippie movement following the drawdown after the Vietnam War, Reed College cultivated Jobs’ interest in spirituality and personal growth. He was influenced by books such as “Be Here Now,” by Richard Alpert, which was a guide to meditation and psychedelic drugs. Jobs said, “It transformed me and many of my friends.” Paradoxically, Jobs’ interest in drugs such as LSD accompanied his spiritual journey. Nevertheless, like many artists during the 1970s and the broader hippie movement, Jobs attributed his creativity in part to his substance use.

Walter Isaacson’s biography depicted Jobs’ engagement with Eastern religions as more than just a youthful phase. Jobs pursued Zen Buddhism and its principles aggressively, and with every intention of incorporating its edicts into his personality. Jobs was also influenced by the emphasis Buddhism places on the virtues of human

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89 Ibid.

90 Baer, “Here’s How Zen Meditation Changed Steve Jobs’ Life.”


92 Isaacson, Steve Jobs, 34.

93 Ibid., 35.

94 Baer, “Here’s How Zen Meditation Changed Steve Jobs’ Life.”
intuition, and incorporated such concepts into his life. Jobs said, “I began to realize that an intuitive understanding and consciousness were more significant than abstract thinking and intellectual logical analysis.” Upon dropping out of Reed College, Jobs started to take classes that appealed to him. He enrolled in a calligraphy class, and at the same time led a life of ascetics and simplicity. He returned soda bottles for spare change, and regularly attended the local Hare Krishna Temple on the western side of Portland.

Jobs’ first attempt to integrate his spirituality into his professional life occurred when he was an employee at Atari. He was unsuccessful in persuading his management to fund a pilgrimage to India, yet convinced them to grant a stay of absence while he traveled. Once in India, Jobs traveled by train to the city of Nainital in the foothills of the Himalayas, where one of his revered gurus had lived. He rented a room with a mattress on the floor, and then traveled from village to village on foot, and attended gatherings of the followers of a local holy man. Jobs remarked, “It was a chance to meet a spiritual being and hang out with his followers.” Throughout his life, Jobs would seek to apply many of the basic principles of Eastern religions, such as experiential wisdom and cognitive understanding. Years later, Jobs reflects, “The

95 Ibid.
96 Ibid.
97 Isaacson, Steve Jobs, 35.
98 Ibid., 47.
99 Ibid.
100 Ibid., 48.
people in the Indian countryside don’t use their intellect like we do, they use their intuition instead, and their intuition is far more developed than in the rest of the world. Intuition is a very powerful thing, more powerful than intellect, in my opinion. That’s had a big impact on my work.”

This sentiment was reflected in perhaps his greatest representation of the influence of Zen in his life—the creation of the iPad. With the creation of the iPad, Jobs sought to create a closed system that was streamlined and minimalist in its design, and possessed the ability to arouse other sensations such as intellectual consciousness and intuition in much the same way that his trip to India had revealed.

The iPad eventually became the techno-Zen experience that he had longed for. By March of 2011, just nine months after its release, fifteen million iPads had been sold, making it the most successful product launch in history.

The Legacy of Steve Jobs

Steve Jobs was a historical figure whose leadership and decision-making thrived on the nexus between science, the arts, and religion. Ultimately, it was his ability to blend these fields that allowed him to ride the Nexus towards innovative new concepts in computing and design. Like Thomas Jefferson, his ability to transcend these three fields enabled the development of intellectual capacities for him to realize new concepts. Early in his career, Jobs meditated in the morning, audited physics at

\[\text{101 Ibid.}\]

\[\text{102 Ibid., 496.}\]

\[\text{103 Ibid., 498.}\]

\[\text{104 Baer, “How Zen Changed Steve Jobs’ Life.”}\]
Stanford in the afternoon, and worked nights at Atari.105 Job’s said of that period, “There was just something going on here. The best music came from here—the Grateful Dead, Jefferson Airplane, Joan Baez, Janis Joplin—and so did the integrated circuit, and things like the Whole Earth Catalogue.”106 Traditionally, technologists and hippies were not known for their compatibility. Early participants in the counterculture movement saw computers in an Orwellian light, and as surrogates of the power of an autocratic Pentagon and a controlling national bureaucracy (much the same way as Buddhists like Sivaraksa viewed globalization as mentioned in Chapter Three). Steve Jobs helped shift this paradigm. Jobs was a romantic who had a love for what artistry and technology could produce when they were blended in the same arena.107 This was reflected in his success in combining art and digital technology to transform the industry of animated films at Pixar.

His upbringing cultivated an appreciation for different ways of thinking, and was represented in the deliberate blending of two or more disparate fields. One of the most poignant examples of this occurred while he was in college, where he came to the determination that the field of computer science is closer to the liberal arts.108 Jobs said, “The minute I dropped out [of college], I could stop taking the required classes that


106 Ibid.

107 Ibid., 248.

didn’t interest me, and begin dropping in on the ones that looked interesting,” he said.109 Jobs developed an interest in a calligraphy class after noticing an artistic poster on campus advertising the course. Jobs said, “I learned about serif and sans serif typefaces, about varying the amount of space between different letter combinations, about what makes great typography great. It was beautiful, historical, artistically subtle in a way that science can’t capture, and I found it fascinating.”110 Biographer Walter Isaacson writes of Jobs, “It was yet another example of Jobs consciously positioning himself at the intersection of the arts and technology. In all of his products, technology would be married to great design, elegance, human touches, and even romance.”111 Jobs reflected on the calligraphy course, “If I had never dropped in on that single course in college, the Mac would have never had multiple typefaces or proportionally spaced fonts.”112

**Assessing the Nexus Riders**

Thomas Jefferson and Steve Jobs were not the only “Nexus Riders” in history. Several other important leaders were considered for their historic contributions, decision-making abilities, and innovative approaches to problem solving. However, Thomas Jefferson and Steve Jobs were chosen not only because they were well-known problem solvers, but because of the method they used to create new alternatives.

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110 Ibid., 41.

111 Ibid.

112 Ibid.
Throughout their lives, both Jefferson and Jobs demonstrated a prolific ability to blend two or more disparate fields in order to develop unique alternatives to problems. Naturally, researching leaders such as Benjamin Franklin, Bob Dylan, Albert Einstein, M.K. Gandhi, Leonardo Da Vinci, or Marie Curie would have also likely proven to be a worthy endeavor. These leaders were also known for blending two or more subjects in order to create new ideas. Walter Isaacson, Chairman of the Aspen Institute and biographer for Jobs, Franklin, Da Vinci, and Einstein wrote, “The creativity that can occur when a feel for both the humanities and the sciences combine in one strong personality was the topic that most interested me in my biographies of Franklin and Einstein, and I believe that it will be a key to creating innovative economies in the twenty-first century.”

Isaacson hailed Leonardo Da Vinci as an innovator who considered himself an engineer, but with the prolific abilities of an artist. In a 2017 interview with David Rubenstein, Isaacson described how Da Vinci’s concept of flight originated in the arts, through a play he wrote in which he described angels coming to earth from heaven. Da Vinci sought to make the concept a reality, which eventually resulted in several of his flying machine designs.

113 Ibid., xix.


115 Ibid.

116 Ibid.
Albert Einstein was a member of a group of transformational scientists who’s work in quantum physics were bolstered by their knowledge of ancient Hindu texts called the Vedas. Among the group was Erwin Shrodinger, a physicist who established particles as a representation of wave functions. He wrote, “The unity and continuity of Vedanta are reflected in the unity and continuity of wave mechanics. This is entirely consistent with the Vedanta concept of All in One.”\footnote{Erwin Shrodinger, \textit{What is Life} (Cambridge, MA: Cambridge University Press, 1967), 129.} Like Jobs, Shrodinger did not limit the blending of religious values to only Western religions, and also noted Eastern philosophies as an important component to understanding his scientific theories. As discussed in Chapter Three, both Western and Eastern religious traditions share important edicts on the sciences, and contribute to the environmental influences on the decision-making abilities of executives.

Nevertheless, both Jefferson and Jobs offered a unique appeal because of the period in which they lived. Thomas Jefferson was a product of the enlightenment period, a time in which traditional ways of thinking were being challenged on a global scale, and manifested in his own desire to build a republican form of government.\footnote{Onuf, \textit{The Mind of Thomas Jefferson}, 112.} However, this was not always the case. Nicolaus Copernicus and Galileo Galilei suffered greatly during the sixteenth century due to the clash between religion and science, despite their attempts to maintain their allegiance to the Catholic Church.\footnote{Dava Sobel, \textit{Galileo’s Daughter} (New York, NY: Penguin Books, 2000), 7.} Likewise, Steve Jobs grew up during the 1960s, a time affected by postmodern skepticism of government and a burgeoning youth movement that embraced a
rebellious ‘counter-culture.’ Of particular note, and irony, is that Jefferson’s brand of innovation was born of the enlightenment, while Jobs’ represented a deconstruction of its grand narratives, and the ensuing counter-culture that resulted in the information age so eloquently stated by Lyotard’s treatise. Subsequently, the times in which they lived provided an important backdrop for how these leaders acquired the skill to innovate and apply their craft to important problems. As such, the historical accounts presented on both Jefferson and Jobs offer important observations on addressing the Executive Dilemma.

**Nexus Riders: Three Observations**

Both Thomas Jefferson and Steve Jobs were able to innovate by cultivating new ideas on the nexus between science, the arts, and religion. They regularly mixed and matched two or more fields that leaders have traditionally kept at an appreciable distance. A historical review of their personal and professional lives revealed three key observations. First of all, both leaders held a unique capacity for understanding two or more disparate fields of inquiry with enough depth that useful connections could be drawn between the fields. They also possessed an innate interest in these fields at an early age. This allowed them to cultivate a curiosity for applying knowledge in an interdisciplinary fashion. Did human typology play a role in the development of their unique skill sets? Evidence suggests that since both of these leaders possessed this ability at such a young age, it is reasonable to conclude that human typology did play a role in cultivating their appreciation for multiple fields. Since neither of these individuals accomplished the MBTI survey [notably, Jefferson was not alive during the formulation of

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of the MBTI, considerable debate exists on which personality types they would have been more closely aligned with. Speculative exercises on what their personality types might have been are beyond the scope of this research. Regardless of what their MBTI would have been, their innate curiosity for disparate fields led them to develop a simultaneous understanding of science, the arts, and religion that enabled them to innovate.

Second, both Jefferson and Jobs blended two or more fields that were traditionally considered too disparate to yield any appreciable interest or intellectual pursuit. However, a determination on whether Jefferson chose to deliberately approach problems in this manner, or whether he simply possessed a natural desire to do so was inconclusive. There is little evidence to suggest that he chose to engage in the blending of disparate fields for the purpose of enhancing creativity. Jefferson appeared to simply do this because curiosity was inherent to his personality. However, the review of Jobs produced a different observation. Evidence from Walter Isaacson’s biography does suggest that that Steve Jobs was aware of this as an approach and deliberately pursued blending activities as a method of innovating new ideas. During an interview with Isaacson, Jobs said, “Then I read something that one of my heroes, Edwin Land of Polaroid, said about the importance of people who could stand at the intersection of humanities and sciences, and I decided that’s what I wanted to do.”

Surrounded by, and often feuding with one-dimensional thinkers, both Jefferson and Jobs expressed frustration with colleagues who chose more traditional methods of leadership. They both opted for intellectual pursuits that expanded their ability to generate new and

\[\text{121 Ibid., xix.}\]
improved alternatives. Jobs’ desire to streamline the Apple computer by incorporating non-moving parts and Jefferson’s pursuit of more effective plow designs are just two examples of how this approach translated into simple innovations for each leader.

Third, an examination of both Jefferson and Jobs revealed potential constructs for mitigating the effects of the Executive Dilemma. As defined in Chapter One, the Executive Dilemma is characterized by the failure to recognize that alternative solutions may reside within another field of inquiry. The associated behaviors resulting from the Executive Dilemma might include parochialism, deference to self-interest, or confirmation bias resulting from one-dimensional thinking. Evidence suggests that both Jefferson and Jobs were able to successfully overcome these elements with their ability to operate on the Nexus. Jefferson and Jobs were able to advance concepts, ascend through levels of aspirational adaptation, and legitimately proceed to satisficing by blending two or more disparate fields of inquiry using the Nexus. There is also evidence that science, the arts, and religion (more closely affiliated with culture in Jefferson’s case) were fields of choice in their pursuit of satisficing. Jobs said:

The reason Apple resonates with people is that there’s a deep current of humanity in our innovation. I think great artists and great engineers are similar, in that they both have a desire to express themselves. In fact, some of the best people working on the original Mac were poets and musicians on the side. In the seventies computers became a way for people to express their creativity. Great artists like Leonardo da Vinci and Michelangelo were also great at science.\(^{122}\)

In the course of the historical examination, the role of human curiosity and its ability to develop personal intuition became an important area of focus. Jefferson

\(^{122}\text{Ibid., 568.}\)
wanted to bring both literacy and science to the masses, and it was his personal intuition that led him to conclude that this was foundational to the success of a new republic. 123 He believed that local educational opportunity for common citizens was an expression of human courage and freedom that would strengthen the nation over time. Likewise, Jobs’ personal intuition served as his primary guide. It manifested through his pursuit of personal electronic devices that were not only affordable to the masses, but intuitive for all ages. Ultimately, Thomas Jefferson’s crown achievement and testament to his intuition was the Declaration of Independence. For Jobs, his intuition led him to a declaration of his own—his “Think Differently” campaign embodied the energy of all of the leaders that preceded him, former Nexus Riders with the cognitive capacity and intuition to blend science, the arts, and religion. 124 Like Jefferson’s crown achievement, Jobs believed that his work would change the face of democracy. Screenwriter of the film, Steve Jobs, Aaron Sorkin, said of Jobs, “Steve Jobs had a vision, that was the democratization of the world, as a result of putting a computer in the hands of everyone.” 125


124 Isaacson, Steve Jobs, 48.

CHAPTER FIVE

MITIGATING THE EXECUTIVE DILEMMA WITH THE NEXUS

After a certain high level of technical skill is achieved, science and art tend to coalesce in aesthetics, plasticity, and form. The greatest scientists are artists as well.¹

- Albert Einstein

Innovation is about constructing something new. In many cases, executive leaders possess the resources to shape the enterprises they lead and make decisions that change future outcomes. As senior leaders, they are also positioned in their organizations to cultivate an environment that promotes the development of new ideas. However, Chapter One introduced a problem experienced by executive leaders—that is, the existence of viable solutions that might reside outside the chosen vocation of an executive leader. Termed the Executive Dilemma, it describes a phenomenon in which a viable solution, or new idea, exists in a disparate field of inquiry and thus goes unrecognized. Three case studies were introduced in Chapter One that illustrate the potential for the Executive Dilemma to impede innovation, or even cause harm to an enterprise. In Chapter Two, the theories of Simon and Jung were introduced in order to analyze decision-making for the purpose of characterizing how executive leaders might be limited in their capacity to incorporate views outside their vocation. Their theories codified processes that enabled a better understanding of the Executive Dilemma, established a working lexicon, and demonstrated how decisions, however rational, can

be bounded by environmental complexities and human typologies. These theories were matched to the three case studies, and a deeper investigation was accomplished in Chapter Three in order to better understand potential root causes of the Executive Dilemmas within their respective environments. In Chapter Four, Thomas Jefferson and Steve Jobs were examined as historical examples of leaders with the ability to blend disparate fields of inquiry and potentially overcome the Executive Dilemma. By combining science, the arts, and religious cultural value-sets, they were able to generate new ideas and accelerate progress during the periods in which they lived. The examination brought forth key observations applicable towards the construction of a useful framework to address the Executive Dilemma.

