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Empowering The Enemy: The Cold War And The East-West Battle For Information Superiority, 1945 - 1969

Stan Trembach
University of South Carolina

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by

Stan Trembach

Bachelor of Arts
Samara State Pedagogical University, 2002

Master of Arts
Clemson University, 2004

Master of Library Science
University of North Carolina – Chapel Hill, 2006

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Accepted by:

Samantha K. Hastings, Major Professor

R. David Lankes, Committee Member

Patricia E. Feehan, Committee Member

Charles Bierbauer, Committee Member

Cheryl L. Addy, Vice Provost and Dean of the Graduate School

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ABSTRACT

This comparative study employs a historical perspective to narrow the gap in the existing knowledge of the origins of an information explosion phenomenon that dates back to the early decades of the twentieth century. It argues that the root cause of the unprecedented growth of the overall amount of documents was the rapid expansion of scientific and technical advances across the world and the subsequent spread of modern technologies, particularly those applied to scientific and technical information (STI).

This research is based on the premise that the thriving of the Soviet military-industrial complex went hand in hand with the rise of the STI management system in the mid-twentieth century United States. However, the specific nature of that two-way relationship has been insufficiently studied, in part due to information isolation and the scarcity of original sources. Reflecting the regime in place, the Soviets and the Western world pursued a unique course in managing STI. Using a number of primary and secondary sources, this research examines the Soviet centralized system of tightly regulated government control over information versus an amalgam of various U.S. agencies, jurisdictions, private and even academic institutions playing a role in STI gathering, storage, and dissemination.

Overall, by exploring the practices of a range of the U.S. and Soviet information agencies, this research throws additional light on how the United States and the Soviet Union handled the Cold War information overload. In doing so, it opens up new

educational opportunities and informs our judgment about the challenges and possibilities in scientific and scholarly research brought about by today's global information age.

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LIST OF ABBREVIATIONS

AEC.....Atomic Energy Commission

FIAT.....Field Information Agency; Technical

NDRC ..... National Defense Research Committee

NFAIS……National Federation of Advanced Information Services

NSF ..... National Science Foundation

NTIS.....National Technical Information Service

OSS ..... Office of Strategic Services

OTS .....Office of Technical Services

PSAC.....Presidential Science Advisory Committee

STI.....Scientific and Technical Information

TIIC.....Technical Industrial Intelligence Committee

USIA .....United States Information Agency

VINITI ..... All-Union Scientific and Technical Information Institute

CHAPTER 1

INTRODUCTION

Every era has its defining moment. Arguably, the Cold War period that ensued in the wake of World War II saw this moment in 1957 when the governmental, scientific, and scholarly establishments in the United Stated were perturbed by the successful launch of the Sputnik satellite by the Soviet Union, their political arch-rival for over a decade. For all its symbolic significance, Sputnik was not the first or the only wake-up call for the West. Less than two years before Sputnik, Rudolf Flesch warned American educators that the U.S. educational system was in jeopardy of failing to instruct students in basic academic skills, such as reading and literacy (Flesch, 1956). While the first reaction to Flesch's diatribe was that of skepticism, seeing the Soviet satellite as it crossed the sky brought home a tangible issue. Not only were American students failing their literacy tests, but there was now a distinct need to keep the United States as a nation on par with booming Soviet science, mathematics, and space technology (Graves & Dykstra, 1997). The launch of Sputnik marked the pinnacle of the ongoing transcontinental race for superiority in many areas, most heralded of them being the Space Race. One of the often-overlooked, but most influential of these areas was information dominance. The East and the West treated information, especially information related to science and technology, in diverse ways, which impacted the development of social institutions, ideological stances, and political agendas in both regions.

1.1 Statement of the Problem

The Cold War was a period of competition, tension, and conflict between the United States and the Soviet Union. As such, it was too complex of a socio-political phenomenon to be described in a concise fashion. In the most general of terms, it was about the effectiveness in the use of resources for research and development. Both sides saw a dramatic expansion of state-funded science and technology research. Government and military patronage shaped Cold War techno-scientific practices, imposing methods that were project oriented, team based, and subject to national security restrictions. These changes affected not just the arms race and the space race but also general research in agriculture, biomedicine, computer science, ecology, meteorology, and other fields.

There exists a substantial body of literature discussing the post-1945 U.S. – Soviet relations. The sources cover in great detail seemingly every facet of that relationship--military, economic, cultural, historical, political, as well as philosophical. This research takes a somewhat different approach. It posits that in addition to the above-mentioned aspects, the Cold War was also about the race for information superiority that stemmed from the unprecedented growth midway through the twentieth century of the overall amount of documents, particularly scientific and technical information (STI). In the post-War United States, a number of federal establishments attempted to develop their own strategies of keeping the information overload in check. Such increased attention resulted in the steady government support of research and development related to information problems and solutions.

Eastern Europe saw an almost parallel development as the Soviet Union had emerged by the 1950s as a powerful military and economic force that sought to establish

its superiority over the West in a number of areas, including management of its vast amount of information resources (Caponio, Bracken, & Feinstein,1990; Tsvetkova, 2008). The Soviets succeeded in the latter, particularly after the state-run VINITI (All-Union Scientific and Technical Information Institute of the Academy of Sciences of the USSR) came into existence in the early 1950s.

In the framework of the Cold War, VINITI as the embodiment of centralized orderly power was repeatedly brought up in the Western world as a challenge needing a response, although much of its operations remained hidden behind the "Iron Curtain." Although there exists a widely-accepted postulate that the Cold War and the Soviet military-industrial complex spurred the rise of the STI management system in the mid-twentieth century United States (Pospelov & Pospelov, 1990), the specific influence of the Soviet STI has been insufficiently studied. The paucity of interpretive scholarship is due in part to information isolation and meager original sources, the majority of which have been published in the Russian language to never be translated into English. Therefore, little is actually known about the influence of the Soviet experience on the development of American STI and the institutions that were charged with its management. There is also a lack of systematic knowledge regarding the reactions on the U.S. soil to how the Soviets approached managing their scientific, research, scholarly, and technical information.

The conceptual differences in STI management manifested themselves in a rigid and monolithic system on the Soviet side that stood in stark contrast with a ramified array of somewhat compartmentalized American agencies, each of which dealt with its own area of focus. Indeed, the Soviets assumed tight control over all their information output

through consolidation and central control in one agency, VINITI, as well as state-controlled libraries. In the West, however, the United States government allowed several departments to handle their own documentation, including its storage and release. In addition, state and municipal libraries, as well as numerous private libraries, differed in their practices regarding document handling and dissemination. Therefore, the crux of this study lies in comparing and contrasting the two information handling styles, centralized vs. decentralized, to ascertain their impact on society at the time, as well as to establish the implications for devising information crisis management strategies in a modern Internet and social media-savvy world.

1.2 Background: The Global Information Crisis Ensues

The Soviet Union and the United States had a long history of antagonizing each other through political maneuvering, military coalitions, espionage, propaganda, arms buildups, economic aid, and proxy wars between other nations in the Eastern and in the Western blocs. The two nations fought as allies against Nazi Germany during World War II. But the alliance began to crumble rapidly as soon as the war in Europe came to an end in May 1945. As the Soviets tightened their grip on Eastern Europe, the United States embarked on a policy of containment to prevent the spread of Soviet and Communist influence in Western European nations. The tensions resulted in a prolonged and highly politicized confrontation that began in the mid-1940s.

One of the possible interpretations of the information explosion is one that is grounded in politics. Adolph Hitler, a master manipulator of people's will, recognized the power of information when he wrote in *Mein Kampf* that "the art of propaganda [controlled information dissemination] lies in understanding the emotional ideas of the

great masses and finding, through a psychologically correct form, the way to the attention and thence to the heart of the broad masses" (Hitler, 1925, p. 165). In other words, manipulating information so that it elicits the desired response can be viewed as crucial to attaining and cementing political power. Thus, governmental control (or lack thereof) over information plays a paramount role in the perception of the populace, thus assisting or obstructing whatever policies, programs or plans the government wishes to enact. While political propaganda is beyond the scope of this study, it recognized the fact that the significance of governmental control over scientific and technical information became particularly apparent during the Cold War era.

The Cold War represented the time following World War II when democracy and communism butted heads, with potentially lethal outcomes. Inspired by and building on the technological prowess of Nazi Germany, both sides were experiencing a huge technology push. It can be safely said that World War II profoundly transformed the techno-scientific discipline. The results of scientific activity started to play an increasingly important role in shaping the outcome of world developments. Scientists themselves grew into national heroes as a nation's strength came to be determined equally by military might and by scientific capability. Yet, despite the growing prominence of science on the national and international scene, a significant problem reaching emergency proportions plagued all scientific disciplines (Kevles, 1995). This internationally recognized problem was truly universal as it concerned all scientists who faced the need to deal with exponentially increasing numbers of books, journals, and conference papers (Mikhailov, Chernyi, & Giliarevskii, 1985). This overload threatened to burden individual researchers with so much documents waiting to be processed that

they feared they would be left unable to advance their own ideas, thereby ending or compromising the future progress of science.

Thus, the outburst of scientific knowledge concomitant with the war effort was one of the most significant intellectual concerns of the twentieth century. Indeed, the scientific mobilization and effort for the war was directed single-mindedly toward military success. Consequently, much of that work was classified as secret. However, with the end of the war and the loosening of governmental secrecy bans, a large body of research was made available through publications (Harris, 1995).

Immediately following World War II, the Cold War played a key role in heightening the sense of an information crisis. This perception was exacerbated in the United States by the stunning success of the Soviet Sputnik satellite in 1957 (Colwell, 2008). The Sputnik launch brought home the realization that American space engineering was falling behind that of its Communist counterparts. It then impelled the United States to enact reforms in science and engineering education so that the nation could regain technological ground it appeared to have lost to its Soviet rival. Furthermore, evidence of a vast centralized information network at the Soviet All-Union Institute for Scientific and Technical Information (VINITI, or *Vsesoyuznyi Institut Nauchnoi i Tekhnicheskoi Informatsii*), greatly concerned U.S. scientists. Reports indicated that this Institute employed twenty thousand abstractors and translators to effectively disseminate information to Russian scientists and engineers (Sharp, 1965). This centralized government information service seemed to be a huge step toward ameliorating the information mismanagement problem on the Soviet soil.

The information crisis that emerged after 1945 stemmed from the natural perception at the time that scientific growth was out of control. This natural state of growth, coupled with the circumstances surrounding the end of World War II and the imminent Cold War, gave rise to the crisis-like state of affairs on the information scene world over.

1.3 The German Influence: 1939-1945

In such conditions, Germany continued to act as a "role model" both the United States and the Soviet Union kept an eye on when it came to advancements in science and the technical documentation used to describe those. As World War II was gradually winding down, the race ensued between the Soviet Union and the United States to seize as many German scientists as possible in anticipation of the Cold War. Those efforts were to be expected since Germany had entered the Second World War with centuries-old reputation for scientific and technological leadership, a reputation that was barely tarnished by the outcome of the war (Kevles, 1995). To produce cutting-edge means of warfare, to prepare for fighting for world domination, Hitler's Germany adopted in I936 a four-year plan of military and industrial development for its economy and armed forces. In I943, having suffered a crushing defeat at Stalingrad, it declared total war and completely militarized the economies of the Third Reich and enslaved countries. Any achievements in science and technology were promptly used in the development and serial production of new types of weapons (Irving, 2005).

In the United States, early attempts at extracting German science and technology for industrial purposes were mired in the quagmire of overlapping jurisdictions, military and civilian organizations, codenames, and multiple bureaucratic lines of authority.

President Truman issued Executive Order 9568 on 8 June 1945 instructing the Department of Commerce to establish a Publication Board under its Office of Technical Services (OTS), which would be responsible for releasing to industry all scientific and technical information developed by the United States during the wartime, pending declassification and national security limitations. Executive Order 9604, issued 25 August 1945, expanded the scope of these orders to include the publication of 'enemy' science and technology (Adkinson, 1978).

Most of the history of U.S. efforts at technical exploitation can be focused on just a few agencies. Technical Industrial Intelligence Committee (TIIC) and Field Information Agency; Technical (FIAT) shared personnel and had functionally identical missions, each assigned to coordinate the efforts of other groups, with the primary functional difference being that TIIC was stateside and FIAT based in Germany. The Department of Commerce's Office of Technical Services, headed by John Green, was the public face of these efforts, advertising completed FIAT reports to industry and issuing press releases to inform the public.

Operation Paperclip has attracted by far the most public attention, both in terms of reactions at the time and in subsequent, popular exposes and academic histories of the hiring of Nazi scientists. Germany’s precipitous losses in logistical advantage manifested themselves in the second half of World War II, despite early multiple attempts to conquer the Soviet Union with Operation Barbarossa, the Siege of Leningrad, and the Battle of Stalingrad. One of the more noteworthy outcomes of the failed conquest was utter depletion of the German military-industrial complex and other resources. To combat this new threat, the German government began by early 1943 to recall from the front line a

number of scientists, engineers, and technicians. Those specialists returned to work in research and development to bolster German defense for a prolonged war with the Soviet Union (Braun, Ordway III, & Durant, 1985). Many, like Werner von Braun, were members of the Nazi Party and the SS and had worked in Germany's rocket development program. To re-establish their eligibility for scientific work, the Nazi government needed to ascertain their political and ideological reliability. Those who cleared the government check were placed on the so-called Osenberg List which came to include the crème de la crème of the German military science (Forman & Sanchez-Ron, 1996).

Although it was by mere accident that the Osenberg List eventually reached the U.S. Secret Intelligence Service, it turned out to be one of the most prized possessions for the Research and Intelligence Branch of the U.S. Army Ordnance Corps as if the future of U.S. superiority in everything from chemical and biological warfare to its space program depended on gaining these German brains (McGovern, 1994). Small wonder, therefore, that following World War II, the Office of Strategic Services (OSS) wasted little time to move about 1,500 other scientists, technicians, and engineers to the United States as part of Operation Paperclip. Since a sizeable portion of them were genocidal rocket-science geniuses and doctors who stood behind murderous medical experiments at concentration camps, the Central Intelligence Agency deliberately changed their identities to conceal any association with the heinous Nazi crimes. Their records as war criminals were classified for most of the twentieth century in order to prevent prosecution or extradition by foreign and domestic entities including the American Justice Department (Ordway & Sharpe, 1979).

As a result of Operation Paperclip, hundreds of former Nazi Germany technologists were officially put on the U.S. payroll. At present, it seems problematic to objectively assess the value-to-evil ratio of that well-executed campaign to boost American science and technology. It is highly doubtful, though, that without the influx of ex-Nazi brainpower, America would have had a much longer and more convoluted road to becoming the world's superpower that fully capitalized on the information obtained from the Germans related to major advances in science, military craft, and medicine.

Successful efforts to seize not only German manpower and equipment but also information gave the United States hopes of gaining strategic advantage over the Soviet Union and taking the lead during the early years of the ensuing Cold War. The Soviets were not to be outdone, however, as the victors in World War II made ample use of Germany's discoveries in science and technology in their own scientific, economic, and military spheres. When in 1943 the German leadership realized that there was little to no hope of winning the war with conventional weapons and started allocating the necessary funds and resources into the total war effort, time had been hopelessly lost. The Allies, spearheaded by the Soviet Union, bombed German laboratories, the territories under Germany's control continued shrinking, and there was lack of coordination between scholars attached to various departments of the once immensely powerful scientific mechanism dating back to the 1930s.

Overall, the impact of Nazi Germany was undeniably significant for global progress in science and technology, particularly in the military sphere. As soon as the war was over, a number of German inventions, projects and developments were seized by the leading winning powers, first and foremost the United States and Great Britain, and to a

lesser extent, the Soviet Union. Wernher von Braun brought to the United States his records, plans, and specifications. His subsequent work in the American interests resulted in the appearance in this country of intercontinental ballistic missiles, cruise missiles of varying ranges, and finally, of the carrier rocket for man's flight to the Moon (Neufeld, 2007). To his credit, von Braun channeled his engineering genius into a more peaceful and ultimately pro-American cause. He had dreamt of space travel and planned to constructing a manned space station that would function as a base for further space exploration and as a battle station and orbiting reconnaissance platform to achieve "space superiority" over the Soviet Union (Braun, 1953).

In all fairness, it has to be said that the design of intercontinental ballistic missiles in the Soviet Union also started with a detailed study of the service forms and records and design features of V-l and V-2 missiles captured by the advancing Soviet troops in Germany, as did the creation of the carrier rocket for outer space later (O'Brien & Sears, 2011). The entire set of engineering data on controlled nuclear reactors and the nuclear bomb was carefully removed from the German territory by the U.S. and British intelligence, and documents pertaining to controlled nuclear reactors landed in the hands of the Soviets. Thus, the development of science and technology, especially in the scientific and military spheres, by the two major Allied powers was to a considerable extent influenced in the post-war period by scientific discoveries, engineering and technological ideas and inventions of Nazi Germany.

The large-scale proliferation of science and technology went hand-in-hand with the significant expansion of scientific and technical information (STI) produced by the burgeoning American, as well as Soviet, science. Handling of STI mirrored the extremes

of the two polar political doctrines themselves. Using a centralized system to gather, hold, and release STI gave the Soviets complete control over how their scientific documents were used. In addition, even the use of the Soviet library system worked for propaganda purposes against the United States and the Western bloc (Richards, 2001).

One of the major issues troubling experts of the day was the sheer mass of material being churned out in printed form. Some thought that the Soviets were better equipped to handle and make use of this data (Mackay, 1954) compared to the processing capabilities afforded by the siloed system in the United States. It was as if information was becoming too plentiful and therefore nearly unmanageable. The library system in particular was a target for such criticism, and it even became the topic of doom-and-gloom writers (Toffler, 1970). The idea that STI would overwhelm the United States, while the Soviets had it covered efficiently was the root cause of the feeling of inadequacy in science and education that came to the forefront of the U.S. national agenda, particularly in the wake of the Sputnik launch in 1957.

The handling of STI during the Cold War was influential in terms of the formation of public opinion and governmental response to a different ideology. It was also reflective of a larger trans-Atlantic societal clash. While conflicts are usually associated with violence, and almost always with struggles, handling of information can also be viewed as a force that fueled the said conflict. Therefore, the following research questions and sub-questions will be considered through the lens of the conflict theory put forth by sociologist Lewis Coser. Incidentally, Coser's conflict theory was developed concurrently with the Cold War. In fact, one of his major works was published in 1957, the year of the Sputnik launch, when American society felt a distinct pressure to mobilize

its intellectual capital in the face of an apparent scientific and technical information war with the Communist Soviet Union.

1.4 Research Questions

This dissertation focuses on issues of scientific and technical information management in the context of the Cold War. There exists an extensive and still growing body of literature analyzing the political, ideological, and various societal aspects of the confrontation. However, far fewer sources center on the outburst of STI and strategies to keep the growth of information in check during the heat of the Cold War. The purpose of the research is to narrow the gap in the existing knowledge through an investigation of the evolution of information crisis as a unique phenomenon of the mid-twentieth century.

The main question posed in this study is: Why did the United States and the Soviet Union go separate ways in their quest to manage the information overload and achieve information dominance? What prompted them to choose completely different means to essentially the same end?

In this study, information overload is presented as a viable concern recognized in twentieth century political and scholarly circles, as well as in society at large. As mathematician and philosopher of science Norbert Wiener pointed out, the motto of the post-war world was ‘to live effectively is to live with adequate information’ (Wiener, 1948). More specifically, for Wiener modern life placed greater demands than any previous era on the process of exchanging information. In light of the escalating concerns that too much information could be just as dangerous as not enough, it is critical to

examine the efforts to control the communication of information, which became a major focus of both U.S. and Soviet Cold War policies and various STI management agencies.

In order to answer the main question in this study, the work of the following agencies is examined:

- National Science Foundation
- National Technical Information Service
- Atomic Energy Commission and, on the Soviet side,
- VINITI, or the All-Union Institute for Scientific and Technical Information.

Additionally, to gain a more in-depth understanding of the issue under the investigation, a series of sub-questions are posed:

1. What was the impact of the Cold War (delineated herein from 1945-1969) on information production in general, and specifically in relation to the scientific and technical areas?

2. What was the effect of multiple independent departments and jurisdictions each dealing with their own specific concerns regarding information gathering, processing, storing, and utilizing in the Cold War era United States?

3. What was the effect of the highly centralized government on information gathering, processing, storing and utilizing in the Cold War era Soviet Union?

4. To what extent can the handling of STI during the Cold War era inform scientific and research data-handling processes in the digital age?

1.5 Significance of the Study

The enthusiastic emphasis placed on the production of scientific and technical information in the second half of the twentieth century has led to a crucial problem. A culture which so highly values information is inevitably going to face the problem of information excess. Since World War II, the fear of too much information has become one of society's most significant, yet historically neglected, intellectual concerns. Those who have addressed this phenomenon from a contemporary perspective have nearly all argued that the information explosion represented a problem for society (Richmond, 2003). Most frequently, such arguments revolve around the idea that the information explosion threatened the progress of science, the future of democracy, the existence of libraries, and human intellectual health. Indeed, many in government, science, and industry believed that the Soviet supremacy in science and technology represented the first falling domino in the demise of democracy.

While there was a real increase in the production of information during the Cold War period, it would be erroneous to single it out as the sole threat to the futures of science, democracy, libraries, or human civilization itself. This research does not deny the problem of information explosion that resulted from an apparent inability to control the publication of books, journals, and reports which emanated everywhere from scientific laboratories, industrial organizations, medical research, military intelligence, government hearings, legal cases, and humanistic scholarship. Instead, what this research does strive to accomplish is to depict information explosion as a relatively positive

phenomenon that caused immense growth in STI management capabilities developed in the aftermath of the Second World War by the United States and the Soviet Union.

Therefore, the historical phenomenological research described herein is untouched scholastic territory. It aspires to take a critical look at the past, at the time when the Soviet Union and the United States—two superpowers holding diametrically opposed views on how to organize human society at both the state and the international level—fought to establish their hegemony in the information realm as a means of advancing their political and social agendas. The intended result is to underscore how important it is to retrospectively analyze (and understand) the roots of the battle for information supremacy that transpired in the latter part of the twentieth century.

1.6 Definition of Terms

Atomic Energy Commission (AEC): Established in 1946, this was a commission within the United States executive branch that placed control over the nuclear development that had led to the bombings at Hiroshima and Nagasaki into civilian hands. Along with its legacy as the agent of nuclear weaponry, however, the AEC played an important part in research, particularly ecologic and bio-environmental research near the Arctic (Mazuzan & Walker, 1985). The agency was abolished in 1974, under fire for lax environmental protections. It was succeeded by the Energy Research and Development Administration and the Nuclear Regulatory Commission. Much of its purview is now subsumed under the mantle of the Department of Energy, spawned more out of concern about fossil fuel shortages than nuclear control, but created in 1977 by President Jimmy Carter and active to this day.

Cold War: Technically the state of non-aggressive conflict that existed between the Communist bloc, headed by the USSR, and the democratic or Western bloc, headed by the United States, following World War II. Many designate the fall of the Berlin Wall in 1989 and disintegration of the USSR into Russia and other nations as the end of the Cold War (LaFeber, 1991). For purposes of this research, however, due to its emphasis on scientific and technology information, the end will be considered 1969, when the United States succeeded in sending humans to the Moon, thus effectively ending the rush for technological superiority that had obsessed many Americans since the Soviet launch of Sputnik just over a decade earlier.

Information Explosion: Proliferation of information available to the public that, for purposes of this study, began prior to World War II but rapidly accelerated during the Cold War period, prompting governments on both sides of that conflict to determine methods of dealing with the abundance of information as best suited their political and other agendas.

National Science Foundation (NSF): Founded in 1950 as an outgrowth of the scientific movement that prevailed during World War II, this organization is a federal agency dedicated to the support of fundamental research and education in all scientific and engineering disciplines. Charged with making certain that the United States maintains leadership in scientific discovery and the development of new technologies, the NSF has over time provided funding for thousands of distinguished scientists and engineers to conduct groundbreaking research.

National Technical Information Service (NTIS): This is a division within the Department of Commerce that contains federally funded reports collected in the fields of science,

technology, engineering, and related disciplines, made available to all users with additional search services offered for various subscription fees.

Scientific and Technical Information (STI): Information developed in pursuit of science, technology or related fields in education and commerce.

Sputnik: The first manmade satellite successfully launched by the Soviets into space from Earth in October 1957. Its unexpected success awakened concerns over scientific and technological inferiority on the part of Americans and was a major part in instigating the "Space Race" that defined the Cold War era competition between the Soviet Union and the United States. In fact, Sputnik not only caused alarm in Americans that they were behind the Soviets in progress, it also helped bring about major studies concerning the educational system and methods in the country, including the seminal "First-Grade Studies," which examined reading instruction across the United States and paved the way for many educational reforms beyond the field of science and engineering (Graves & Dykstra, 1997).

United States Information Agency: This agency was founded by President Eisenhower during the Korean War in 1953 to handle issues of public diplomacy in response, in part, to the activities of the U.S. National Security Council's censorship efforts on library materials during the era of McCarthyism.

VINITI: Centralized database run by the All-Soviet Institute for Scientific and Technical Information. This organization was formed in the 1950s to handle Soviet STI as a hard-copy reference service. Soviet government policies were at the heart of VINITI activities and programs during the period under the investigation.

1.7 Conclusion

In the years following the Second World War, the United States and the Soviet Union experienced unprecedented industrial growth. Simultaneously, after World War II large files of documentation on military technology, especially rocket and radio engineering systems, were appropriated from occupied East Germany. The study of these materials gave powerful impetus to active information work in military industries. The demand for special information in various fields of science and industry intensified when programs to develop nuclear weapons, rocket technology, radar, and technical modernization of all military services were instituted in both the Soviet Union and the United States.

These developments meant increase in the value of controlling information. This value was highlighted first by Hitler's use of political propaganda paired with the successful militarization of German factories and emphasis on research during the war; second by the rise, following World War II, of a bi-polar global power structure. On one side was the Communist bloc, led by the Soviet Union, and with admitted plans of expansion and rigid unity of governmental control. In opposition was the Western or free-world democracy-led bloc with the United States at the helm.

The next decades were to be overtaken by this rivalry—politically, economically, socially, and informationally. One of the most vivid contests between the two super-powers involved science and technology. The alarmist attitudes toward the widening of the perceived technology gap became more intense when Americans faced the fact that in 1957 the Soviets succeeded in launching a manmade satellite, Sputnik, into space. Thus, a need developed to control information as an outgrowth of the rivalry involving arms

and space. By the early 1950s, the Soviets instituted a centralized system called VINITI that was subject to strict government control.

The United States, on the other hand, established several federal agencies, autonomous of one another, to deal with the growth STI: the National Science Foundation, the National Technical Information Service, and the Atomic Energy Commission, among others. In addition, in the United States there were numerous private, state, and local libraries, media outlets, and educational institutions dedicated to the production, preservation and promulgation of scientific and technical information.

This is a study of the diversity and complexity of approaches to managing the expanding body of STI in the post-World War II United States and Soviet Union, approaches that stemmed from intense intellectual and ideological rivalry between the two superpowers. This dissertation is divided into five chapters, including this introduction, that collectively intend to argue that the role of information management agencies in the development of large scale scientific and technological systems, most notably improvements to information infrastructure, can best be understood through an examination of their institutional history. The subsequent chapters are devoted to exploring the historical, rhetorical, political, and theoretical contexts in which the NSF, NTIS, AEC, and VINITI operated.

The attention in the following chapters is focused on the institutional history of the NSF, NTIS, AEC, and VINITI. This research investigates these organizations as political entities subject to stimuli and impulses of the political process. On the U.S. side, information management agencies found themselves dependent on congressional budget appropriations and at the same time enmeshed in a constellation of federal agencies with

both overlapping and conflicting interests. In the Soviet Union, VINITI represented the one massive centralized information service, and as such appeared to effectively abstract, translate, and disseminate the world's information to communist scientists and engineers. Was one arrangement more effective than the other? The following chapters will attempt to investigate.

CHAPTER 2

REVIEW OF THE LITERATURE

Few people understand the correlation between information handling, scientific advancement, and public opinion as clearly as those Americans who were made aware of the Soviet Union's successful Sputnik launch in 1957. The pace of science and technology development accelerated even further following World War II, just as the Cold War era set in. The Cold War was a time of global polarization. On one side were the Communists, with the Soviet Union acting as the dominant player on the geopolitical scene in Eastern Europe. Although the Soviet Union and the United States had been allies during World War II, the Soviets upon signing of the truce formed a solid bloc with avowed expansionist goals. Opposed to them was the pro-democratic Western bloc, headed by the Americans and other members of the allied forces in the West. The two groups represented highly different approaches to political, economic and social structuring of society. The Soviet power had grown out of Marxian communist doctrine, which advocated strong centralized state control over means of production as a result of class conflict (Crossman, 2014). The West, on the other hand, historically favored laisse-faire capitalism and democracy.

Although the two regimes were so drastically different, both were rooted in social conflict. The research herein continues to examine the impact of conflict, but in a non-violent context, pertaining to control of information, specifically STI. Whoever controls information controls the destiny of the people is a thought expressed in many ways

throughout history, including by the leaders of Nazi Germany that set the stage for war-related scientific and technical outburst (Hitler, 1925). The manner in which information is controlled and released varies and can dramatically effect intra- and interstate relations.

Prior to World War I, information was almost always conveyed in the printed form, with some exceptions: telegraph and to a lesser extent, telephone. In the United States, there were various sources and compilers of information. Many municipal, state and even federal repositories quickly sprung up, along with private collections and those affiliated with universities. Because of the plethora of institutions housing and handling documentation, one can assume that control over the process was all but nominal.

Overall, information was from an early age recognized within all forms of government as a tool of control and influence, but its success in a highly centralized, rigid or autocratic regime would seem far more likely than in a dispersed system with nominal freedom of the press and many libraries and other repositories of knowledge. Following World War I, Adolf Hitler displayed another example of a keen understanding of the power of information in political maneuvering. Hitler realized that information control was essential, and that it must be targeted at the less intellectual within society (and controlled by the government), since those with higher intelligence might not be easily swayed or may have already formulated their own opinions. His charisma, particularly with regard to speechmaking, underscored the veracity of his mostly unheeded intentions.

When Nazis came into power, another important factor that Germany's rulers realized was the need for scientific and technological knowledge, advancements, and armaments. Major factories were converted from commercial to military operations

without attracting much attention, and throughout the war German scientists dedicated countless hours and dubious methods to all forms of research (Wiesel, 2006). The near success of the Third Reich served as an inspiration for both sides battling in the Cold War to take seriously the development and handling of STI. In part this may explain why so many of the scientific research agencies and information gathering systems had their genesis less than a decade after the ending of the Second World War.

2.1 The post-1945 Information Explosion Uncovered

The meaning of the post-1945 information explosion is quite literal. Following the dropping of the atomic bomb, scientific and technology research took off, producing volumes of valuable and strategically important documents. Information availability increased in other disciplines as well. The basic idea was that with progress came reporting about it, in unfathomable quantities. New resources were needed to keep up with this outpouring of documentation, and considerably varied methods were developed. While the Eastern bloc adopted a more centralized approach to managing its information centers, the Western way was fragmented and the government exerted considerably less control over release or slant of information.

After World War II, the problem of information overabundance was viewed as a Cold War phenomenon. More importantly, in the context of the ideological confrontation, information as a new and valued commodity became another yardstick to be used to compare the developments in the United States with the Soviet Union. Despite the barriers presented by the Iron Curtain, the emergence of VINITI as a major scientific information management service did not go unnoticed in the United States. Out of this

awareness, grew the information race that boiled down to which nation would devise the means to control the information in their possession, thereby ascertaining their superiority on the political and many other fronts.

Governments on both sides of the ideological spectrum had to confront this massive amount of documents. In the United State a belief grew in popularity that the ability to effectively manage the growth of information might be a crucial factor in winning the Cold War. This belief came largely from the intellectual circles as scientists and information gurus, such as James Perry and Allen Kent, acknowledged that effective utilization of recorded knowledge was rapidly becoming an area of intense competition between Americans and the Soviets (Perry, 1949; Perry & Kent, 1956). Allen Kent, who is widely considered a pioneer in the field of information science, noted that the magnitude of the Soviet information effort suggested the importance with which this problem is regarded by the Communists in their resolve to overtake and surpass the United States ideologically, scientifically, economically, and militarily (Kent, 1956).

The Sputnik launch in 1957 only served to intensify the belief that the secret to the Soviets apparent (and apparently growing) technological advantage over the United States was in the effective handling of scientific information by the former. Francis Bello (1960) further spoke to the increasing politicization of information as a social phenomenon when he attempted to muse about how to cope with information in his *Fortune* magazine article. Bello's claim that the Soviets' rapid progress in jet aircraft, rockets, electronics, and other areas might be traceable in substantial part to its effective retrieval of information was not without substance.

As the Cold War gained momentum, the phenomenon of information excess continued to be central to human existence. It should be noted, therefore, that it was never a one-time episode or an issue peculiar to a single domain of knowledge. On the contrary, as the above-mentioned American sources testify, it was an international phenomenon that was at the core of every intellectual endeavor in the years following the end of the Second World War. In fact, one is led to believe that the overabundance of information, especially in the remits of science and technology, was a generational problem affecting much of what transpired between the years 1945 to 1969. Kent (1977) characterized the situation back in the day as an information explosion or avalanche saying that the dramatic increase in the amount of information that was freely available post-World War II placed a burden on information centers, information retrieval services, government agencies, libraries, and business offices who were faced with an avalanche of recorded information unprecedented in the history of mankind.

The problem represented by too much information was neither solved in the generation after World War II nor did it fade away over time. Highly sensitive STI required careful handling in many cases, to protect or prevent the other side from getting ahead in the race, as many in the United States believed had occurred following the Sputnik launch (Graves & Dykstra, 1997). In fact, President Eisenhower‘s initial reaction to the satellite had been to downplay its significance, but intense media coverage quickly required further presidential action. In response, Eisenhower announced the creation of a new cabinet position: the Special Assistant for Science and Technology, appointing James Killian, who would simultaneously serve on PSAC, or the Presidential Science Advisory Committee (Killian, 1977).

In a sense, the Cold War information overabundance signified a healthy competitive situation because the information race resulted in a considerable boost to American science. The launch of Sputnik in October 1957 brought all types of science back into the government fold, reminiscent the developments that had taken place during the Manhattan project (Frisch, 1970). Killian (1977) later reflected that ―while scientists possessed immense prestige in Washington during the years following World War II and historic actions were taken during the Truman administration to institutionalize science and technology in government, science had a uniquely close relationship to the presidency during Eisenhower‘s second term and extending into the Kennedy administration. The pivotal event was the public demonstration of Soviet achievements in space and rocket technology, embodied by Sputnik and potentially signifying a science gap afflicting the United States. That event led to the creation of an extensive federal science advisory apparatus, and a splurge in funding for research and development.

In many ways responsible for the Sputnik boom and further STI proliferation, the early PSAC scientists were largely academic physicists. Many had participated in the Manhattan Project or radar research during World War II. Therefore, they were especially patriotic, anti-communist, and idealistic, and thus happy to offer part-time or full-time government service while maintaining their academic positions. The PSAC scientists were enthusiastic about their new and expanded roles as government advisors because they considered national service and national security part of their obligation as scholars.

Thus, explosion in the amount of STI and the Soviet advancements were the underlying reasons for renewed appreciation of the expertise that scientists could bring to the government. One issue associated with the information explosion was the reality of

too much information being generated and it getting out of control. This idea, termed "information overload," was coined by Alvin Toffler in his book *Future Shock* (Toffler, 1970). The alarming side of this flood of information, particularly in terms of STI, according to Toffler, was that a super-industrial society would emerge that most human beings could not handle. People would become disassociated or isolated from one another and from their own humanity, in essence, as STI-generated programs would take over. Whether or not Toffler's dire propositions that too much information may cause the downfall of humanity are even plausible, to date the major impact of information in the twentieth century has not yet been fully quantified.

2.2 "Information" as a Central Phenomenon of the Cold War

There is no doubt that scientific research and material grew exponentially following the ending of World War II. With a polarized world, and each side attempting to devise mechanisms to potentially annihilate the other, various improvements in both lesser and advanced armaments, as well as scientific progress in general, were the order of the day (Kalenov, 2015). With this push for scientific and technological superiority came two major responsibilities: the need to disseminate scientific research and the need to store it (in a pre-computer age) (Kalenov, 2015). Prior to the access capabilities of the Internet, dissemination fell upon the shoulders of support units, as the scientists themselves were not capable of both creating and reporting their findings efficiently. Thus, scientific libraries became important in the handling of information, which became a phenomenon of perennial significance and power. Until after World War II, such libraries came to serve many vital purposes. They:

> collected, stored, and made the necessary information available to scientists. The development of academic libraries worldwide, and specifically in Russia, was accompanied by the development of scientific infrastructure. Due to the rapid development of science in the 20th century, the rise of a strong network of scientific institutions and, as a result, an avalanche of scientific information, it became necessary to inform researchers about new scientific results that were obtained worldwide in their areas of research in a more targeted way. Many countries… established national and sector information centers that generated secondary information (Kalenov, 2015, p. 54).

During the Cold War, information became the driving force in and of itself, almost an independent industry that supports or destroys those it impacts. However, in circumstances when nearly everything revolves around information the danger is that, if information becomes so important and humans become slaves to it, distortions, miscalculations and mismanagement are virtually inevitable. If one admits that information can control populations in the form of propaganda, one has to concede that that is *managed* information. If information becomes so overwhelming that it is no longer controllable, governments could sink under the weight of excessive documents that they are unable to process, much less use effectively. This is why a widespread perception of an information age was and is that it is one of the most important developments of the past twentieth century.

The information crisis that emerged immediately after World War II is closely connected with the conflict at the core of the Cold War. Typically, an information crisis occurs when society's informational needs are not met by the current system for delivering information. In the generation after the Second World War, the system of information transfer that included books, scholarly journal articles, abstracts, and conference presentations appeared to be breaking down because the sheer amount of information made its effective processing difficult. The spread of scientific and technical

information presented not only practical but also theoretical concerns. What emerged in the debate over the information explosion was a representation of a larger professional conflict between two groups. Humanists or literary intellectuals were at one pole and at the other were the scientists. Between them was a gap of mutual incomprehension, sometimes hostility and dislike, but most of all a lack of genuine understanding.

While humanists and scientists each promoted their own approach to solving the problem of the information crisis, participants from these groups barely worked together, and they frequently attacked each other from their distinctive professional poles. The scientific documentalists capitalized on this conflict by leaving librarians marginalized and, in the process, they improved their own professional status (Hahn & Buckland, 1998). By linking the information crisis with winning the Cold War, the documentalists revived their profession, captured the leading role as information specialists away from librarians, established the computer as the central tool to manage the information explosion, and earned a tremendous amount of funding for their activities.

The American political situation played an important part in exacerbating the perception of the threats posed by the East-West confrontation. Because Russian science structure was so drastically different from, and seemingly more advanced than, that in the Western Europe and the United States (Markusova, 2012), the Soviet state managed to create within the minds of Americans a number of insecurities regarding the state of their own science, technology, and education.

Those alarmist attitudes left the U.S. intellectual elite vulnerable and contributed to the heightened perception of information crisis and the need to somehow keep it in

check. The most important component of this intellectual anxiety was related to information. Indeed, the Soviets appeared to be making great strides in the usage of scientific and technical information. In the Soviet Union, there were several agents of the central government, including libraries, which handled the information explosion. The managing role was assigned to the following national centers: the National Institute for Scientific and Technical Information (VINITI), which was thematically responsible for exact, natural, and technical sciences, the Institute of Scientific Information on Social Sciences (INION), which covered the social sciences, the All-Russian Research Institute for Health Information (VNIIMI), which specialized in processing of information in the health area, and other centers (Kalenov, 2015).

VINITI was by far the dominant force behind scientific and technical information handling, along with the doctrines the central government directed at libraries through *Bibliotekar* publications (Richards, 2001). Microfiche, microfilm, newsreels, recordings, photographs, but mostly the printed word were the major types of information requiring at that time limited multidisciplinary management. Warehouses or libraries usually had adequate facilities necessary to house the vast quantities of materials being produced. Access was more difficult due to the fact that at the time information was in solid form, rather than accessible by computers.

Incidentally, one of the major premises regarding information during the Cold War centers on the lack of coordination and cooperation between the two superpowers (Lubrano, 1981). It was, in fact, the United States that initiated the sharing resistance. Prior to that, the Soviets were, apparently, under the impression that sharing was possible

and mutually beneficial when it came to STI. The United States did not share this view due to the daunting effects of the Soviet science developments which culminated in the launch of Sputnik.

Scientists and administrators abroad believed that their Soviet colleagues maintained a veil of secrecy over their research and used the satellite launch for geopolitical purposes. The foreign scientific community largely disregarded Soviet attempts to provide information about the satellite and to break through the isolationism of the Stalin years. Western scientists perceived the Soviet space program as competitive, secretive, and driven by Cold War diplomacy (Hughes, 1988). This pattern of missed and misread signals continued throughout the first fifteen years of the space age, and the perceptions of Western scientists have colored most Western historiography ever since.

Sputnik, the knowledge of nuclear weapons, and the bits of information about VINITI were three key examples of their growing capability (Graham, 1998). Aggravating the situation was the fact that Soviet scientists published papers in the Russian language, a language that few American scientists could comprehend. This arguably added to an aura of secrecy and superiority that surrounded the Soviet endeavors. This Cold War anxiety was the central factor in spreading the awareness of the information crisis as it urged the Americans to invest even more efforts in scientific research and development.

The Soviet advancements were pivotal for the evolution of the Cold War American science. David Kaiser (2006), however, attempted to demonstrate the primacy of scientists themselves in the creation of the scientific boom. Keiser (2006) wrote that

Sputnik had no automatic political valence because any technopolitical events are rarely capable of such impact. Rather, the determined lobbying by physicists and others transformed the launch of the satellite into a political event requiring a specific political response. The political response enriched scientists, particularly physicists, as it helped to drive an unprecedented explosion in physics enrollments in the United States, outstripping every other field in rates of growth (Kaiser, 2006).

Surely, self-interest may have in part guided the lobbying efforts of scientists in the aftermath of Sputnik as they—and their research institutions— would benefit financially from the new policies and government investment. Nevertheless, for many Westerners the triptych of the Soviet scientific and informational prowess—Sputnik, VINITI, and successes in nuclear weapons research and development—raised genuine concerns about Cold War security and the state of American science (Herken, 1992). In all, the growing Soviet technological capability combined with the secrecy of their scientific achievements and their ability to manage the information explosion, created anxiety for both American scientists and American society during the initial stages of the Cold War.

Information overabundance has often been used as an explanatory device for different contexts and cultural interpretations of various current information problems, but few studies have actively explored the history of the information excess in the context of agencies that were created worldwide (namely, in the United States and the Soviet Union) to combat the global information crisis. This research argues that this is why there has been a dearth of scholarship on such an important phenomena—the comparative

history of information management institutions—because few people have even believed that this problem has a history. This study attempts to reconsider the immediacy myth that treats information overload as a predominantly contemporary phenomenon by unveiling the details of the evolution of several key STI management organizations in the wake of the Second World War.