Chapter Five represents the culmination of the investigation, and transitions from a determination of root causes to the construction of a framework designed to mitigate the Executive Dilemma. Can the approaches used by Jefferson and Jobs be codified in any way? Most importantly, would NASA have benefitted from leaders that actively pursued the simultaneous blending of two or more disparate fields of inquiry? Evidence from Case Study One and the ISS KERMIt program suggests that due to the technical depth involved with the development of the system, an overreliance on engineering processes existed, with a focus on program optimization (symptoms characterized by Simon as limiting factors in effective decision-making). Furthermore, the existence of the St. Petersburg effect suggested an over-emphasis on rational theory at NASA that resulted in premature satisficing, at the expense of viable alternatives that were not considered by management and resulted in confirmation bias at critical decision points.
Steve Jobs regularly confronted this tendency with his engineering counterparts at Apple. Yet he maintained a countervailing theory that pure engineers lacked the ability to achieve the artistic elegance required for successful design projects. Jobs needed two things to change the paradigm at Apple towards more elegant designs. First of all, he needed an intellectual shift in thinking to recognize that the Executive Dilemma was present. This gave him the ability to integrate the arts and religious philosophy into his design approaches. Second, he needed the courage to articulate that both an engineering and artistic design project could be advanced simultaneously.

What could be done at NASA to encourage these two activities? Naturally, the typologies of leaders at NASA trended toward introversion, and thus posed natural barriers to this type of conceptual blending. Despite having a significant amount of technical expertise in a given field, probabilistic analytics are unable to generate kinds of abstract solutions that human intuition often produces. Developing the type of decision-making displayed by Jobs required a new type of intuitive thinking at NASA; unbounded by probabilistic, incremental approaches, and cultivated by the arts. Educating leaders with the capacity to understand the complexity of engineering, and at the same time strive to expand creative boundaries, is the objective of the proposed framework. The problems of drone technology in the Air Force, as well as in global economics demand similar approaches. However, the investigation conducted in Chapters One through Four yielded the conclusion that a balanced and blended approach could provide favorable results.

In order to overcome the Executive Dilemma, leaders must cultivate an appreciation for fields other than their own. With this intellectual growth, the leader can
build the ability to ascend through the levels of aspirational adaptation in a more authentic manner and avert the tendency to prematurely proceed to satisficing. Alternative solutions can be considered from a broader point-of-view, an activity that leads to newer and bolder ideas. As stated in Chapter Two, aspirational adaptation models the cognitive processes a leader undertakes when searching for alternatives, and seeks to characterize the motivation of a leader to pursue newer solutions. Levels of aspiration describe a leader's desire for feasible alternatives to a given solution set. Subsequently, an upward adjustment to a new level of aspiration signifies a desire (or motivation) for the individual to seek new ideas. The propensity to seek alternatives is increased when satisficing is achieved in an authentic manner.

Case Study Three introduced the subject of religion to the analysis, generating the need to consider the importance of religious values in decision-making frameworks. The case study started by first presenting the subject of global economics as an established hard science. However, the study revealed that religious values play an influential role in the economic decisions that executive leaders make. Both Jobs and Jefferson recognized this fact, and often articulated the integral role religion played in their decision-making. Jobs went so far as to attribute successful decision-making, including the development of greater human intuition, to the introduction of Zen Buddhism in his life.

Each case study, when characterized using the theories of Simon and Jung, offered a foundation for understanding how the Executive Dilemma played a role in inhibiting effective decision-making. A deeper examination into the human interactions

2 Gigerenzer and Selten, *Bounded Rationality*, 17.
representative of the case studies yielded potential root causes. The culmination of the research conducted in Chapters One through Four led to the author’s conclusion:

Characterizing the nexus between science, the arts, and religion—in essence, improving access and agility within this three-dimensional intellectual space, can yield new methods for improving the decision-making and innovative abilities of executive leaders.

What new methods can this intellectual space yield for executive leaders? First of all, leaders can mitigate the effects of the Executive Dilemma by building awareness of viable solutions that may exist beyond their field of view. Improving decision-making requires that the leader acknowledge the existence of this phenomenon. This first step may seem intuitive, however Jung’s theories tell us that certain typologies are prone to resisting external solution-sets, particularly for typologies that identify as “Guardians.”

Therefore, recognizing this reality provides an important step in mitigating the effects of the Executive Dilemma. Second, blending two or more disparate fields of inquiry might increase the probability of establishing unique alternatives. For an artist, seeking alternatives in the scientific realm might yield an ordered approach that generates new options. Likewise, scientists or engineers may establish unique alternatives by utilizing the arts to generate new methodologies. Ever present is the influence of human values, which are predominantly rooted in the religious make-up of individuals. These values influence over 85 percent of the world’s population, however their elements are often neglected within the hard sciences.

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3 Ibid., 194.

The case studies provided insight on choosing three fields of inquiry for the construction of an effective Nexus framework. The intent is to create a methodology that facilitates the blending of two or more disparate fields, with the goal of increasing the ability of leaders to innovate or improve decision-making capabilities. Analysis of the three case studies using the theories of Simon and Jung suggests that science, the arts, and religion may create that environment. In recent history, both the sciences and the arts have evolved into two fields diametrically opposed and different enough to stretch conventional thinking. However, this was not always the case. Throughout the European Middle-Ages and Renaissance, science and the arts shared common arenas, to include the workshops of pioneers such as Da Vinci and Michelangelo. They retained the connection in an effort to define God’s creation, and the role of humanity within it. Signs of Michelangelo’s scientific research often emerged in his artwork. In 2010 Johns Hopkins researchers published a study in the *Journal of Neurosurgery* claiming signs of anatomical diagrams of the brain located in Michelangelo’s artwork in the Vatican’s Sistine Chapel, as shown in Figure 8.

Considered a ‘natural philosophy’, both science and the arts remained in lockstep within Michelangelo’s and Da Vinci’s workshops, and expressed an integrated focus on understanding the purpose and meaning of life. However, the period of enlightenment

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6 Ibid., 65.

that culminated in the Nineteenth Century debate on Darwin’s Theory of Evolution caused a rift between science and religion. As a result of the split that occurred during the scientific revolution, religion became less and less a part of research into the origins of the material universe. Case Study Three re-introduced religion as a third component to the Nexus. By incorporating religion into this intellectual space, human values are deliberately integrated with scientific principles in order to account for the limits posed by bounded rationality. While other disciplines were considered for inclusion in the Nexus, the experiences of Jefferson and Jobs guided the construction of the Nexus towards the arts and religion as two attractive options within the humanities that might generate significant impact. The framework is presented in Figure 9.

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9 Ibid.
The current state, depicted in Figure 9A, depicts the traditional existence of the three modalities (science, the arts, & religion). While all three are connected to human consciousness, they remain separate and distinct fields of inquiry. However, the objective of the Nexus is to invite these three modalities into the boundaries of human cognition, with the purpose of blending them within the decision-space of executive leaders (Figure 9B). It is important to note that the current state may create an environment conducive to the Executive Dilemma, because of the fact that human typology can prevent leaders from entering a disparate intellectual space.\textsuperscript{10} This can be more prevalent in the government space, where a high percentage of typologies are represented with “Guardians,” as shown in the NASA and Air Force analysis. Once these two elements are drawn together and addressed within the framework of the Nexus, any conflicts between the two are considered cognitively “within reach” and can

\textsuperscript{10} Gigerenzer and Selten, \textit{Bounded Rationality}, 243.
be effectively accounted for without being overcome by the constraints posed by human typology. Of course, the key to this approach is active engagement on the part of the individual in order to build behavioral patterns. An introduction to the human physiological impact of this strategy is presented later in this chapter.

**Using the Nexus**

The objective of the Nexus is to create a three dimensional intellectual space that senior leaders can draw upon to mitigate the effects of the Executive Dilemma. The goal is to build awareness and spark curiosity in order to generate alternative solutions that reside in disparate fields of inquiry. It is important to note that the approach is not designed for an individual to build the equivalent level of depth in a new vocation, rather it focuses on building connectivity to other vocations. For example, an economist would not be expected to achieve the similar level of depth in a given religion that a theologian would (entry of the individuals own religious tradition into his vocational awareness may suffice). Likewise, a physicist would not be expected to achieve the knowledge and practice of the arts that a professional composer might possess. The goal is for the individual to enhance their own vocation with the integration of another, more disparate field, to the extent it shapes the cognitive state and subsequent behaviors impacted by it.

How can the Nexus be used to shape future outcomes and influence decision-makers? Like Jefferson and Jobs, executive leaders can build their awareness of the Nexus by ensuring their educational development includes its elements. As such, leaders are able to fight the effects of the Executive Dilemma and generate innovative

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alternatives. In post-industrial societies, complex social learning mechanisms such as imitation and teaching contribute to the transmittal of new concepts. Information acquired in formal settings, as well as the strong conformist tendencies in human culture, ensures traditions evolve in a natural progression. The conclusion made by Boyd and Richardson in 1985 is that this process has a significant influence on human decision-making.

The first area that the Nexus can impact is education. Learning institutions may establish foundational approaches aimed at building the intellectual capacity to blend disparate fields of inquiry. In 1959, a physicist named C.P. Snow, wrote an influential essay titled, “The Two Cultures.” In it he warned that the polarization of educational knowledge into disparate camps would produce a state of “mutual incomprehension…hostility and dislike” among vocations. He made this case not only on behalf of scientists, but of those representing the arts. This parallels the experiences and corrosive organizational behaviors that resulted in the deep divides between communities at NASA and the Air Force. Snow attributed the dysfunction to the educational split that occurred between science and the arts, and dividing them into seemingly incompatible camps. The Nexus seeks to undo this process. By applying the Nexus framework to educational endeavors, a foundation for resolving the Executive Dilemma and mitigating these cultural divides can be established.

12 Gigerenzer and Selten, *Bounded Rationality*, 243.

13 Ibid.


15 Ibid.
Yale University has made an attempt to blend disparate fields into their educational programs. In 2011, Yale University partnered with the National University of Singapore to establish an institution capable of blending its instruction using the elements of the Nexus. The objective of Yale-NUS was to account for the challenge of a globalized world with a broad-based curriculum that incorporated both the sciences and the liberal arts in its curriculum. Students participated in skills-based instruction, as well as liberal arts studies. Yale-NUS abolished traditional academic departments, which were viewed as information silos that inhibited cross-pollination of ideas and interdisciplinary focus. Instead of scientific facts, the scientific method was emphasized as an approach for problem-solving. Simultaneously, students studied the religious philosophy and values of the Buddha, as well as the artwork of Picasso. The Yale-NUS model offers an educational method of applying the Nexus to broaden the perspectives of a leader, and encourage the development of remedies to the Executive Dilemma.

While education provides a platform for deploying the Nexus for future leaders, how can it be deployed to impact current leaders? Developing training curricula designed to build awareness of the Nexus is an important consideration. However, given the stages of career development Executive Leaders are positioned in, an approach designed to enact an intellectual shift requires more than an instructional

16 Ibid., 68.
17 Ibid.
18 Ibid.
19 Ibid., 69.
The goal of the Nexus is to create a broader intellectual space for the purpose of shaping the human cognitive perspective of a senior leader. Ultimately, immersive approaches offer a more effective platform for current leaders, who often come to rely on well-established decision-making processes that they believe have worked for them throughout their careers. Over time, they come to rely upon their unconscious modes of thinking, and make decisions in a much quicker fashion. It is in this mode of cognition that the Nexus can wield significant influence, since the model has the capability to account for human values, and address the type of subconscious Executive Dilemma that Secretary Paulson faced in Case Study Three.

Changing the decision-making approach of a seasoned executive leader is a daunting task, one that requires a methodical approach to training. The endeavor becomes even more challenging when the objective is to shift a leader’s subconscious decision-making abilities. Simply alerting a leader to a new cognitive framework may not be enough, since some human typologies do not readily engage in the act of perception and change (as witnessed by the existence of a disproportional amount of “Rationals” and “Guardians” among government leaders). In order for executive leaders to incorporate a new model like the Nexus, they must first be attracted to the prospect of improving their own decision-making. Case Studies One through Three provide such an environment, where concrete examples of failures can be studied and presented. The leaders can be encouraged to assess and determine areas in their own organization where the Executive Dilemma is impeding progress. Following this step,

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20 Gladwell, *Blink*, 12.
they may be tasked with creating intellectual space for the arts and religious values in their decision-making. Practical exercises are accomplished that incorporate greater alertness of the impact of faith-based values, in order to account for its impacts on their decision-making. Ultimately, the executive leader must acquire an intrinsic desire to incorporate awareness of all three elements of the Nexus, simultaneously. The best way for an established leader to build this desire is through practical application. Many leaders like Steve Jobs have incorporated this into their leadership development. In his book *In Defense of a Liberal Education*, noted political scientist and journalist Fareed Zakaria shared an example of how leaders applied this approach during the dot-com boom of the early 1990s. He believed that technology and the humanities played a collective role in the development of today’s global business environment. Zakaria wrote, “Twenty years ago, tech companies might have survived on simply as industrial product manufacturers. Now they have to be at the cutting edge of design, marketing, and social-networking.”21 He believed that the global economy has shifted from a knowledge economy to a creativity economy, and agile thinking has become an important commodity in it.22 However, not all leaders share this sentiment. Some executives in the tech industry have stated that pursuing vocations other than STEM in the information age is inadvisable. Sun Microsystems cofounder Vinod Khosla has said, “Little of the material taught in Liberal Arts programs today is relevant to the

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22 Ibid., 84.
future.” Despite some naysayers, the end result of blending educational disciplines should facilitate use of the Nexus and likely result in more innovative thinking.

Whether the individual is an undergraduate student or a seasoned executive, transitioning to the effective use of the Nexus emanates from a combination of education, training, and practical application. What this immersive environment seeks to achieve is a more simultaneous and spontaneous use of Nexus elements to broaden the leader’s ability to transcend a given vocation, and peer into the solutions that emerge in other fields. It encourages the type of rapid cognition in which the executive leader ascends through the levels of aspirational adaptation by actively engaging the sum total of their experiences—to include their scientific knowledge, artistic creativity, and religious value-sets. This approach is designed to fight the tendency to compartmentalize these fields, a habit that C.P. Snow and Jean-Francois Lyotard warned was causing a plateau in the cognitive reality of executives in the information age. Unlike the case of Henry Paulson, leaders trained in the Nexus can account for the unconscious existence of subconscious influences, bring them into deliberate awareness, and harness them for better decision-making. That is what Steve Jobs sought to attain in his travels to India, and what he attributed to the development of his leadership intuition and instinct.

Intuition is a commodity that both C.P. Snow and Steve Jobs argued is in short supply in the West, and thus is resulting in an impoverished state of creativity across its institutions. He attributed this to the split between science and the arts into two cultures during the Twentieth Century. From Jobs’ perspective, the opposite has occurred in the

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23 Olejarz, “Liberal Arts in the Data Age.”
East, and these two fields have remained curiously intact. Ironically, Jobs viewed this environment as important to his leadership development and a missing puzzle piece to the future of innovation in his global enterprise. He wrote, "Western rational thought is not an innate human characteristic; it is learned and is the great achievement of Western civilization. In the villages of India, they never learned it. They learned something else, which is in some ways just as valuable but in other ways not. That’s the power of intuition and experiential wisdom."