2.3 Theoretical Framework

This research is based on the premise that two highly stratified sides were engaged in non-aggressive conflict over a period of years. The two sides, as mentioned earlier, were the Communist bloc led by the Soviet Union, and the Western or Democracy-oriented bloc led by the United States. Just as each side had different political, social and economic aims, each employed a dissimilar method of information management. This bifurcation in the management of information, especially STI, is the lens through which the Cold War era conflict is viewed in this research. Coser's theory of conflict provides the theoretical basis to support this research.

Coser's Theory of Conflict

Conflict theory has a long history in sociology. Karl Marx' work in the early to mid-1800s formed the initial statements of this perspective. Marx was centrally concerned with class and the dialectics of capitalism. He argued that capitalism would produce its own gravediggers by creating the conditions under which class consciousness and a failing economy would come into existence (Darity Jr., 2008).

In the early twentieth century, Max Weber formulated a response to Marx's theory. Weber saw that conflict did not overwhelmingly involve the economy, but that

the state and economy together set up conditions for conflict (Darity Jr., 2008). Of central importance to Weber's scheme is the notion of legitimation. All systems of oppression must be legitimated in order to function. Thus, legitimation is one of the critical issues in the idea of conflict. Weber also saw that class was more complex than Marx initially supposed, and that there were other factors that contributed to social inequality, most notably status and party (or power). Since that time, a number of efforts have combined different elements from one or both of these theorists to understand conflict.

In general, conflict theory seeks to scientifically explain the general contour of conflict in society: how conflict starts and varies, as well as the effects it brings. The central concerns of conflict theory are the unequal distribution of scarce resources and power. What these resources are might be different for each theorist, but conflict theorists usually work with Weber's three systems of stratification: class, status, and power. Conflict theorists generally see power as the central feature of society rather than thinking of society as held together by collective agreement concerning a cohesive set of cultural standards, as functionalists do. Where power is located and who uses it are thus fundamental cornerstones of conflict theory. In this way of thinking, power is not necessarily bad: it is a primary factor that guides society and social relations.

Although Lewis Coser's theory of conflict is by no means the most recent or most common used in academic research today, it is highly appropriate for this study for several reasons. First, Coser developed his theory while a doctoral candidate at the Columbia University precisely at the beginning of the Cold War era. A refugee from Europe to the United States, Coser was no stranger to the type of potential devastation

through change that could occur were either of the two superpowers to upset the equilibrium that existed at the time. Therefore, his theory bears authenticity due to its time of origin and the circumstances of its creator.

Even more fitting, however, is the basis and content of Coser's theory of conflict that distinguishes it from most other similar sociological schools of thought. Coser chose as his major influence Georg Simmel (1904). As opposed to other prominent conflict theorists, such as Karl Marx, George Sorel or Max Weber, who viewed conflict as a class struggle involving coercion and power, with inevitable tearing down before reaching a period of equilibrium, Coser followed Simmel's lead that conflict was a necessary component that could actually help maintain stability within social institutions. He explained this in terms of conflict creating agents to serve as "safety-valves" (Coser, 1957, 202). Basically, if conflict arises within a society or between societies (which in most cases is an eventual certainty), certain institutions can manage and absorb the brunt of the conflict, allowing the discontent to feel that they have been heard and acknowledged without resorting to violence. In sociological or political terms this might be akin to either deterrence or appeasement. Nevertheless, the method by which the two Superpowers—the United States and the Soviet Union—managed information during the Cold War era reflects Coser's theory in action.

On the one hand, Coser recognized the catalyst role of conflict in regards to science, technology, and information development in contexts where adaptation and flexibility in the face of conflict "prevents the ossification of the social system by exerting pressure for innovation and creativity (Coser, 1957, p. 197). Coser continued to

explain the positive impacts of conflict: "[c]onflict not only generates new norms, new institutions…it may be said to be stimulating directly in the economic and technological realm. Economic historians often have pointed out that much technological improvement has resulted from the conflict activity" of various institutions developed within free-market or capitalist societies, such as unions in the 1900s (Coser, 1957, p. 198). Indeed, Coser basically tailored his conflict towards Western free-enterprise society. He contrasted the open society in the West with highly structured systems and concluded that "the emergence of invention and of technological change in modern Western society, with its institutionalization of science as an instrument for making and remaking the world, was made possible with the gradual emergence of a pluralistic and hence conflict-charged structure of human relations" (Coser, 1957, p. 199).

2.4 Conflict Theory in the Information Race

Thus, taking the Coser theory and applying it to the Cold War era is promising due to the distinction in societal freedoms which, Coser posits, enhance scientific and technological change, against the rigid dogmatism and centrality of the Soviet bloc, particularly in its treatment of STI. Internally, every system is bound to face challenges; if the government does not allow for adjustment based on a variety of needs, but sets out one rule to apply to all, conflict can encourage pronounced strain on that system. Coser's theory supports the idea of conflict as force for strengthening structures, but only in a well-integrated society. According to Coser (1957), "a weakly integrated [society] must fear it" (p. 205).

This is why the dichotomy of information handling during the Cold War era is so amenable to Coserian analysis. The Soviet bloc was a rigid society, with little freedom of expression or choice such as those available in the opposing U.S.- led faction. This rigidity carried over into information handling, with the Soviets channeling and managing all their documents and information through one, state-controlled source (VINITI).

The Cold War, rooted in the political and ideological conflict between the Eastern and the Western blocs, represented the time of global change. This confrontation divided the world between the two superpowers, resulted in a dramatic arms race, and led to numerous smaller but still violent conflicts around the world. However, the Cold War was also a period of economic change around the globe, as nations aligned themselves with the engaged superpowers. New nations emerged as economic powerhouses or at least gained more relevance economically, and global interdependence became reality in an ever-shrinking market place.

Given the duality of the Cold War impact, destructive on the one hand and change-provoking on the other, Lewis Coser's theory of conflict seems to be the appropriate conceptual framework within which to analyze the issues of information control and management that plagued the world in the middle of the twentieth century. Coser's is one of several schools of thought that have found their niche under the umbrella term "conflict theories." These theories, as mentioned above, draw attention to power differentials, critique the broad socio-political system, and generally contrast historically dominant ideologies. In general, conflict theory maintains that in every type of social structure there are circumstances conducive to conflict, since individuals and

subgroups are likely to make occasional rival claims to scarce resources, prestige, or power positions.

Although conflict theory is most commonly associated with Marxism, sociologist C. Wright Mills is considered the father of the modern iteration of conflict theory (Sim & Parker, 1997). In a nutshell, Mills' view is that social structures are created through conflict between people with differing interests and resources. Unequal distribution of power and resources, in turn, is what influences individuals in every society. Mills argues that the interests of the elite (such as the military-industrial complex) conflict with the interests of the common folk. At his most radical stance, Mills proclaims that the policies of the power elite tend to result in increased escalation of conflict, production of weapons of mass destruction, and possibly the annihilation of the human race.

2.5 Application to the Current Study

In the spirit of Mills' research, Lewis Coser spearheaded the examination of previously neglected aspects of the theory concerning the functions of social conflict. Coser's *The Functions of Social Conflict* (1957) was one of the best-selling sociological works of his time. Although not intended to reflect on the Cold War dynamics, the essay published at a time when the global geopolitical crisis nearly reached its climax laid the groundwork for our present-day understanding of the forces that propelled the social, political, and economic development of the two sides engaged in a massive battle of ideologies and worldviews. Coser postulated that conflict is inherently built into the functioning of society. In his analysis of conflict in terms of interactive processes, Coser went as far as to depict conflict as a form of socialization. Perceiving society as a

dynamic organism, Coser asserted that social groups were by their nature inharmonious. Somewhat paradoxically, Coser posited that if they (social groups) were harmonious, they would lack process and structure.

Further, social processes under the conflict theory paradigm are the result of both association and dissociation, so that conflict eventually leads to cooperation, just as tears—the epitome of stress—eventually relieve physical pain and psychological tension. With tensions that are politically-driven, a similar scenario is in place. At first, conflict has a polarizing effect that accentuates the division between "us" and "them," clarifying the factors that make each group distinct. This demarcation can be a hopeful sign of better things to come. In the words of Sharon Nepstad (2012), conflict with an out-group (external enemy) enhances identity and cohesiveness (the feeling of belonging) for the in-group. Thus, a certain degree of conflict is an essential element in group formation because external threats build group solidarity as members—in this case, nations—unite to protect their common interests.

The conflict theory also explains why the Cold War progressed—and ended—in a relatively peaceful fashion. In reference to factors that may exacerbate conflicts, Coser observed that conflicts tend to be more intense and destructive in close relationships than in distant ones. It is also part of human psychology to engage in long-term, drawn-out disputes that employ extreme tactics if people associate themselves with a bigger group fighting for a sacred cause. However, as everything else in life, both external and internal conflicts wane out over time, especially if one of the sides gains clear advantage and the

opposition is contained within the boundaries imposed by the victor to the extent that it is no longer a threat.

Overall, the premise behind the conflict theory has valuable explanatory power for analyzing historical events. As the race for information superiority gained momentum in the context of the ideological dissention of the Cold War, the conflict theory situates information-specific problems, such as indexing and cataloging of technical reports, within the much wider range of issues pertaining to institutional rigidity, technical progress, productivity, and above all — evolutionary or revolutionary change of social system currently in place.

Despite its seemingly destructive nature, conflict, in Coser's interpretation, actually has considerable albeit latent functional consequences. What is important for this research is the idea put forth by Coser and his predecessors that conflict—of any type—prevents stagnation in a social system by exerting pressure for change, innovation and creativity. This is why for each antagonist the conflict of the Cold War can be regarded as the catalyst in the economic, technological, and information production realm. The conflict theory in this case serves as a convenient springboard to the study of the volatile relationship between the capitalist West and the communist East, the relationship that is perhaps best reflected through the lens of their divergent scientific information management systems.

2.6 Conclusion

Following World War II, the global political scene split into two major blocs, each controlled by a superpower: the Eastern bloc controlled by the Soviet Union and the

Western bloc controlled by the United States. Simply put, the two sides had different views of government role versus the individual, although both developed from conflicts. To explain the differences in ideology in very basic terms, one can posit the following:

> The Americans have individual rights, personal freedom and opportunity based on capitalist principles. A capitalist economy is based on private ownership, profit and free competition. In the Soviet Union… no one profited from the labor of another and all profit was to be shared. These differences became a part of historical cultural and ideological gap that made it hard for the USA and the USSR to get along. (Hubpages, 2015).

In reality the nuances were much greater, and divisions occurred along all lines, including STI management. This research focuses on the role of information, specifically scientific and technical information, in shaping the socio-economic and political developments of the Cold War era.

A pivotal event, the Soviet launch of the manmade Sputnik satellite in 1957 sets the tone for this analysis. This event caught Americans off-guard and immediately launched a separate concern: that the United States was lagging behind the Soviet Union in STI and specifically the Space Race. A number of information agencies and educational programs came into existence, and this very fact demonstrates the profound impact that the Soviet STI domain had on America during the Cold War era. Although many consider that era to extend until the collapse of the Berlin Wall in 1989 or even the dismantling of the Soviet Union and freedom of Russia and the CIS in the early 1990s, for the purposes of this paper, the ending date is 1969, when Americans landed on the Moon. At this point the United States proved its superiority in STI and the Space Race.

The United States set up several independently run government agencies with roles in STI handling—the Atomic Energy Commission, the National Science Foundation, and the National Technical Information Service, along with federal, state, and local libraries, private foundations, and academic institutions. The U.S. also supported libraries overseas, which were under more direct government control and tended to reflect government viewpoints more often than the independent organizations did. This correlates with VINITI, which was the centralized STI agency established by the Soviet Union.

The theoretical framework of the dissertation is based on Lewis Coser's theory of conflict. Unlike many of his predecessors, including Karl Marx and Max Weber, who viewed conflict as an inevitable destructive force of change, Coser sided with Georg Simmel (1904) in concluding that conflict could have a stabilizing impact on society. This could occur under specific conditions, including latitude in expression and the lack of dictatorial control (in this case, control over information).

Chapter Three, will discuss the choice of the methodology for this research. Chapter Four will include the results of the historical analysis of primary and secondary sources as well as findings from personal interviews, while the final chapter will be dedicated to conclusions, recommendations, and suggestions for further research.

CHAPTER 3

METHODOLOGY

In the academe, research can be understood as the continual search for truth using the scientific method, without the claim that the said truth can ever be fully discovered or confirmed. In more practical terms, Leedy and Ormrod (2010) define research as the process of collecting, analyzing, and interpreting documents in order to understand a phenomenon under the investigation. One may argue that its systematic nature is what distinguishes academic research from our daily information pursuits. The scholarly research process is much more structured in that a scholar is more often than not bound by certain frameworks and has to follow a set of previously established guidelines as he or she strives to define the purpose and the objective(s), collect and manage the data before finally communicating the findings to the rest of the world (Connaway & Powell, 2010). This greater degree of prescriptiveness goes a long way toward facilitating discovery of elements of truth by helping one identify a research paradigm that further dictates the overall direction, as well as what needs to be included in the study, how the study is to be done, and what types of inferences are probable based on the data collected.

The specific choice of a research methodology and the overall approach largely depend on the nature of the study one plans to conduct and the question the study seeks to address. This dissertation research aims to examine the social, technological, political, and ideological issues that surrounded the emergence of scientific and technical

information (STI) systems in the post-World War II United States and Soviet Union. At the core of this research lies the exploration of the race for information superiority between the United States and the Soviet Union that transpired in the middle of the twentieth century. The overall intent of the researcher is to see how varying degrees of government centralization in the two countries impacted their respective approaches to scientific information management. The questions posed in the study are: Why did the United States and the Soviet Union go separate ways in their quest for information dominance? Were the means they chose to arrive at essentially the same end drastically different or were there similarities in their approaches?

This study attempts to address these questions through a historical analysis of primary and secondary sources coupled with a series of face-to-face interviews with scholars whose expertise extends to the formative years of the U.S. and Soviet scientific and technical information domain. Consequently, what this research represents is a qualitative historical and cultural investigation of the STI management evolution, viewed through a number of information agencies that mushroomed in the mid-1940s-late 1950s to combat the post-World War II scientific and technical information overload.

To a degree, this research is also a phenomenological study because it revolves around the phenomenon of the information explosion and its affects on the politics, society, and culture of the Cold War United States and the Soviet Union. It links information explosion to a political culture contextualized by the Cold War. The story this research aspires to unveil is about the intersection between human thought, or ideological history, and human action, or socio-political history (Nord, 1990).

3.1 Comparative Historical Analysis

By definition, historical research deals with describing and explaining history, an ever-flowing stream of events and continuing changes in human life and a number of social, political, economic, and cultural institutions. Thus, historical research is undertaken in an attempt to discern patterns that tie all these events together. It is essentially a meaning-making exercise that aims not at the accumulation but at the interpretation of facts.

The researcher acknowledges a critical distinction between merely conducting historical study and engaging in formalized research that is based on the historical method. Although both involve gathering information about major events and organizing the facts into a sequence, chronological or otherwise, this activity does not become methodologically-sound historical research until the act of interpretation comes into play. As Leedy and Ormrod (2010) assert, nothing can happen without it. It follows, then, that the task of the historian extends beyond describing what events happened and when. The historian is always intrinsically motivated to delve into the realm of *why* by unearthing and presenting a factually supported rationale for understanding an event, person, state, or even the whole historical era from a new vantage point.

There has been a great deal of debate about whether to consider historical interpretive research as a truly scientific method (Mottier, 2005). It is often criticized for the lack of control the researcher has over the events gone by. Indeed, variables examined through historical research cannot be manipulated in any controlled fashion and there is hardly any certain way of knowing how these variables might have been influenced. While all of the above does hold true to some extent, one argument in defense of

historical research is that in the history domain, similarly to the physical sciences, cause and effect relationships do exist. Unlike physics or chemistry, though, history as a field of knowledge does not purport to exactify the nature of things. Nevertheless, it is hard to disagree with Pickard's (2007) assessment that by reconstructing past events, the researcher's task is to put together the pieces of the puzzle, add interpretation, and thereby contribute to the creation of new knowledge. The goal of such research is not to develop "the" answer, but an answer that is people, place, and time-specific.

History is a 'modest' science because the focal point of the historical research method is to portray events, people, and agencies associated with them accurately and in a manner that facilitates empathic identification. Grounded in subjectivity, agency, and meaning, the epistemology of historical knowledge is narrational as it makes sense of the context within which the historical past comes to be known. O'Sullivan (2006) has rightfully suggested that one of the undeniable consequences of the non-deductive character of historical thinking is the possibility that different researchers may start from the same material and reach quite different conclusions that that are, given the available evidence, equally plausible. Lastly, historical analysis has been deemed particularly useful in obtaining knowledge of unexamined areas and in reexamining questions for which answers are not as definite as desired (Edson, 1998).

How can the choice of the historical design propel the current research? In the case of document analysis, the logic is formed by establishing categories relating to the function of the document and the entity to which it is associated. Categorization of the data is an intuitional act which aims to form universal concepts, or truth. By intuitively examining combinations of the data, one forms a view of the whole.

A few paragraphs earlier, the researcher referred to history as a modest science because its ambition is to offer but a possible interpretation of a period in the evolution of mankind and connect it to the present and the future. Historical research establishes this very important linkage by “systematically recaptur[ing] the complex nuances, the people, meanings, events, and even ideas of the past that have influenced and shaped the present" (Berg & Lune, 2012, p. 305). History is a very generous science as well because it allows for multiple voices to be heard and for multiples perspectives to be taken into account, especially with regards to the so-called landmark events that may have received a fair share of media, scholarly, and public attention. There are always stories that have yet to be told and subtleties that have yet to be considered.

Take, for example, the race for socio-political and military supremacy that transpired in the context of the Cold War between the twentieth century United States and the Soviet Union. There are many distinguished scholars who have written at length about the Soviet economy in the mid-twentieth century. An even greater number of intellectuals have concerned themselves with the examination of the communist versus capitalist social order. The breadth and depth of coverage of the Cold War politics are impressive, too.

It is obvious that the rivalry manifested itself in the information domain as well. There is a realization in the literature that the rapid expansion of scientific and technical advances across the world and the subsequent spread of modern technologies was the root cause of the unprecedented growth of the overall amount of documents, particularly scientific and technical information (Gaddis, 1983). In the United States and the Soviet Union, this growth spurred a heated cross-continental rivalry that lasted nearly five

decades. In the post-War United States, a number of federal establishments attempted to develop their own strategies of keeping the information overload in check. Such increased attention resulted in the steady government support of research and development related to information problems and solutions.

Despite an almost parallel course of development in the Soviet Union, little is actually confirmed about the influence of the Soviet experience on the development of American scientific and technical information and the institutions that were charged with its management. In actuality, did the influence go both ways?

As any historical research, this study deals with the major issues of *why* and *how*. Why did the United States and the Soviet Union go different ways in their quest for information dominance? How did it come down to the dichotomy of the rigid, tightly-controlled, and monolithic system of STI management on the Soviet side and a vast array of siloed agencies each of which dealt with its own area of focus that Americans developed over time? A familiar challenge for every historian is the paucity of interpretive scholarship, which in the case under the investigation is due in part to information isolation and meager numbers of original sources, the majority of which have been published in the Russian language to never be translated into English.

This study utilizes two methods of data collection: secondary source analysis and interviews. The interviews will, arguably, be the more important aspect of the data collection because this research seeks to uncover individual perceptions of a phenomenon (information overload) and the perceived influence of one system of STI management on the other. However, the two methods combined add breadth to the study by discovering another dimension and giving a counterpoint to the interpretation of the interviews. The

study of any political era or a sequence of social events benefits from the presence of multiple vantage points. Fielding and Fielding (1986) said that "the essence of the triangulation rationale is the fallibility of any single measure as a representation of social phenomena" (p. 29). Thus, the goal of utilizing multiple methods is to demonstrate validity through the process of triangulation and to add breadth to the findings.

A triangulated method of data collection has been described as a means to enhancing the validity of the data (Olsen, 2010). It often involves two or more instruments of data collection (in this case historical analysis and interviews that were used to validate the findings from secondary sources). Using more than one instrument or source enables a researcher to use the strengths of an instrument to compensate for the strength of the other (Olsen, 2010), which, in turn, also increases the accuracy of a research study.

At the same time, Patton (2002) observes that while the goal of triangulation is to demonstrate validity of the findings, triangulation does not always point towards the same answers. When multiple methods are used, different data sets may emerge. There are certainly inherent biases in any research, but by triangulating the data and using multiple types of evidence, claims can be constructed which are grounded in evidence.

3.2 Qualitative Research Design: Relevance for the Current Study

The interview (a qualitative research method) participants were selected on the basis of their exposure to VINITI and the degree of involvement with their Soviet counterparts. When discussing qualitative design types, John Creswell (2013), renowned for his expertise in research design and methodology, emphasized the role of the researcher who applies his or her personal perspective to investigating social phenomena.

Unlike its statistics-driven counterpart, qualitative research revolves around collecting primarily textual data whose purpose is to describe, explain, and contextualize phenomena rather than establish direct cause and effect relationships between variables.

Locke & Golden-Biddle (1997) have stated that the socially constructed view of science suggests that "knowledge cannot be known separately from the knower, because the content of knowledge is influenced by social practices and interactions, and because the determination of what ideas count as knowledge is a meaning-making activity enacted in particular communities" (p. 1025). According to Moustakas (1994), the commonalities of qualitative research include the following:

- The wholeness of human experience include personal behavior and knowledge;
- Qualitative researchers seek to understand the meanings and value of experience;
- The methods of qualitative research may include formal or informal interviews where participants describe their experience verbally or in writing.

The commonalities of qualitative research that Moustakas (1994) highlighted are relevant to the nature of this study. The human experience that the interview participants have had and the value of such experience are at the center of this study. Therefore, this study looks into addressing these commonalities and ensuring that the intended objectives are achieved.