The differences are validated through the review of religion and economics, where the Arthashastrian view of abundance contrasts the Protestant ethic of scarcity driving a labor-based revival of industrial work ethic. Through this, the reader may be attracted to an ‘either-or’ approach of understanding which is better. However, the spirit of the Nexus is to understand both, recognize their virtues, and apply them in the right environment, and at the right moment.

Naturally, building this ‘muscle memory’ is a process that takes time and personal investment. However, in the construction of the Nexus, two additional human qualities emerge that play a vital role in its functionality as a cognitive framework. The first quality is humility. In the context of executive leadership, humility plays a role in distinguishing between the benefits to the individual verses the benefits to the whole, or the group. An individual is said to possess humility when their pursuits seek a broader good, rather than the pursuit of individual gain. In this respect, the Nexus upends Adam

24 Isaacson, Steve Jobs, 48.

Smith’s concept of self-interest, and the fact that it provides strong fundamentals in the long-run. The Nexus is more akin to awareness of the pitfall of the St. Petersburg principle. Determining where the right balance exists between individual and institutional benefit is the heart of the conflict that affects many large organizations and in the case of the Air Force, led to the Executive Dilemma. In many complex and collaborative environments, the pursuit of individual gain can derail the authenticity of the aspirational adaptation process, and prematurely convince the leader to proceed to satisficing. In his book, the Anatomy of Bias, Jan Lauwereyns, drew upon the example from gaming theory, most notably the prisoner’s dilemma, to explain the challenge posed to leaders. He wrote, “Paradigms in game theory also implement a fundamental friction between the benefits of self versus those of the group, when the total payoff for all players is maximal in case everyone cooperates, but an individual stands to receive the biggest personal paycheck if he or she is the only one to defect, cheat, or chose the selfish option.”

Of course, bounded rationality theory reminds us that this environment is messier than simply balancing individual and group interests, as witnessed from numerous examples of the St. Petersburg principal emerging in the three case studies. Lauwereyns offers valuable insight in this arena by contributing the following passage, and referring to the ethical failure of Scientist Woo Suk Hwang, who was discovered to have falsified research on human cloning:

> Ideally, in Utopia, we would all be rational players, able to think dispassionately, neutrally, and objectively about which is the best solution for the benefit of our species, any species, the entire planet, and beyond. Yet even in the micro world of science, where rational thinking is exercised to the best of our

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26 Ibid.
abilities, we encounter highly intelligent players such as Woo Suk Hwang who take shortcuts for personal gain. On a much smaller scale, I bet many of us would have to admit moments in our scientific careers when we were not quite sure that what we were doing was the ‘right thing’ but charged ahead anyway, conveniently forgetting about messy data from other experiments while writing up a research paper, or bypassing difficult ethical questions in the design of new experiments, satisfied with the idea that other people do it too.\textsuperscript{27}

Like the scientific community, many institutions develop systems of peer review that ensure these corrosive human tendencies are checked. However, the institutions in the three case studies experienced breakdowns leading to the creation of biases that promulgated the Executive Dilemma and adversely impacted their respective institutions.\textsuperscript{28} It is important to note that while the subject of Jefferson’s humility might be cause for considerable debate, this is not the case for Steve Jobs. Jobs was known for his self-centered persona, and employed considerably cruel approaches when dealing with people, a fact that is a natural paradox when placed in context with the broader nature of his professional accomplishments.\textsuperscript{29} Nevertheless, evidence suggests that humility is an important component of the Nexus that prevents institutional biases based on individual interest from taking root, and impeding progress—\textit{that is, ensuring the pursuit of what is just precedes what achieves power}.\textsuperscript{30}

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{27} Ibid.
\item \textsuperscript{28} Lyotard, “Report on Knowledge,” 46.
\item \textsuperscript{29} Isaacson, \textit{Steve Jobs}, 302.
\item \textsuperscript{30} Ibid.
\end{itemize}
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The second human quality is courage. In keeping with Jefferson’s sentiment, courage, “arouses the best feelings of man, which call him into action, and substantiates his freedom.” Case Study Two showed how professional risks involved with presenting new ideas, or even identifying problems, can be daunting for a leader working in the military industrial complex. In the NASA Shuttle Challenger example, pressures to meet scheduling constraints accelerated leaders through the decision-making process prematurely, leading them to falsely conclude that the vehicle would be safe from catastrophic harm if a launch occurred. In both case studies, professional risks played a role in creating bias, resulting in premature satisficing. In the scientific community, career standing is often a function of social factors, such as enrollment in professional societies and submission of journals. New and unique methods for solving problems, to include processes that undermine the legitimacy of one’s own community, can be met with hostility. Scientists who regularly engage in this activity are likely to have their professional standing impaired to some degree. Such a condition is likely to promote confirmation biases and perpetuate the Executive Dilemma.

Therefore, personal courage is an important quality, and essential ingredient in ensuring successful functionality of the Nexus. Noted neuroscientist Beau Lotto captures the interrelated nature of courage and humility and its importance to innovation by writing,


33 Ibid., 20.

34 Lotto, Deviate, 142.
“Doubt with courage and your brain will reward you for it through the new perceptions this process opens up. To question one’s assumptions, especially those that define ourselves, requires knowing that you don’t see the reality—only your minds version of reality—and admitting this, not to mention accepting the possibility that someone else might know better.”35

As previously stated, the best way to instill professional courage is through education, training, and practical application. The Federal Executive Institute is a government institution located in Charlottesville, Virginia.36 It serves as a national education and training center for senior federal government managers preparing for careers as Senior Executives. Intended as a center of excellence for leadership, coursework includes the blending of disparate fields in order to build the confidence of its students. Notably, coursework blends the arts and sciences into the curriculum. Students have the opportunity to gain exposure to orchestra, theater, or comedy improvisation. By integrating the arts into an otherwise technical training program, leaders can develop the capacity to solve problems in unique ways. Feedback from 12 different cohorts at the Federal Executive Institute revealed strong favorability ratings for this brand of training.37 Many of technically oriented students reported that the

35 Ibid., 11.


37 Marcia Ledlow from the Office of Personnel Management, and instructor at the Federal Executive Institute, provided the student feedback on March 10, 2017.
exposure to the arts allowed them to draw connections to better leadership and
decision-making skills, and attributed the insight to the creativity brought out by the arts
and humanities.\textsuperscript{38} Several of the students remarked that they were confident that the
course would improve their creativity and problem-solving skills.

It is important to note that humility and courage are not additional fields of inquiry
in the Nexus, as science, the arts, and religion are. Rather, they are designed to be
catalysts that encourage the blending of two or more of the aforementioned fields. They
are established to counteract the societal trends called to attention by Lyotard and
Snow that have divided these areas into distinct fields of inquiry during the post-modern
era of knowledge and the information age.\textsuperscript{39} More importantly, they are designated to
ensure human social bonds play an active role in the determination of whether rational
processes and probabilistic optimization models are appropriately generating unique
alternatives, without needlessly succumbing to the forces bureaucratization, or other
detrimental environmental influences.\textsuperscript{40} In the case of the Air Force and drone aircraft,
the institution influenced data-driven analytics not to validate a knowledge-based truth
claim, but rather to concentrate organizational power and retain control.\textsuperscript{41} Furthermore,
as stated in Chapter One, a drone pilot testified that the institution ‘cooked the books’ in

\textsuperscript{38} Ibid.

\textsuperscript{39} Lyotard, “Report on Knowledge,” 15.

\textsuperscript{40} Ibid.

\textsuperscript{41} Ibid., 46.
favor of a manned alternative.\textsuperscript{42} In this respect, courage and humility play a vital role in thwarting the tendency of large organizations to seek broader institutional control. The qualities of humility and courage are designed to seek what is “just” instead of what is “strong,” in order to preserve the social bond that enables the Nexus to function.\textsuperscript{43} Furthermore, these qualities are also designed to counteract the forces of the information age, in which institutions perpetuate the development of market-driven executive skills instead of ideals—given the tendencies of managers, engineers, administrators, lawyers, computer scientists, or any other profession identified to operate and optimize in a system of systems.\textsuperscript{44} Humility and courage serve an important role in the Nexus, because they act as coagulants that provide an internal cohesion designed to fulfill society’s needs beyond localized systems.\textsuperscript{45} Added to this, they are qualities that serve as effective tools to fight confirmation bias.\textsuperscript{46} Ultimately, these two qualities are designed to ensure the ideals of individual freedom and the emancipation of humanity remain intact while new concepts are being developed—the same elements Nexus Riders like Jefferson and Jobs deployed in their endeavors.\textsuperscript{47}

\textsuperscript{42} E-mail interview conducted with drone pilots serving both within the Air Force May of 2017 (all interviews were kept confidential; the names of interviewees are withheld by mutual agreement). Interviewees consisted of drone pilots serving within the Air Force, as well as pilots serving in industry.

\textsuperscript{43} Ibid.

\textsuperscript{44} Ibid.

\textsuperscript{45} Ibid.

\textsuperscript{46} Lotto, \textit{Deviate}, 142.

\textsuperscript{47} Lyotard, “Report on Knowledge,” 51.
Neuroscience and the Nexus

What does the field of neuroscience have to say about the Nexus, and its ability to mitigate the Executive Dilemma? Does the framework have physiological effects? In the past two decades, researchers have made marked advances in psychology and neuroscience.48 Brain wave analysis technologies have revealed previously unmapped neural activity in the living human brain and linked it to processes in human cognition.49 Modern research in neuroscience suggests that deliberately integrating knowledge from disparate fields has the potential to create favorable physiological responses in the human brain.50 Neuroscientist Beau Lotto believed that the internal assumptions that produce personal bias [the kind that that triggers premature satisficing] are primarily physiological in nature.51 Lotto writes, “Assumptions are deeply physiological, electrical, in fact they are not just abstract ideas or concepts. They are physical things in your brain, with their own sort of physical laws. This is what one would call the neuroscience of bias.”52 Lotto delves deeper into the mechanics of this process by writing:

The reality we see projected on the “screen” of perception begins with the flow of information our five senses take in. This stimulus (or stimuli if there are more than one) creates a series of impulses at your receptors


49 Ibid., 2.


51 Lotto, Deviate, 156.

52 Ibid.
that move into your brain (the input), becoming distributed across the different parts of your cortex and other areas of your brain until they eventually settle on activating a response (motor and/or perceptual, though the separation between motor and perceptual isn’t as distinct as was once thought). That is basically the whole of neuroscience in one sentence, with an emphasis on “basically.” Perception is nothing more than a complex reflex arc...what you experience at any moment is just a stable pattern of electrical activity distributed throughout your brain—an unromantic view of perception, but it is nevertheless roughly accurate.  

Since the Nexus is designed to change the number of potential outcomes an executive envisions, what does neuroscience say about its ability to accomplish this? Lotto writes, “Since the potential connections [in the brain] form the possible reflex arcs that shape behavior, what’s really at stake is how you will respond, what you perceive and whether the perception you produce will be good or bad, innovative or complacent, risk-taking or conservative. So what we are talking about is possible responses versus actual ones, and the possible ones are almost inconceivably numerous.” Creating greater access to possible responses is what the Nexus is designed to accomplish. Through deliberate engagement, the Nexus is constructed to change boundaries, create new pathways, and facilitate the removal of biases driven by limitations in synaptic pathways through which behaviors and actions come into being.  

The Nexus leverages the process of blending “left brain” and “right brain” cognitive activities by encouraging leaders to incorporate science, the arts, and religious streams of information into their cognitive awareness. Left brain activities are

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53 Ibid.

54 Ibid., 159.

55 Ibid.

56 Siegel and McCall, “Mindsight at Work,” 8.
characterized by analytical and logical behaviors, while right brain activities are characterized by more creative behaviors. As such, humans tend to migrate towards professions that are aligned with their dominant hemisphere, often formed by their individual typologies. Naturally, Kiersey’s MBTI “Rationals” referenced in Chapter Two would prefer to engage in left brain activities, while “Artisans” prefer to sort themselves with like-minded peers engaging in creative or artistic activities. In his article titled, “The Neuroscience of Leadership,” Dr. Jeffrey Schwartz, research psychiatrist at the University of California, School of Medicine, wrote, “People who practice a specialty every day literally think differently, through different sets of connections, than do people who don’t practice the specialty. In business, professionals in different functions—finance operations, legal, research and development, marketing, design, and human resources—have physiological differences that prevent them from seeing the world in the same way.”

The Nexus upends this natural sorting process by integrating disparate fields of inquiry within a single stream of consciousness. While this process can be considered disruptive, evidence suggests the activity causes physiological effects within the brain. By deliberately focusing on integrating left and right brain activities, individuals can generate new neural pathways that build more inclusive intellectual capacities.


58 Ibid., 2.

In 2009, two psychiatrists, Dr. Daniel Siegel and Debra McCall, published an article for the Neuroleadership Institute on Interpersonal Neurobiology. Their article titled “Mindsight at Work: an Interpersonal Neurobiology Lens on Leadership,” described how interdisciplinary inclusiveness can improve the organizational effectiveness of leaders. Siegel described how the baseline functions of the left and right brain hemispheres encourage the mind to develop behavioral tendencies toward specialization in one of the two hemispheres. The left hemisphere emphasizes linear, logical, and literal meanings, while the right is more holistic, nonverbal, imagery-based, and relational. During periods of brain development, experiences can shape adaptations that leave one side more dominant than the other. Siegel proposed a method of interrupting the process of specialization, and balancing the tendency to favor a dominant hemisphere of the brain. Siegel called this process Horizontal Integration. It is accomplished through the act of deliberately changing modes of operation within the brain and promoting neural integration between the two brain hemispheres. Horizontal integration occurs when new neural pathways between the two hemispheres

60 Ibid., 8.
61 Ibid., 3.
62 Ibid., 8.
63 Ibid.
64 Ibid.
65 Ibid.
66 Ibid.
develop over time and result in a broader, more holistic mind capable of traversing left or right modalities.\textsuperscript{67}

Since the Nexus promotes the blending of disparate fields of inquiry, its elements are designed to activate the neurological process of Horizontal Integration in the mind and produces favorable outcomes for leaders. Leaders who deliberately choose to enter multiple streams of cognitive consciousness activate physiological synaptic responses that broaden the brain’s ability to generate alternative solutions to problems. The synaptic responses include the generation of new neurological pathways and linkages in the brain. As leaders hone their ability to move between streams of consciousness in the left and right brains, they are able to increase their ability to access a broader range of alternatives to solve problems. However, can the impact of new brain pathways create a substantial enough effect on personality traits as to overcome the impact of human typology on decision-making? Can a left brain dominant rational human re-balance their world view? Data presented by Schwartz suggests this is possible when individuals engage in the process of actively shaping their stream of conscience towards right brain activities.\textsuperscript{68} Subsequently, it is the Nexus that can create the space to facilitate these processes, as shown in Figure 10.
New ideas emanate from new ways of thinking. Chapter Five introduced a new way leaders can approach the problem of the Executive Dilemma, which denotes the existence of potential solutions residing in an unfamiliar, or disparate field of inquiry. The Nexus between science, the arts, and religion is a cognitive framework designed to establish a three-dimensional intellectual space designed to overcome the Executive Dilemma. Noted neuroscientist Jan Lauwereyns offers a representation of how the Nexus can function and have an impact on the decision-making of executive leaders. In his monograph, *The Anatomy of Bias*, he introduces a theoretical example of a runaway trolley out of control and on course to kill five innocent people. Standing next to the track is a man of large build that, if pushed onto the tracks, could derail the trolley and prevent the crash. A rational approach simplifies the equation for the leader, and to minimize loss of life the decision to sacrifice one individual to save five would be a

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70 Ibid.
logical course for “Rationals.” Naturally, a pre-programmed model that projects potential for greatest loss of life would produce the same result. However, such an approach invokes the St. Petersburg principle, whereby a seemingly rational course of action violates “reasonableness” criteria, and is bounded by the moral implications of the situation. Subsequently, the introduction of human values into the equation creates room for pause. Naturally the act, while protective of the whole, would require a murder. This presents a dilemma which could result in a suboptimal decision if the complexities of the situation were not adequately accounted for. This situation is not unlike the NASA case study, where managers became overly focused on internal system optimization of KERMIT, and ended up missing the broader imperative for an on-orbit repair capability. In both shuttle disasters, managers became consumed with the absence of data and other complexities, without engaging in the broader implications of inaction and reasonableness—thus exposing both missions to hazards that were not contemplated, despite the existence of intellectual bandwidth that could be used to solve problems.