Qualitative research embodies numerous tools and methods. Among the most common are phenomenological means, by which participants in a given study reveal impressions or concepts about a phenomenon that they have experienced. This can be

done through surveys, interviews, or narrative reports. In fact, this study contains inherent and specific reasons for selecting qualitative research design over other alternatives. One of the most important advantages of this design is that data are based on the participants' own categories of meanings; (Creswell, 2013). With a qualitative research design, a researcher is able to understand and describe individuals' personal experience of the phenomenon under study while exploring the phenomenon within its natural environment (Creswell, 2013). Besides, the researcher gets to utilize dynamic approaches during a research process. Most importantly, a qualitative research design yields more detailed data, which other research designs cannot guarantee (Creswell, 2013).

It is easy to understand how qualitative methods involve bias, as analysis and opinion of the interviewer (or document examiner) and the interviewee (or documents) reflect or hold information that is selectively chosen for presentation. Interestingly, one form of qualitative design that eliminates, to the extent possible, researcher bias is transcendental phenomenology (Husserl, 1931). This is an unusual qualitative methodology that has influenced content analysis of data tremendously. Most phenomenological research is based on narrative or tool-aided information gathering and then theme or content analysis, and is therefore subjective. Given the nature of this study, a certain degree of subjectivity is inherent in data analysis.

3.3 The Interview Protocol

Interviews take more time than do questionnaires to administer and also allow for follow-up and detailed explanations. Therefore, the group to be interviewed for this study was rather small compared to the vast amount of other materials that were considered.

The interviewees included four prominent scholars and information specialists whose research and professional practice has dealt with some, or all, information management agencies under the investigation.

The following open-ended interview questions were asked:

- Could you tell me about your experience, if any, in the Soviet Union and the growth of their scientific and technical information management system during the Cold War era (1945-1969)?
- What was your impression of their influence, if any, on the U.S. counterparts? Did the influence go both ways?
- Which of the U.S. information management agencies, if any, did the Soviet VINITI impact the most and why, in your opinion?
- How would you assess the impact of VINITI on developing countries? Was it any different from the influence on the U.S. information agencies? Why?
- How would you describe the relationship between the two superpowers, the US and Soviet Union, in terms of their struggle for information superiority? Was it a relationship of mutual respect and recognition of each other's strengths, or perhaps fear, or despise?
- There is an opinion in scholarly circles that the influence actually went the other way around and every innovative approach or technique the Soviets did or came up with in the 1950s-70s—the Americans already has in place some twenty or thirty years ago. Would you agree or disagree with this view? Why?

Face-to-face interviews are somewhat spontaneous events that can lead in the direction of the interviewee's expertise. For this reason, the questions and probes were open-ended and could be followed up with more specific inquiries depending upon the experience of the interviewee and what he or she can add to address. The standardized open-ended interview, the method employed y this research, is more structured in terms

of the wording of the questions. Participants are asked identical questions, but the questions are worded so that responses are open-ended (Gall, Gall, & Borg, 2003). This open-endedness allows the participants to contribute as much detailed information as they desire and it also allows the researcher to ask probing questions as a means of follow-up.

Personal interviews allow for reading of the body language and additional interaction. In addition, the same questions were used in either case to preserve the consistency of results. The sample should be adequate for this particular study; according to methodologists such as Polkinghorne (1989) and Leedy & Ormrod (2010), an interview pool or sample consisting of participants numbering from five to twenty-five is usually considered sufficiently reliable if the individuals have direct experience that they can recall and articulate. Although only four interviewees were identified, they are eminently qualified as they possess significant knowledge of the topic of information processing and use during the Cold War era. Experts in this area, such as Moustakas (1994) and Polkinghorne (1989), have produced a four-step procedure, similar to that developed by Creswell (2013) for narrative research and reproduced below:

1. Interviewer preparation, including developing a frame of mind conducive to receiving information that supports or undermines one's proposals and that puts the interviewees at ease.

2. The data collection phase that requires contact with a sample population experienced with the phenomenon. Although this sample should be statistically significant, it should not be overwhelming, to insure that quantity does not compromise quality.

3. Data analysis.

4. Finally, the researcher produces both a textural description of the experiences and structural description of experiences reported. By developing these, the researcher can arrive at the underlying themes and apply them to the theoretical construct. In this study, data analysis was performed by historic analysis (particularly of secondary sources but also of interview results), combined to some extent with thematic processing.

3.4 Justification of Methods

Because it would be erroneous to expect completely unequivocal answers to any of the questions posed in the proposed study, it falls within the realm of qualitative methodology, further subcategorized as comparative historical analysis. In particular, this investigation involves a chronological analysis of primary and secondary documents coupled with a series of face-to-face interviews with U.S. and Russian scholars whose expertise extends to the formative years of the United States and Soviet scientific and technical information domain. The interviews were conducted to help obtain descriptive, in-depth data on unique perspectives and individual opinions inaccessible through other data gathering means. The interviews, allowing the subjects to respond on their own terms and within their own linguistic parameters, also served to offer a great way to clarify meaning and shared understanding.

Comparative historical analysis is usually associated with social sciences, as opposed to quantitative analyses which are the mainstay of empirical, scientific research. One of the key points for history scholars is that they try to explain issues that have been

disputed "over divergent theoretical frameworks, for which the tension between structuralism and culturalism [and this writer would add functionalism] is a major example. And there are still unresolved epistemological issues that arise from the attempt to do justice to historical particularity and at the same time achieve theoretical generalization" (Mahoney & Reuschmeyer, 2006, 5).

Comparative historical analysis is an optimal method to perform causal analysis, such as that laid out by the theoretical framework of Coser's theory of conflict combined with the examination of events and expert opinions in the field of STI. This is the appropriate choice of the methodological approach because the present study is concerned with the development of STI management institutions over time and with the use of systematic and contextualized comparison (Mahoney & Reuschmeyer, 2006, 6). Consistent with over qualitative methods, historical analysis brings together historical evidence through methodological tools that have developed over the decades. There is a specifically delineated time period—the Cold War era from its beginnings until 1969, when the U.S. "won" the Space Race by landing humans on the Moon. There are cases that are sufficiently similar to be meaningfully compared—the U.S. information management system regarding STI that is decentralized versus VINITI, a rigidly controlled arm of the Soviet scientific and technological machine.

Scholars of history become intimately familiar with their subject, as they must research original and secondary sources from specific time periods and within specific topics. There continues to be a paradigm debate over whether or not historical research is sufficiently original or if it merely supplements the initial conclusions of others.

Interestingly, some comparative historical research has answered this charge by combining qualitative and quantitative methods (Mahoney & Reuschmeyer, 2006). Such an approach is not necessary in this study, however, because much of the research is new and until now has been unavailable to the West as many documents written in Russian have not been previously translated or otherwise scrutinized. Thus, the current study touches uncharted territory and need not rely on an excessive mixture of methods for legitimization. It does, of course, combine interviews with archival research, so in that sense it constitutes a hybrid within qualitative research methodology.

Importantly enough, qualitative research builds on inductive reasoning that derives general principles from specific observations or sources and their interpretation. Inductive reasoning is inherently uncertain because the conclusions it affords are always those of a personal nature as examination in qualitative research is done through the eyes of the researcher. It does not have rigorous, time-proven instruments or theories to fall back on. Rather, the researcher him/herself is in charge of carving out the data collection and analysis processes. Dry numbers are out of the equation; and in their stead the scholar undeterred by the nuances of the qualitative methodology weaves feelings, conjectures, and at times downright speculation into the fabric of a coherent argument. The beauty of qualitative research is that it is never finite. Conclusions drawn through inductive reasoning are always open to question since by definition the conclusion is a bigger deal than the evidence on which it is based. Simply put, qualitative studies hold untapped potential for further inquiry because it is simply beyond the power of the human mind to put the boundaries on how social, cultural, political, or historical phenomena can be explained in light of past or emerging evidence (Magilvy & Thomas, 2009).

3.5 Conclusion

This research is conducted within the broad framework of qualitative design. Although great consideration has been given to the benefits of quantitative or mixed-methods research, two aspects of qualitative methodology are optimal for this study. First, the researcher located four experts in the field of STI with much experience among them, particularly involving VINITI, the powerful Soviet information management agency. All four individuals agreed to in-person interviews with the researcher.

The second form of qualitative research to be utilized herein is the comparative historical chronological method. Two diverse systems of STI handling are being compared to ascertain if there is any causal relationship between their structures. A specific time period of the Cold War era, from the end of World War II until 1969, provides the chronological time frame. Finally, the interpretation of a polarized world with the information explosion phenomenon in a pre-Internet setting and scientific and technology research progressing at a mind-boggling speed provides the context. This area has had little definitive research accomplished about it in the past, so this work should enlighten many, in particular since some of the documents are available only in Russian and hence have not enjoyed much scrutiny in the West.

What the researcher hopes to achieve overall is an improved understanding of today's global effort to continue mastering the art of information management and reduce what author David Shenk (1997) has defined as "data smog." The historical perspective is instrumental in this regard because the problems we are encountering now—massive data outputs and the need to manage them for the betterment of humanity—are conceptually

quite similar to the issues the information world encountered some seventy years ago. Therefore, this study argues, continued research on the work of the pioneers of contemporary information management has a distinct future outlook.

CHAPTER 4

DATA ANALYSIS RESULTS

The history of organizations established to manage scientific and technological information in the United States and in the Soviet Union is critical for addressing the question of why the United States and the Soviet Union undertook such different paths to manage information overload and attempt to achieve information dominance during the Cold War period – the central research question of this study. As mentioned previously, among the key organizations in the United States for the management of scientific and technical information were the National Science Foundation, the National Technical Information Service, and the Atomic Energy Commission. The Soviet Union, conversely, had VINITI, or the All-Union Institute for Scientific and Technical Information. This chapter presents the history of these various agencies and considers how their organization and their operational practices affected the management of information and the potential for information dominance; the strengths and weaknesses of these organizations and their relationships and contributions to the intelligence communities in the United States and the Soviet Union.

4.1. Scientific and Technical Information in the United States

The organization of information in the United States during the Cold War period was represented largely by the operation of such agencies as the National Science

Foundation, the National Technical Information Service, and the Atomic Energy Commission, with specialization as the driving force of the American information matrix.

Indeed, specialization, particularly as it was related to electronic sorting of journal abstracts, became one of the most obvious means of coping with the rising flood of literature (Price, 1961). Price also wrote about the growth of information as a primary issue of the twentieth century. He suggested that science was expanding at such a rapid rate that it was effectively doubling both in terms of publication and manpower in a ten to fifteen-year period following the Second World War (Price, 1961), fitting into part of a much broader trajectory, going back to the seventeenth century, the time that also saw a major explosion of science.

The translation of this idea into the context of Cold War information management may not be obvious but it provides a segue toward understanding that the way that the United States sought to manage information and the way that the Soviet Union managed information was very different. The Soviet Union sought, primarily, to generalize, although their generalization was not an emphasis upon general skills. As has been already discussed in the preceding chapters, the Soviet Union created a centralized STI management structure that was epitomized by VINITI. All disciplines of science were managed through the Institute. On the other hand, the United States tended to approach information management with much more emphasis on specialization. Different organizations were responsible for managing information about scientific advancements in their respective fields.

National Science Foundation

The National Science Foundation is recognized as a key organization in the management of information in the United States, to the extent that it is widely credited as instrumental in the development of the Internet during the 1980s with the construction of the Supercomputer Center Program. In a summary of the organization's history, Gonzalez (2014) discusses how the NSF was founded to support both basic research and education in the non-medical sciences and engineering. Congress established the foundation as an independent federal agency in 1950 and directed it to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes. The NSF quickly established itself as a primary source of federal support for U.S. university research, especially in certain fields such as mathematics and computer science. The agency also became responsible for significant shares of the federal science, technology, engineering, and mathematics (STEM) education program portfolio and federal STEM student aid and support (NSF Annual Report, 1955; 1956).

Gonzales (2014) notes that the NSF was established as an independent federal agency, meaning that, although it was technically controlled by a budget and oversight process, it had a relatively large amount of autonomy as an institution compared to many other federal agencies. The U.S. government did not have as much direct involvement in its operations so as to have a substantial impact. This autonomy was what might have allowed NSF to stay consistent with the scientific mission of the organization, too, indicating that it might have something to do with the goal of acquiring knowledge or

managing knowledge. The Federal government did not view this largely societal goal as something that necessarily needed to be tightly controlled as other missions associated with Federal agencies would perhaps demand. An alternative perspective is that the independence of the organization is connected to the tension concerning public values and accountability as a key issue.

In addition to its research responsibilities, which were primary, the NSF was also understood to be the only federal agency whose main mission involved education across the various fields of science and engineering, establishing a dual involvement in education and research in STEM areas. Virtually from its very inception, the NSF was under considerable pressure to be responsive to both the President and Congress on one side and the scientific community on the other. This pressure was compounded by the necessity of the NSF to walk a narrow path in seeking out and claiming its spot under the Sun that would solidify its position in the federal apparatus, without stepping on the toes of the well-connected mission agencies or alienating its supporters.

In the early 1950s, the organization saw the need to expand its constituent base both inside of the federal government and the scientific community. To do so, the NSF focused its attention on several areas that were to become mainstays of Foundation policy over the years – namely, grants to fund basic research, investment in scientific equipment and facilities, and perhaps most importantly scientific manpower. However, the NSF development did not go without challenges, not the least of which was the geopolitical environment of the time. In the heat of the combat that transpired on the Korean Peninsula, William T. Golden, special consultant to President Truman on mobilizing the

nation's scientific resources, recounted a conversation with Vannevar Bush in which both agreed that during military mobilization in Korea NSF appropriations should be reduced well below the proposed $10 million budget, with Bush suggesting a meager appropriation of $200,000 (Golden, 1950).

In his December 6, 1950 memo, Golden observed that "The National Science Foundation should not be given funds or otherwise encouraged to compete with these programmatic military agencies in the quest for scientific talent etc.-- certainly not at this time since the National Science Foundation is supposed to support only basic and non-military scientific research and development (Golden, 1950). Nevertheless, Bush anticipated the basic research programs of other federal agencies, specifically mentioning the Atomic Energy Commission (AEC), would be turned over to the NSF once it was operational and the "Budget boys [Bureau of the Budget]" had determined funding levels across the federal science apparatus.

In its unique position, the NSF growth was in line with the general developments of the information age. Carroll, Jack, and Cotter (1990) produced an extensive study on that era. They explored how the information age came about and how the world became "overloaded with data" (p. 3). They open their work by summarizing a range of studies that give an impression of how the information age emerged and what, in a way, it looked like. They describe that studies typically demonstrate that scientists "spend more time handling research results than conducting new research. Categorically, this observation demonstrates the significance of the ensuing information age and the relevance of studying it: aerospace scientists and engineers found that they spent about thirty-five

percent of the work week communicating technical information and about thirty-one percent of the work week dealing with "technical information received from others" (p. 3). Both tasks taking up roughly sixty-six percent of the work week dealt with the phenomenon of information management.

Their research also puts together a vivid picture of the variety of organizations that operated in the United States to support information management. They consider the information infrastructure and note that the needs and information-seeking behavior of scientists, engineers, managers, and policy makers were all different, creating the contextual goal of information management. They also outline how systems developed to capture information in the research and development (R&D) process, using the term "stage" to delineate chronological steps from the first steps in the R&D process, the development of the research proposal, and all the way through to the final steps, the publication of final results.

Carroll, Jack, and Cotter (1990) concentrate on the major scientific and technical information repositories of the three major federal agency members in the subfields of energy, space, and defense-related information:

- The Department of Defense (DOE) is noted as having technical report databases with 1.5 million records at the time of publication, with the beginning date of the organization noted as 1953.
- The National Aeronautics and Space Administration (NASA) is noted as having an STI database and 2.4 million records, with the beginning date of 1962.

- The National Technical Information Service, the NTIS, is identified as the NTIS Bibliographic Database, with 1.5 million records and a beginning date of 1964.

In compiling this information, Carroll, Jack, and Cotter (1990) underscore the fact that these databases were launched on the basis of CENDI (Commerce, Energy, NASA, Defense Information Managers Group), an interagency group of senior Scientific and Technical Information (STI) managers from fourteen different United States federal agencies. The resources of these CENDI databases were the result of massive information production spurt that, one way or another, took the form of publication, accompanied by millions of dollars of R&D investment.

As a result, bibliographical systems began to emerge that featured information architecture to support national and international global change. Reviewing global change information, they note, too, that, dealing with major interdisciplinary and intermission problems complicated the collaboration between various agencies and numerous obstacles had to be overcome so that scientists could see and solve purely technical problems. Their observation is also that the historical information of information infrastructure, STI management, R&D management, and policy management have not been "closely coupled", although today, the U.S. government is noted to spend billions of dollars per year on STI systems, with four percent of every research dollar spent on information organization that supports R&D (Carroll, Jack, and Cotter, p. 12).

Table 4.1 and Table 4.2 illustrate the steady growth of Federal research and development expenditures as a percentage of the U.S. Budget between 1940 and 1969, the time period representing the primary focus of this study (Maddrell, 2013):

Table 4.1 Federal Research and Development Expenditures as a Percentage of the U.S. Budget, 1940-60, millions of dollars

Fiscal Year	Total Budget Outlays	R&D Expenditures	% of Budget Spent on R&D
1940	9,589	74	0.8
1945	95,184	1,591	1.7
1950	43,147	1,083	2.5
1955	68,509	3,308	4.8
1960	92,223	7,744	8.4

As becomes evident from Table 4.1 above, the Second World War acted as a major catalyst for drastic increases of the percentage of the U.S. Federal budget allocated for research and development expenditures during and immediately following the war. It is hardly surprising that the largest increase occurred between the years 1940 and 1945. Federal budgetary allocations for research and development more than doubled in the five-year period as the government was investing heavily in the war effort. Predictably, as the space race was heating up, the second largest increase in funding allocated in the U.S. for research and development was registered between the years 1955 and 1960 in response to the Soviets' launching of Sputnik in October 1957. Table 4.2 below provides a more detailed account of the U.S. R&D budgetary allocations dynamic through the end of 1969, the year of the U.S. astronauts' landing on the Moon that, in essence, reaffirmed the U.S. decisive advantage in the space race. According to Table 4.2, U.S. budgetary allocations for research and development continued to grow, albeit on a lesser scale, throughout the 1960 and remained consistently high in the latter half of the decade.

Table 4.2 Federal Research and Development Expenditures as a Percentage of the U.S. Budget, 1950-69, millions of dollars

Fiscal Year	Total Budget Outlays	R&D Expenditures	% of Budget Spent on R&D
1950	43,147	1,083	2.5
1951	45,797	1,301	2.8
1952	67,962	1,816	2.7
1953	76,769	3,101	4.0
1954	70,890	3,148	4.4
1955	68,509	3,308	4.8
1956	70,460	3,446	4.9
1957	76,741	4,462	5.8
1958	82,575	4,991	6.0
1959	92,104	5,806	6.3
1960	92,223	7,744	8.4
1961	97,795	9,287	9.5
1962	106,813	10,387	9.7
1963	111,311	12,012	10.8
1964	118,584	14,707	12.4
1965	118,430	14,889	12.6
1966	134,652	16,018	11.9
1967	158,254	16,859	10.7
1968	178,833	17,049	9.5
1969	184,548	16,348	8.9

National Technical Information Service

Recognized today as the largest central resource for government-funded scientific, technical, engineering, and business related information, the National Technical Information Service (NTIS) organization was established more than sixty years ago, with the purpose of providing support for businesses, universities, and, consistent with STI, managing the provision of public access to roughly three million publications covering

over three hundred subject areas (NTIS). The precursor to the NTIS was the Office of the Publication Board, an agency created by President Harry S. Truman during World War II to collect, review and transmit to the public formerly classified technical information. In 1950, Congress passed the Technological, Scientific and Engineering Information Act, instructing the commerce secretary to establish a repository for technical information from whatever sources, foreign and domestic, that may be available," and to make "the results of technological research and development readily available to industry and business, and to the general public. The Office of the Publication Board became the Office of Technical Services, which in turn became the Clearinghouse for Federal Scientific and Technical Information. Finally, an act of Congress established the NTIS on September 2, 1970.

Over the next two decades, there have been occasional grumblings about the NTIS' future. Some have asserted that there isn't sufficient oversight on the agency, while others say the NTIS faces insurmountable competition from private-sector information sources, the Internet and even other government agencies. Still others say the way the NTIS functions is inefficient and unfocused—an apparent reflection of the organizational legacy of its incarnations prior to 1970.

The mission of the organization today is recognized as promoting "American innovation and economic growth by collecting and disseminating scientific, technical and engineering information to the public and industry, by providing information management solutions to other federal agencies, and by doing all without appropriated funding" (NTIS, 2015). Although the structure of the organization has changed somewhat

since its foundation, this mission has largely been maintained and at the forefront of the organization's operations. During the Cold War period, the NTIS was a clearinghouse of sorts for government reports and STI.

Atomic Energy Commission

As previously stated, the Atomic Energy Commission was created in 1946, in the aftermath of the dropping of nuclear bombs on Hiroshima and Nagasaki, and the conclusion of the Second World War, as concerns about the future state of the world and about the relationship between the United States and the Soviet Union were beginning to take center stage. The organization was created within the executive branch of the United States government and charged with overseeing the information that had led to the development of nuclear weaponry and that could also presumably lead to its refinement and further utilization. A key part of the AEC operational focus was research into the effects of atomic energy and the use of nuclear weaponry (Buck, 1983). However, to understand the relevance of the AEC in influencing the United States' approach to information management, it is necessary to delve further into the history and operations of the organizations like this.