While in the trolley example the right pathway was more easily discernable (that is, to avoid committing murder), the Nexus is designed to account for Executive Dilemmas that are more complex in nature. Should the space shuttle launch on time, despite the potential for design flaws? Should drone development be accelerated in the Air Force? Finally, does religion have a place in global economics? As previously discussed in Case Study Three, the Secretary Henry Paulson’s dilemma was complex enough to prevent him from accounting for, and tendering the religious value-sets that

71 Ibid.
delayed his journey to satisficing. The introduction of a values-based dimension to decision-making can be cultivated by the Nexus, and used in such a situation to account for ways in which rational thinking is bounded.

**Evaluating the Potential of the Nexus: Survey of Executive Leaders**

How might leaders welcome the Nexus as a new method of improving their decision-making abilities? In order to explore this question, a survey of 80 senior executives was conducted in July of 2017. The goal of the study was to determine if there was a propensity among senior executives to embrace the characteristics of the Nexus, to include blending of disparate fields such as science, the arts, or religion. The survey accomplished this through a suite of 22 questions.

The executive population sample consisted of 80 senior leaders in both the public and private sector. Participants represented industry, the non-profit sector, academia, and the U.S. government. The survey also sought representation from the 16 different Meyers-Briggs Type Indicators. The intended sample population of the survey enabled researchers to determine if human typology or profession had any influence on the propensity for executives to use the Nexus. Senior leaders were asked if they strongly agreed or disagreed with the blending of disparate vocations such as science and the arts, as a method of improving the decision-making skills of executives. They were also asked if they believed that religious values played a role in influencing the decisions they made on a daily basis. Furthermore, leaders were asked if they observed instances in which decision-making might be enhanced with a broader understanding of disparate fields.
Due to the nature of the survey, it is useful to understand the composition of the sample population. First, the survey participants were not evenly distributed among sectors. The sample population consisted of approximately 49 percent industry executives, 31 percent government leaders, 11 percent non-profit executives, and 9 percent leaders from academia. Therefore, the survey was most significantly representative of industry and government executives. However, non-profit and academia did provide some influence on the survey. A summary of the population distribution as a function of sectors is provided in Figure 11.

![Pie Chart]

**Figure 11.** Sample population survey for executive leaders, grouped by sector.
Source: Author Illustration

Second, 59 of the participants (73 percent) reported their MBTI. Of this group, 34 percent identified as ENTJs, while 14 percent identified as ESTJs. INTJs and ISTJs comprised approximately 10% of the population, respectively. However, when the surveys were grouped into the four Keirseyan Temperaments (Idealists, Guardians,
Rationals, and Artisans), a more useful distribution emerged.\textsuperscript{72} It is important to note that, ESTPs, ESFPs, and ESFJs were not represented in the executive surveys, which signaled that Artisans were not significantly represented in the sample population. However, the Artisans that did participate in the survey offered several observations, despite having less than the requisite number to be considered significant. A distribution of the temperaments represented in the survey is shown in Figure 12.

![Figure 12](image)

Figure 12. Executive survey population distribution, grouped by temperament.
Source: Author Illustration

The results demonstrated that, among the surveyed population, the propensity to utilize characteristics of the Nexus was favorable. On average, executive leaders strongly agreed that Science and the Arts can be compatible fields of inquiry and that blending disparate fields is a worthwhile endeavor. They also strongly agreed that

\textsuperscript{72} Isachsen and Berens, \textit{Working Together}, 63.
leaders with a broad, interdisciplinary exposure to experiences are more effective
decision-makers than individuals with established depth in a given field of study.
Additionally, some trends did emerge among various typologies. True to their nature,
Guardians were supportive, but were consistently less enthusiastic about the idea of
blending disparate fields. Idealists consistently provided the most support for the
Nexus, and its intended objectives.

Though they shared agreement on blending of disparate fields, the executives
surveyed conveyed some uncertainty about the influence of religious values on their
decision-making abilities, recording neutral or slightly unfavorable perceptions.
However, there were slight differences among temperaments and sectors. The
Artisans were the most supportive of this concept, while the Guardians and Academians
slightly disagreed with the influence of religious values on decision-making. On the
issue of innovation, there was broad consensus that innovation is not merely a technical
activity, but must also include the arts. Executives also regularly observed instances in
which a leader became focused on a single perspective to the extent that it inhibited his
or her decision-making abilities. This result signaled that executives would have little
resistance to confirming the existence of the Executive Dilemma, followed by the use of
a suggested framework such as the Nexus to mitigate its effects. The sample
population also strongly believed that technical activities could be enhanced by blending
the arts, and vice versa. Returning to the question posed in Chapter One, can an
individual who is pre-disposed towards an aptitude for science effectively employ
techniques traditionally intended for the arts and humanities? Judging from the
perspective of the sample population of executives in the survey, the answer is yes.
The survey also provided some data on the existence of the “Paulson effect,” or uncertainty on the influence of religious values on the decisions leaders make. Data from survey showed that executives expressed some reservations with the existence of this influence, thus revealing an area where use of the Nexus might improve awareness and understanding.

The study increased confidence in the potential viability of the Nexus. Leaders who accomplished the survey reported that they regularly observed instances in which executives became focused on a single perspective to the extent that it inhibited decision-making abilities. Finally, executives regularly noted instances in which highly technical or scientific endeavors might have benefitted from artistic perspectives, in order establish a more creative approach to problem-solving. How might this be accomplished? Among the survey participants, one executive made the following declaration:

For executives, we must see the broad application and wide-ranging effects of our decisions. Strategy isn’t a math problem, nor is risk management. Seeing problems in multiple dimensions is what separates good from great. We must get back to a holistic approach in our leadership training. We lack basic understanding because we are too focused on what we can measure.

The executive’s comment provides important insight on how the Nexus might be deployed to mitigate the effects of the executive dilemma. Leaders have the flexibility to deploy the Nexus in any number of ways, to include education, training, practical application, or even a combination of all three. Thankfully, leaders are not expected to become learned in new fields of inquiry—all that is required is for the executive to mitigate the tendency to omit disparate fields of inquiry as potential warehouses of unrealized solution sets. Successful deployment of the Nexus involves opening up
access to this new cognitive space, and focus on the junctures of disparate fields. Building upon the analysis of the three cases studies, and the experiences of historical figures that blended disparate fields of inquiry, evidence suggests that the Nexus has the potential to mitigate the effects of the Executive Dilemma. Advances in neuroscience over the past twenty years bolster this argument. Neuroscientists suggest that a three-dimensional cognitive framework, through the process of Horizontal Integration, can assist with efforts to address strategic problems faced by executive leaders.  

Ultimately, the true motive force of the Nexus is to harness the human capacity for humility and build the intrinsic courage to reject the grand narratives of compartmentalized practices—then engage in the communal activity of blending science, the arts, and religion in a simultaneous fashion.

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73 Siegel and McCall, "Mindsight at Work," 2.

CHAPTER SIX

USING THE NEXUS

I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do.  

- Leonardo da Vinci

Chapter Five introduced a cognitive framework to address the problems that are caused by the Executive Dilemma. Termed “The Nexus,” it proposes a multi-dimensional approach towards improving the capabilities of Executive Leaders. By blending science, the arts, and religion into a single cognitive consciousness, leaders are less prone to relegating their individual decision-making processes to a single field of inquiry. Two historical leaders, Thomas Jefferson and Steve Jobs, were examined as examples of leaders who exemplified the intent of the Nexus. Steve Jobs attributed his success to this blending process, as well as the development of heightened skills in intuition that improve decision-making. Advancements in neuroscience and the executive survey bolstered confidence in the Nexus, and its potential to build intellectual capacity by establishing new brain pathways; but how does one get started using the framework?

Up until this point, examples presented for validation were either historical in nature, or representative of how the Nexus might be applied. The foundation laid by Chapters One through Five was successful in building confidence in a theoretical approach to mitigating the effects of the Executive Dilemma with the use of a cognitive framework called the Nexus. How would the Nexus react in a real scenario?

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1 Chinazom, Iwuaba, *Shaped by Struggles* (New York: Xulon Press, 2010), 120.
Chapter Six introduces four areas where the elements of Nexus were deliberately introduced to generate positive effects in large enterprises.

**Applying the Nexus to Case Study Three: Formulation of Religionomic Theory**

While all three case studies provided evidence for the existence of the Executive Dilemma, Case Study Three yielded the added benefit by opening a theoretical space for application of the Nexus. The case study uncovered the existence of a void between the practice of economic sciences and the existence of human religious values that influence them. Finding a way to blend the subject of economics and religion yielded the potential for a better understanding of behavioral economics, as well as methods for applying its attributes in a variety of economic endeavors. Referred to as “Religionomics”, the approach produced potential benefits for senior leaders when applied to real-world scenarios.

Religionomics is the study of the core teachings of a given religion and its impact on economic decision-making. It is primarily grounded in the understanding that humans form the basis of their decision-making by utilizing their individual ethical frameworks. This framework is often imbedded in the theology of individual human religious values. Ultimately, economic decisions are affected by our ethics, both at the theoretical and pragmatic level. Therefore, it is important to incorporate a "religionomic" perspective when trying to understand the economic behaviors of others.

Religionomics impact decision-makers on both a fundamental and pragmatic level. Religious scholars regularly debate the root meaning of key scriptures, and their

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implications on economic issues. Discussions often take the form of comparative or inter-religious debate. There is also an abundance of intra-religious debate, whereby scholars discuss interpretation of scriptures within a given world-view. It is in this manner that similarities and differences on economic issues emerge, and can be leveraged for benefits. For example, from an inter-religious standpoint Hinduism's emphasis on abundance in economic systems contrasts with Western concepts of scarcity theory. This fundamental difference can have an important impact on decision-making. For example, a Western economist might argue that today's modern economic systems are devoid of religious influence and are focused solely on the production of profit margin. On this point, Max Weber might contend that on the surface it may appear this way, but the Western economic system is based on the Protestant ethic, and the diligent production of wealth through hard work is considered the pathway to salvation. Jewish and Buddhist systems might emphasize the pursuit of economic sustainability through non-violent means. Islam and Christianity would emphasize help for the poor and under-privileged. Of course, the virtues of each religion may be contained in one or more of the others. The approach encourages economists to account for religiononomic variations on their decision-making, an activity that can shed light on differing perspectives.

As noted in Case Study Three, economic systems can trace their roots to both the fundamental frameworks within a religious tradition, as well as pragmatics that reveal their deontology. In the case of Secretary Paulson, consider the 2008 economic crisis, in which the collapse of the U.S. housing market occurred due to the packaging and sale of subprime mortgages into high-risk securities. This eventually resulted in the
failure of major financial institutions like Lehman Brothers and AIG, and nearly triggered a world-wide economic collapse. These institutions earned the moniker "Too Big to Fail," an economic term used to describe financial institutions that are so large and so interconnected that bankruptcy would be catastrophic to the welfare of the entire economy. How would the situation benefit from using a religionomic approach?

Naturally, use of a religionomic approach might have broadened the scope of potential solutions for Secretary Paulson. For example, Islamic scholars might have argued that the source of the problem lies in a system of excessive greed, and Shari’a jurisprudence would have avoided the crises by citing the sale of mortgages as third party *riba* prior to the accumulation of risk. They would also consider this unnecessary handling of "the property of others," a violation also common to Judaism. Jewish scholars might have labeled the system as excess usury to the disadvantage of the poor and prescribe no more than a 20% profit margin, in order to prevent the accumulation of excessive risk for buyers (a rule common to all of the major religions). Buddhists would agree, and adopt a more holistic perspective on the financial crisis, and consider the personal effects of happiness and welfare of society. In the end, Secretary Paulson labeled the bailout of financial institutions as a "moral hazard" for rewarding institutions that exhibited poor business practices. His approach, rooted in Christian values, was to deny bailout of the financial institutions, because it would constitute a violation of the Protestant ethic of hard work and dedication as a means of achieving salvation. Furthermore, companies would be allowed to fail, and markets would "self-correct," in accordance with views on salvation. From a religionomic standpoint, each faith tradition set forth rules that leaders share an affinity for, and
eventually developed solution sets utilizing their independent world-views. However, the religionomic approach opened up the number of solution sets beyond a single world view.

While the world's religions can produce differing economic perspectives for executive leaders, adopting a conscious understanding of religionomics can also spark important innovations. First of all, understanding the religionomics of a different faith tradition can play a major role in avoiding gridlock between two opposing factions engaged in mediation activities. For example, negotiations on the acceptance of genetically modified salmon in bilateral trade talks between India and the United States might require an understanding of Hindu religionomics in order to avert a potential trade dispute, and litigation in the World Trade Organization.

Developing an understanding of religionomics would also allow leaders to enter the Nexus, and innovate newer economic theories. Some economists argue that religion and economics should maintain a distinct separation. This sentiment is a bi-product of the rational theories brought forth by the enlightenment thinkers and eventually evolved into modern Western economic thinking. While modern economists might believe that such a system exists, the works of Max Weber show how Western capitalism can trace its roots to a form of religionomic ethics. Ultimately, the confluence of religionomic approaches emanating from differing religious perspectives can lay the foundation for hybrid economic theories. Cultural transformation in Communist China in the past 20 years offers a poignant example of a hybrid economy in which the
fundamentals of free-market capitalism are fully incorporated into a socialist ideology. While not entirely attributable to religionomics, the connection is traced to the ethical roots of Chinese culture, and the transformation from rural lifestyle to consumerism. Recognition of this connection will enable new paradigms in economic theory, and challenge previous boundaries once considered taboo in contemporary economics.

From a pragmatic perspective, a religionomic approach would allow modern enterprises to adjust their practices during periods of economic austerity. Adopting a global religionomic perspective will enable organizations to open their aperture on a wider range of ethical frameworks, and draw from the gamut of world-views available to them. Organizations facing extreme budgetary constraints might employ Buddhist methods of reducing waste, environmental stewardship, and work-life balance approaches for workforces of the future. An organization plagued with corruption may benefit from development of an ascetic work ethos in their labor force. At the macro level, governments may benefit from adopting Jewish methods of price control when considering bilateral trade agreements with multi-national pharmaceutical corporations.

The art of operations management calls for application of the appropriate technique for a given situation at the right point in time. From an application standpoint, it is prudent to assume that the larger the "toolbox" of applications, the more viable solutions can be generated. It is in this area that religionomics offers an untapped intellectual resource for executive leaders. By understanding the differences and similarities between religious world views, leaders will better situate themselves to meet

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the challenges of globalization, and adopt a global perspective on problem solving that mitigates the Executive Dilemma.

**Introduction of the Nexus into Global Policy in the Arctic**

Introduction of the Nexus into key issues in the Arctic yielded important results. Prior to discussing its deployment, it is first prudent to establish the geopolitical context in order to understand key complexities and problems in the region. The Arctic region is one of the most extreme and diverse environments in the world. Its boundaries include the area north of 60 degrees latitude, commonly referred to as the Arctic Circle. Due to the existence of substantial natural resources such as oil and minerals, the Arctic region remains a geographical area of interest to many nations, particularly for countries whose boundaries include portions of the Arctic region. The Arctic is also home to a diverse group of indigenous people who depend on the Arctic and its resources to sustain their culture.

According to international agreements, no single nation has a claim to the Arctic region. However, the Arctic Council is the leading intergovernmental forum promoting multi-lateral cooperation, coordination, and interaction among the Arctic states, Arctic indigenous communities, and other inhabitants on common topics. Issues include, but are not limited to sustainable economic development and environmental protection of Arctic resources. The members of the Arctic Council include Canada, the Kingdom of

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5 Ibid.

6 Ibid.
Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States. In addition, six organizations representing Arctic Indigenous peoples have status as permanent participants of the council. Chairmanship of the Arctic Council rotates every two years among Arctic states.

The Arctic region remains an area of cooperation, ranging from scientific, environmental, and economic collaboration under the auspices of the Arctic Council. Civil and military cooperation regularly occurs to enhance maritime awareness, balance sovereignty, promote Arctic transportation capabilities, and improve search and rescue capabilities. However, there are points of disagreement among nations. The most significant disagreements center on territorial claims to maritime boundaries and exclusivity to economic zones. The United States has protested excessive maritime claims as inconsistent with international law and does not recognize them. This will likely remain an issue in which the United States and a number of other nations will continue to disagree.

7 Ibid.
8 Ibid.
10 Ibid.
11 Ibid.
12 Ibid.
Environmental impacts also present a changing geopolitical environment in which nations pursue unilateral interests in the Arctic.\textsuperscript{13} Diminishing sea ice resulting from climate change effects will give rise to new economic opportunities in the region while simultaneously increasing concerns about protection of unique ecosystems that many indigenous communities depend on for survival.\textsuperscript{14} In the near term, the increasing rate of coastal erosion similarly will threaten Arctic coastal infrastructure.\textsuperscript{15} As ice recedes and resource extraction technologies improve, competition for economic advantage and a desire to exert influence over an area of increasing geostrategic importance can result in tension among nations.\textsuperscript{16} These economic and security concerns may increase the risk of disputes between Arctic and non-Arctic nations over access to shipping lanes and natural resources.\textsuperscript{17} How might the Nexus be deployed to this environment and generate favorable impacts on the decision-making abilities of leaders?

At the United States Department of Transportation’s (USDOT) Federal Aviation Administration (FAA), use of the Nexus enabled senior leaders to establish priorities that might have otherwise been neglected using more conventional, compartmentalized approaches. The FAA is responsible for the safe and efficient use of the United States Airspace. It is primarily an aviation regulatory organization, with significant technical

\textsuperscript{13} Ibid.

\textsuperscript{14} Ibid.

\textsuperscript{15} Ibid.

\textsuperscript{16} Ibid.

\textsuperscript{17} Ibid.
capabilities that set it apart from the civil aviation authorities in the world. Like NASA, the FAA contains a large technical employee population, including thousands of engineers designated to certify aircraft, airports, and operations throughout the world. Since the Arctic includes portions of the U.S. in Alaska, aviation and transportation issues related to the Arctic Council remain a priority for senior leaders in government.

Subsequently, leaders at the FAA were assigned aviation priorities in three key areas. The first area was to modernize navigation systems and technical capabilities. The second area was the development of improved and more accurate technologies that allow safer aircraft approaches. The third area included integration of Unmanned Aircraft Systems. Given the technical nature of the work, the FAA was poised to remain focused on the engineering aspects of releasing new technologies in the Arctic region.

In order to leverage the benefits of the Nexus on Arctic policy, leaders from the FAA’s Alaskan region conducted educational immersion events that encouraged a broader view of FAA responsibilities in the Arctic. Engaging the native cultures represented in the Alaskan region provided a foundation for establishing important new aspects of aviation. FAA leaders visited local villages and took the time to understand Native Alaskan history. Leaders garnered knowledge of the history of indigenous people of Alaska by building partnerships with the Alaska Native Heritage Center. The center was established as a cultural institution that offered educational programs in both formal and informal settings, to include guided tours of village sites and exhibits.18 As

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such, FAA leaders were exposed to a number of art forms, to include cultural dances, paintings, and ornamental artifacts (Figure 11B).\textsuperscript{19}

Understanding native religions through local art was also important to the experience. The Artwork of John Hoover, shown in Figure 11A, is titled \textit{Raven the Creator}.\textsuperscript{20} Completed in 1998, the statue represents the religious heritage of the native cultures. The raven is a common representation of native legends, and represents human freedom.\textsuperscript{21} As a representation of contributions from differing religious traditions, the Russian Orthodox faith is depicted within the figure as the Raven’s claws.\textsuperscript{22} The face depicted in the belly of the raven is symbolic of the earth and the connection of humans to earth cycles.\textsuperscript{23}

\textsuperscript{19} Inuit Cultural Dance, Alaska Native Heritage Center, August 17, 2015.


\textsuperscript{21} Ibid.

\textsuperscript{22} Ibid.

\textsuperscript{23} Ibid.
One of the more consequential discoveries of the immersion program occurred during the interaction with the instructor (shown in Figure 11C). A person of Native Alaskan heritage, he shared that many of the ancient villages across Alaska were facing extinction due to a variety of factors. Seeking educational opportunities, employment, or merely a modern lifestyle, many of the younger generation had departed their native villages for larger towns such as Anchorage at an accelerated rate. Sustainment of their native culture, while important, had been overcome by the scarcity of resources and educational opportunities. Information access in the post-modern era had brought on this phenomenon. The instructor conveyed his personal story as well as the broader challenge of transportation to local villages from Anchorage, Alaska. This exchange broadened the importance of having reliable transportation capabilities within the state of Alaska. The instructor impressed upon the FAA that aviation was critical to the survival of native Alaskan heritage. Since many of the villages were located in austere
locations, aviation was the only way for younger generations to travel to and from their locations and meet with elder members of the villages. Subsequently, the interaction enabled leaders from the FAA to conclude that aviation was responsible for sustaining Native Alaskan heritage more profoundly than previously understood. For example, aviation was not only responsible for sustaining villages through logistical means, but was also responsible for maintaining a cultural lifeline between generations of Native Alaskans. All told, the immersion provided FAA leaders the opportunity to broaden traditional perspectives on Arctic policy and shape future activities. In what ways would this immersion event manifest itself among leaders in the FAA regarding policy activities in the Arctic?

Considered well outside the norm for such a technically-oriented agency, the intent of the cultural immersion for FAA leaders was to encourage the application of the Nexus in order to facilitate the process of Horizontal Integration, and eventually authentic satisficing. Subsequent to this event, the FAA leaders were approached by the U.S. Fish and Wildlife Service in order to address the challenges of biodiversity in the Arctic region.\textsuperscript{24} Due to the effects of global climate change, deterioration of ice floes in the Chukchi Sea had limited the resting locations for Pacific Walruses.\textsuperscript{25} In response to the change, thousands of walruses would collect on Alaskan beaches and cluster in

\begin{footnotesize}
\footnote{\textsuperscript{25} Ibid.}
\end{footnotesize}
large crowded herds.\textsuperscript{26} The herds, consisting of thousands of walruses (some weighing as much as 2000 pounds) and their pups, became easily startled and susceptible to stampedes.\textsuperscript{27} The stampedes resulted in the deaths of the thousands of females and young walrus pups each year. When leaders at the FAA partnered with the U.S. Fish and Wildlife Service to investigated potential collaborative solutions, they determined that low flying aircraft were a root cause to some of the stampedes. Amidst competing technical priorities in the region, the FAA recognized the importance of preserving biodiversity in the Arctic region, in part, to preserve Native Alaskan villages that depended on walrus for food. Therefore, the FAA developed flight restrictions, notification systems, and the design of airspace restrictions to minimize the proximity of aircraft to the walrus herds.\textsuperscript{28}

Recognizing the Arctic priority of protecting biodiversity in the region, the FAA also prepared for the advancement of drone technology, or unmanned aircraft systems (UAS). UAS offer a variety of applications in the region, to include rescue, terrain survey, and maritime oil spill response. However, one of the most compelling missions for UAS involved marine life research. UAS technology is quieter than conventional aircraft, and prevents disturbance of natural migratory patterns of marine life, as well as higher fidelity of research data. FAA leaders recognized the importance of the technology to improving the understanding of local seal populations in the Arctic. The impact of the environment on the marine life plays an important role in the preservation

\textsuperscript{26} Ibid.
\textsuperscript{27} Ibid.
\textsuperscript{28} Ibid.
of Native Alaskan culture, since villages depend on the marine life as a local food supply.

The final area of benefit to the FAA regarding the Arctic policy occurred in the Native Alaskan villages affected by global climate change. Coastal erosion, caused by rising waters in the Chukchi Sea, has threatened many villages. Positioned primarily in coastal ecosystems, many Alaskan Native villages rely on coastal areas to sustain their way of life. The villages depend on natural resources, such as fish, seal, and whale in order to maintain food supplies for the winter months. As sea levels increased, villages positioned close to the water became endangered. The combination of rising seas and melting permafrost caused localized flooding and raised levels of bacteria. To make matters worse, coastal erosion severely damaged local airports, causing the FAA to investigate airport repair options. Understanding the broader cultural impact on the people of coastal villages convinced FAA leadership to visit several of the villages. Leaders spent time with the villagers, learned from their experiences, and drew conclusions based upon their feedback. This discussion led to a concerted effort to secure greater funding for airport relocation and assistance in securing funding from the federal government.

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30 Ibid.

31 Ibid.
Many FAA executive leaders would agree that aviation is primarily a technical endeavor in which the science of flight permeates the desire for greater safety and efficiency. However, FAA leaders in the Arctic took upon the activity of entering the Nexus, and leveraged its benefits. Technical managers by vocation, they cultivated an intellectual space in which Horizontal Integration could occur—an activity that yielded key benefits within their enterprise. Subsequently, entering the Nexus created results different from what might traditionally be expected from the enterprise. Beyond the technical aspects of aviation navigation or UAS integration, FAA leaders were able to incorporate the human connections to their work. Doing so made their technical activities more fruitful. Ultimately, their humility and courage transcended a traditionally bounded approach to rational thinking. They not only developed a sense of what they sought to accomplish, but they also were able to articulate why they were doing it.

Figure 14. The Nexus and Artic policy
Source: Author Illustration
Figure 11 shows how the components aligned with activities conducted to affect Arctic policy.

In the course of accomplishing this, an otherwise limited presence of Arctic issues in broader agency discussions changed into genuine interest. The effects ultimately translated into increased funding priorities on aviation safety programs. Alaska FAA regional executive leadership experienced a greater frequency of visits from senior leaders in Washington. Their efforts were even recognized in the broader media environment. The prevailing connection to human freedom and the cultural access provided by aviation shifted the mindset to a more robust understanding of the impact leaders can have, well beyond what would have otherwise been articulated through technical means. Ultimately, the Nexus was effective and improved the decision space in the Arctic, because it empowered aviation leaders to blend an interdisciplinary approach to their decision-making.\textsuperscript{32} Furthermore, it cultivated a better understanding of how their technical activities could be enhanced by blending other disparate fields of inquiry. By immersing themselves into the Nexus, leaders were able to extend beyond their bounded solution sets. The new environment allowed solution-sets that increased the number of alternatives. Overall, leaders were able to mitigate the potential for the emergence of Executive Dilemmas by broadening their solution sets and proceeding to satisficing with alternatives outside the technical realm.

**Integrating Drones into U.S. Civil Aviation**

The proliferation of Unmanned Aircraft System (UAS), or drone technology in civil society has posed significant challenges and opportunities for the United States. Like

\textsuperscript{32} Lyotard, “Report on Knowledge,” 52.
the Air Force, the Federal Aviation Administration has had to address a number of policy issues as a result of the accelerated growth for potential applications. Like the Air Force, the manned aircraft industry has raised objections to the technology. Citing threats to manned civil aircraft as a significant safety issue, both the airline community and the general aviation community have expressed reservations about the safe co-habitation of UAS with manned aircraft.

UAS have the potential to provide significant benefits to society. UAS are essentially remote-controlled vehicles that operate in the air. The pilots are physically separated from the aircraft. UAS can be launched from the land, the air, or from ships. Due to their size, UAS are relatively cheaper than manned aircraft to manufacture, and their operating costs are significantly lower. In the past decade, a wide variety of designs have been developed in order to meet specialized civil needs. Applications include, but are not limited to land surveying, scientific research, videography, package delivery, real-estate, bridge inspections, disaster rescue, and fire-fighting. Telecommunications companies and internet service providers are pursuing designs capable of loitering at high altitudes as relay stations for improved signal strength. All-new “quadcopter” designs are being developed by companies such as United Parcel Service and Amazon to deliver packages to consumers.

In order to prepare for their increased use, the FAA has assumed responsibility for full and safe integration of these vehicles into the National Airspace System, or

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The FAA began the process of developing regulatory methodologies to ensure safe use of UAS in 2005. That year, the FAA issued an airworthiness certificate to a company named General Atomics, for their aircraft named the Altair. The aircraft was approved in the experimental category, and required a significant number of safety limits. The constraints included weather, altitude, and geographic restrictions, as well as a requirement for a pilot and observer to maintain line of sight visual contact with the vehicle. The FAA also maintained close contact with the UAV industry in order to determine processes that would ensure successful integration of the vehicle into the NAS. By 2010, the UAS industry in the United States grew weary of the progress made by the FAA. UAS policy for use in the NAS had not kept up with the growing demand for commercial applications. Companies began to complain to the U.S. Congress, claiming that the U.S. was ceding a potential market to foreign competitors. European drone companies had gained significant ground, and not yet placed restrictions on their UAS companies. A significant policy problem had emerged. Could the Nexus offer a potential pathway to accelerate innovation?

With problems mounting for the FAA, the agency sought to develop a more comprehensive strategy towards implementation of UAS. Up until that point, the issue of UAS integration into the NAS remained within the comfort zone of its workforce. Safe operation of aircraft in the NAS was a technical issue, accomplished by a technically-minded workforce. As such, the integration of the UAS was on a similar pathway—

34 Ibid.
35 Ibid.
36 Ibid.
rational engineering approaches would be trusted to provide the path forward for this scientific activity. However, the flurry of issues that followed had driven gridlock within the FAA. With sales of small UAS projected to exceed one million annually, an Executive Dilemma had emerged due to a largely unknown stakeholder community that had grown (referring to the commercial and toy model drone market). The conventional strategy applied by the FAA required a more comprehensive approach, involving several disparate fields.