Jason Nicholas Wingerd (2000) has discussed the nature and functions of the AEC in considerable detail. He notes that the organization emergence was tied into the passing of the Atomic Energy Act of 1946. Congress and the President Truman established the United States Atomic Energy Commission (AEC) as "an administratively unique government agency empowered to supervision nuclear weapons' production and custody" (Wingerd 2000, p. ix). The stated objective of the AEC was, during the Cold

War period, to increase the country's security plans. The focus was largely on building thermonuclear weapons and expanding the manufacturing complex of the country. Wingerd (2000) argues that this objective was set up in response to the Soviets' success with the testing of their first atomic bomb in 1949. He also suggests that the Atomic Energy Commission represented the continuous expansion of the federal bureaucracy into new areas of responsibilities and thus, in various ways, it was representative of the mechanism for centralized resource management that the U.S. favored over the Soviet centralized model. Wingerd (2000) also notes that the consolidation of the armed forces into the Department of Defense led to some centralization of power, some effort to align resources in a centralized system, although a substantial degree of specialization within small units was still maintained. He suggests, too, that he establishment of the AEC pushed the federal bureaucracy into unexplored regions of responsibility, organization, culture, and leadership. With regard to the AEC position among other federal agencies, Wingerd (2000) posits the following:

> [t]he new duties the government assumed included the supervision of a military weapon by civilians and the potential development of a new commercial energy source by a federal agency. The Commission's organization was a decentralized structure and consisted of a five-member board format, which made the AEC a unique federal bureaucracy. The Commission's culture included beliefs in the civilian custody of weapons, collegiate decision-making, and political neutrality. The structure required leaders to negotiate with other Commissioners as coequals (p. 6).

The apparent emphasis on collaboration in this structure again draws attention to the way in which the AEC operated in relation to other STI organizations in the United States.

Early Efforts to Coordinate STI management in the U.S.

Although a key difference between the American and the Soviet approach to STI was specialization versus centralization, research demonstrates that it would be erroneous to think of the U.S. as having a disjointed system of agencies that has no centralization. Organizations such as the Committee on Scientific and Technical Information (COSATI) and the Commerce, Energy, NASA, Defense Information Managers Group (CENDI) were vital to the organization of the specialized information management systems in the U.S. Kent Smith (1994), in a lecture titled "Federal information policy: Putting it all together," describes the operations of COSATI in relation to the management of STI programs in both the public and private sector. Smith (1994) references the 1963 Weinberg Report that declared that information management was not a separate but an integral and inseparable part of the research and development process, suggesting how the importance of committees arose in response to this perspective or in acknowledgement of it. He suggests that "the technical community was essentially being told that they, the scientists and engineers along with the conventional information handlers, were now bonded in a new information community, in a new era of "Big Science"" (p. 61), again alluding to how the attitude towards STI management through committees began to be shared by many, partly to mitigate the issue of decentralization.

Gallo (2008) discusses the role of the National Science Foundation (NSF) in the development of the U.S. information infrastructure and argues that the NSF's role and its influence on the evolution of large scale scientific and technological systems was vital to the development and improvement of the U.S. information infrastructure. He suggests

that the relatively weak position of the NSF in the 1950s was also significant to the development of the organization and to the timeline according to which the process of information management was modernized. Indeed, the NSF emphasized the development of information and communications infrastructure information management, virtual simulation, and at the most fundamental level, the generation of new scientific knowledge. Crucially, Gallo (2008) also concludes that the NSF achieved its objective and sustained its vital role through its mode of operation:

> By providing support at critical and overlapping stages and junctures of the frontier enterprise, the NSF simultaneously fulfills its mission and creates lasting infrastructural traces that establish sovereignty over space and enables the generation of fundamental knowledge that undergirds, at least rhetorically, the linear model of innovation that shapes post-war science and technology policy in the United States (p. 3).

Gallo (2008) draws attention to the way in which nuclear research was undertaken in the 1940s as an example, with a focus on the development of a comprehensive U.S. atomic program over several years. He describes how President Roosevelt established the Uranium Committee in 1939, which later merged into the National Defense Research Committee (NDRC) in 1940. He also mentions how, in 1941, the NDRC was reformed as the much more powerful Office of Scientific Research and Development (OSRD), empowered with control of the Uranium Committee which was renamed S-1 Section. The S-1 Section was also reorganized and restructured into the S-1 Executive Committee in June 1942, allowing to focus on a nuclear weapon in cooperation with the U.S. Army. The subsequent change in late 1942 the S-1 Executive Committee created two sites to support the U.S. Army Corps of Engineers' newly formed Manhattan Project, with its

base in Oak Ridge, Tennessee, and Los Alamos, New Mexico. This is also a good example of the flexibility of the American approach to STI management. From it, one can distinctly see how specialized organizational units were by and large supported with committees backing up their activities and representing their interests to a more centralized unit in the Federal government.

U.S. government committees like COSATI, ASTIA, and CENDI attempted to coordinate the U.S. STI management efforts and to represent the work of the relevant agencies, the NSF, NTIS, and AEC, for instance, to the government, speaking to their interests, their achievements, and their needs in the political forum. This model stands in obvious contrast with the Soviet model, where VINITI was entirely responsible for STI management. Yet, the work of the above-mentioned committees in the U.S., or rather their results, were substantial and sufficient to show that there was considerable benefit to having the "specialized" approach to STI so long was there was a more centralized mechanism for support integrated with it. Although Gallo (2008) insists that "the absence of a central government agency does not *ipso facto* necessitate the creation of one" (p. 133), the bulk of his argument highlights how there was, in effect, a distinct group of central agencies created to at least represent the interests of the specialized groups to the Federal government, with the primary objective of ensuring that funding and other resource requirements were consistently met (Spencer, 2014).

4.2. Scientific and Technical Information in the Soviet Union

The following section outlines the emergence and the rapid rise to prominence in the early-to-mid- 1950s of VINITI, or the All-Union Scientific and Technical Information

Institute, through a review of secondary sources pertinent to the organization. VINITI is mostly known for beginning to produce *Referativnyi Zhurnal*, a Russian-language set of abstracting journals the first of which were initiated in the Soviet Union in 1952 (Shamaev, 2011). They were abstracts of mostly magazine (journal) or conference articles, but books and patents were also included as well as unpublished "deposited" articles. The articles they abstracted included sixty-six different languages from 130 different countries of the world. However, for the purposes of this research the focus here and in the following subsections is to address the way that information management through VINITI epitomized the Soviet Union drive to undertake a different approach to STI compared to the United States. This is done to address the first research question of the study that explores the root causes of what prompted the Soviets to make the decision to maintain a centralized information management system.

VINITI (All-Union Institute for Scientific and Technical Information)

VINITI has been described in the literature as a massive abstracting and translating service that also housed an advanced punched-card computing machine for searching scientific literature (Baker & Hoseeh, 1960; Bello, 1960). Created in 1952, the organization was said to have more than twenty thousand employees working on managing information by abstracting, translating, automating, and disseminating scientific information; organizing the information and distributing it primarily to communist countries to support their development and expansion. VINITI covered more than twelve thousand foreign journals each year. In 1959, for instance, there were more than 700,000 articles abstracted in many different languages, with the subtle emphasis

always upon working out how information could be used to advance the Soviet's agenda to promote the superiority of their information management and, through it, their theoretical and practical scientific knowledge (Shamaev, 2007).

Schneider (1994) undertook a substantial study of the information management of the Soviet Union summarized in his seminal work, *Research and Development Management: From the Soviet Union to Russia*. Schneider (1994) attests to the sporadic nature of interest in the research and development strategies of the Soviet Union but follows up this attestation with an acknowledgment that the end of the 1980s and the decline of the Soviet economic model was one of the factors that caused a relative "surge" (p. 13) of attention in the Soviet economy and what became the Russian economy. He argues that the "incredible investment" of the former Soviet Union in domestic science and research was particularly important, too, implying a clear focus on the development efforts of the Soviets through their information management strategies.

Throughout the rest of the study, Schneider (1994) probes the issue of information management as both a concept conceived in relation to research and as a practical initiative that had to be carefully implemented. He considers some of the paradoxes and basic issues that arguably undermined the relationship between Western organizations and their Soviet counterparts, perhaps explaining the somewhat uneven relationship. Considering the Soviet style of government, Schneider (1994) conveys the impression that the functioning of the Soviet government was "indicative of the system's functioning and [was] finally synonymous with the definition of the system" (p. 1). Schneider (1994) describes the fluctuation of the market economy in the "inventory of technical

knowledge" (p. 13) and indicates that those fluctuations were the result of changes in expenditure on R&D by private firms, the government, and by groups of individuals in universities and other for non-profit and nongovernmental research institutions.

The significance of Schneider's observation, however, is that it perhaps points to one of the reasons why the centralization of the Soviet STI management was deemed the preferred and the most optimal approach. With a state-funded program, the potential for fluctuations in funding was presumably lessened. Given the need for up-to-date and comprehensive information declared by the burgeoning body of technical specialists, scientists, and other scholars, the consistency of funding to support information management appears to be highly relevant.

Ruggero Giliarevskii (1999) made a telling comment on the condition of the Soviet Union in a paper presented at the 1998 Conference on the History and Heritage of Scientific Information Systems. He observed, in particular, that the STI system of the Soviet Union was actually destroyed when the country disintegrated in December 1991. This perspective actually provides a key insight into the main research question of the current study, why the U.S. and the Soviet Union pursued different paths in STI management. Giliarevskii (1999) suggests that it was a matter of the Soviet Union being in a position to maintain a unique standard for STI. He argues that "[t]he Soviet Union's national economy was administered by command and constructed on a departmental basis. This method of control was also reflected in the organizational functional structure and practical activity of the STI system" (p. 195). Unlike its Western capitalist rival, the Soviet Union allowed no room for the market principles of economy.

As a result, spheres of private property failed to extend firmly enough for the economic methods of management to take root. Unlike the United States, the Soviet Union had no free enterprise to meddle in the activity of STI management bodies. So, the Soviet Union never came close to having the circumstances for the final transition to information service in a purely market based context. Such a transition would have meant a fundamental change of the regime and—with it—the organizational structure of the country's STI which was not to be implemented. Instead, he insists, the need was created for a new system and the demand was there that it should be developed quickly to make maximum use of structures and staff from the command and control system. It does not seem surprising that the nature of the Soviet information structure was sufficiently tied to the country's political organizational structure, its centralized administrative perspective. The connection was so tight, in fact, that when the political system disintegrated several decades later, the support structures necessary to maintain the condition of the STI, the VINITI, were no longer in place or at least no longer functional (Rapoport, 2006).

This further suggests that the relationship between the U.S. and the Soviet methods for STI were defined or at least heavily influenced by the political manifestations of these countries, affecting how the countries' administrative resource developed. Indeed, Giliarevskii (1999) outlines quite clearly how the Soviet STI system emerged according to the principles stated by Lenin between 1918 and 1922, taking the initiative from many of his political speeches that addressed matters of scientific and technical information. Those communist principles were embodied in the concept of government but also in the STI management system at the point that VINITI was formed and really prospered.

According to Giliarevskii's (1999) assessment, the following issues emerged in relation to the ideological structuring of the Soviet Union and had an impact upon the STI management systems which was deeply rooted in ideology, as well as in the formation and operation of government and subsequent power structures within the Soviet society. He outlines how, during periods of maximum growth, the system generated the following principles to control the management of resources and thus the management of scholarly and scientific information (p. 196):

- Unified government control of scientific and information activity under the U.S.S.R. State Committee for Science and Technology. The development of a specialized (largely departmental) STI system was delegated to government ministries and departments. Within the republics the STI systems were the responsibility of the councils of ministers, while directors of factories and organizations supervised the work of information departments often subordinated to them.
- The structure of the Soviet STI system was organized like the national economy. Each management level, from government ministries (departments) to local economy units (enterprises and organizations), corresponded to a certain level in the system. Restructuring in the national economy necessarily caused a reorganization of the system.
- Coverage of all types of documentary sources for all fields of science and national economy. The complete coverage was a proclaimed goal, but in practice there was a wide difference in the degree of coverage in individual industries.
- Specialization of STI agencies based on a rational division of functions. The specialization was two- fold: centralized, analytical, and synthetic processing of documents by federal and specialized (and partly territorial) STI agencies and decentralized delivery of information to users, accomplished mainly by interdisciplinary and regional STI agencies and information units at enterprises and organizations.
- Uniform construction of the network and organization of activity of STI agencies and special libraries based on standardized reference information col- lections (federal, disciplinary, regional, and local).

- Unified classification (indexing) of natural and engineering sciences publications by publishers and editors of special journals and information materials kept by STI services.
- Use of modern technologies (computers, office automation, broadcast, motion pictures, and television) to improve the speed and quality of information services provided to scientists, professionals, and industrial innovators.
- Financing virtually all expenses of information services by government budget. (Some self-sufficiency was required, but in practice it boiled down to shifting funds from one budgeted expenditure item to another.)
- International cooperation in scientific and technical information limited because of the ideological and military-industrial confrontation with economically advanced countries. The forms, methods, and degree of realization of these principles varied in different phases of the system's development.

The importance of acknowledging this information is that it also lays considerable emphasis on the perspective that the Soviet Union was operating from a distinctly ideological perspective in the way that it attempted to develop and apply STI services. Connecting the ideological context to the practical side again also explains why there was such a substantial STI growth when the Soviet political infrastructure was in its prime in the decades immediately following the victory in World War II. The interconnection appears to be a condition that cannot be overestimated in its importance to understanding why the Soviet Union operated as it did in relation to information management.

Nevertheless, the actual development of information systems in the Soviet Union was slow, despite the ideological foundation that was in place to support operations when they began. It was not until the late 1940s, however, as Giliarevskii (1999) suggests, that the major sources of scientific and engineering information were being published and being widely made available to scientists and engineers as well as to publishers and

libraries as part of the more strictly information-based structure that had a stake in how this type of information was collated and distributed.

The STI systems in the Soviet Union were also, Giliarevskii (1999) suggests, set up through factories and design bureaus first, with "disciplinary information centers in some fields operated independently [and] their links sporadic and disorganized" (p. 196). There were high instances of duplication in the first several years, largely because of the bureaucratic nature of the operation. Giliarevskii points out that the coordinating functions of the State Committee for New Technology and the organization that succeeded it, the State Scientific and Technical Committee, had a limited number of things to publish and disseminate. There were also various attempts to make abstract journals available from the 1920s onwards, but that also was not really widely achieved until after World War II. Giliarevskii (1999) describes how, at that point (p. 196):

> files of documentation on military technology, especially rocket and radio engineering systems, were brought to Russia from occupied East Germany. The study of these materials gave powerful impetus to active information work in military industries. The demand for special information in various fields of science and industry intensified when a program to develop nuclear weapons, rocket technology, radar, and technical modernization of all military services was instituted.

This point allows that there was, of course, a demand for "special information" and that there was thus a pressure, perhaps, for the STI systems in the Soviet Union to become more specialized rather than centralized. However, allusions to a degree from the Council of Ministers, presented in the summer of 1952 explain how the Soviets responded to this need. Through the degree, VINITI was established and it was created with a dedicated mission to publish abstract journals, providing exhaustive coverage,

effectively, of all of the scientific and technological literature that was being produced (Shamaev, 2011; Markusova, 2012).

According to Giliarevskii (1999), beginning in 1956 VINIT began to publish current-awareness materials, too, and this was indicative of their global engagement from the early stages of the process. Also significant, however, was the way that the organization was further developed and its powers further defined by subsequent degrees from the Council of Ministers. An earlier analysis by Mikhailov, Chernyi, and Giliarevskii (1965) highlights how the development of information services occurred at industrial enterprises and scientific research institutes and how, from 1951 through to 1955, some 230 information units emerged, with this number excluding information services in the defense industry, distinguishing between STI information and that which is perhaps more readily identifiable as classified material. Mikhailov, Chernyi, and Giliarevskii (1965) also mention that between 1956 and 1960, the number of information units produced increased by 1,631 and there was a further evolution of a network of specialized information centers (p. 197).

Giliarevskii (1999) stresses that a movement to industrial management for the VINITI was established according to the regional principle of economic boards in the Soviet Union and there was increased emphasis on the development of regional scientific and technical bureaus in 1957, as well as central bureaus of technical information for the industry boards and republic information institutes in the Union republics. What this information points to, in particular, is the way that the Soviet Union was not necessarily as straightforwardly centralized as might be assumed. Although the VINITI was state-

funded and state-run, to say that it did not promote specialization like the U.S. equivalent systems is perhaps misguided. The specialization may not have been subject-specific, yet there was specialization to a discernible degree; resources were organized so that VINITI, in its approach to STI, did not simply operate the vast variety of its resources at random. There was internal structuring that controlled or attempted to control the way that information was generated and disseminated.

On the other hand, Giliarevskii (1999) insists that the resulting "swollen network" of regional publishers that existed across the Soviet Union was ineffective and a subsequent degree from the Council of Ministers in 1962 was issued to require centralization of publishing information materials by specialized central institutes, attempting to overcome the issue of a network of units that was too substantial to be controlled; that was not, in a word, sufficiently centralized. The degree made mandatory the classification of all publications and materials in natural and engineering sciences according to the universal decimal classification (UDC) by publishers and editors of scientific and engineering journals. Other decrees issued in 1964 by the Council of Ministers also saw the Central Institute of Patent Information, the All-Union Institute of Technical Information Classification and Coding (VNIIKI), and the All-Union Collection of Standards and Technical Specifications (VIFS), which helped to promote more coordinated information management (Mikhailov, Chernyi, and Giliarevskii, 1965, p. 197). The emphasis on the collection of foreign literature in natural and engineering sciences and on information agencies securing manuscripts of interest to limited groups of specialists were also functions that emerged for the VINITI during this period, but

attempts to circulate unpublished research and development documentation through information channels were also continued and with varying degrees of success.

Gradually, technology helped to make the national information network of VINITI more effective. Giliarevskii (1999) suggests that "[e]expansion of computerized information processing became the main phase of further STI system development" (p. 199). A network of computerized information centers eventually emerged, as well, with remote access to databases produced by national, specialized, and regional information services to accelerate delivery of documents to scientists, engineers, and managers. The integration of information became increasingly important, which would then give rise to a move towards automated STI systems from the late 1960s onwards.

For the VINITI, however, most of the developments that occurred to improve the STI systems in place since the 1950s were behind the efforts of the American counterparts and still consistently tied to ideological perspectives of Socialism. The issue of separating the Soviet STI system from the government infrastructure was seemingly never addressed. Although an interdisciplinary automated STI system evolved from the first stage of the state system, with the distinct purpose of establishing automated services of the defense industries with the services at VIMI through dedicated communication links into a star-shaped network, the formation of the channels was utterly problematic.

The Space Race: What Sputnik Meant for the Information War

Determining the significance of a single development in the so-called war for information superiority, the successful launch of Sputnik, is difficult but important. Smith (1994) describes the launch of Sputnik in 1957 as a momentous event: "the USSR

launched a 3,000-pound Sputnik into space" (p. 60) and points out that the Americans responded with the founding of the National Federation of Science Abstracting and Indexing Services. Smith's narrative suggests that it was in response to the success of Sputnik and the relative failure of the American moon rocket design attempts that U.S. Senator Hubert Humphrey went to Congress, to the Senate Subcommittee on Government Reorganization, and demanded an investigation of what the government was doing to stay on par with the Soviets and manage the wealth of scientific information that was being generated.

Western European and U.S. scientists generally responded to Sputnik with surprise, despite the public announcements preceding its launch, and despite hearing definite predictions of the launch from the science and intelligence communities. In the U.S., space researchers were discouraged by their inability to launch the first satellite, and frustrated by the American government's lack of support of their efforts. As for the public reaction, Most of the general public in the West, encouraged by the media, was frightened by the idea of a Soviet satellite traveling overhead, with its implications about the strength of Soviet military rocketry. President Eisenhower was a prominent exception to the general anxiety. On learning of Sputnik, he said, "Now, as far as the satellite itself is concerned, that does not raise my apprehensions, not one iota. I see nothing at this moment, at this stage of development, that is significant in that development as far as security is concerned, except, as I pointed out, it does very definitely prove the possession by the Russian scientists of a very powerful thrust in their rocketry, and that is important" (Eisenhower, 1958, p. 730).

The Soviet leader Nikita Khrushchev saw the satellite as proof of the victory of the socialist system over the capitalist system, and his statements reflected his analysis (Roberts, 2010). Within the Soviet Academy of Sciences, some officials echoed this sentiment. A. P. Aleksandrov, who later became president of the Academy, wrote that Sputnik began a new stage in history, when "in this region of technology socialism has surpassed capitalism. The scientific-technological superiority of the new more progressive social order is clear." An article in International Affairs reinforced this interpretation: "The whole world saw yet one more extraordinary, important demonstration of the Socialist system's superiority to the capitalist system" (Josephson, 1990, p. 174).

Although the first satellite flew during a year of international scientific cooperation, the Sputniks also demonstrated Soviet military capability. Trying to prevent the militarization and weaponization of space remained a top priority within the United Nations over the next several years, mostly revolving around the U.S. and the Soviet Union as the two launching nations and the two strongest military powers (U.N. General Assembly Resolution, 1957). While Soviet and American diplomats agreed on the desirability of peaceful uses of outer space, they continued to disagree on how to reach this goal in practice. Since each side saw the other as refusing to give up certain requirements that the other side found untenable, each considered the other's proposals for peace in outer space to be sheer propaganda (U.S. Department of State, 1958). The status-quo only served to exacerbate the existing diplomatic tension and led to an even more heated rivalry for scientific and technological information superiority amid

competition for greater sophistication of the scientific and technological knowledge of American and Soviet scientists.

4.3. Interviews

The following section contains analysis and interpretation of the four interviews conducted over the course of this research with scholars who had worked with VINITI. The primary objective of the interviews, as indicated in chapter three, was for the four scholars each to give their comparative assessment of the growth and development in trends related to managing scientific and technical information in the United Sates and Soviet Union in 1945-1969. The researcher asked the interviewees to focus on the similarities and differences of the two approaches and corroborate their assertions with anecdotal evidence whenever possible.