Recognizing the need to develop a newer, more comprehensive strategy for implementation of UAS, the FAA developed a broader approach for UAS integration. The agency embarked on a series of executive meetings among its senior leaders. Among the organization’s observations were significant gaps in blending disparate functions that were connected to the integration of UAS technology. Like the Air Force, strong cultural identities and rivalries had formed among various communities in the agency throughout its history. The UAS program was executed by the Aviation Safety organization and was responsible for developing safety rules and standards for operation of the vehicles. The Air Traffic organization was responsible for safe operations of UAS in the NAS. The Airports organization was responsible for certification and safe operation of airports in the U.S. Each of the major organizations were considered major stakeholders in the safe operation of UAS; however, there was very little cross-functional integration between these large organizations. While UAS were on track towards meeting the threshold for singular operations, few resources were being put towards challenges other organizations were facing. In the period immediately after 2010, UAS sightings by commercial airlines and general aviation
aircraft, to include several near misses, were increasing in numbers. Initial corporate meetings were contentious, which reflected both the deep rivalries that had emerged and parochial interests of the executives from their respective organizations. Like NASA and the Air Force, the FAA displayed characteristics of bounded rationality and government-related human typologies that might be mitigated by the Nexus.

While the science of UAS operations was well developed in 2010, the agency opted to cultivate the process of Horizontal Integration across its senior leadership ranks with an educational training program that employed aspects of the Nexus. The agency developed a training course called *Influencing a Performance Culture*, in which executive leaders from across the agency participated in an intense, two day training program. The training was designed to generate interaction from executives in different organizations in order to create a more cooperative working environment. Leaders were assigned to small groups and developed solutions to key agency problems. The initial problem included the prisoner’s dilemma, a values-based exercise that compelled the teams to choose between localized interests or broader enterprise interests, and reconcile the St. Petersburg principal. Subsequent modules included an introduction to human-values in decision-making, and encouraged members from different organizations to provide individual leadership coaching opportunities.

The course also employed the arts in order to highlight the need for interdisciplinary collaboration among affected communities in the agency. More specifically, theatrical performances were used to simulate instances where the Executive Dilemma surfaced in the integration of UAS technology into the NAS. Actors presented scenarios in which members from differing communities in the FAA worked
through integration challenges. Disagreements occurred and actors shared frustration on issues of cooperation, enterprise-level decisions, and agency direction on the implementation of UAS. Senior leaders made observations of the behaviors, and discussed points of failure, as well as opportunities for better cooperation. While blending the science of UAS with the arts, members sought to break through their organizational barrier focus on the pursuit of the “greater good” instead of individual interests. Photographs of the theatrical simulation are shown in Figure 12. Feedback from a sample of 149 executives who attended the course, on average, reported that the use of theatrical actors in simulated scenarios exceeded their expectations.\(^{37}\) The theatrical simulation achieved a 4.31 average rating on a five-point scale, higher than the academic portions of the course. Of the ten written remarks by senior leaders, eight reported favorable impressions.\(^{38}\) One leader remarked, “actors were fantastic in their mastery of FAA behaviors…it is a little sad that we as leaders accepted watching it without rallying for change.”\(^{39}\) The comment made by the executive illustrates the success of the scenarios in illustrating the imperative to stimulate aspirational adaptation towards satisficing. More importantly, it directly confronted the issue that had plagued NASA in Case Study One. Feedback on the team dilemma (using the example of the prisoner’s dilemma) was slightly less positive, recording average scores


\(^{38}\) Ibid., 3.

\(^{39}\) Ibid.
of 3.83 and signaling that the exercise met expectations.\textsuperscript{40} The disparity in feedback also suggests that the theatrical approach was more successful at creating an effective intellectual space for dealing with complex decisions.

![Image](image.jpg)

\textbf{Figure 15. Influencing A Performance Culture using theatrical simulations}

Source: Author Illustration

The FAA also employed an executive exchange program, which sought to provide new perspectives for executive leaders. The objective of the program was to place executives in an entirely different community within the FAA for a period of six weeks. Members were encouraged to assume new roles in order gain fresh perspectives on leadership and decision-making.

Finally, the executives conducted another meeting that implemented a values-based approach to solving integration challenge for UAS. They formulated a series of guiding values and principles, which they called the “Sheperdstown Principles,” named after the location of their gathering in Sheperdstown, West Virginia. The principles set the stage for a collective enterprise approach to mitigating cultural barriers between

\textsuperscript{40} Ibid.
organizations, and establishing a foundation for enhanced cooperation. Along with the training course, the event set the stage for building humility and courage to collectively meet the challenges of UAS integration.

Ultimately, the approach yielded success. In the year following the training, the FAA published a new strategy for integration of UAS, and successfully released new rules for commercial use of drones. A new online registration system was established for drone pilots, which achieved over 600,000 new registrants to the system. All new “Before You Fly” safety campaigns were launched. More importantly, the FAA successfully implemented a governance system that comprised of multiple organizations, allowing the implementation of a single integrated strategy. The approach also involved public and private stakeholders, who provided feedback on new rules. Through the involvement and integration with the FAA’s General Counsel’s office, significant policy issues such as federal control of airspace for UAS as well as privacy and law enforcement challenges were addressed. FAA Regional Administrators
participated in outreach activities and the establishment of test centers to promote innovation. Use of the Nexus enabled leaders to extend beyond merely the technical realm, and provide tools to overcome Executive Dilemmas that emerged for the integration of UAS. Figure 13 describes how aspects of the Nexus were utilized. The Nexus mitigated the bounded aspects of UAS policy for U.S. civil aviation. Most importantly, it enabled leaders to overcome the challenges associated with human typology as well as the deep institutional divides between organizations that lead to the Executive Dilemma.

Using the Nexus to meet Department of Defense Diversity Challenges

From the years 2000 to 2010, the Asian American population in the U.S. increased by 46 percent. This trend has continued from 2010 to 2015. As the Asian American population has grown, so too are the numbers of Asian Americans choosing to serve in the U.S. military. In a recent demographic report, the Department of Defense (DoD) reported that from 2010 to 2015, the number of Asian American Officers in the military increased from 3.8% to 4.7%, reflecting an increase of over 22%. In 2009 the Los Angeles area experienced an 80% increase in Asian American recruits for


the Armed Services.\textsuperscript{43} What are the implications of this demographic shift in the military, and are there indicators of burgeoning challenges within the Department of Defense (DoD) as a result of this change?\textsuperscript{44} The DoD has articulated the need to develop a new framework for addressing this demographic shift, in order to change the mindset of senior leaders from the concept of equal opportunity to becoming more inclusive.\textsuperscript{45} Could the Nexus help mitigate emerging Executive Dilemmas in this arena?

The history of civil rights within the DoD can be described as paradoxical. Prior to World War II, discrimination against minorities was a normal part of life in the military, which reflected societal norms of the time.\textsuperscript{46} In 1945, the U.S. military was a completely segregated institution, which represented the sentiment of a largely bigoted broader American population.\textsuperscript{47} Units such as the 442nd Regimental Combat Team, which consisted of Japanese Americans, remained segregated throughout World War II.\textsuperscript{48}


\textsuperscript{45} Ibid.


\textsuperscript{47} Ibid.

\textsuperscript{48} Matthew Elms, \textit{When the Akimotos Went To War} (Washington: American Battle Monuments Commission, 2015), 47.
Many of the Japanese Americans that served chose to enlist in the army even after the signing of President Roosevelt’s Executive Order 9066, which detained approximately 120,000 Japanese Americans and confined them to camps across the nation.\textsuperscript{49} The U.S. military has a long history of enlisting segregated units, dating all the way back to the revolutionary war. Examples of segregated minority units include the 54th Massachusetts Regimental Infantry unit during the U.S. Civil War, as well as the Tuskegee Airmen of World War II. Segregated units were regularly subjected to unequal and inhumane treatment. However what is considered paradoxical is that their existence often caused a shift in thinking on the state of equality in their respective institutions, and eventually broader societal norms. The Japanese American Nisei soldiers of the 442nd Regimental Combat Team eventually became the most decorated combat unit in U.S. history. For their efforts, President Truman said of the Nisei soldiers, “You fought not only the enemy, but you fought prejudice, and you have won.”\textsuperscript{50} The performance of the 442nd as well as other units such as the Tuskegee Airmen led to detailed studies of minorities serving in military and pursuit of full integration of the military. While full integration of the military eventually did occur, it took approximately twenty years since the end of World War II for African American military members to serve in increasing numbers.\textsuperscript{51} The trend in increasing numbers of African Americans serving is considered by some to be misleading, since the increase

\textsuperscript{49} Ibid.

\textsuperscript{50} Harry Truman, Senate Congressional Record, V. 146, Pt. 8, June 13, 2000 to June 21, 2000, 10420.

\textsuperscript{51} Gropman, The Air Force Integrates, XIV.
was predicated on the existence of the draft during the Vietnam War years. The true measure of the slow progression towards full integration was reflected in the officer corps of the military. For example, in 1951 when the Air Force had eliminated the last all-black unit, the percentage of black officers serving did not reach 1 percent until 1954. At the same time, the Civil Rights Act was not passed into law until 1964. This occurrence reflects a paradox within the broader American society. That is, while equal rights was a problem in the military, changes in military policy often preceded and served as catalysts in the areas of social justice in broader society.

On June 24, 1962, President Kennedy launched the Gesell Commission, a Committee on Equal Opportunity in the Armed Forces. Members of Congress reacted harshly to the formation of the committee, denouncing the effort and stating that it was a threat to the Republic. Yet most of its recommendations were eventually adopted by the military. Nevertheless, Congressional opposition to the study centered on the argument that President Kennedy was using the Gesell Report as a political tool for social reform in American society. Senator Strom Thurmond lashed out at the initiative, stating that the objective of the Kennedy administration was to use the military to drive radical social

52 Ibid., XV.
53 Ibid., 126.
54 Ibid.
55 Ibid., 133.
56 Ibid., 126.
57 Ibid., 133.
change in the U.S. 58 The precedence set by the Gesell Report has been instrumental in setting the stage for social reforms for other underrepresented groups in the military and ultimately affected broader social policies in American society. Issues such as equal rights for women, the LGBT community, and other disadvantaged communities often followed the policy changes instituted by the U.S. military. In the case of integration of minorities into the U.S. military during the 1950s and 1960s, many of the leaders involved did not change their perspectives on integration until commissions were formed that entered into a dialogue on the subject. Use of a broader dialectic didn’t necessarily mean their racial bias had changed. In most cases it didn’t. However, the studies and reports allowed leaders to activate their pragmatic sense of what was best for the improvement of the U.S. military, and ultimately concluded that it depended upon institutional integration of racial groups to ensure military readiness. 59 Segregation in the military was having a negative impact on morale, and race riots in units all over the nation were occurring in response to the inequities of segregated units. 60 Rational approaches presented to them in study after study were not addressing two pragmatic truths. The first was that segregation was in fact adversely affecting morale in the military. The second was that minorities were performing at an equal or better rate than their peers. Ultimately, the St. Petersburg principle came into play, and leaders were able to proceed to satisficing in a more authentic manner. This context played an

58 Ibid., 138.
59 Ibid., XIV.
60 Ibid., 17.
important role in the development of new diversity policies for the DoD in response to changing demographics from 2000 to 2010.

How could the Nexus be used to address diversity policy for Asian Americans in the U.S. military? Recognizing that rational approaches can be bound by their environment, the Nexus is designed to create an interdisciplinary culture in which new alternatives or pathways can emerge. The goal is to break potential points of gridlock caused by the Executive Dilemma and allow the process of satisficing to proceed in a more authentic manner.

The first step was to determine if any Executive Dilemmas in the policy arena existed. Was the Department of Defense (DoD) aware of the changing demographics of the military? A 2010 study on diversity and inclusion by the Department of Defense did provide indicators that leaders had an awareness of changing demographics in the nation, as well as the military. However, the study did not call to attention the extent to which this was occurring in the Asian American community. The President’s Advisory Commission on Asian Americans and Pacific Islanders established an outreach plan to garner feedback from Asian Americans serving in the military, and determine if any problems emerged with the demographic change.

In 2014, the Commission conducted research and a series of listening sessions with Asian American Military members in order to determine if any challenges existed. The research uncovered that in 2011 two suicides of Asian Americans occurred while

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serving in the U.S. military.⁶³ Both of the tragic events occurred while the members were deployed to combat zones.⁶⁴ DoD investigations revealed that racially motivated hazing preceded both suicides.⁶⁵ In the course of the Commission review, an Asian American active duty soldier who was vegetarian reported that he had been force-fed meat within his unit while serving at deployed location.⁶⁶ Subsequently, the Commission interacted with a number of other service members and uncovered a significant number of challenges faced by both Asian American Military Members and Veterans in three key areas.

The first problem was with antiquated DoD policies on issues of cultural accommodation. Military members and stakeholder groups representing the Sikh faith claimed that religious discrimination had prevented orthodox Sikhs who wore turbans and maintained unshorn beards from serving in the military. Additionally, since many Asian cultural traditions include a vegetarian diet, problems with receiving adequate nutrition during intense training periods and deployments were raised by military members.


⁶⁵ Ibid.

The second issue involved the inadequacy of chaplain services and programs representing faith groups common to Asian cultural traditions. The DoD has worked to establish new chaplaincy programs in faiths such as Buddhist and Hindu faith traditions. However, these efforts were established after significant lobbying from local faith groups. While not specifically denied by leadership, support for and conduct of Asian American religious traditions was sporadic at local bases and the four service academies. Furthermore, there was no central training pipeline to account for training of chaplains from Asian faith traditions. The institutional infrastructure required to maintain such a chaplaincy required established personnel positions and allocations across the chaplain corps.

The third problem was that Asian Americans serving in the military reported instances of hostile organizational climate that were not adequately addressed by the DoD Equal Opportunity system. In 2013, DoD’s first Hindu Chaplain was reported to have been removed from service under complaints of discrimination, professional “silencing” and harassment by her military chain of command. Another case of discrimination surfaced in 2015, whereby an Army Officer was accosted by his senior chain of command and was verbally compared to terrorists due to his ethnic background as an Indian American. Subsequent investigation by senior officers revealed no


68 Chaudhary, “Pentagon’s Forgotten Weapon.”

69 Ibid.
wrong doing, despite having confirmed the occurrence. Additional review through urging by the Commission revealed an improper case dismissal by military equal opportunity representatives.\textsuperscript{70} In addition to this incident, the Commission documented numerous instances of hostile work environments, many related to statements of cultural ignorance of Asian American traditions that resulted in intimidating or hostile behaviors. During the conduct of focus sessions, military equal opportunity representatives reported that they were significantly under resourced and unable to maintain support for the thousands of service members in a given unit. In the course of the review, DoD Inspector General reached out to the Commission in order to garner feedback from Asian American military members. Upon report of the incidents, no further actions by DoD were accomplished, and not contact was received.

DoD had taken some steps to address issues brought forth by various Asian American communities represented across the diaspora. However, given the diversity across various Asian American communities, the task proved to be an intense and laborious undertaking for DoD. Filipino American veteran advocacy groups were pursuing individual cases of World War II Veterans who had been denied benefits, dating all the way back to discriminatory policies put in place by Congress after World War II. Japanese American advocacy groups were involved with activities supporting the Nisei warriors of the 442nd, and the recommendation for award of the Congressional Gold Medal. Veterans from the U.S. Territory of Guam served at a rate greater than any U.S. state, yet received the lowest level of resources for care. As previously stated, the Sikh American community sought a change in policy for religious

\textsuperscript{70} Ibid.
accommodation, and regularly engaged the Pentagon on this issue. The frequency with which advocacy groups approached DoD posed resource constraints with the Pentagon and other military organizations. With little infrastructure to address key issues, there was a high propensity for leaders to conclude that the concerns of advocacy groups were external to mission readiness. The general sentiment among advocates was that Asian Americans were viewed as a model minority by the Pentagon, with few challenges that might require greater levels of support or resources.

The gap between issues of social reform and military mission readiness provided evidence that an Executive Dilemma existed. The DoD has developed infrastructure to affect changes according to demographic shifts in the military. Senior diversity officials, some by presidential appointment, were allocated in the Pentagon and throughout the DoD enterprise in order to address diversity policy.\(^{71}\) However, when viewed as an issue of social reform, the importance of diversity lost strength among similarly appointed leaders in more operational positions.\(^{72}\) As a result, social reforms and mission execution assumed decidedly separate pathways. The institutional divides, as described in Case Study Two, took hold and overshadowed new endeavors. Like the issue of drones, dismissal under competing hegemonies within the Pentagon was reality for diversity as a major personnel initiative. Therefore, the gap between the issue of social reform verses military readiness among senior leaders in DoD was significant enough to conclude that an Executive Dilemma existed. For example, in 2013, leaders in the Pentagon were reluctant to meet with members of the Sikh community on issues

\(^{71}\) Ibid.

\(^{72}\) Ibid.
of religious accommodation. After agreeing to a meeting to discuss policy issues, little progress was made. While subsequent meetings were polite and cordial, progress stagnated on substantive issues of policy reform. Leaders cited that competing priorities affecting military readiness took precedence. As a result of this sentiment, recruiting and retention programs neglected focus on the Asian American demographic changes that were taking place, and potential problems with existing policies.

Could the Nexus play a role in blending these two parallel and seemingly separate pathways between social reform and military readiness? For leaders during the 1950s, the negative impacts on troop morale caused by racial tensions, coupled with inequities in facilities and support infrastructure resulted in a change in their way of thinking. Leaders proceeded through the aspirational levels of decision-making, and concluded that a correlation existed between social reform and military readiness. Ultimately their decision to integrate came as result of the blending of two concepts that they had originally felt were distinct and disparate. Naysayers such as Senator Strom Thurmond fought to preserve this distinction in the 1950s and 1960s, arguing that social reforms were detractors to morale and subsequently hurt military readiness. Given the projected rise in the Asian American demographic, how could the Nexus be deployed to convince leaders that a correlation exists between the social reforms required for Asian Americans serving and mission readiness?

The White House Commission on Asian Americans sought out new ways to create awareness of the challenges Asian American military members face. Working

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with members of the community, the Commission helped support the celebration of Asian American religious festivals at military bases, including the Pentagon.74 Use of Social Media ensured events were widely publicized, both within the DoD news networks and with external news agencies. The objective of the efforts was to build awareness in the military community about the changing demographics in DoD, as well as the importance of understanding unfamiliar cultures. Events included the Indian festival of Diwali, which is celebrated by Hindu, Buddhist, Sikh, and Jain faith traditions.75 Vaisakhi is a holy festival traditionally celebrated in the Sikh faith tradition. Following discussion with the Pentagon Chaplaincy, leaders from the DoD welcomed the conduct of a Vaisakhi celebration.76 Key advocacy groups were captivated by the events, and took a broader interest in learning about the service of Asian Americans in the military. Senior DoD policy leaders such as the Secretary of the Army and Senior Generals were invited to the events, and gave speeches on the importance of cultural diversity. The events were advertised as open to the public, and encouraged all demographics to participate in the activities.

The humanities and arts remained an integral part of the events, which included a host of cultural and religious activities. Classic cultural dance performances and a


75 Ibid.

wide variety of musical activities showcased the beauty and depth of Asian American culture. Performances were accomplished by families of military members and offered a generational perspective on military service.\textsuperscript{77} Paintings and artwork were display at the events in order to capture the contributions and symbolism of military service and Asian American culture. Most importantly, Asian American veterans from previous wars told stories and shared their personal history of the Asian American military experience.\textsuperscript{78}

Eventually, use of the Nexus brought forth greater attention and awareness. Leaders such as the President and Vice President began including discussions of Asian American military members in their policy speeches.\textsuperscript{79} Soon leaders in the Pentagon followed suit by hosting discussions on key issues concerning service of Asian Americans in the military. The effort also received Congressional support. Added to the Congressional support, over one hundred former and current military generals signed a petition of support for religious accommodation for Sikhs seeking to serve in the military. With support building, the Secretary of the Army requested a study accomplished on the issue of readiness of bearded troops in the chemical biological environment, since naysayers contended that it was impossible for bearded soldiers to wear gas masks


\textsuperscript{78} Ferdinando, “DoD Celebrates,” May 4, 2015.

properly without leaks occurring. The results revealed little risk to bearded soldiers in maintaining a proper seal with their gas masks, which was presented as the top reason for allowing beards.

Application of the Nexus culminated in December of 2016, when the White House Commission on Asian Americans and Pacific Islanders convened the first National Forum for Asian American and Pacific Islander (AAPI) Military Members and Veterans. The event welcomed AAPIs from all military branches and ranks to Washington D.C. for a day of panel discussions and feedback sessions. Senior leaders in government attended the event, including the Secretary of the Army, members of Congress, and a number of Assistant Secretaries from the Pentagon. The forum marked the first time more than one Asian American military or veteran group gathered together. The gathering was also multi-generational, and included Filipino military members and family members of Japanese Americans that served during World War II. Active duty, reserve, and retired military officers also attended, to include senior generals. Added to this, mid-level and junior military members attended, ranging in rank from Lieutenant Colonel to Private. Culturally, attendees represented a diverse range of Asian American heritages, including Japanese, South Asian, Vietnamese, Filipino, and Chinese cultures.

80 Ibid.
81 Ibid.
82 Ibid.
83 Ibid.
84 Ibid.
The event blended the arts and humanities into the event with the use of cultural music, dances, historical accounts, foods, and story-telling (depicted in Figure 14). First of all, the event featured several cultural dance performances. The event opened with a traditional American fife and drum band. The band was adorned in traditional army dress from the Continental Army of 1776, reminiscent of national origins and symbolic of the values of the U.S. Constitution. Following this, members of the Indian American community performed a musical Punjabi folk dance called “Bhangra, as shown in Figure 14.”86 Performers dressed in their native costumes, wore traditional turbans, and used live drums to immerse the attendees into the cultural atmosphere of the forum.87

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86 Ibid.

87 Ibid.
lead choreographer introduced the cultural significance of the performance, and then shared his personal experiences as a family member of a military soldier. Attendees were also served a traditional Chinese meal, and were provided courses as a traditional Chinese family unit in order to invoke a sense of community.

Leaders also engaged in story-telling, from both a historical and personal perspective. The Army Secretary provided a historical foundation for the event by delivering a brief history of Asian Americans serving in the military.\(^{88}\) Other senior leaders shared first-hand accounts of their experiences as military members of Asian descent. Accounts were provided by Filipino World War II Veterans and family members of Japanese Americans detained during the 1940s.\(^{89}\) The humility displayed by the senior veterans provided a foundation for the courage of younger soldiers to share their experiences in various panel discussions. Subsequent discussions involved generational interactions between senior leaders and younger service members.\(^{90}\) The young soldiers’ personal accounts of their experiences informed senior leaders on burgeoning challenges in the Asian American military community, and at the same time established authenticity to their feedback. Asian American soldiers provided direct feedback to senior leaders on the challenges faced across the spectrum of service.\(^{91}\)

Despite being a governmental gathering, the forum did not shy away from the issue of religion within the military. The event was opened with a chaplain’s invocation,

\(^{88}\) Ibid.

\(^{89}\) Ibid.

\(^{90}\) Ibid.

\(^{91}\) Ibid.
presented in a secular format to ensure the faith traditions of all attendees were respected equally. This type of invocation is traditional for military chaplains, although occasionally invocations do take on themes geared toward individual faith traditions. Sikh soldiers were also in attendance at the event, and participated in key panel discussion. Of course, the topic of religious accommodation for various faith traditions consumed the majority of the discussion. Overall, the forum opened up a conversation with young service members on the importance of examining what their authentic spiritual needs are going forward. Senior leaders determined the potential for readiness gaps if a more diverse chaplain corps could not be trained.

During the second half of the day, the Commission blended the concept of scientific design into the forum. A professional facilitator trained in design-thinking led a session to collect feedback from junior service members, and build a future strategy for AAPIs military members and veterans. Senior generals and DoD civilian leadership partnered with the junior military members. The purpose of the session was to match executive leaders experienced in crafting strategic policy with the experiences of young military members. The group, which totaled approximately one hundred individuals, was arranged into smaller teams of ten. They took the time to brainstorm key problems faced by Asian Americans, and used a systems approach to develop potential root causes. Aided by senior policy leaders in Washington, the teams developed cross-functional strategies to address the challenges, as shown in Figure 15. Deployment of

92 Ibid.
93 Ibid.
94 Ibid.
the Nexus proved particularly useful, because it was able to employ a systems-engineering approach, followed by engagement and review of potential pitfalls due to the emergence of the St. Petersburg effect.

Figure 18. Applying Design Thinking to future military policy  
Source: Author Illustration

Did deployment of the Nexus yield positive results for the Department of Defense? While such a determination would be considered merely qualitative in nature, several observations were made that provided potential evidence that the effort was creating effects in the DoD enterprise. For example, the cultural performances and religious celebrations were followed with key policy discussions at the Pentagon. A task force was formed in order to conduct a review of religious accommodations in the U.S. military. The review caused a change in policy, allowing exceptions for members of the Sikh and Muslim faith to wear articles of faith such as turbans. Figure 16 summarizes how the Nexus was deployed to generate results in DoD diversity programs.
In this Chapter, four scenarios were presented in which the Nexus was deliberately deployed with the specific purpose of generating favorable outcomes. Use of the Nexus allowed the process of Horizontal Integration to occur among the leaders involved in the scenarios.

The advantage of this activity was that a new theoretical framework could be evaluated for its effectiveness in a real world situation. The four trials provided opportunities for exploration and feedback on key policy matters that could be influenced by leaders within their respective enterprises. In all three cases, the Nexus allowed leaders to build a more comprehensive understanding of the factors involved in their operating environment and account for their impacts. In the case of Artic Policy, leaders extended their knowledge beyond a simply technical approach to aviation and its impact on aviation safety. Decisions moved quickly through aspiration levels to satisficing when the capacity for cultural understanding was present. In the case of
drones and the FAA, the arts enabled leaders to extend their professional lens and view their relationship with other communities in a more collaborative light. Finally, use of the Nexus enabled leaders in the DoD to better inform themselves on the needs of Asian Americans serving in the military. Awareness of the pitfalls of the St. Petersburg principal enabled leaders to account for it, and proceed to satisficing in a more authentic manner.

At the same time there were also several limitations observed during deployment of the Nexus in the three scenarios worth mentioning. First of all, leaders were limited to applying concepts that were considered professionally acceptable within the norms of their enterprise. For example, embedding the direct application of a single faith tradition within the bounds of a given setting would be considered unacceptable. Such efforts had to proceed within the boundaries of a value-driven environment and within the acceptable norms of shared-values. Such an undertaking was easier for Arctic Policy and DoD diversity, where cultural issues were integral to the ongoing discussions. However, application with drones in the government setting of the FAA was more tenuous, and required more restraint. For example, use of the arts in taxpayer driven leadership exercises can be a controversial subject—therefore leaders preferred referring to the use of actors as “scenario based” simulations, which allowed leadership to bridge the gap with such a technical organization (despite the fact that such an endeavor was sanctioned in the leadership curriculum of government organizations such as the Federal Executive Institute).95

95 This observation was provided by a representative in the Federal Aviation Administration who was responsible for designing the Influencing a Performance Culture Course. The individual reported that once the artistic performance was
Second, deploying the Nexus in real-world situations can be limiting, since the responsibility for prudent management supersedes experimental objectives. Therefore, the full range of the Nexus was challenging to exercise. However, applying a new concept to a disparate field of inquiry may be more suited for enterprises that are small enough or ambitious enough to embed new frameworks into their executive leadership philosophy. As such, the exercise of the Nexus was dependent upon the enterprise and scenario that was chosen. In Chapter Six, the scenarios were admittedly geared toward policy improvements in government organizations. Therefore, future applications might consider choosing scenarios from non-governmental enterprises.

Third, the deployment of the Nexus was subject to the influence of the environments in which it was placed. The Nexus was designed to encourage leaders to enter a new intellectual space in order to mitigate the effects of the Executive Dilemma. However, the three key policy scenarios in this chapter presented complex environments. As with the three case studies in Chapter One, issues such as resource constraints, institutional biases, and competing sub-organizations all played a major role in perpetuating the Executive Dilemma. In the Arctic, competition for natural resources, lack of infrastructure, and adverse environmental affects created difficulties for leaders focused on solving technical problems. The sheer number of geopolitical interests among competing nations at stake made the complexity of environment even more tenuous. For the Federal Aviation Administration, complex stakeholder environments that contained competing regulatory requirements impeded the safe integration of

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presented as a ‘scenario-based’ simulation as opposed to the employment of artistic theater, it was accepted as a valuable approach. This highlighted the challenge of deploying the Nexus in a highly technical environment.
drones. Within DoD, long standing historical biases and a lack of familiarity with the cultural nuances of the Asian American diaspora are added to an already complex military bureaucracy. Despite these environmental challenges, the Nexus components of humility and courage enabled leaders to reconcile the threat that bounded rationality poses to innovation. When applied in the three scenarios, the Nexus empowered leaders to engage in complex environments (as opposed to compartmentalizing or even discounting them) and remain motivated to pursue authentic satisficing despite a complex environment. More importantly, it encouraged the convergence of disparate cultures in order to fight the schisms that can emerge between communities. Making decisions within the bounds of the Executive Dilemma can cause organization divides—divides that often go unnoticed when they have been mitigated effectively and proactively. In summary, deploying the Nexus showed that it is preferable to engage complexity and manage it before organizational schisms arise, rather than avoid it and risk the emergence of an Executive Dilemma—a recipe for inaction that caused catastrophic results in the case of NASA.
CHAPTER SEVEN
RESULTS, CONCLUSIONS, AND SUMMARY

An equation for me has no meaning…unless it expresses a thought of God.749

- Mathematician Srinivasa Ramanujan

The construction of new frameworks executive leaders can use to address the complexity of the information age is a daunting subject. The decisions leaders make on a daily basis can have consequences that create favorable or unfavorable results on a global scale. Often times it is merely the speed at which information can travel that amplifies potential consequences. In a globalized world, leaders contend with making strategic decisions to address the complex problems they face, and in some cases environmental constraints can go unrecognized. In the post-modern era, grand narratives supporting the efficacy of large institutions caused leaders to pursue self-interest as a strategy, which in turn influenced their decision-making.750 At times, this has inhibited the ability of leaders to develop new and innovative ideas designed to advance a given field of inquiry. Naturally, individual experiences of the leader, education, their respective field of study, and even their human value-sets are just a few of the areas that influence the decisions they make on critical issues.