Interview One

The first of the four interviews conducted in the course of this research was with Bonnie Lawlor, at the time Executive Director of the National Federation of Advanced Information Services (NFAIS), a membership association for organizations that aggregate, organize, and facilitate access to authoritative information. Prior to NFAIS and her stint as Senior Vice President and General Manager of UMI's Library Division (now ProQuest Information and Learning), Ms. Lawlor served for several decades as Executive Vice President of the Database Publishing Division at the Institute for Scientific Information (ISI – now Thomson Reuters, Healthcare & Science) where she was responsible for product development, production, publisher relations, editorial content, and worldwide sales and marketing of all of ISI's products and services.

Ms. Lawlor discussed working with VINITI on various occasions and with various colleagues. A chemist by training, with both a bachelor and master's degree in organic chemistry, Ms. Lawlor began working at the Institute for Scientific Information in 1967 as a chemical indexer. This work involved reading literature and creating abstracts and indexing chemical products for the Institute. Ms. Lawlor was involved with both the ASIS and NFAIS, which was formed, she suggested, out of concern over the launch of Sputnik and the growth in the VINITI activities, indicating that, in some ways, NFAIS is one of the agencies that can be considered a counterpart to a specific Soviet organization designed to manage scientific and technical information.

Ms. Lawlor summarized the history of NFAIS, indicating that it was established in 1958 (personal communication, January 24, 2014) because President Eisenhower believed that science had won the war and would subsequently be instrumental for keeping the peace. He ordered NFAIS to support all activities related to scientific communications, including indexing and abstracting.

The process of indexing and abstracting, though, which Ms. Lawlor emphasized repeatedly in her discussion of information management, was identified as already ongoing by the time that Eisenhower created NFAIS. Ms. Lawlor mentioned that there were already people working on indexing and abstracting across government and non-profit organizations, "and, they didn't want the government interfering with what they were doing because they felt they knew this area best" (personal communication, January 24, 2014). However, Miles Conrad, the director of biographical abstracts and what later became Biosis, now part of Thompson, indicated that all the people together could be

involved in abstracting and indexing; so that by establishing a federation, it would be easier to support those activities.

Concern about VINITI was a factor in the organization of indexing and abstracting processes. Ms. Lawlor reported that a year after the formation of the NFAIS, Miles Conrad and Dale Barker, who managed chemical abstracts, were actively discussing VINITI and seeking to visit different departments and organizations, including the National Science Foundation, to determine what might constitute the most effective strategies for information management.

Ms. Lawlor also noted that the bulk of the information that was being indexed, came out of Germany and that, although there was obvious concern about VINITI, it was not sufficient to prevent interest in information sharing or at least modeling. According to Ms. Lawlor, representatives from NFAIS grew determined to visit VINITI to make an assessment of how VINITI undertook comparable work; despite the tensions surrounding the situation, the competition between the American and Soviet organizations, accessing VINITI posed no issues, at least not any that were reported. The main purpose of the early visits by the NFAIS delegations was, in the words of Ms. Lawlor, to "start a dialog but also really to see first-hand how advanced [the Soviets] were" and also to "get and eye on how [they] actually compare[d] with what we had here, and was it as, uh, fantastic as it was described or was it very rudimentary…I think it was really just to see first-hand, was it propaganda they were hearing or was it the truth" (personal communication, January 24, 2014).

Ms. Lawlor said that, although the purpose of NFAIS has changed significantly over the time, the general context has changed considerably as well. It was established so that companies who were doing indexing and abstracting could collaborate and discuss any problems in order to work efficiently to catch up on the backlog. The organization expanded, too, from the original fourteen participants. It peaked at seventy-five and, according to the interviewee, currently has around sixty-two members. The goal from the start was to promote abstracting and indexing and to manage an annual conference that promotes the activities of the organization, offering webinars and workshops on various issues in the field. Despite the multitude of tasks, the focus of NFAIS has always been upon documents management, organizing documents sets, data minding, and various forms of information analytics.

To some extent, the scope of the organization's activities expanded as the collection of the library or information center increased. What started as a concern about the Soviet developments, then just took on a life of its own. Ms. Lawlor observed, "in the 60's everybody was suffering so much… because you just could not keep up with what was being published. I mean, so many new journals came out after WWII, people just couldn't deal with it" (personal communication, January 24, 2014). This quote confirms the enormous amount of material published in the 1960s. So many new journals came out after World War II that it was naturally challenging to manage the information. However, toward end of the 1960s, the focus of conversations between those involved in information management shifted onto computer applications, including processing and new delivery mechanisms.

What started as a concern about the Soviet developments thus snowballed, evolving to respond to the overall expansion of the American information landscape. The point at which the main focus was concern about the Soviets seems to have been the late 1950s and early to mid-1960s. Much beyond that, the interviewee reported, there was no discussion about what the Soviets were doing and what the implications of their achievements might be for the United States. The focus of the competition shifted from the early years of the organization to focusing on internal competition, however strong the initial impetus had been about the Soviets and their work. Ms. Lawlor even reported that many professional relationships involved people in the USSR who were undertaking similar work to manage scientific information.

Interview Two

The second interview conducted by the researcher was with Dr. Eugene Garfield, one of the leading scholars in the fields of bibliometrics and scientometrics. As the founder of the Institute for Scientific Information (ISI) that developed and maintained citation databases covering thousands of academic journals in various areas of science, Dr. Garfield is a major contributor to the system of STI retrieval and management in the post-World War II United States. Dr. Garfield had a connection to VINITI through his work as a chemist, which eventually led him into abstracting and indexing of STI. Dr. Garfield commented that the name of the Institute for Scientific Information was influenced by the name of VINITI because at the time the organization was formed, it was an objective, informally at least, that the organization would do what VINITI did with a lot fewer people than VINITI could, which employed thousands or tens of

thousands specialists. The objective was to be efficient in operations and the push for this began with the Sputnik launch, according to Dr. Garfield.

Having worked at a small company in the industry – dealing with scientific data – Dr, Garfield changed the name of his company, Eugene Garfield and Associates, into ISI as he felt compelled to start working to challenge VINITI, although the latter "had a completely different system" (personal communication, January 24, 2014).

Dr. Garfield's first trip to the Soviet Union was in 1961 and, although they do not recall visiting VINITI on that occasion, as they did later, they referred to attending an international congress of biochemistry and being among many visitors concerned about the progress of international science.

Dr. Garfield described attending the international congress of biochemistry with five hundred other Americans. The focus on chemistry was important, too, as Dr. Garfield is a chemist by professional training and chemistry was among the primary scientific disciplines that VINITI dealt with. Dr. Garfield indicated that it was clearly necessary for the Soviets to keep up their interest and performance in chemistry if they wanted to keep their lead that had been proclaimed with the Sputnik launch.

Dr. Garfield reflected on how that single event caused considerable stirring in the American scientific community. The Russians were always very good in physics as well, in addition to space industry, as Dr. Garfield indicated, and the production of the atomic bomb was obviously an important issue of contention, too.

Dr. Garfield mentioned going back to Moscow in 1965. The first time he went, too, he described attending the Moscow Book Fair, with all the publishers present. The

fairs were arranged in different cities but the largest exhibition of book publishers always took place in Moscow. Although Dr. Garfield did not go back to visit VINITI very often, he remembered meeting other important figures, including Chernyi, Mikhailov, and Giliarevskii, and recalls himself becoming good friends with Vasily Nalimov, a prominent Russian information scientist who has a reputation as the founder of the area of scientometrics. Nalimov would often send long lists of books that he wanted and was unable to get from the Soviet Union. Some of them very obscure and Dr. Garfield describes going from book fair to book fair until he found the books.

Asked to comment on information security, though, and whether there was any sense of secrecy, something being hidden, Dr. Garfield indicated that everybody was aware that the KGB was watching everything. “It would have been stupid if you did not know that,” Dr. Garfield insisted (personal communication, January 24, 2014).

Dr. Garfield was unaware, though, that A. I. Mikhailov was at the top of the VINITI leadership for as long as thirty-two years, up until his death in the mid-1980s. Dr. Garfield indicated that he could not imagine him as the leader of VINITI, although he acknowledged that Mikhailov was a brilliant scholar and famous for his work on theoretical statistics. One of Mikhailov’s ideas that the interviewer drew attention to was the creation of a universal system of access to scientific and technical information across continents and in many different languages. Asked whether researchers were aware of the system and of what Mikhailov had published, Dr. Garfield indicated that he did not know, though he considered Mikhailov to be an internationally-minded person.

Overall, Dr. Garfield commented, however, that there was nothing unusual in what the Soviets were doing with abstracting services in the early 1950s-1960s. The only difference between what was happening in the Soviet Union and what was happening in America, Dr. Garfield noted, was that in the U.S. there were discipline-oriented abstracting services.

Dr. Garfield indicated that he was the one who said that it was necessary to cover all of the sciences in one place, attempting to create a quasi-centralized system of STI management. Dr. Garfield maintained he was also the one who went about organizing science citations altogether rather than creating biology, chemistry, or physics citation indices separately. There was some attempt to be discipline-oriented later but it was not very successful, Dr. Garfield concluded.

Asked whether it was the U.S. intention to emulate the Soviet model and create a system of centralized information management, Dr. Garfield insisted that there was no need for an imitation. Nevertheless, Dr. Garfield admitted that there was certainly credit given to the Soviets for starting out with VINITI in the early days, even before the international hype over the launch of Sputnik in 1957. On the whole, though, if there was any imitation, Dr. Garfield suggested, it went the other way as the Soviets sought to follow the model that was already present here in the U.S. Dr. Garfield remarked: "When scientists in Russia said, 'why don't we have better service', they came up with something specific. If you were a chemist in Russia and you were familiar with chemical abstracts or you were a physicist, you wanted the same as the Americans had, a similar…

same system, except with a lot more resources and support coming" (personal communication, January 24, 2014).

Dr. Garfield also described a delegation of Russians who came to visit ISI in the 1960s. He recalled inviting the delegation to his house and among the people there was someone in charge of the purchasing all the books and periodicals for the entire Soviet Union,-- definitely an important position. He spoke very good English, Dr. Garfield noted, and he had been in America during the war as part of Land Lease. He controlled the purchase and he knew exactly who was getting the Science Citation Index in the Soviet Union. There was a copyright law in the Soviet Union which permitted making an extraordinarily large number of copies of a foreign scientific publication but they didn't make copies of the SCI because it was too difficult of a printing job. However, not abiding by copyright seemed to be an issue of the information management under the Soviet regime.

Dr. Garfield observed that that the Russians were copying valuable current content locally in different places like Leningrad or Moscow. Dr. Garfield insisted that he never saw any copies but people used to read Current Contents as a way to keep up with what was going on outside Russia and Eastern Europe because for the Soviets it was a coveted source of information. Going outside of the Soviet Union was not a normal part of the information management process, though, so "they tired to get anything they could for free" (personal communication, January 24, 2014).

Dr. Garfield described how many people in the United States made a substantial deal about how many different publications VINITI covered but it was not all that

significant because the U.S. were also covering what was considered significant literature in a core group of scientific journals. It addition, the American abstracting services started their publications long before the Soviets, Dr. Garfield observed, with the coverage going as far back as the early 1920s.

The primary motivation for focusing on information management, though, at least in terms of the development of indexes and abstracts in both countries was the awareness that the abstracting was behind the development of scientific literature. The catching up involved the government giving millions and millions of dollars to Chemical Abstracts that could withstand competition from anyone. There also were some grants available but they had to be justified.

Due to the speedy circulation of scientific material in America, Dr. Garfield noted, thousands of scientists relied on Current Contents and gave up reading specialized publications, such as Chemical Abstracts, or Physics Abstracts and Biological abstracts. Worldwide, he suggested, it was the same thing, the only difference being that Soviet and other international scientists in the Communist bloc were copying Current Contents, and distributing the publication using their own channels. That way, they could do the same thing as the Americans with their science and technology. Also, American scientists got reprint requests from the Soviet Union all the time "We know because we used to collect the stamps," Garfield said. So, he posed a rhetorical question: Who was the superpower, then? The response was, "The superpower was clearly the United States. They were more advanced, producing more than anything VINITI ever produced."

Dr. Garfield concluded with an observation that VINITI still had an impact on scientific information management, although it may not have been especially substantial or at least it never became particularly competitive in relation to the United States, which was always the more advanced player in this regard.

Interview Three

The third interview was conducted with Dr. Tefko Saracevic, a prominent American information scientist of Eastern European descent who for nearly thirty years was a faculty member of the School of Communication, Information and Library Studies at Rutgers University. Dr. Saracevic is known to have conducted substantial research on the information retrieval system testing and evaluation, as well as for engaging in studies of the human aspects of human-computer interactions, user studies, and information behavior studies. Originally from Croatia, Dr. Saracevic has traveled extensively and has been active in the field of information management within the former Soviet Union.

During the late 1960s-early 1970s, he was also part of a team under the leadership of the National Science Foundation, charged with visiting Moscow and Kiev and establishing connections there to share relevant information and gain unique insights into the Soviet strategies for information management. The collaboration was earmarked as a political issue, as well; the meeting lasted about a week, Dr. Saracevic reported, and the following year, as part of the collaborative agreement, Soviet representatives were expected to travel to the United States at a later date to continue the process of information sharing between the two countries, primarily as a political gesture.

One of the points of the agreement, Dr. Saracevic suggested, was that the Soviets were to travel to the United States and there was to be a meeting of the Association for Information Science in Boston. Derek De Solla Price, coming from New Haven, was supposed to host the Soviets but only one of those Soviet representatives who was supposed to attend the meeting actually did come in something of a "Soviet type of sham" (personal communication, December 10, 2014).

Dr. Saracevic mentioned being put on the mailing list for the Soviet Reference Journal, which is described as one of the main publications of VINITI. Dr. Saracevic acknowledged that he indeed received the journal, which had two versions, one more theoretical and one more practical. In one of his own articles about the relevance of Soviet research, Dr. Saracevic also said that he even cited somebody from the Soviet Union, "and the Soviets were very impressed that I cited somebody from Russia, from the Soviet Union" (personal communication, December 10, 2014).

Familiarity with VINITI was a given at the time, Dr. Saracevic suggested. The influence of VINITI in the United States, however, was close to zero, for two reasons, according to the interviewee. One of the reasons was that very few people were able to speak or read Russian. Although VINITI translated a number of publications, the language barrier was still substantial. The second reason was that science in the United States, and in Western Europe, was considered as being ahead of the science in the Soviet Union, although this is not too, in many respects" (personal communication, December 10, 2014). By being increasingly practical in their approach to research and information management, the Soviets fell further and further behind in theoretical work.

Dr. Saracevic described visiting the VINITI once and the Soviet Union only once, going, besides Moscow, to Kiev in the Ukraine. Tracing the Soviet interest in scientific and technical information, Dr. Saracevic suggested that it stretched back to Lenin, when the Soviets were still in the state of the civil war, in a revolutionary war as much as anything, and Lenin instructed Soviet foreign representatives and embassies to start establishing themselves around the world, to collect and convey scientific material. The Soviet interest in scientific and technical literature thus went back years before the VINITI establishment. Although it is difficult to say whether the Soviets might have been more advanced than the United States in their scientific knowledge during the 1930s, following the Great Depression, how much information was collected and what they did with information was at least very interesting, Dr. Saracevic admitted. He suggested that it is really too difficult, too complicated to try and determine whether the Soviets were ahead or behind of the United States.

Dr. Saracevic also mentioned A. I. Mikhailov as an academic who was extremely highly regarded in the Soviet Union, the highest ranked professor in the field of information science in the country. Whether he had anything to do with information is unclear though, according to Dr. Saracevic. Yes, Mikhailov wrote a book but it was an "amateur-type of a book," with most of the information copied from sources, making it neither influential nor an original book.

Dr. Saracevic mentioned Vasily Nalimov, too, who was described as a talented scientist and someone who wrote quality material. He was also the best of them all, in the words of Dr. Saracevic. While in the Soviet Union, the locals were not interested in direct

contact with the U.S. delegation but the people who did appear in the meetings or who were mentioned by the Soviets were very carefully selected. The Soviet leader for the area of information management was not from Russia but from the Republic of Georgia.

Along with the leaders of the American group, formally members of the National Science Foundation, Dr. Saracevic described visiting the Soviet Union and finding that, not with a visa stamped in their passport but a piece of paper stating that they were entitled to enter the Soviet Union, the group was allowed into the country and housed in a prestigious hotel in Moscow, welcomed at the airport into a special lounge for visiting dignitaries that suggested the relevance of the interaction from the perspective of the Soviets. The actual meetings were carefully staged as well, with the Soviets on the one side and the American representatives on the other, followed by the engagement between the leaders of the information management groups. What was significant about those interactions was their intent. As Dr. Saracevic observed, "the whole goal was to make some exchange programs in which we would cooperate" (personal communication, December 10, 2014).

Although Dr. Saracevic insisted that he did not perceive at the time that that information and proper management of information could be linked to political supremacy, he did suggest that both sides at least recognized the importance of the exchange of information and the interaction itself. There was no spying, though, Dr. Saracevic confirmed, although it would, he joked, be necessary to go to the secret archives of both countries to verify this more conclusively. The level of conversation, he suggested, was of "empty words on both sides" but "there were two guys sitting in the

back and nobody ever introduce[d] them, uh, they didn't look at them. I looked at them a few times. They said nothing. So, evidentially, there were two guys who were there to listen to everything, you know, and report whatever. The Russians ignored them and after a while, we ignored them. But there were constantly sitting there" (personal communication, December 10, 2014).

During the visit, the U.S. representatives took a particular interest in the machines on display in the VINITI headquarters and noted that there were Xerox machines, an American product, and several other types of equipment and material that were of interest. The display of the Soviet achievement, Dr. Saracevic said, was an important aspect of the visit. He stated again that they never saw Mikhailov but that Mikhailov's impact was felt everywhere at VINITI and that was a point emphasized during the visit as well by the Soviet hosts. Dr. Saracevic noted that the VINITI, at the height of its operations employed thousands of people – some twenty thousand scientists, engineers, and outsiders who were involved in abstracting (personal communication, December 10, 2015). There were many foreign languages used, as well. There were communications about computers and the application of computers, as well as information retrieval systems and databases.

Dialogue was the intended product of the interaction, according to Dr. Saracevic, but the scope of the intention is perhaps difficult to determine because of the political overtones of the situation that manifest a kind of competitiveness between the Soviets and American delegates in attendance and those who organized the meetings. Dr. Saracevic noted, for instance, that the U.S. delegation never saw a single computer

although they were told that there were computers and other equipment. All of the indexing and translation was manual. Dr. Saracevic emphasized, however, that the Soviet coverage of the world literature, the theoretical and practical research output from around the world including regions such as Kyrgyzstan, Africa, and Japan was thorough and particularly impressive because the Americans were not interested or at least not attempting to undertake such work. They were not looking into the research done in these countries so the diversity of the Soviet interest was truly striking.

Dr. Saracevic also discussed the Stalin library, to which he and the other delegates were invited. It was, he suggested, a big honor and the group had a tour. It was the modern part that they were invited to see, though, and then the director explained that there were levels of access, all the way to the sixth level. Each of the delegates was offered a card for the National Library and the highest level was noted as level six, at which they could read all of the American newspapers. Undergraduates and their counterparts were given level one access, with the level of access improving according to the rank of the individual. Looking for computers, though, Dr. Saracevic noted that there were not any to be seen in the library either. Visiting the Kiev offices as well, Dr. Saracevic observed that there were not any computers on display in that city.

Asked whether there was any sign of anything suspicious going on behind closed doors, Dr. Saracevic responded that the American delegates did not think there was anything suspicious. Related to computers, he insisted that the Russians were secretly developing a computer called Minsk, which was basically a copy of the IBM 360 and ended up in a failure. The emphasis on copying American technology is particularly

important. One of the problems with the Soviets, Dr. Saracevic said, was that they did not focus sufficiently on trying to develop their own computing. Considering the reasons for the fall of the Soviet STI management system, Dr. Saracevic suggested that the lack of modern technology was perhaps the most striking aspect. Having a strong army and powerful energy-producing facilities, they lacked modern technology, particularly computing. It is especially perplexing because, as noted at the beginning of the interview, the Soviets were developing their knowledge of math and physics, but that did not translate into computer science until much later. The United States, on the other hand, appeared to have managed to translate the more theoretical, the more abstract knowledge, into something more practical.

Considering whether the lack of the Soviets' access to computers was one of the primary reasons why the country did not get ahead, however, Dr. Saracevic insisted that there were many reasons and there is not necessarily any data to substantiate the claim. Among several reasons, technology was probably one of the easily identifiable factors.

The overall treatment of the delegates during the events described by Dr. Saracevic was definitely positive and intended to prevent further investigation; it was designed to give the impression that there was progress being made and that the communists were even further ahead in the technology race than they really were. Importantly, "there was no looking down. There was respect… There was respect. There was no doubt about that. Uh, and there was a feeling of collegiality [between the U.S. and Soviet information managers]. They were dying to go out to see the world, to cooperate" (personal communication, December 10, 2014). Commenting on VINITI

specifically, Dr. Saracevic noted that the Soviet Union undertook the VINITI as a huge project and published more in the STI domain than anybody else. Yet, the effect it had outside of the Soviet Union was negligible, even in developing countries or in the Communist bloc.

Nonetheless, Dr. Saracevic also reiterated the significance of the competition between Soviet and American agencies in driving scientific information management forward. The National Science Foundation was mentioned as having received a lot of money from Congress as a result of the launch of Sputnik, with part of the emphasis being on education. A lot of funding went toward the education of physicists, computer scientists, engineers, and so forth, because education was perceived as constituting a major part of the information science program. "[After the Sputnik launch], the NSF got a lot of money from the Congress as a result of Sputnik, part of it was for education. And… a lot of money went for education [of] physicists, computer scientists, engineers, and all that. Plus, there was a part of information science. So, Sputnik helped us a lot" (personal communication, December 10, 2014). The political competition was a factor, too, in so far as there were Cold War politics to consider in this, but it was strategic, Dr. Saracevic suggested, more than it was actual, with two huge entities in the world seeking to outdo each other in the rhetoric of information management.

The operations of VINITI, though, Dr. Saracevic suggested, had really no comparison in the world. Although American representatives, members of the American community for information management, were very interested in the way that VINITI agencies were managing information, there was no equivalent constructed in the United

States. Dr. Saracevic described but a brief consideration by Congress as one Chicago congressman insisted that there should be a VINITI-like structure and there should be a bill prepared for it. However, the American system was more segregated, in the words of Dr. Saracevic. He mentioned the National Library of Agriculture and how it did a good job managing agriculture information, as well as the ACM, with its digital library and its engagement with medicine. The American Computing Society was another organization mentioned for its effectiveness at information management in the United States but the key point made was that these organizations were distinctly separate in their areas of individual specialization.

Asked whether he supported the idea that America already had in place much of what the Soviets were working on twenty to thirty years later, Dr. Saracevic noted that there was a lot of innovation done on the basis of competition on both sides, including scientific and technical information on computers that could be searched in any place at any time, even when there was no Internet. Applying computer power and internet-like databases to research purposes before the actual emergence of the Internet was a substantial achievement and Dr. Saracevic noted in the end that there was, since the late 1960s, the expectation that the advent of the Internet was imminent, which would drastically change the global information management landscape.

Interview Four

The fourth interview took place with Dr. Toni Carbo who for a number of years was a professor in the School of Information Sciences and the Graduate School of Public and International Affairs at the University of Pittsburgh. Dr. Carbo's work in the

information field began in 1962 and includes extensive experience working with information service producers and users (database producers and libraries) and conducting research in the areas of information policy and use. Dr. Carbo is a fellow of the American Association for the Advancement of Science, the Institute of Information Scientists, and the National Federation of Abstracting and Information Services (NFAIS). During the interview, Dr. Carbo noted that she had become extremely interested in indexing and abstracting as part of her own research efforts and that her interest in this general field concerned the management, indexing, and citation analysis pertinent to United States and Soviet operations. During the course of her research, Dr. Carbo worked with the European community on indexing and she reported that a friend of hers was the executive director of the National Federation of Abstracting and Indexing Services in Philadelphia, providing work for Dr. Carbo as a consultant in Europe and later within the International Counsel of Scientific Unions, where Dr. Carbo met some of the people from different countries, including the Soviet Union, who were involved in the abstracting and researching work in the first place. Dr. Carbo added, "it wasn't just indexing and abstracting. We got involved in teaching people how to search databases, so it was hard wired into our mainframe" (personal communication, November 10, 2015).

As part of the NFAIS, Dr. Carbo worked very frequently with overseas organizations, including UNESCO. Part of the operations involved teaching, thus the sharing of knowledge and information. It also involved working with specialists to develop an indexing seminar and present it in European countries.

Several specialists from the Soviet Union were interested in abstracting and indexing and potentially in teaching, so it made it worthwhile to pursue the connection. Dr. Carbo discussed what VINITI was doing to develop indexes. She insisted that there was nothing particularly unique about the way in which the organization operated, noting that "In many cases it was following Chemical Abstracts [in the U.S.] (personal communication, November 10, 2015). The NSF provided some initial funding for the NFAIS, so the people working on developing the indexing services could get together and share what they were learning and continue to improve access to information. In terms of VINITI, Dr. Carbo said, it was not a case of trying to steal every available innovation but rather a case of watching and learning from what the Americans were doing that was unusual and vice versa. Dr. Carbo insisted that there was really no apprehension or caution in the relationship between the Americans and the Soviets. She said, "So, it was a time of a lot of change, a lot of looking at how we could better provide access to the information people needed using the technologies, um, in multiple languages" (personal communication, November 10, 2015).

Dr. Carbo put forth the idea that the American STI organizations were all looking not only at the Soviets but at the organizations in Europe in general. She also described visiting Moscow and Leningrad – at least twice – and concentrating on scientific and technical information in discussions, in the sharing of information. She noted, emphatically, that the interaction in these places was always straightforward; there were normal security procedures followed and minimal stress on the way in which American scientists interacted with their Soviet counterparts. Dr. Carbo did not encounter any significant problems, though. Other than one incident concerning a dinner, Dr. Carbo

insisted that the experience of being in the Soviet Union as a representative of American science was not threatening at all.

The exception was, an event when Dr. Carbo was headed to dinner with a group of fellow scientists and they were about to get on an elevator. Dr. Carbo described how it stopped at the floor and "there was a woman sitting right there, clearly watching who was going to what room and such" (personal communication, November 10, 2015). When she started to get on to the elevator, one of the Soviet colleagues grabbed her arm and said, "No." The warning was taken as an indication that it was not safe to go onto the elevator as it was full of Armenians, a rebellious nation in the North Caucasus, suggesting some of the tensions that were going on. Otherwise, though, Dr. Carbo insisted that the interactions between the American representatives and their Soviet counterparts were very positive, welcoming, collaborative, and productive.

She recognized the contributions of VINITI to STI growth and dissemination in the 1950s-1960s: "We wouldn't have access to the important Russian literature had VINITI not made that available" (personal communication, November 10, 2015). Language was not much of a barrier, either, in Dr. Carbo's eyes. For many people it was, but there were many things that were translated just as there were databases in German and in other languages too. The challenge of demonstrating good English skills is brought up in relation to that of learning a second language, but the key point made was that the capacity for collaboration and shared information was substantial and VINITI's role in it was crucial.

Nonetheless, when asked to compare the decentralized system of STI management in the U.S. and the governmentally controlled system of the Soviet Union, Dr. Carbo commented that the U.S. approach was far superior because it was not even a competition. Despite decentralization, collaboration across the agencies, however, and across disciplines was common and even encouraged, according to Dr. Carbo's assessment. There was not anyone telling them what to do or otherwise trying to restrict their activities. The degree of sharing was substantial, too. One of the things information management agencies in the United States were concerned about was that if a company developed a standard, then those doing research would be quite interested in learning more about what was being developed. There was an interest in studying technology, as well as what technology people were buying.

The metaphor Dr. Carbo used was flowers, suggesting that we have to let a thousand flowers bloom and it was a matter of looking for the best approach and of finding opportunities to collaborate. The "we" in this conversation is very important because it refers to men and women from different backgrounds, different parts of the country, different types of organizations. Dr. Carbo also mentioned going to VINITI and attending various meetings and workshops. There were no computers, she noted, or photocopy machines, or access to other information. You would, on the other hand, go into most U.S. offices or schools, and there would be this type of access. There was a sense that it was very controlled, she suggested, and, of course, there was censorship. Obviously, Dr. Carbo acknowledged, there were some classified documents, but the number of such documents was hardly striking and really there was the same degree of censorship from the U.S., which also had some classified material.

Dr. Carbo noted that there were people with security clearances and she herself did not have access to top secret stuff, not being involved in that level of work, which would have included weapons research, for example. The situation was comparable in the Soviet Union and in the United States, though, and not everyone had access to top secret information there either. Still, there was, Dr. Carbo suggested, at least some sense of not sharing as much with the Soviets as you might with someone from the United States.

Asked whether the Americans felt that their Soviet counterparts were archrivals or something to be weary of, Dr. Carbo implied that there really was not such a feeling in relation to developing technology; the only sense of that type of rivalry came from the more direct political interactions in the Cold War environment. Thus, the cautiousness had more to do with the Cold War propaganda than any kind of race towards the establishment of a superior information system because "we knew ours was better. And, I think that for people like me, the idea was we wished we could help our colleagues in Russia and the Soviet Union" (personal communication, November 10, 2015).

There was some of that, Dr. Carbo suggested; some sense that there was a race, but it was secondary to the issue of the Cold War as a more general context. The Americans were aware that their systems were better, and it was not much of a concern to compete with the Soviet Union on the basis of information management strategies. Interestingly enough, the focus for information professionals was more on helping colleagues in the Soviet Union and around the globe.

Dr. Carbo suggested that she and many of her colleagues had a feeling that once information technology was available, it would eventually become available to others.

The implication is that there was perhaps enough exposure in the Soviet Union to what the Americans were doing, to what they had achieved, that it was better to facilitate collaboration than try to keep information and technology so exclusive, particularly because the Americans knew that they were ahead anyway. It was not a matter of giving away trade secrets or secrets about military equipment. They would not give that out or share information that was the equivalent of a new product developed by a company; that type of information, again, was kept private. "But in terms of other things like education and, you know, scientific research, how to do mathematics better or improve agriculture…all of that kind of information, very definitely. So, most information we think should be available, at least I do, and did" (personal communication, November 10, 2015). Nor, in the process of sharing information, was there a single thing that Dr. Carbo was able to think of that the U.S. information specialists wanted to know from the Soviets but found themselves unable to discover.

They were curious to learn more but the Soviet Union was interesting primarily because it was such a huge territory and there were so many different cultures, Dr. Carbo commented. There was a curiosity to learn shared by both the Americans and the Soviets. There were social events that also helped to try and build relationships, which Dr. Carbo described as all very cheerful, as indicative of a particular sense of comradery in the information community: "It wasn't trying to embarrass anybody or say we're better or different. But it was, we're human beings. And, the guys back in the Kremlin and the White House may have been all concerned about whatever but I think ordinary folks like… me, uh, were more interested in getting to know the individual and sharing information" (personal communication, November 10, 2015). Dr. Carbo, however,

insisted that it was because so much was changing technologically that there was such an emphasis on how to do things better in the global scheme of things.

Dr. Carbo described trying to rethink how information was provided on the global scale and she discussed a process of talking to a variety of people in relevant fields in different countries who were facing the same problem. In all, Dr. Carbo reiterated the importance of collaboration, mentioning the various meetings that took place with colleagues from the Soviet Union, from South America, and from the U.S. and Canada. She also emphasized the distinction between the status of people as information-orientated versus those who were security-minded. The focus for those involved in information management, she summed up, was to try to use information, share it for the betterment or the greater good of society. The common goal and motivation of purely information professionals was to improve access to information and help people. There was little motivation to promote one or another political agenda. Dr. Carbo said, "all of us got into our field, in part, because we wanted to improve access to information, help people and not to defeat the evil Communist régime" (personal communication, November 10, 2015).

In the conclusion of the interview, Dr. Carbo acknowledged that there were certainly many people in the U.S. who felt information was power and wanted to restrict access to it. However, her own perspective was that there was a distinction between different types of information: classified information or some other things that need to be kept protected and the more general types of information, a large part of which could and should be made available to all people.

4.4. Conclusion

The general takeaway from the four interviews is that, contradicting the political rhetoric of the day, the desire to collaborate was far more common than not among the American and the Soviet information managers. The interviewees arrived at remarkably similar conclusions when they characterized the U.S.-Soviet relationship with regard to managing the growing body of scientific and technical information. The interviewees observed that there was professional interest in what the Soviets were doing in STI management rather than hostility, animosity, and the desire to outdo the "enemy" at all costs. As the next chapter will explore further and contrary to the popular perception stemming from media sentiments and political propaganda, evidence suggests a relationship of the overall healthy competition and mutual respect between the two superpowers, the United States and the Soviet Union rather than that of hatred and apprehension, regarding the management of scientific and technical information in the mid-twentieth century.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This chapter seeks to collate the information from the previous chapters to construct a discussion of findings pertinent to the contrast between the American and Soviet attitudes toward managing scientific and technical information in the wake of the Second World War. Conclusions are also made toward the end of this chapter in relation to the research questions of the study, with some attention lent to the implications of this research for the field of library and information science and for further study of the history of information management agencies, considering issues such as how the knowledge gleaned in the course of this research can inform and guide our approach to resolving the current problems of information overload and the contemporary information crisis.

5.1. Interpretation of Findings

The four interviews conducted for this study provided a substantial amount of information regarding the comparison of the American and Soviet approach to managing the growing body of scientific and technical documents during the early Cold War period. As anticipated, the interviews provided a great deal of information pertinent to the research questions of this study: all four interviewees were in a position to speak about the American and Soviet mechanisms for managing research-related information. Their

professional backgrounds are rich and diverse, involving frequent engagement with both the American and Soviet organizations associated with information management.

Ms. Lawlor specifically mentioned working with colleagues in VINITI and, emphasizing her background in chemistry, her training as a chemist, spoke about working for the Institute of Scientific Information in 1967, attesting to the fact that the United States tended to involve various organizations in information management, concentrating on a mechanism of specialization rather than allowing for the kind of generalization and centralization that was preferred in the Soviet Union.

Dr. Garfield spoke to working with VINITI as well, holding the position of a chemist. He spoke at length about working on abstracting and indexing scientific and technical information. His association was primarily noted to be with the Institute of Scientific Information, but he indicated that the name of this organization was influenced by VINITI, suggesting the kind of indirect way that VINITI and the Soviets in general tended to subtly influence the management of information in America. Although all of the interviewees agreed that the United States was by far superior to the Soviet Union in the realm of information management, with no real competition in the practical sense of the word, they all indicated that there was a general concern about, and interest in, the way that the Soviet Union information management system was operating.

The United States was clearly interested in maintaining its advantage; although they may not have actually been worried about the Soviet's capacity to advance, to compete with the United States in any meaningful way when it came to information management, a competitive spirit endured nonetheless. Dr. Garfield's comment about the

influence of VINITI upon the naming of the Institute for Scientific Information is interesting because it appears to represent exactly the kind of indirect impact that all of the interviewees seemed to agree on.

Drs. Saracevic and Carbo worked within the corporate sector, too, and their comments about their professional engagement and their situation illustrate how and why the American system of information management was less concentrated upon government organizations; government funding was less of a control measure and, in general, available to American information management organizations on a lesser scale compared with the massive investments in VINITI made by the Soviet Communist government. The Soviet system was primarily state-funded but the American system opted for more engagement from businesses. The interviewees' comments about working in the corporate sector stress this and also draw attention to the more involved type of collaboration between businesses and government institutions, entities like the ISI, that were set up to specialize in particular fields of research.

All four interviewees, however, described traveling to the Soviet Union and having some interaction and even collaboration with Soviet colleagues or counterparts. The issue of competition arises again, then, in these sections of the interviews. The four interviewees all mentioned visiting the Soviet Union on more than one occasion. Their impressions of the country were also largely positive. They indicated that there was a general willingness to share information and there appeared to be some interest in open collaboration with colleagues in the information management sphere. All of the interviewees at least alluded to the way in which the Soviet Union or its representatives

tended to exaggerate their position, to suggest that they had more advanced resources or information than they did, in fact, possess, but this practice appears to have ben connected more to the political competition than the scientific one.

The interviewees seemed to speak to a distinction between the political tensions of the Cold War and the more common reality of interaction between information specialists, between scholars, and between researchers. The latter type of interaction appears to have been mostly positive and welcomed by both sides; although there was mention made of information withheld or classified, even of spying by the KGB, but these instances are largely general and the interviewees conveyed an overall sense that this was the standard, the accepted way of doing things during the period under the investigation. There was little sense of intimidation or feeling threatened; none of the interviewees really indicated that they encountered any substantial problems interacting with the Soviet Union colleagues in whatever capacity the interaction might have transpired. Several interviewees even indicated that they had friendships in the Soviet Union developed during the course of their work.

Clearly, the United States was not intimidated by the technological advancements of the Soviet Union. Although there were repeated references made to the Soviets concealing certain information-- having early computers, for instance, and other technologies like copy machines and fax machines, the emphasis was very much upon the United States being technologically advanced and the Soviet Union, if anything, struggling to make up the difference.

There was also a mention of possible publishing copyright infringement by the Soviets, demonstrating that there was perhaps a tendency for countries in the Eastern bloc to utilize resources from the West during the Cold War. There appears to have been an attitude in the Soviet Union that the collating of information was unavoidably linked to leaving aside where the information originated and any sense of ownership pertaining to that information.

The frequent references to cooperation, though, and the open sharing of information cast a shadow of doubt on the assumption that relations between the Soviet Union and Western countries, the U.S. in particular, were that problematic in the information management realm during the Cold War period. The interviewees unequivocally opted to distinguish between their work and the context of their collaboration and the political context. They claimed that the scientific and technological interests and engagements fostered an entirely different perspective and a different attitude. Whereas there would have been and probably still is substantial concern about the sharing of information that might be deemed classified, the idea of sharing scientific and technological documents seemed far less problematic. The emphasis was, in fact, upon sharing such documents. All of the interviewees commented on the overwhelmingly positive nature of their relationship with their counterparts in the Soviet Union and alluded to partnerships and collaborations on the sharing of data and experimentation, for the sake of developing new knowledge.

The contrast between the American and Soviet approach to information management came to the forefront during the Cold War period. In 1983, Marshal Nikolai

Ogarkov, the Chief of the Soviet General Staff, insisted that the Soviet Union was likely to lose the Cold War because of the computer, suggesting that the Soviets were so far behind the Americans in the development of the computer that they had lost technical ground and that they were highly unlikely to make up the loss (Lubar, 1993). From this comment concerning the development of the computer, though, particularly in the broader context of the space and technology race, it seems that there was at least a subtle rivalry to consider by either side.

To address the main question posed in this study, then, why did the United States and the Soviet Union go separate ways in their quest to manage the information overload and achieve information dominance? What prompted them to choose completely different means to essentially the same end? As one continues to ponder, the answer appears to come back to the matter of approach. Although there was collaboration and engagement across the divide of the Cold War and this was a positive situation for the time being, the Soviet Union appeared to have firmly stuck to its preferred its centralized approach. Whatever its exposure to the way that the American system operated, it was the Soviets' preference to maintain a state-funded structure for the management of scientific and technical information.

Although the interactions between the U.S. and the Soviet information scientists must have made both sides aware of the limitations associated with their specific agendas, neither side really appears to have felt that the disadvantages of either one of the applied systems were sufficient to warrant a change in their operations. The U.S. certainly created the closest thing to a hybrid with their emphasis on specialization

through a variety of different organizations and their equal emphasis on the use of committees to represent the interests of different organizations to the U.S. government. However, even this hybrid and its relative success, its durability in particular, was not enough to cause a system change in the Soviet Union.

The impression of the Soviet Union's information agency operations is very much that they were not only centralized but also cumbersome. The interviewees commented that the perceived—as well as reported—number of people that were involved in the transfer of information at different stages of the process was phenomenal – far too large to be either accurate or practical, even at a number less than what was reported. The reported figure was actually about 20,000 specialists employed by VINITI (Markusova, 2012), and this figure was mentioned as reflecting the number of people involved in the management of indexes and abstracts in the Soviet Union, while the need for such a number of specialists remains questionable.

Although the launch of Sputnik and the successful testing of nuclear weapons are two incidents in the history of the Soviet Union that are also mentioned in the context of researching these issues, in relation to the research question, these events are really indicative of why the Soviet focus on STI was a lost cause. Although the U.S. may have tapped into popular unease about the competition between the Americans and the Soviets and although the Soviet Union likewise may have promoted the idea that the launch of Sputnik and their testing of nuclear weapons was some genuine indication that the country was about to achieve nuclear capabilities, the reality was that the Soviet Union was never technologically competitive with the U.S. All of the interviewees

acknowledged this. Their collective assessment of the situation of scientific knowledge and technological development in the Soviet Union was consistent. They assessed that knowledge and new technology was generated on a lesser scale than across the Atlantic.

While the motto of the post-war world was ‘to live effectively is to live with adequate information’ (Wiener, 1948) and while modern life placed greater demands than any previous era on the process of exchanging information, with escalating concerns that too much information could be just as dangerous as not enough, the Soviet Cold War stance still never put them in a position to rival the U.S. and the communist regime was always going to find itself behind the Western level of progress.

The following section addresses the sub-questions of this research study in a more abridged manner:

1. What was the impact of the Cold War (delineated herein from 1945-1969) on information production in general, and specifically in relation to the scientific and technical areas?

The response is that the impact of the Cold War on information production in general and in scientific and technical areas specifically was probably less substantial in itself that previously noted. The U.S. and Soviet organizations for STI management emerged immediately after the conclusion of World War II and it might be argued on that basis that it was really that war that created something of an overload of information, a surge in information production, consumption, and dissemination. During the Cold War period, as suggested by the emphasis on information management, on collation, on abstracting, and

indexing, the issue was not necessarily information production but the cataloging and management of existing information.

2. What was the effect of multiple independent departments and jurisdictions each dealing with their own specific concerns regarding information gathering, processing, storing, and utilizing in the United States during the early years of the Cold War?

The multiple independent departments and jurisdictions in the United States that dealt with information gathering, processing, sorting, and utilizing created a clear emphasis in the American approach to STI on specialization, which is commonly seen to counter the Soviet's centralized system. However, the multiple independent departments actually necessitated the creation of committees that built something of a bridge between the issue of specialization (and its potentially isolating effects for specific departments or units) and that of centralization, which allowed for more of a collective management of information resources.

A major outcome of this study is that it shows the distinction between the American and the Soviet systems to be less substantial than previously assumed, with ideas about the relative focus on specialization by the Americans and centralization by the Soviets as misguiding or at least overly simplistic. Both countries actually promoted specialization within STI management and both created the mechanism for centralization to deal with the practical issues of information funding and information sharing.

3. What was the effect of highly centralized government on information gathering, processing, storing and utilizing in the Cold War era in the Soviet Union?

As stated in response to question two, the assumption that the Soviet system was lacking in specialization because of an emphasis on centralized government involvement in information gathering, processing, sorting, and utilization is erroneous. Granted, evidence suggests that the Soviet Union was behind the U.S. in its approach to STI and this may have been the result of a centralized governmental involvement; it may have been the product of bureaucratic limitations applied to managing STI.