This research project examined the case in which a leader makes a decision by relying on their chosen field of expertise as a foundation for their decision. Through an examination of three separate case studies, it was determined that problems can

emerge from using this approach. This phenomenon is termed the Executive Dilemma, denoting the inability of executive leaders to recognize that alternative solutions to problems may reside in another field of inquiry. As such, the case studies were presented to illustrate the potential for hazard, either physical or institutional, when executive leaders relegate their perspectives to a single field of inquiry. The case studies in this research were chosen for their relevance to the Executive Dilemma. The associated executive behaviors resulting from the Executive Dilemma might include organizational parochialism, excessive focus on localized interests, or extreme rivalries between peer organizations. In the case of NASA, the Executive Dilemma resulted in a catastrophic loss of life. In the Air Force, it resulted in delays in the development and integration of drone technology into the organizational structure of the military. The final case study unveiled an unlikely relationship between religion and economics that often goes unrecognized among economists. The three case studies illustrated how the Executive Dilemma can create problems for leaders, and warranted the deliberate development of a model designed to mitigate its effects. A subsequent review of the case studies revealed that the Executive Dilemma emanated from the tendency of leaders to rely upon rational processes when decisions actually required reconciliation of the complexities within the environment.\textsuperscript{751} Furthermore, rational thinking secluded leaders from pursuing solutions in disparate fields, as explained by the theories of Simon and Jung. Therefore, the research focused on delving into the underlying values and behaviors exhibited by executive leaders through the use to two important theories.

\textsuperscript{751} Ibid., 31.
by noted psychologists, Nobel Laureate Herbert Simon, and Carl Jung, often known as the father of analytical psychology.

**Results from Simon and Jung**

Subsequent chapters focused on using the theories of Simon and Jung in order to better characterize and explain potential root causes of the Executive Dilemma. The theories of Simon and Jung sufficiently characterized the problem and at the same time enabled the development of a lexicon that facilitated subsequent analysis activities. In essence, Simon tells us how the Executive Dilemma emerges, while Jung tells us why it occurs. When coupled with the experiences of historical leaders, a framework emerged that opened up a cognitive space that leaders might utilize in order to mitigate the effects of the Executive Dilemma. As such, the theories of Simon and Jung yielded the following results:

1. Decision-making consists of choosing between alternative courses of action. Often times the number and diversity of alternatives are dependent on the motivation of the decision-maker. Once the leader is convinced that enough alternatives have been considered, the decision is made—this is called satisficing. Aspirational adaptation is a process by which a decision-maker renews their desire to seek additional alternatives by ascending through levels of motivation.

2. Problems emerge when the leader has not proceeded towards satisficing in an authentic manner, and the process of satisficing is concluded prematurely, or without action. The leader has chosen a course of action without considering viable alternatives that may reside in another field of inquiry, thus bypassing important complexities leading to potential solutions.

3. There are a number of reasons why the process of satisficing can by disrupted. Certain human typologies are more resistant to new ideas, and thus the process of aspiration can arrive at satisficing pre-maturely. In other instances, organizational rivalries might prevent satisficing from occurring. Environmental constraints, professional competition, or even scarcity of resources can cause this to occur.
4. Ultimately, decision-making suffers from an absence of alternatives that may reside in another field of inquiry. This can lead to sub-optimal decision-making, or inaction leading to catastrophic outcomes.

5. While the leader does not intend for this to occur, the existence of the Executive Dilemma is difficult to detect or acknowledge. The theory of bounded rationality showed how rational thinking is limited, because the process of probabilistic optimization has difficulty accounting for the complexity of environmental conditions. As a scientist, Albert Einstein balked at the prospect that “God plays with dice,” and advised that leaders attend to complex environments with more than a probabilistic approach. The St. Petersburg Principle, when accounted for, can alert leaders to this phenomenon when it occurs. Recognizing this challenge, leaders have been deterred from engaging in this space, an occurrence that limits their ability to achieve authentic satisficing. While Einstein did not view the influence of God as probabilistic endeavor, he maintained an ideological alignment with the role of religion [in particular, Eastern religions such as Hinduism] as integral to understanding the philosophical impact of science. Einstein wrote, “I maintain that the cosmic religious feeling is the strongest and noblest motive for scientific research.”

Characterizing and analyzing the three case studies through in-depth analysis yielded the conclusion that the Executive Dilemma can be mitigated through the use of an interdisciplinary intellectual framework that accounts for more complexities than rational thinking is capable of mitigating.

**Results from the Nexus Riders**

In Chapter Four the lives of Thomas Jefferson and Steve Jobs were examined for possible remedies to the Executive Dilemma, as well as for potential elements of a new framework. Given the name, “Nexus Riders,” both Thomas Jefferson and Steve

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752 Ibid., 57.
753 Albert Einstein, *The World as I See It* (Snowball Publishing, 2014), 24. Einstein was an avid reader of the Vedas, or ancient Hindu texts. As with the Theory of Bounded Rationality, the Veda’s spelled out the limitations of human rationality, and stated that humans are limited by their imperfect perceptions and senses.
Jobs were able to innovate by cultivating new ideas using the Nexus between science, the arts, and religion. They regularly blended two or more fields that traditional leaders often maintain at an appreciable distance. A historical review of their personal and professional lives revealed the following results:

1. Both Jefferson and Jobs maintained a unique capacity for understanding two or more disparate fields of inquiry with enough depth that useful connections could be drawn between the fields. They also possessed an innate interest in these fields at an early age. This allowed them to cultivate a curiosity for applying knowledge in an interdisciplinary fashion.

2. Evidence suggests that both of these leaders possessed interdisciplinary abilities at a young age. Therefore, it is reasonable to conclude that human typology did play a role in cultivating their appreciation for multiple fields. Their innate curiosity for disparate fields led them to develop a simultaneous understanding of science, the arts, and religion that enabled them to innovate.

3. Both Jefferson and Jobs blended two or more fields that were traditionally considered too disparate by many other experts in their chosen fields. However, a determination on whether Jefferson chose to deliberately approach problems in this manner, or whether he simply possessed a natural desire to do so was inconclusive. The review of Jobs produced a different observation. Evidence from Walter Isaacson’s biography of Steve Jobs does suggest that that Jobs was aware of this as an approach and deliberately pursued the blending of science, the arts, and religion as a method of innovating new ideas.

4. An examination of both Jefferson and Jobs revealed potential constructs for mitigating the effects of the Executive Dilemma. As defined in Chapter One, the Executive Dilemma is characterized by the failure to recognize that alternative solutions may reside within another field of inquiry. The associated behaviors resulting from the Executive Dilemma might include parochialism, confirmation bias, or deference to self-interest. Evidence suggests that both Jefferson and Jobs were able to successfully overcome these elements with their ability to operate on the Nexus. Jefferson and Jobs were able to advance concepts, ascend through levels of adaptation, and legitimately proceed to satisficing by blending two or more disparate fields of inquiry.

5. In the course of the historical examination, the role of human curiosity and its ability to develop personal intuition became an important area of focus. Jefferson wanted to bring both literacy and science to the masses, and it was his personal intuition that led him to conclude that this was foundational to the success of a
Likewise, Jobs’ personal intuition served as his primary guide in decision-making. It manifested through his pursuit of endeavors such as personal electronic devices that were not only affordable to the masses, but intuitive for all ages.

The historical conclusions from the personal and professional lives of Jefferson and Jobs, supported the construction of a framework designed to mitigate the Executive Dilemma. Science and the arts provided an important starting point for an interdisciplinary framework. However, the role of religion in each of their lives provided evidence that a new framework should include a third component prominent enough to influence decision-making as a proposition grounded in human religious values.

**Conclusion: The Nexus as an Interdisciplinary Framework for Problem-Solving**

Construction and use of the Nexus is an argument for applying interdisciplinary approaches to problem solving. The Nexus is an interdisciplinary framework executive leaders can use to address decision-making challenges. It is designed to mitigate the effects caused by the Executive Dilemma, particularly when solution sets exist in a disparate field unknown to the leader. It challenges executive leaders to construct a three-dimensional space for finding interdependencies and creating something new. Naturally, the Nexus is not a polemic on specialized research, or rational thinking. Rather, it seeks a more inclusive approach to decision-making, one that accounts for the myriad of effects caused by bounded rationality and human typology. The following conclusions were drawn from development and implementation of the Nexus:

1. The Nexus allowed leaders to build a more comprehensive understanding of the factors involved in their operating environment. In the case of Arctic Policy, leaders extended their knowledge beyond a simply technical approach to aviation. Decisions moved quickly through aspiration levels towards satisficing when the capacity for cultural understanding was present. In the case of drones

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and the FAA, the arts enabled executives to broaden their professional lens and view their relationship with other communities in a more collaborative light. Finally, use of the Nexus enabled leaders in the DoD to better inform themselves on the needs of Asian Americans serving in the military.

2. The Nexus components of humility and courage enabled leaders to reconcile the constraints that bounded rationality poses to innovation. When applied in the three scenarios, the Nexus empowered leaders to engage in complex environments and remain motivated to continue the process of satisficing. More importantly, it encouraged the convergence of disparate organizational cultures in order to fight the schisms that can emerge between communities when resources are constrained.

3. While the Nexus proved effective in mitigating potential Executive Dilemmas, several limitations were observed in the scenarios it was deployed in. First of all, leaders were limited to applying concepts considered professionally acceptable within the norms of their respective enterprises. For example, direct application of religious traditions within the bounds of a given setting would be considered unacceptable in government scenarios. Such efforts had to proceed within the boundaries of a value-driven environment, and within the acceptable norms of shared-values within the enterprise. The undertaking was easier for Arctic Policy and DoD diversity issues, where cultural norms involving faith traditions were integral to the ongoing discussions. However, applications with drones in the government setting of the FAA were more tenuous, and required a degree of restraint. Furthermore, use of the arts in taxpayer-driven leadership exercises would be a controversial subject. Therefore, leaders preferred to refer to the use of theater actors as “scenario based simulations,” which allowed leadership to bridge the arts with technical activities.

Second, in certain instances the responsibility for prudent management superseded experimental objectives. Therefore, the full range of the Nexus was challenging to exercise. However, applying new concepts to a disparate field of inquiry might be more suited for enterprises that are small enough and willing to embed new frameworks into their executive leadership philosophy.

Third, the deployment of the Nexus was subject to the influence of the environments in which it was placed. The Nexus was designed to encourage leaders to enter a new intellectual space in order to mitigate the effects of the Executive Dilemma. However, the key policy scenarios presented complex environments. Would the Nexus prove resilient enough to overcome this austerity? As with the three case studies in Chapter One, issues such as resource constraints, institutional biases, and competing sub-organizations all played a major role in perpetuating the Executive Dilemma. In the Arctic, competition for natural resources, lack of infrastructure, and adverse environmental effects created difficulties for leaders focused on solving technical problems. The sheer number of geopolitical interests among competing nations made the complexity of environment even more challenging. For the Federal Aviation Administration, complex stakeholder environments that contained competing regulatory requirements impeded the safe integration of drones.
Within DoD, long standing historical biases and a lack of familiarity with the nuances of the Asian American diaspora are added to an already complex military bureaucracy. While the limitations were important to note for future research, the Nexus enabled leaders to account for and engage complex issues. This is a marked improvement over rational theory, where leaders might refrain from engaging the complexity, and instead make the mistake of proceeding to satisficing without the benefit of examining a broader field of options.

**Future Research Considerations**

Deployment of the Nexus demonstrated the value of constructing frameworks capable of generating new alternatives for leaders posed with the Executive Dilemma. The examination represents a first step in the development of interdisciplinary techniques executive leaders can use to improve decision-making and innovation. The following recommendations are presented for future research:

1. Historical research on leaders such as Jefferson and Jobs should be expanded to additional leaders in order to better understand how the Nexus can be used. The effort can also lead to the construction of more sophisticated frameworks capable of addressing the Executive Dilemma.

2. With the exception of Religionomics, the scenarios used to deploy the Nexus in Chapter Six were limited to government enterprises. However, the executive survey provided important insight on the propensity for leaders in the private sector to use the Nexus. Senior executives in the private sector strongly supported use of the Nexus in order to influence their decision-making ability, and mitigate the Executive Dilemma. Leaders in small businesses as well as large enterprises can benefit from applying the Nexus to their enterprises. Since the Nexus is intended for use by all Executive Leaders, future research should incorporate scenarios from non-governmental entities represented in industry.

3. While the real-world scenarios put the Nexus through its paces, the limitations noted in the previous section prevented experimentation of the full range of the Nexus’ capabilities. Future research should consider stretching the capabilities of the Nexus framework using controlled experiments. Additionally, such a framework can be used to develop architectures that leverage emerging technologies in the information age, such as artificial intelligence, big data, cloud computing, or mobile applications.

4. May leaders construct their own Nexus? Yes. Given the foundational challenges posed by the theory of bounded rationality, it would be difficult to argue otherwise. Jung’s theory adds to this complexity, and provides evidence that leaders and their teams may be pre-disposed to a given direction. For that
reason, artificially imposing three set fields of inquiry could induce another Executive Dilemma [thus contradicting the foundational premise of the research]. Therefore, it is important to understand that leaders should retain the freedom to construct their own framework. This exercise itself might open the doors for institutions, market forces, or even internal rivalries to constrain the efforts. However, the knowledge and awareness of interdisciplinary approaches like the Nexus should assist with a step-by-step approach to cultivating a community of practice capable of mitigating impure influences that lead to the Executive Dilemma. Thus, the very act of engaging complexity, as opposed to truncating or compartmentalizing it, would be beneficial to leaders.

At a very minimum, the Nexus offers an important starting point for leaders to get started with the engagement process. Those wishing to tailor their approach are encouraged to do so. As a practical measure, leaders may choose to start with their own case studies, apply a theory other than Simon or Jung, select Einstein or Marie Curie as leaders (as oppose to Jobs and Jefferson), then construct a new framework. As such, it is analogous to the process of choosing the right statistical distribution to model a physical problem. The leader has the option of starting anywhere in process and replicating the approach where he or she chooses. However, the core principal is to arrive at a “Nexus” that can build confidence in addressing a singular, or series of executive problems.

**Summary**

Seven years before NASA’s Challenger disaster, Jean Francis Lyotard wrote, “We are all stuck in the positivism of this or that discipline of learning, the learned scholars have turned into scientists, the diminished tasks of research have become compartmentalized, and no one can master them all.”756 The experiences of an executive leader, their respective field of study, and even their human value-sets are just a few of the areas that influence the decisions they make on critical issues.

However, a condition emerges in which a leader may not have complete access to all viable courses of action. This research asked the fundamental question: What if the optimal solution to the problem resides in a field of inquiry other than their own? If the leader is faced with an Executive Dilemma, decisions can limit innovation, or even have catastrophic results.

This research looked at this problem through the lens of three case studies, reviewed the historical experiences of two prolific executives, and proposed a new approach to avoiding gridlock—the application of an intellectual framework called the Nexus. The Nexus is designed for leaders to blend science, the arts, and religion, in order to broaden their decision-making capabilities. This three-dimensional access is designed to establish an interdisciplinary bridge to human values in decision-making by utilizing three disparate fields of inquiry. The Nexus was deliberately applied to four real-world scenarios, which revealed potential benefits for executive leaders that apply its elements. Through education, application, and practice, leaders may apply the Nexus to daily challenges, and avert the Executive Dilemmas that emerge within complex environments.