However, the Soviet Union was able to collate a large amount of information and to do so, relatively speaking, through a single major database that was accessible across multiple disciplines of science and technology. The centralized nature of the resources was also potentially beneficial to the general management of STI because it meant that there was relatively little dispute about how information management was prioritized and the wealth of information generated was quite impressive. Problems with disseminating the information relate more to the external geopolitical issues of the Soviet regime rather than the structure of VINITI itself.

4. To what extent can the handling of STI during the Cold War era inform scientific and research data-handling processes in the digital age?

Although the response to the previous question has to be linked to the necessary acknowledgment of the technological limitations of the Soviet Union in the 1990s, at the time of its collapse, what is generally clear from a review of the operations of both the

American and the Soviet mechanisms for STI management is that many of the processes for research data handling in the digital age originate in the Cold War period. It was during this period that computer technology was actively developing and that digital technology received more and more attention in the scientific circles. As a result, the persistent challenge of managing the wealth of documents produced, even what was already in existence, created a context in which the documents-handling processes became intensely important and vital; the strain upon the resources of both the U.S. and the Soviet Union to manage the information load meant that the emergence of digital technology was increasingly a prerequisite to successful STI handling.

5.2. Outcomes and Implications for Research and Practice

Recent decades have seen a resurgence of interest in the phenomenon of information overabundance spurred by the advent of the Internet and the accompanying avalanche of digitally produced, stored, and disseminated information. The term "knowledge society" has entered the discourse of scholars and practitioners alike, as they use this expression to describe the twenty-first century evolution of human civilization. Information, or knowledge society is the reality we live in in which the creation, distribution, and manipulation of information has become the most significant economic and cultural activity.

On the flip side of the issue is, of course, the risk of suffocating in the so-called "data smog" of which journalist David Shenk forewarned us nearly twenty years ago (Shenk, 1997). One can argue that data smog can potentially be much more perilous than industry-induced environmental hazards because overabundance of published material—

coming at us not only from entertainment establishments but even more so in the form of scholarly, scientific, and research output— is unprecedented and pervasive. Data, information, and knowledge are meant to enlighten society, eradicate poverty and hunger, cure disease, and serve the public good in many other ways. Information is indeed power in the twenty-first century, just as it has always been. However, if there are no mechanisms in place to properly manage this type of power, it threatens to get out of control and "become an unexpected, unwelcome part of our atmosphere, an expression for the noxious muck and druck of the Information age" (Bucy, 2005, p. 169).

Is there an antidote to the global information crisis? This research has sought proof in history that no matter how overwhelming the problem of too much information may seem, there must remain hope for a brighter future. The study's central argument is that if our forefathers managed to find the solution in the heat of the Cold War some fifty-to-seventy years ago, so should we. Rees (1964) made the following comment on the continuation of scientific productivity from 1945 through 1963: "Meanwhile the show continues and scientific research is surprisingly conducted with a large measure of success undaunted by the unproven allegation that… creative undertakings are stifled by inadequate information services" (p. 4291). What this study aims to direct attention to is the fact that when post-World War II scientists should have been inundated with their own material and their efficiency should have suffered dramatically due to the sheer volume of the output they were producing—it did not, and the growth of scientific and technical information continued at a sustained pace on both sides of the Atlantic.

This research draws parallels between the period under the investigation and the current information landscape. It shows the untapped potential of information and communication technologies to change the way we live, how we work and do business, how we do research and perceive allies and "enemies." Its claim, corroborated by the interview findings, is that in the context of the information war the animosity might have been at least partly superfluous, stemming from and fueled by the differences in political agendas, social misconceptions, and economic regimes.

Examining the formative years of agencies concerned with managing scientific and technical information in the middle of the twentieth century challenges historians to expand their analytical parameters in assessing the global impact of the Cold War era. The current study calls for a renewed emphasis on another, undeservedly overlooked dimension of the East-West battle for general superiority, the information one. The "battle for information dominance" that ensued between the Cold War United States and the Soviet Union is used in this study as a metaphor rather than an accurate characterization of the relationship between the two counterparts. Unlike the developments on the military-industrial, economic, or geopolitical front, the information domain left far less room for antagonism and open resentment. This research argues that "crushing the enemy" rhetoric should be incorporated with extreme cation into the discourse on the U.S. and Soviet approaches to scientific and technical information management. As the interviewees testified, from the information professional's perspective the prevailing intention was to learn what the Soviets were doing, why they were doing it, and what—if anything—could be adopted on the American soil, strategically, programmatically, and organizationally.

Besides historians or political scientists, this research bears significance for many other individuals and groups, such as contemporary providers of scientific, technical, and research output, policy makers, as well as the general public. The findings point to a distinct feature of an information society, even in its earlier iterations: such a society not only affects the way people interact but it also requires the traditional organizational structures to be more flexible, more participatory and more decentralized. When the Internet makes information about governments and individuals so openly available, concerns arise about user privacy and fair or ethical use of such information so that it does not become destructive in the hands of naïve and increasingly diverse audiences (Lankes, 2000). This places additional pressures on customer support staff and frontline service providers who carry the brunt of the responsibility to educate the public about proper practices of handling large and varied amounts of documents.

Now that transmission of said documents can occur instantaneously, transcending geographical boundaries and reaching beyond the confines (physical or virtual) of one information agency, it seems opportune to explore with greater scrutiny questions related to inter-agency collaboration, consistent data management standards, training and tracking programs that can foster conscious data use within user communities. In all, more research is needed to facilitate a standardized approach to data management that will ease compliance and improve management of human intellectual assets. These issues could very well be the focus of a number of interdisciplinary scholarly studies at the intersection of history, information science, and policy and ethics. Along with revisiting the past, the broader ambition of the current research is to provide a historical outlook that would inform and invigorate such endeavors in the future.

In more practical terms, the current study affirms the difference between the American and Soviet mechanisms for the management of scientific and technical information during the Cold War period. It also highlights the fundamental similarities in the overall focus and outcome of those systems, albeit with American superiority maintained. Although the study engages with a wealth of information previously assessed in relation to this topic, this complex outcome is distinct from previous assertions which have perhaps suggested a more categorically defined relationship between the two systems and a more distinct rivalry, consistent with the popular idea of the Cold War sociopolitical climate.

This study argues that the state-funded Soviet information management system within the VINITI domain was in contrast to the United States model of having multiple information agencies. VINITI is shown to exemplify a centralized way of managing information, whereas the United States tended to specialize more and arguably to be more flexible in the way that it managed information.

The four interviewees whose testimony shed insight into the operations of both the Soviet and American information management systems consistently suggest that, although there were commonalities in the way that the two systems operated and although there was even collaboration to some extent, the centralized information management system of the Soviets was largely inferior to the American system. References to the number of individuals involved in abstracting for the Soviet system, for instance, suggest problems of a bureaucratic nature. Allusions to the attempts to

emphasize the superiority of the Soviet system, often as part of orchestrated displays to American visitors, also draw attention to the perceived technological inferiority.

Regarding the rivalry between the Americans and Soviets in the field of information management, it is also demonstrated by all four interviewees that there was less actual competition because the American superiority was widely accepted and considered beyond the capacity of the Soviet Union to challenge. Although the United States was interested in maintaining its superiority, presumably, there was never sufficient concern that the superiority was at risk. Also, the research conducted in the course of this study emphasizes that much of the funding and management of the American STI was organized with considerable autonomy given to the agency in question, government funding being allotted through grants and not overseen with the kind of scrutiny to which the Soviets subjected their state-funded VINITI.

Underplaying the Cold War rivalry, too, the interviewees analyzed in this study indicate that the so-called Cold War mentality may have been less pronounced, at least, within scientific communities. Although consensus might have been that the scientific establishments of the United States and the Soviet Union were in intense competition, particularly after the launch of Sputnik in 1957, the testimony of the four interviewees is to the point that there was indeed widespread purposeful and friendly collaboration. Many of the interviewees reported having sustained relationships with their Soviet colleagues. There were also frequent mentions of meetings between American and Soviet scientists, as well as representatives of information management organizations. These meetings seemed to foster an understanding of the need for sharing of information,

thereby supporting amicable relationships. Although there were allusions to security concerns of American and Soviet organizations and governments, and although there were references, for instance, to the activities of the KGB, monitoring the movements and such of Americans visiting the Soviet Union, the interviewees also indicated that they did not have any difficulty with the surveillance and that their engagement with the Soviet scientific community was intensely positive.

This information – these perspectives – serve to undermine the idea of the Cold War mentality by the people directly involved in STI management, suggesting a far greater subtlety to the relationships between the Soviets and the Americans than have previously been recognized. Because the United States model was considered so superior to the Soviet, it seems that the competition was all but nominal in nature. Moreover, the field of information management appears generally to have sustained its emphasis on the end-goal, the effective management of information. Allusions to the sharing of information between the Americans and the Soviets indicate that the emphasis on rivalry was minimal, almost non-existent; the interest was focused, rather, on the meaningful relationship between the two scientific communities.

VINITI also appears to have adopted a particularly global perspective in its management of information. Mentioned several times is the VINITI interest in collecting abstracts from various different countries and in various different languages. The interest in doing this, at least from the perspective of the four interviewees, appears to have derived from the genuine interest in spreading scientific knowledge. The contribution of both VINITI and the American STI management agencies to indexing and organizing

scientific information is emphasized throughout the interviews, too, and an outcome of the study is also the sense that the growth of information, of knowledge, was of paramount importance to both parties involved.

In addition, this study demonstrates the significance of information management as a common goal. The study shows that, in the Soviet Union, VINITI was entirely responsible for STI management. Although in the U.S. there were many agencies – the likes of the NSF, NTIS, and AEC were chief players among them – this study also suggests that it is wrong to think of these organizations as completely compartmentalized or isolated in the way that they were specialized. As discussed in Chapter Four, the United States, like the Soviet Union, managed to centralize its information management, to a degree. The key difference was that the United States achieved this centralization through the use of committees and specifically governmental committees such as COSATI, ASTIA, and CENDI, which attempted to coordinate the United States STI management efforts, especially in the early stages of the Cold War.

Having acknowledged this, it also becomes possible to see an influence of the Soviet system upon the American system, although again it was quite subtle. The Americans, though they realized their superiority and did it consistently, still understood, presumably from an assessment of the Soviet system, that there were benefits to centralization. They also readied themselves to apply those benefits through the use of committees and through other efforts that helped to ensure the multiple agencies involved in information management were collaborating and sharing information consistently, not only among themselves but with the Soviets and the rest of the world as well.

The implications of the study are, compared to its outcomes, rather difficult to gauge. The results displace ideas about the nature of the relationship between the United States and the Soviet Union during an intensely important period in the recent history of human civilization. The displacement is subtle, though, which is perhaps the operative term: rivalry was a factor, competition was undoubtedly a factor, political differences were an issue in the management of scientific and technical information. Still, none of these issues – nor any others – appear to have stood in the way of the universal and sincere desire to share knowledge. This being the case, it is perhaps possible to conclude that the main implication of this study is the urge to reconsider and reassess the whole spectrum of the American and Soviet relationships during the Cold War, expanding one's thinking beyond just the political and economic spheres.

5.3. Limitations of the Study

The scope of the operations of information management agencies during the Cold War period was immense. The immensity of the topic in question exposes one of the primary limitations of this research: that a single qualitative study undertaking historical analysis of primary and secondary sources cannot encapsulate the scope of the situation under review. The focus of the study attempts to be on the STI management evolution through concentration on primary and secondary sources, through the analysis of interviews with those who have experience that extends to the formative years of the U.S. and Soviet scientific and technical information domains. As noted previously, the choice of the research methodology and the overall conceptual approach were determined by the

nature of the topic and were developed with due attention paid to the question the study seeks to address.

The research aims to examine the social, technological, political, and ideological issues that surrounded the emergence of scientific and technical information (STI) systems in the post-World War II United States and Soviet Union and it has to be duly acknowledged that the scope of this objective is tremendous, that the focus of the research would have to be on the exploration of the race for information superiority between the United States and the Soviet Union that transpired in the middle of the twentieth century, but that this exploration, too, would lead to an encounter with such a wealth of information it would not be possible to consider all of it or include all of it with the kind of detail that it might actually warrant in light of the research questions and related sub-questions.

The overall intent to see how varying degrees of government centralization in the two countries impacted their respective approaches to scientific information management is also deemed to be a substantial undertaking and one that could not be exhaustively achieved under the constraints of the current study. As the research has demonstrated, considering a question as broad as why the United States and the Soviet Union went separate ways in their quest for information dominance necessitates an exploration of first of all how they differed and what directions they actually took. The conclusion of this study is that those directions were not so very different after all and that they may well have arrived at essentially the same end using systems that, although they looked

dissimilar in certain key aspects, were in actuality quite alike or at least had much in common in terms of their products.

The major limitation of this study, then, is the very fact that it attempts to address questions that are extremely broad and it does so, because of the issue of scope, through a limited degree of historical analysis of primary and secondary sources coupled with the analysis of a series of face-to-face interviews. The four interviews conducted allowed for a qualitative historical and cultural investigation of the STI management evolution, but the limitation of qualitative research is also that it has limited scope for application; generalization is challenging and certainly said generalization can never be absolute but only based on conjecture which can be extrapolated from conclusions drawn from the specific examples. With particular reference to the situation in the U.S., the study draws attention to the relevance of governmental committees such as COSATI, ASTIA, and CENDI but the scope to examine these organizations is not broad within the overall framework of the study. Indeed, the general availability of information pertinent to the operations of STI organizations is limiting to the scope of any study because the scale on which these organizations operated is substantial and the means to delve into their archives, to explore their histories, is limited by the inaccessibility of resources and the practicalities of time constraints.

5.4. Conclusions

Despite the limitations of this study, however, its implications are substantial and they do provide some means to begin reassessing the STI systems of the Cold War period. The overall conclusion of this study is that the differences, the rivalry, and the

relationship between the U.S. STI management system and its Soviet counterpart were far less substantial than has previously been assumed. On the contrary, those information management systems were remarkably similar in several key respects. Although the U.S. maintained more of a focus on specialization, it would be an oversimplification to suggest that the U.S. did not have any centralized management of resources or indeed that the Soviets did not have specialization or failed to emphasize specialization in their approach. Rather, both sides operated with a balanced focus on centralization of resources and appropriate specialization with respect to science and technology fields.

With regard to any sense of rivalry, too, there is a need to adjust one's thinking about the Cold War mentality. All of the four interviewees featured in this study, all of whom had dealings with STI both in the U.S. and the Soviet Union, found that there was actually minimal tension: concerns were limited to classified material and military more than STI as a source of human knowledge in general, although there is obviously some overlap. Even with the overlap, though, and the potential for STI to have a bearing on a country's capacity for military action, all four interviewees indicated that they were able to collaborate with their counterparts and that relations were, if anything, mutually respectful and open rather than hostile, which might perhaps be the expected norm.

Rather than a negative rivalry, it seems that collaboration was the defining feature of the relationship between the U.S. and Soviet organizations involved in the management of information for science and technology fields. This could well have been because both the Americans and the Soviets were interested in observing and gathering information from each other and doing so provided a certain level of understanding and

some sense of security about respective conditions. However, from the testimonies by the four interviewees, it seems more likely that there as a distinction between STI in general and military or defense information management systems and the latter were much more concerned about containing information. Krupar (2000) made a point about the tensions between the AEC, which was of course an STI organization, and the Defense Department, highlighting how the two types of organizations differed and drawing attention to the need to distinguish the one from the other in consideration of STI and of the relationships between U.S. and Soviet institutions during the Cold War.

There is perhaps even a more obvious need to reassess thinking about which of the systems was a failure or a success and in what way they were successful as well as how they might have failed. The consensus has been that the Soviet system was a failure and the U.S. system thrived. However, Giliarevskii (1999) states that the main achievement of the State STI system was manifested some twenty to thirty years later. In the end, the Soviet STI system proved to be productive, too, as it gave birth at the time of economic reform in Russia to a four-level network of information services that specialized in different types of documents, the acquisition of document collections, database generation, and supply of services to various user groups. One can argue that the bureaucratic barriers were not a flaw of the system itself but rather the inevitable consequence of the command economy and science management, to the point that it was inevitable that the system structure would largely replicate the organization of economic management in a country operating under the Communist regime.

Likewise, there were certainly aspects of the U.S. STI management system that have been overlooked and that may have been integral to its success more than the assumed point that it maintained specialized organizations. In terms of future research directions, the role of government committees requires further exploration but it raises questions about the similarities and differences between the two systems and definitions or at least assumptions about failures and successes in the system designs. Government departments participating in the formation of national scientific and technological policies created national agencies that were developed at different times and the allocation of funds for their activities or equipment purchases changed depending on the importance assigned by the government to various aspects of technological policy. There was no general underlying rationale behind these changes, and it appears that this idea of governmental control of sorts applies as readily to the U.S. STI realities as it does to the Soviet ones.

At least some of the developments, the processes of STI information management, were reactionary. It can be argued that the development of government-supported STI systems was reactionary in the wake of World War II. As Krupar (2000) notes, most of the historical studies that have examined the activities of government agencies – referring specifically to the NSF and AEC – do not account for how individuals operate, how leaders and personnel construct the organization and the culture of an agency, manage the interactions between these internal relations and external political actors, or form rationales for agency leaders and staff to resist change.

Although this study cannot precisely rectify this problem by developing insight through interviews with individuals who were involved in the operations of the U.S. and Soviet STI institutions, this research can provide some understanding of the human factor, derived from an understanding of the personalities of those who were involved in making policy decisions or who were involved in implementing them. Indeed, the interviewees commented on who they knew within the U.S. and Soviet information environments, which of those individuals were in positions of power or who contributed substantially to the advancement of STI over the course of their careers. Their insights draw attention to relationships, too, especially the relationships between American and Soviet representatives.

Finally, by understanding that the U.S. and Soviet STI systems not only had more in common that previously acknowledged but that they collaborated regularly, it seems that much can be learned about the way in which proper information management practices might help overcome various tensions in a global context. Clearly, there were individuals as well as organizations involved in the STI management that sought to mitigate the tensions that are otherwise perceived to have defined the Cold War period and impeded collaboration, information sharing, and dissemination. The revelation of this study, however, is that collaborations between American and Soviet scientists were not only possible but common and relationships were positive in that they were productive and open, which is a word that the interviewees themselves used when referring to the access that they had both to their colleagues and to resources in the Soviet Union.

Although there is not a sense that access was comprehensive and although there was still an awareness of government surveillance to monitor exchange activities, lacking from the perspective communicated by the sources in this study is any sense of danger or any feeling that the collaboration was not desired for motives that were consistent with the maintenance of positive relationships.

Thus, a major implication of this study for the field of information science and for the exploration of the history of information management agencies is that it exposes some of the previously overlooked subtleties that contradict assumptions about the Cold War relationships in the scientific communities of the U.S. and the Soviet Union, as well as on a global scale. This research effectively employs the historical perspective to invite a reevaluation of the Cold War impact on relationships and ideologies in application to information management.

This study also draws attention to the way in which information overload or crisis can be managed; clearly both the United States and the Soviet Union were engaged in their respective attempts to cope with the post-World War II information overabundance, and they each responded to this challenge, albeit with varying degrees of success. It is the further, more in-depth investigation of their collective response that can help us understand how we might better manage the growing amount of scientific and research data today and tomorrow.

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APPENDIX A

LIST OF INTERVIEW QUESTIONS

1. Could you tell me about your experience, if any, in the Soviet Union and the growth of their scientific and technical information management system during the Cold War era (1945-1969)?
2. What was your impression of their influence, if any, on the U.S. counterparts? Did the influence go both ways?
3. Which of the U.S. information management agencies, if any, did the Soviet VINITI impact the most and why, in your opinion?
4. How would you assess the impact of VINITI on developing countries? Was it any different from the influence on the U.S. information agencies? Why?
5. How would you describe the relationship between the two superpowers, the US and Soviet Union, in terms of their struggle for information superiority? Was it a relationship of mutual respect and recognition of each other's strengths, or perhaps fear, or despise?
6. There is an opinion in scholarly circles that the influence actually went the other way around and every innovative approach or technique the Soviets did or came up with in the 1950s-70s—the Americans already has in place some twenty or thirty years ago. Would you agree or disagree with this view? Why?

APPENDIX B

USC INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF
SOUTH CAROLINA

OFFICE OF RESEARCH COMPLIANCE

INSTITUTIONAL REVIEW BOARD FOR HUMAN RESEARCH
DECLARATION of NOT HUMAN SUBJECTS

This is to certify that research proposal: **Pro00059872**

Entitled: *Empowering the Enemy: The Cold War and the East-West Battle for Information Superiority, 1945 - 1969*

Submitted by:
Principal Investigator: Stanislav (Stan) Trembach
College of Mass Communications & Information Science
Library & Information Sciences
1501 Greene St.
Columbia, SC 29208

was reviewed on **09/20/2016** by the Office of Research Compliance, an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). The Office of Research Compliance, on behalf of the Institutional Review Board, has determined that the referenced study meets the Not Human Research criteria set forth by the Code of Federal Regulations
(45 CFR 46) of:

a. the specimens and/or private information/data were not collected specifically for the currently proposed research project through an interaction/intervention with living individuals AND

b. the investigator(s) including collaborators on the proposed research cannot readily ascertain the identity of the individual(s) to whom the coded private information or specimens pertain

No further oversight by the USC IRB is required; however, the investigator should inform the Office of Research Compliance prior to making any substantive changes in the research methods, as this may alter the status of the project.

If you have questions, contact Arlene McWhorter at arlenem@sc.edu or (803) 777-7095.

Sincerely,

Lisa M. Johnson
IRB Manager